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User Guide for ECS Converted Ancillary Products

Technical Paper

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Abstract

This document is intended for use by anyone who wishes to write software to read HDF-EOS ECS-Converted Ancillary Products in the GRID and POINT data formats.

Keywords: EOSDIS, NCEP, Ancilary, Data, HDF-EOS, Grid, Point, AIRS, metadata

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1. Introduction

1.1 Purpose

This document will serve as a user guide for the access to the following products:

- NCEP 1-Degree Aviation Model (AVN) – (HDF-EOS Grid)
- NCEP 1-Degree Global Data Assimilation Model (GDAS) Product – (HDF-EOS Grid)
- NCEP TOVS OZONE Daily Product – (HDF-EOS Grid)
- NCEP – PREPQC Quality Controlled Observation Data – (HDF-EOS Point)

This document only briefly revisits the basic concepts of HDF and HDF-EOS (see Section 7) and the user not familiar with these concepts are referred to other literature on these topics that cover them in more detail. However, the user is expected to be familiar with the C programming language since the code samples contained in this document are written in that language.

1.2 Organization

This document is organized as follows:

Section 1. Introduction

Section 2. Brief Introduction to HDF-EOS

Section 3. NCEP 1-degree Global Data Assimilation Model

Section 4. NCEP 1-degree Aviation Model (AVN)

Section 5. NCEP TOVS Ozone Daily Product

Section 6. NCEP – PREPQC Quality Controlled Observation Data

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Appendix A. GDAS Ancillary Product Example Metadata

Appendix B. AVN Ancillary Product Example Metadata

Appendix C. TOVS Daily OZONE Ancillary Product Example Metadata

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Appendix F. BUFR User Definition Tables

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Appendix I. Sample HDF-EOS Read Program for Data Tables and Metadata

Questions regarding technical information contained within this document should be addressed to the following ECS and/or GSFC contacts:

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2. Brief Introduction to HDF-EOS

2.1 Background

The Hierarchical Data Format (HDF) is the standard format chosen by the EOSDIS Project for product distribution. (For additional information, see EOSDIS Hierarchical Data Format homepage at http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html.) Many of the earth observation data types map well to HDF datatypes such as raster images, multi-dimensional arrays and text blocks. However there are certain datatypes in EOS that are not catered for directly by the standard datatypes existing in HDF. Hence, there was a need for additions to traditional HDF to fully support these datatypes. Examples include projected grid, satellite swaths and field campaign or point data.

To facilitate this need, three new datatypes were developed within the HDF framework. The APIs and the new suite of libraries is given a name, HDF-EOS.

These new datatypes will be discussed briefly in the next three sections. Although the Swath interface is beyond the scope of this user guide, it is included here for sake of completion. Users are referred to (reference) for more in depth discussion on these datatypes.

2.2 GRID Data

GRID data type is used to represent EOS data that is observed at regular spacing on the surface of the earth either rectilinearly (X dim, Y dim) or in geographical coordinates (lat, long). For that reason, GRID datatype is intricately associated with map projections. For eg. 1-degree Global Data assimilation Model (GDAS) contains observations that are recorded at 1-degree latitude/longitude on the entire globe. This gives rise to data representation as depicted in Figure 2-1. Such a projection is a simple Geographic Projection in map projections terms.

There are therefore three main components of the GRID data type. The first the Data Field that is an observation of similar scientific nature and type. Eg. Land Mask (1 = Land, 0 = sea). The second are the X and Y dimensions of the grid of chosen projections. Third is the projection itself that is used to encode geolocation information as a set of mathematical equations which are capable of transforming geographical coordinates (latitude and longitude) to X-Y coordinates and vice versa.

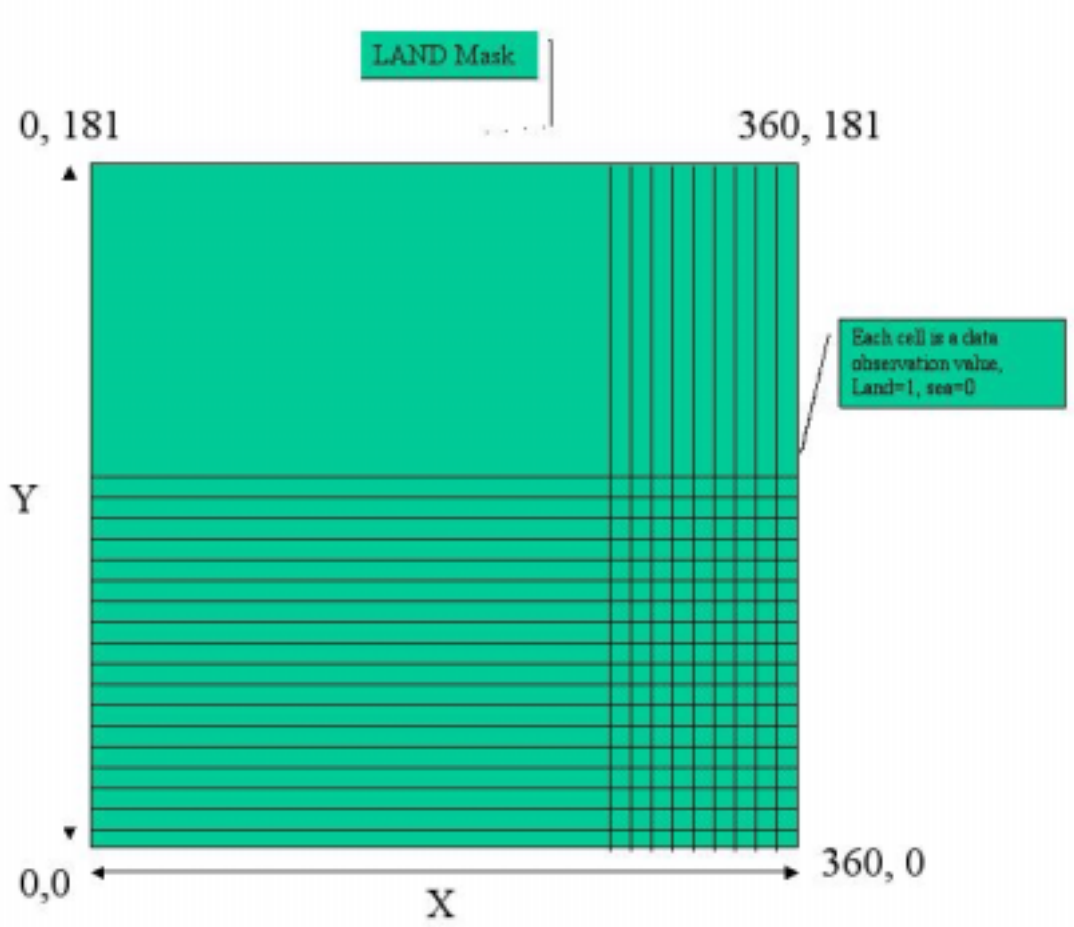
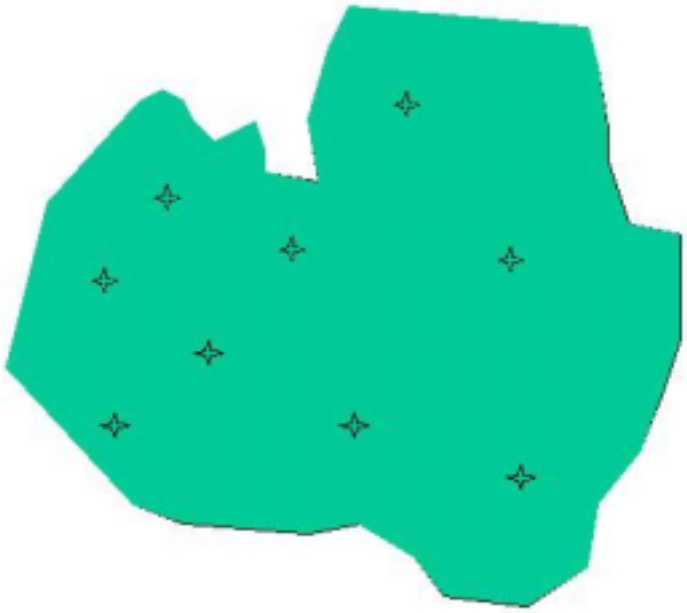


Figure 2-1. HDF-EOS GRID Representation

2.3 POINT Data

Point datatype in HDF-EOS is used to describe EOS data sets that has associated geolocation information but is not organized in any well defined spatial or temporal way. A point data set is a series of data records taken at regular or irregular time intervals and at widely scattered geographic locations. A prime example would be the network of rainguages in a catchment area. Figure 2-2 depicts such an example of a raingauges with corresponding data. Such a data may be represented in HDF-EOS file such that static data like month of year and lat/long may be stored separately with 00 hour is the start of the month. Data would be stored in vector form with link variables (station Id, hour) to index into data for extraction and subsetting.



An example of catchment area with rainguages.

Lat	Lon	Time	Rainfall(mm)
51.24	-139.58	00	0
47.45	-112.36	00	3
45.05	-96.50	00	5
---	---	---	---
---	---	---	---
52.49	-77.37	00	1

Figure 2-2. Point Data Example

2.4 EOS-VIEW

The addition of HDF-EOS layer on top of HDF interfaces necessitated the need for a tool to view these new datatypes. EOS-VIEW tool was developed for such purpose and can be used to view GRID, POINT and SWATH HDF-EOS data files. This section will introduce the initial screens of the tool. For detail acquisition and installation instructions the user is referred to http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html.

Figure 2-3 shows the initial screen when the tool is invoked. Pull down File menu is used to open a particular file. Figure 2-4 shows the window that is displayed for this option to allow the user to browse through the directory structure and double click on the interested file. See Sections 3 and 6 for further details after this step that includes examples of viewing the point and grid data files.

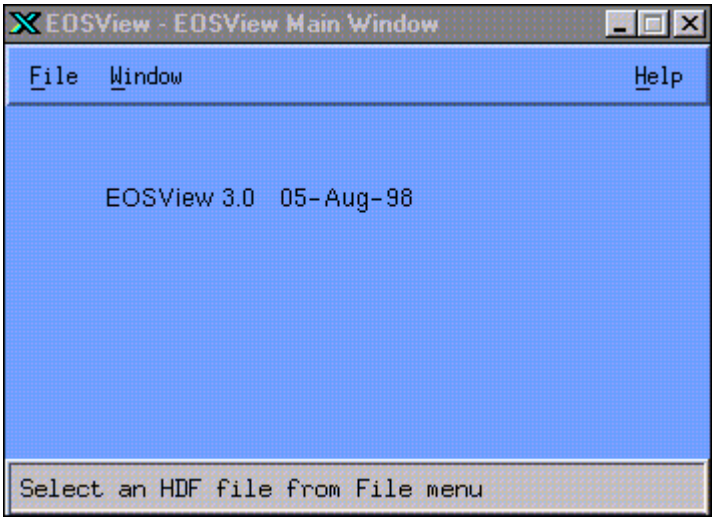


Figure 2-3. Initial EOS-VIEW Screen

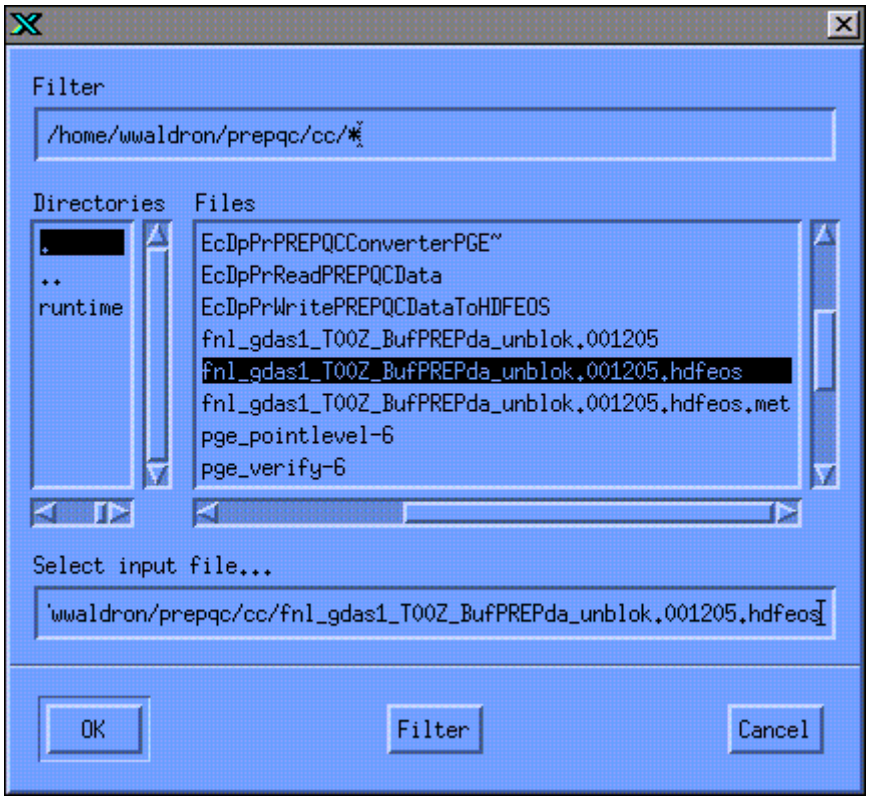


Figure 2-4. Window to Browse for the Particular File

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3. NCEP 1-degree Global Data Assimilation Model

3.1 File Structure

NCEP 1-degree Global Assimilation Model product is produced on 6h basis and contains parameter values such as temperature, pressure, relative humidity etc at 1-degree lat/long intervals for the entire globe. Science data producers (e.g. ASTER), for application to their algorithms, access this data set. For more information please see http://daac.gsfc.nasa.gov/TECHNICAL/larry_info.

The HDF-EOS GDAS grid file depicts the measured variables in the 1-degree geographical projection. The file is a group of several V-groups (see http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html) with one V group assigned to one measured variable. Each measured variable is itself defined by a number of parameters in a 360x181 grid format. These variables are also defined in detail in the associated metadata (Appendix A) that is also part of HDF-EOS file and can be viewed using EOSVIEW. Figure 3-1 shows the file structure of GDAS grid file.

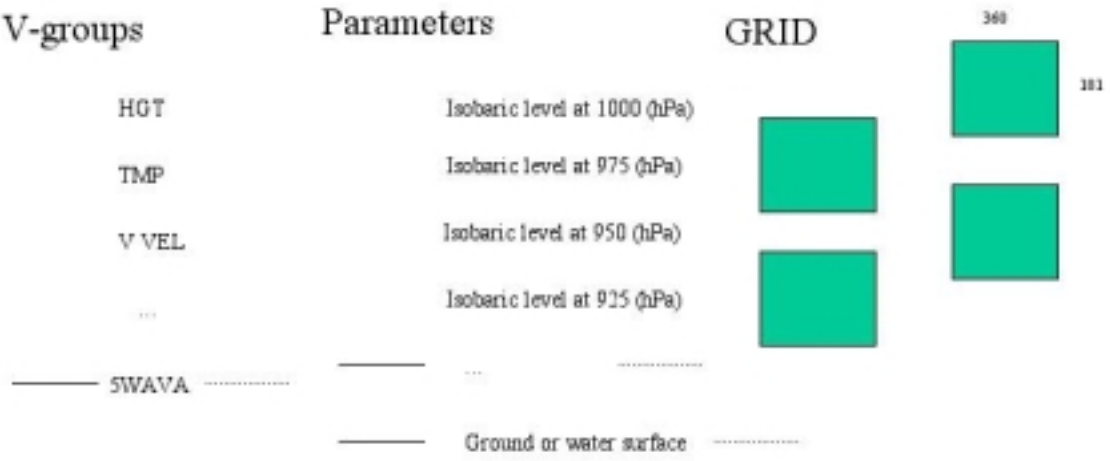


Figure 3-1. GDAS Grid File Structure

The measured parameters within the file have abbreviated names given to them and one has to refer to GRIB documentation for deciphering purposes. The measured parameters are as follows:

Table 3-1. Description of GDAS Measured Parameters

Parameter	Unit	Abbreviation
Geopotential Height	gpm	HGT
Temperature	K	TMP
Vertical Velocity (pressure)	Pa/s	V VEL
Relative Humidity	%	R H
Absolute Vorticity	/s	ABS V
Ozone mixing ratio	Kg/kg	03MR
5-wave Geopotential Height	gpm	5WAVH
u-component of wind	m/s	U GRD
v-component of wind	m/s	V GRD
Specific Humidity	Kg/kg	SPF H
Pressure	Pa	PRES
Precipitable Water	kg/m2	P WAT
Vertical Speed Shear	1/s	VW SH
Surface lifted index	K	LFT X
Convective Available Potential Energy	J/Kg	CAPE
Convective Inhibition	J/Kg	CIN
Best (4 layer) lifted index	K	4LFTX
Pressure reduced to MSL	Pa	PRMSL
Potential Temperature	K	POT
Total Ozone	Dobson	TOZNE
Volumetric soil moisture content	fraction	SOILW
Water equiv. Of accum. Snow Depth	kg/m2	WEASD
Land cover (land-=1, sea=0)	proportion	LAND
Ice cover(ice=1, no ice=0)	proportion	ICE C
Planetary boundary layer height	m	HPBL
Total Cloud cover	%	T CDC
Geopotential Height Potential	gpm	G PA
5-wave geopotential height anamoly	gpm	5WAVA

ECS metadata are written to the HDF-EOS file in accordance with the specifications in the associated ESDT (short name = GDASOZFH). These metadata are written following the general guidelines of the ECS Science Data Processing Toolkit (Release 6A SDP Toolkit Users Guide, 333-CD-600-001, Nov, 2000). Two groups of metadata are written, Inventory and GridStructure Point Structure. The Inventory Group is mainly self-explanatory (Appendix A) and is used by ECS system for temporal and spatial searching. The Grid Structure metadata details the organization of data within the file.

3.2 Viewing through EOS-VIEW

Once the GDAS HDF-EOS grid data file is opened, the top-level v-groups are displayed (Figure 3-2). The associated metadata can be viewed by using the "Attribute" tab and selecting the "global options. This opens a window displaying the metadata info as shown in Figure 3-3.

Double clicking on any of the v-groups gives rise to the window as shown in Figure 3-4. Here the user has the option to select various options such as "grid info", "projection info" etc. as shown in Figure 3-5.

Clicking on the option "Data Fields" shows the list of actual parameters (Figure 3-6). Double clicking on any one of these parameters would produce a window (Figure 3-7) where the user has the option to view the actual grid values either as a whole or a subset by manipulating the X and Y dimension values (Figure 3-8).

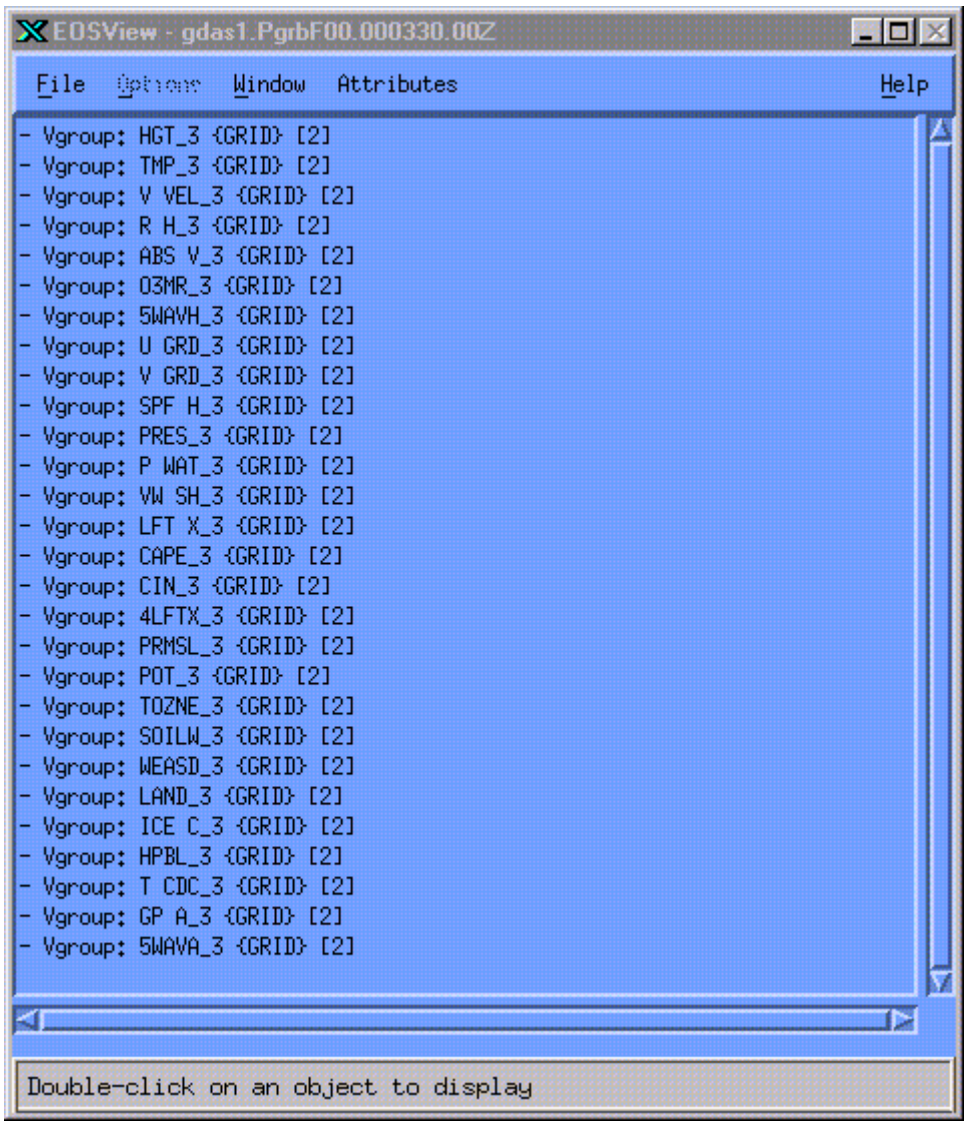


Figure 3-2. The List of V-groups in GDAS GRID File

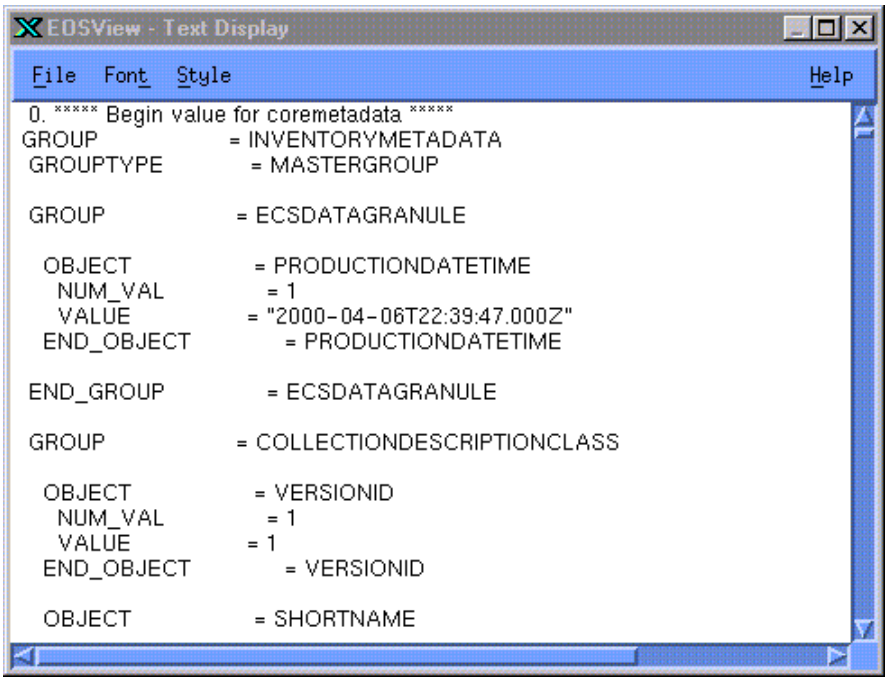


Figure 3-3. GDAS Metadata Information

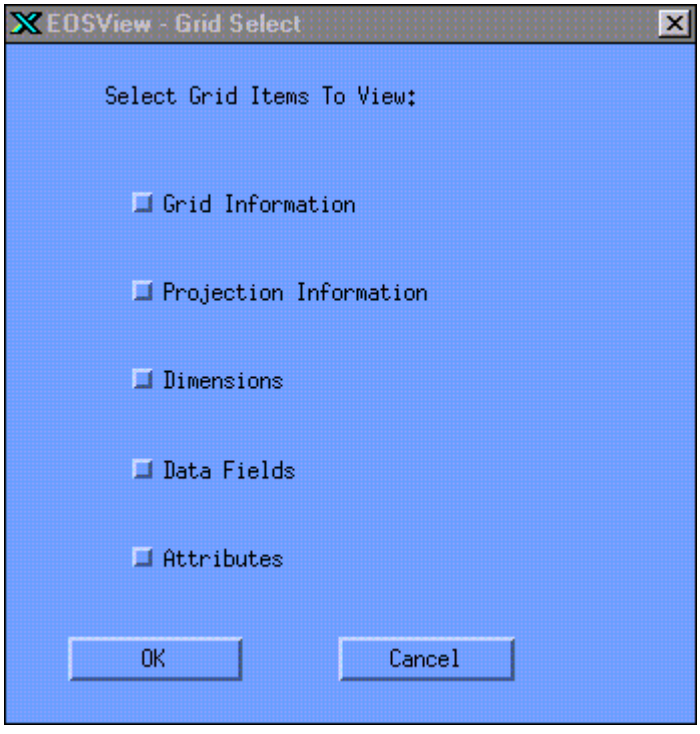


Figure 3-4. Viewing Options for GDAS GRID Data

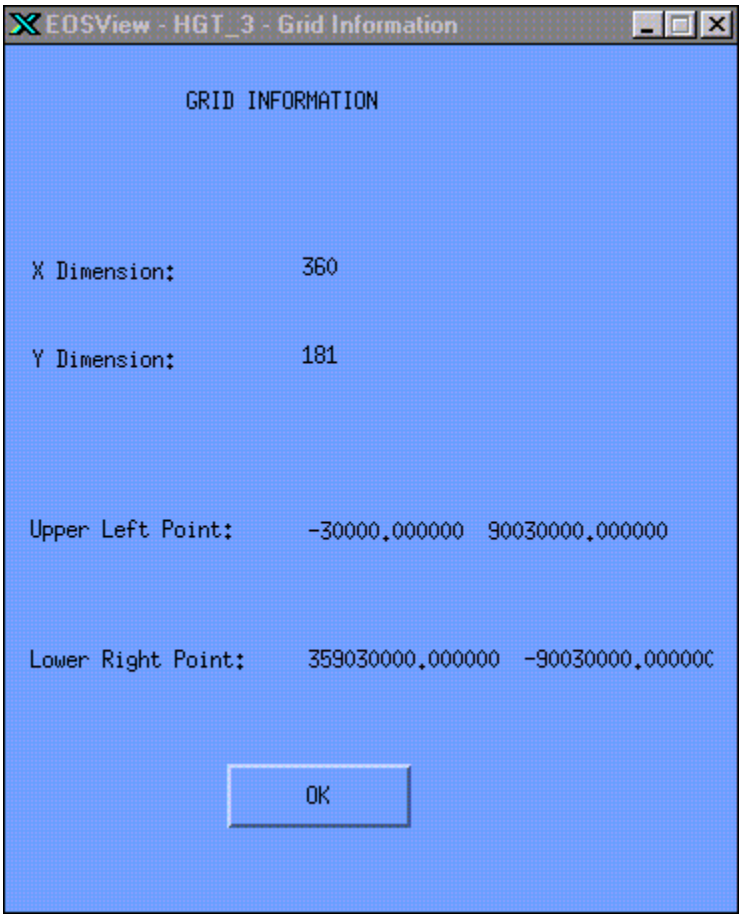


Figure 3-5. GDAS GRID Information

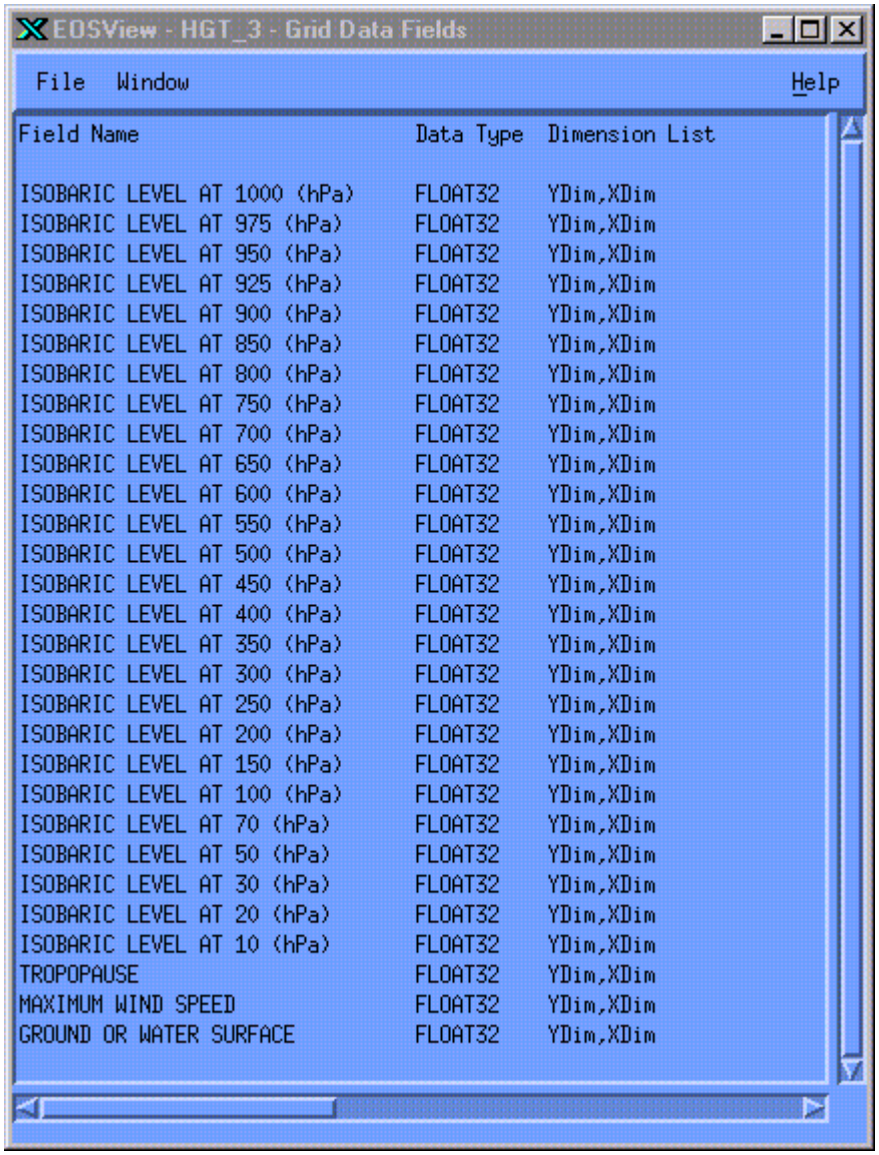


Figure 3-6. GDAS Measured Parameters for a Particular Data

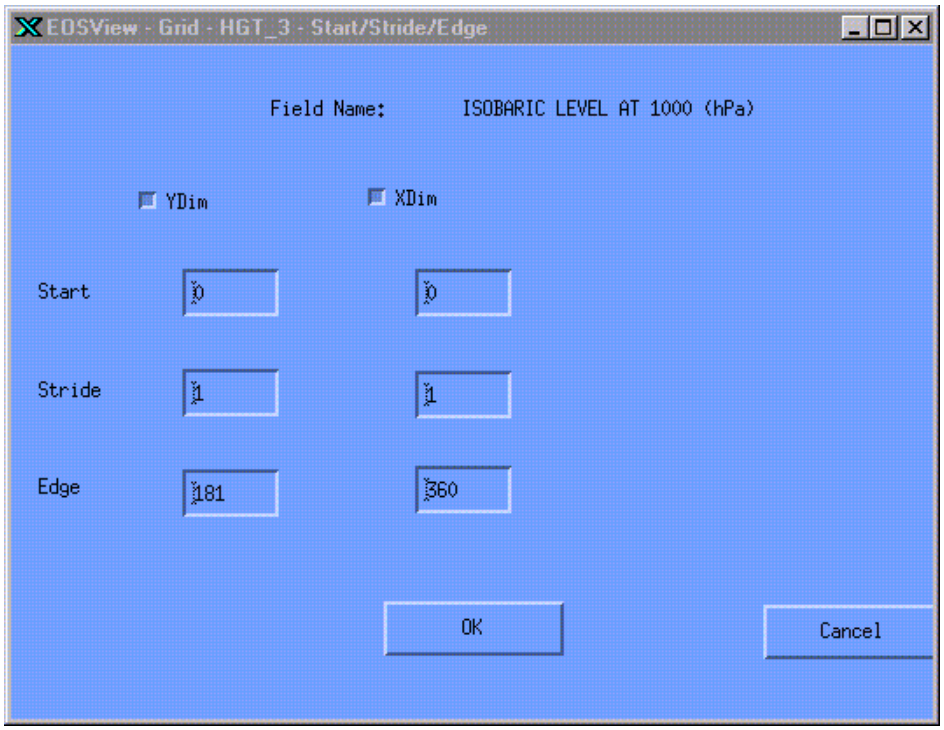
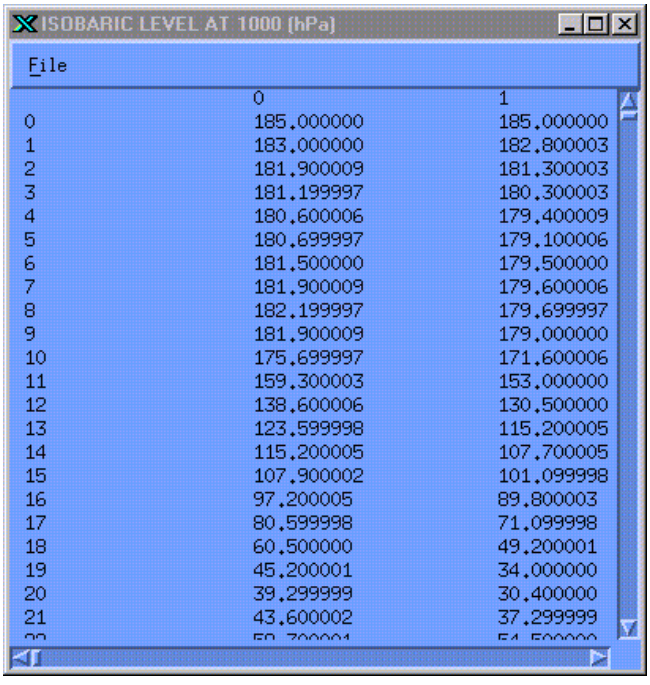


Figure 3-7. Data Viewing Option for Selection Range to be Viewed



	0	1
0	185.000000	185.000000
1	183.000000	182.800003
2	181.900009	181.300003
3	181.199997	180.300003
4	180.600006	179.400009
5	180.699997	179.100006
6	181.500000	179.500000
7	181.900009	179.600006
8	182.199997	179.699997
9	181.900009	179.000000
10	175.699997	171.600006
11	159.300003	153.000000
12	138.600006	130.500000
13	123.599998	115.200005
14	115.200005	107.700005
15	107.900002	101.099998
16	97.200005	89.800003
17	80.599998	71.099998
18	60.500000	49.200001
19	45.200001	34.000000
20	39.299999	30.400000
21	43.600002	37.299999

Figure 3-8. Actual Grid Data Values

3.3 Data Access and Code Samples

To access a single grid data set that already exists in an HDF-EOS file, the calling program must contain the following sequence of C calls:

- Open the file and initialize the GD interface

  GridFileId = Gdopen (filename, access_mode)

- Open the grid data set by obtaining the grid id using the name

  GridId = Gdattach(GridFileId, gridName)

- Perform desired operations such as inquire, read, etc.

  /* get grid info */

  status = Gdgridinfo(GridId, &x_dim, &y_dim, up_left_pt, low_right_pt);

- close the grid data set

  status = Gddetach(GridId);

- Close the file

  Status = Gdclose(GridFileId);

Appendix E lists three complete programs that depicts the Inquiry, Read, and Subset operations on a typical GRID data file.

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4. NCEP 1-degree Aviation Model (AVN)

4.1 File Structure

This is NCEP's Aviation Runs of the global spectral model and are also produced at 6h intervals, similar to GDAS in section 3. This product too form part of input to various algorithms used by the science data producers for production of higher level products. For more information please see http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html.

The HDF-EOS 1-degree Aviation Model grid file depicts the measured variables in the 1-degree geographical projection. The file is a group of several V-groups (see section on HDF-EOS) with one V group assigned to one measured variable. Each measured variable is itself defined by a number of parameters in a 360x181 grid. These variables are also defined in detail in the associated metadata (Appendix B) that is also part of HDF-EOS file and can be viewed using EOSVIEW. The structure is exactly the same as for GDAS file shown in Figure 3-1.

The measured parameters within the file have abbreviated names given to them and one has to refer to GRIB documentation (see http://daac.gsfc.nasa.gov/TECHNICAL/larry_info) for deciphering purposes. The measured parameters are as follows:

Table 4-1. Description of AVN Measured Parameters (1 of 2)

Parameter	Unit	Abbreviation
Geopotential Height	gpm	HGT
u-component of wind	m/s	U GRD
v-component of wind	m/s	V GRD
Temperature	K	TMP
Vertical Velocity (pressure)	Pa/s	V VEL
Relative Humidity	%	R H
Absolute Vorticity	/s	ABS V
Ozone mixing ratio	Kg/kg	03MR
Pressure	Pa	PRES
Precipitable Water	kg/m2	P WAT
Vertical Speed Shear	1/s	VW SH
Surface lifted index	K	LFT X
Convective Available Potential Energy	J/Kg	CAPE
Convective Inhibition	J/Kg	CIN
Best (4 layer) lifted index	K	4LFTX
Pressure reduced to MSL	Pa	PRMSL

Table 4-1. Description of AVN Measured Parameters (2 of 2)

Parameter	Unit	Abbreviation
Potential Temperature	K	POT
Total Ozone	Dobson	TOZNE
5-wave Geopotential Height	gpm	5WAVH
Momentum flux, u component	N/m2	U FLX
Momentum flux, v component	N/m2	V FLX
Sensible heat net flux	W/m2	SHTFL
Latent heat net flux	W/m2	LHTFL
Volumetric soil moisture content	fraction	SOILW
Water equiv. Of accum. Snow Depth	kg/m2	WEASD
Downward long wave rad. Flux	W/m2	DLWRF
Upward Long wave rad. Flux	W/m2	ULWRF
Upward short wave rad. Flux	W/m2	USWRF
Downward short wave rad. Flux	W/m2	DSWRF
Total Cloud cover	%	T CDC
Total Precipitation	kg/m2	A PCP
Convective precipitation	kg/m2	ACPCP
Ground Heat flux	W/m2	GFLUX
Land cover (land-=1, sea=0)	proportion	LAND
Ice cover(ice=1, no ice=0)	proportion	ICE C
Specific Humidity	Kg/kg	SPF H
Maximum Temperature	K	T MAX
Minimum Temperature	K	T MIN
Water Runoff	kg/m2	WATR
Potential evaporation rate	W/m2	PEVPR
Cloud work function	J/kg	CWORK
Zonal flux of gravity wave stress	N/m2	U GWD
Meridional work of gravity wave stress	N/m2	V GWD
Planetary boundary layer height	m	HPBL
Albedo	%	ALBDO
Geopotential Height Potential	gpm	G PA
5-wave geopotential height anamoly	gpm	5WAVA

ECS metadata are written to the HDF-EOS file in accordance with the specifications in the associated ESDT (short name = GDAS_OZF). These metadata are written following the general guidelines of the ECS Science Data Processing Toolkit (Release 6A SDP Toolkit Users Guide, 333-CD-600-001, Nov., 2000). Two groups of metadata are written, Inventory and GridStructure Point Structure. The Inventory Group is mainly self-explanatory (Appendix B) and is used by ECS system for temporal and spatial searching. The Grid Structure metadata details the organization of data within the file.

4.2 Viewing Using EOS-VIEW

The AVN data file is very similar in structure to GDAS GRID data set where viewing a GRID file is fully discussed.

4.3 Data Access and Code Examples

The user is referred to the Section 3 for the purpose of data access and code examples.

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5. NCEP TOVS Ozone Daily Product

5.1 File Structure

TOVS OZONE Daily Product provides ozone readings for the entire globe and is used as input by the science data producers in their algorithms. For more information please see http://daac.gsfc.nasa.gov/TECHNICAL/larry_info.

The HDF-EOS TOVS Ozone Daily Product grid file depicts the measured variables in the 1-degree geographical projection. The file is a group of only one V-group assigned to one measured variable TOZNE. There is only one parameter named "Entire Atmosphere" in a 360x181 grid. It is also defined in detail in the associated metadata (Appendix C) that is also part of HDF-EOS file and can be viewed using EOSVIEW. The structure is exactly the same as for GDAS file shown in Figure 3-1.

The measured parameter within the file have abbreviated names given to them and one has to refer to GRIB documentation (reference) for deciphering purposes. The measured parameter for TOVS is as follows:

Table 5-1. Descriptions of Measured Parameter in TOVS

Parameter	Unit	Abbreviation
Total OZONE	Dobson	TOZNE

5.2 Viewing Using EOS-VIEW

The TOVS data file is very similar in structure to GDAS GRID data set where viewing a GRID file is fully discussed.

5.3 Data Access and Code Examples

The user is referred to the Section 3 for the purpose of data access and code examples.

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6. NCEP – PREPQC Quality Controlled Observation Data

6.1 Introduction

PREPQC is NCEP quality controlled final observation data and is used in science algorithms as ancillary input by the science data producers (eg. AIRS).

This section describes the National Centers for Environmental Predictions (NCEP) PREPQC BUFR data which have been re-formatted into an equivalent HDF-EOS point structure data format. Procedures and requirements for the conversion process are defined in the "Conversion of the BUFR PREPQC Data to an HDF-EOS Format".

The description of the HDF-EOS file is discussed in Section 6.2. Appendix F contains a listing of all BUFR mnemonics.

6.2 Description of HDF-EOS PREPQC Data File

The PREPQC file consists of a collection of data at random spatial locations for a variety of data types. The AIRS team has requested that only one of these data types be converted to an HDF-EOS format; the Upper-Air (RAOB, PIBAL, RECCO) Reports (BUFR mnemonic name, "ADPUPA"). To handle this particular spatial distribution, an HDF-EOS point structure was deemed appropriate.

The HDF-EOS PREPQC point file consists of one point structure labeled according to the BUFR data type, i.e., ADPUPA. To accommodate all the data requested by the AIRS team for this data type, three point levels will be defined. The three level names are:

- Level 0 – GeolocationData
- Level 1 – PressureWater
- Level 2 – HeightTemperature

The associated variables (including data type and units) contained in each level are:

Level 0

SID – station identification (8 char)

XOB – longitude (float, degrees E)

YOB – latitude (float, degrees N)

DHR – observation time minus cycle time (float, hours)

ELV – station elevation (float, meters)

TYP – OI/SSI report type (integer)

T29 – NMC office note 29 report type (integer)

TSB – report sub-type (integer)

ITP – instrument type (integer)

SQN – report sequence number (integer)

RQM – report quality mark (integer)

DUP – message number of duplicate (integer)

SIRC – rawinsonde solar & infrared radiation correction indicator (integer)

NLEVEL – number of entries per message (integer)

LINKID – linkage flag (integer)

Level 1

POB – pressure observation (float, mb)

QOB – specific humidity observation (float, mg/kg)

QOE – specific humidity observation error (float, mg/kg)

CAT – NMC office note 29 category (integer)

PQM – pressure (quality) marker (integer)

PPC – pressure program code (integer)

PRC – pressure reason code (integer)

QQM – specific humidity (quality) marker (integer)

QPC – specific humidity program code (integer)

QRC – specific humidity reason code (integer)

LINKID – linkage flag (integer)

Level 2

ZOB – height observation (float, meters)

ZOE – height error (float, meters)

TDO – dewpoint temperature observation (float, degrees C)

TOB – temperature observation (float, degrees C)

TOE – temperature observation error (float, degrees C)

ZQM – height (quality) marker (integer)

ZPC – height program code (integer)

ZRC – height reason code (integer)

TQM – temperature (quality) marker (integer)

TPC – temperature program code (integer)

TRC – temperature reason code (integer)

LINKID – linkage flag (integer)

The three character variable names correspond to the default BUFR mnemonic names (see attachment 1). The variable "NLEVEL" was added at the request of the AIRS team to give the number of entries per ADPUPA message. The variable "LINKID" was included to provide a common linkage variable between levels. For example, if one is interested in data for a particular ADPUPA message latitude and longitude (given in Level 0), by specifying the corresponding LINKID variable number, one can extract all array variables from Levels 1 & 2 associated with the requested ADPUPA message.

ECS metadata are written to the HDF-EOS file in accordance with the specifications in the associated ESDT (short name = PREPQCH). These metadata are written following the general guidelines of the ECS Science Data Processing Toolkit (Release 6A SDP Toolkit Users Guide, 333-CD-600-001, Nov, 2000). Two groups of metadata are written, Inventory and Archived. The Archived metadata represent the BUFR Section 1 metadata extracted from the PREPQC file. The following list the ECS attributes populated by the PGE in:

Inventory section (ECS attributes) -

WestBoundingCoordinate (float)

NorthBoundingCoordinate (float)

EastBoundingCoordinate (float)

SouthBoundingCoordinate (float)

SingleDateTime (time char string)

CalendarDate (date char string)

Archived section (AIRS requested attributes) -

observation – observation flag indicating whether this is observational data (always 1 for ADPUPA data)

compression – compression flag indicating whether this is BUFR compressed data (always 0 for ADPUPA data)

bufr_master_table – indicates the type of BUFR master table used

originating_center – code for the center at which the BUFR file was composed (775 for NCEP)

update_sequence_number – update number of this file (0 for original version of PREPQC file)

data_category_type – index describing data category (240 for ADPUPA)

data_category_subtype – data subtype (0 for ADPUPA)

master_table_version – version number of the BUFR master table used in writing the BUFR file

local_table_version – version number of the local BUFR look-up tables used

year_of_century – year of cycle time of the quality-control programs run to generate the PREPQC file (this is actually the number of years elapsed since 1900)

month – month of cycle time of the quality-control programs run to generate the PREPQC file

day – day of cycle time of the quality-control programs run to generate the PREPQC file

hour – hour of cycle time of the quality-control programs run to generate the PREPQC file

minute – minute of cycle time of the quality-control programs run to generate the PREPQC file

All archived metadata have integer data types (for additional information, see the AIRS Design File Memorandum 451, JPL, Sept. 6, 2000).

6.3 File Structure

The HDF-EOS PREPQC point file stores the measured variables under one V-group (see http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html) called ADUPA. The data is divided into 3 levels (Geolocation, PressureWater, HeightTemperature) each measuring several different parameters (see Figure 6-1). The parameters contain data for all the points and individual point data is accessed via the LINKID parameter. These variables are also defined in detail in the associated metadata (Appendix D) that is also part of HDF-EOS file and can be viewed using EOSVIEW.

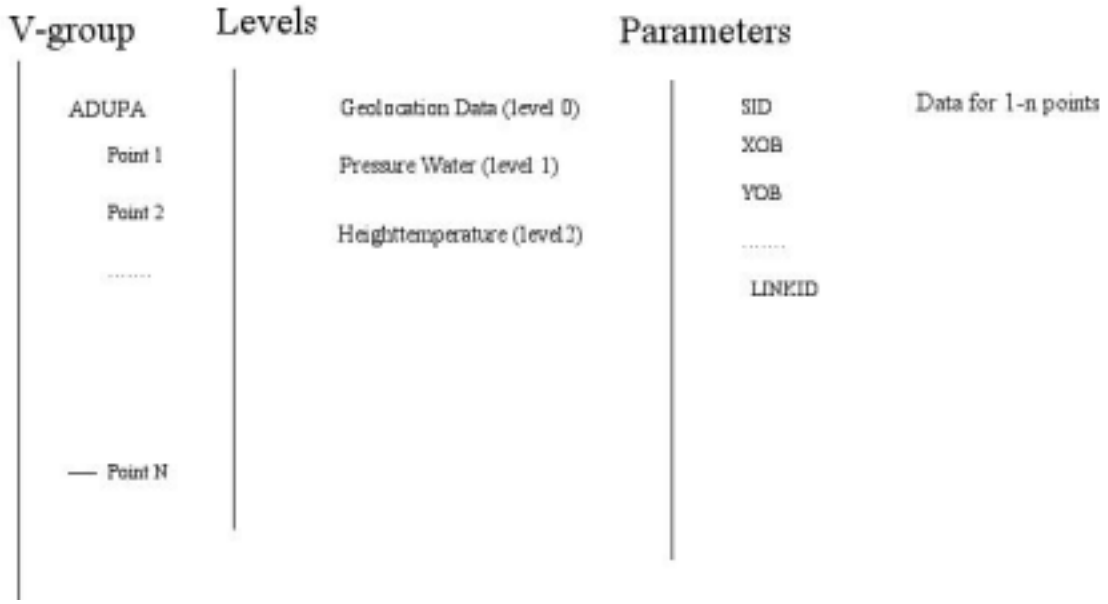

Figure 6-1. PREPQC Point Data File Structure

6.4 Viewing through EOS-VIEW

Once the HDF-EOS file is opened (see section of EOS-VIEW tool), the high level v-group is displayed as shown in Figure 6-2. Associated metadata can be viewed by using the “Attribute” tab and selecting the “global” option (Figure 6-3).

Double clicking on the v-group info would display the window as shown in Figure 6-4. Selecting the point data would display the window (Figure 6-5) showing the three levels of PREPQC data. Double clicking on the individual level info displays the window as shown in Figure 6-6 showing the individual parameters. Double clicking on any of these parameters displays the actual data as shown in Figure 6-7.

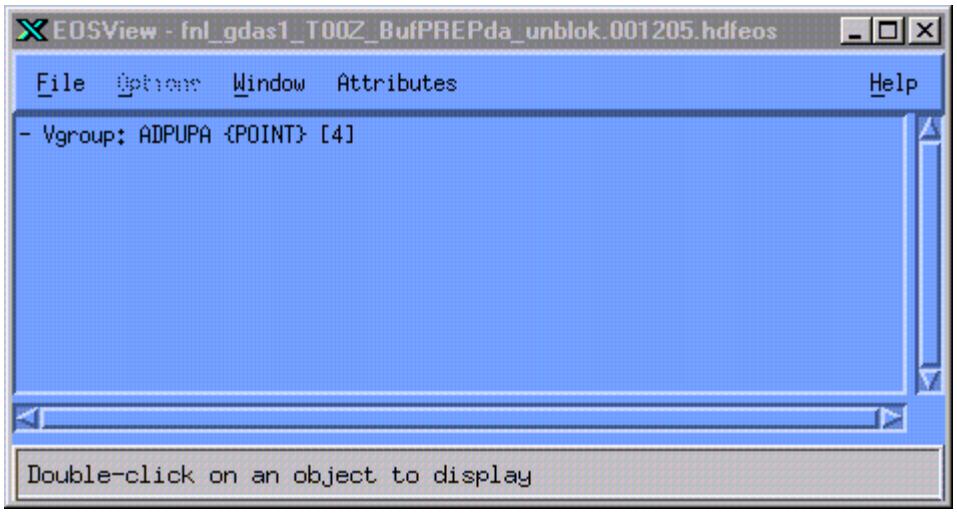

Figure 6-2. PREPQC Point Data v-group

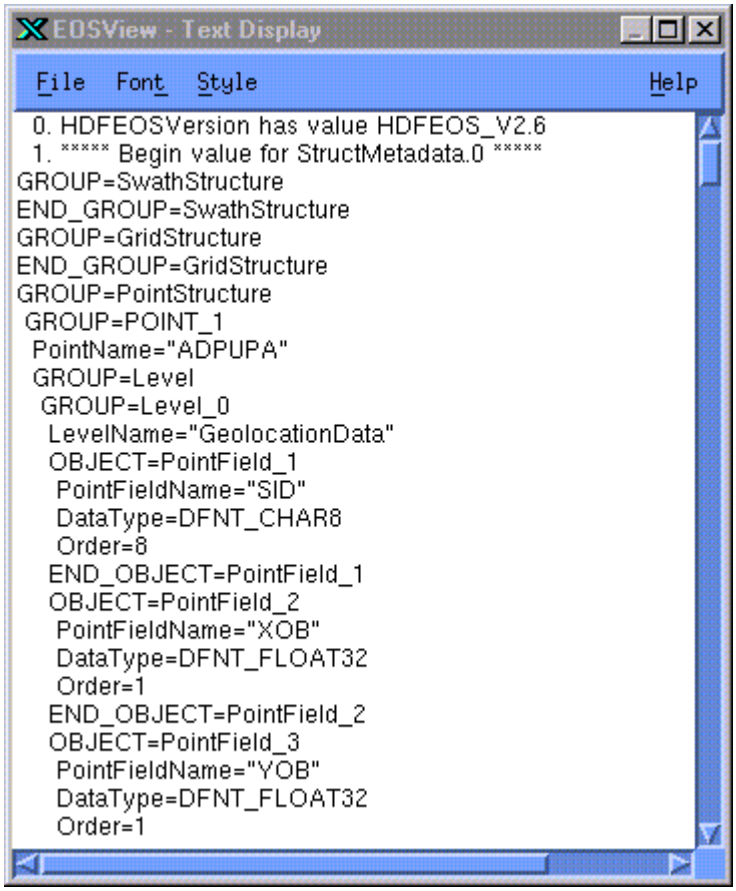

Figure 6-3. PREPQC Metadata Info

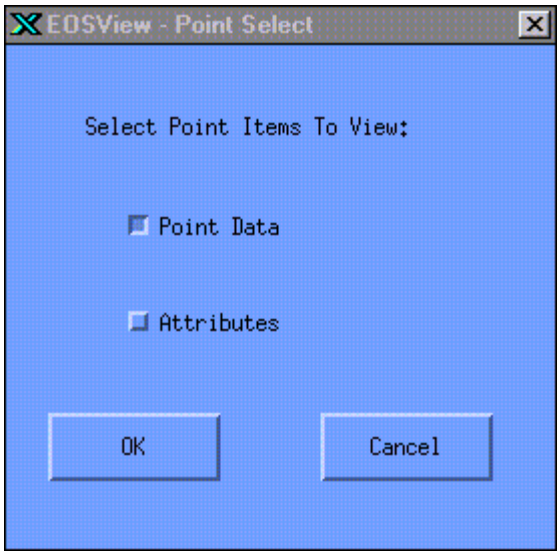

Figure 6-4. Option to Select the Point Data

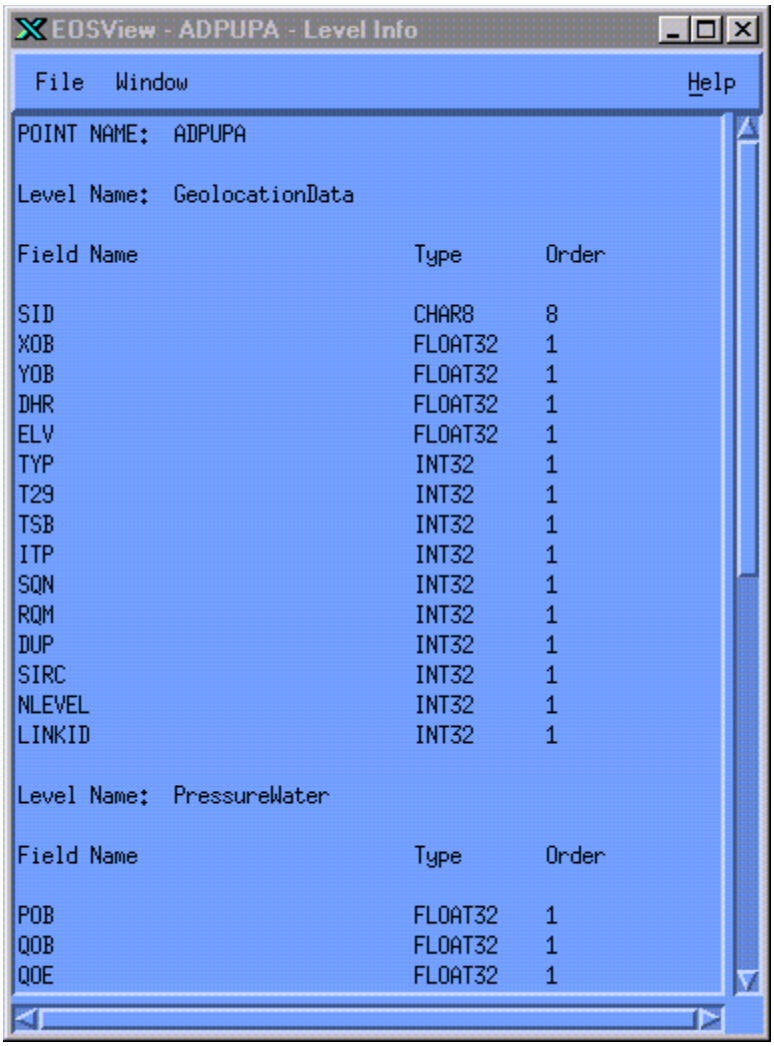

Figure 6-5. PREPQC Point Data Individual Level and Associated Parameters

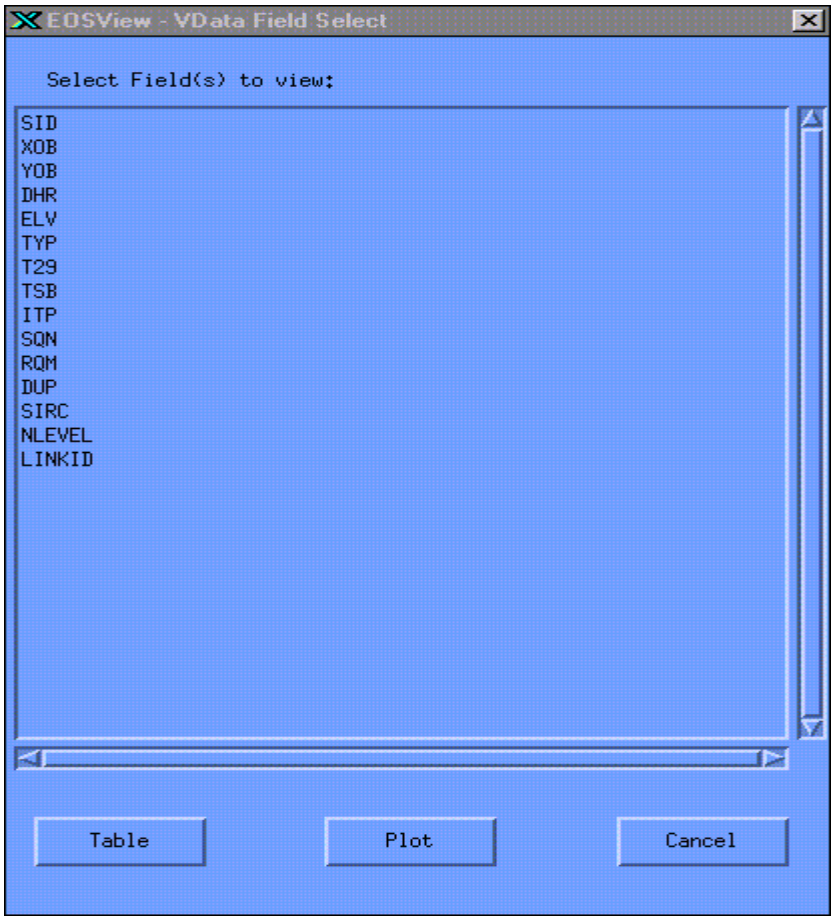

Figure 6-6. PREPQC Individual Parameters

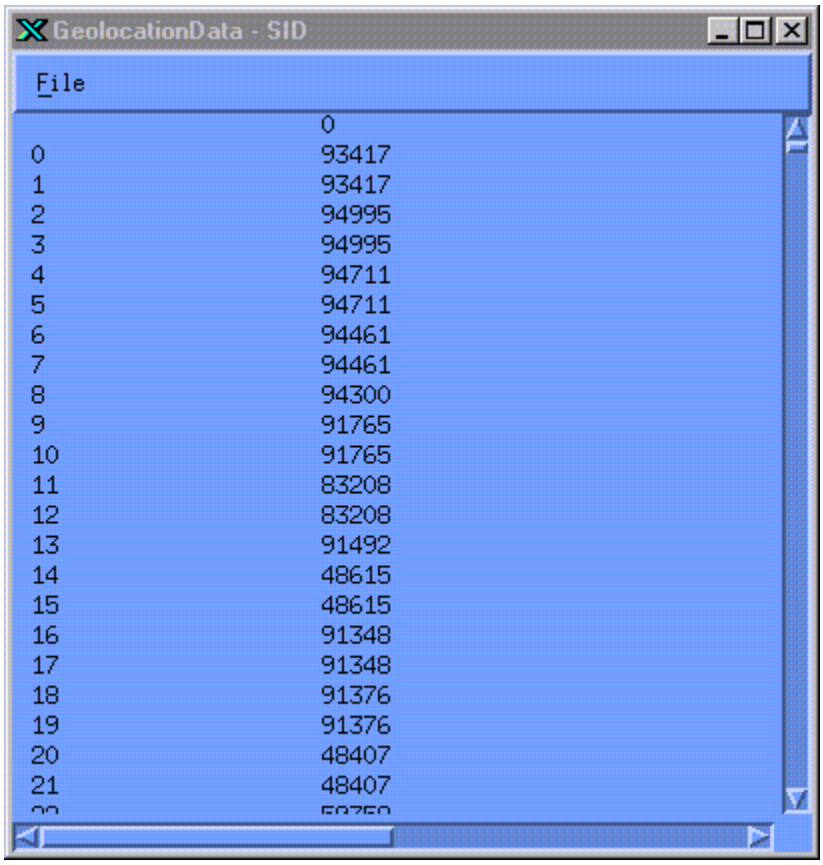

Figure 6-7. PREPQC Point Data Individual Values

7. User's Guide for the Conversion of the BUFR PREPQC Data to an HDF-EOS Format

7.1 Introduction

This document describes the conversion of the National Centers for Environmental Predictions (NCEP) PREPQC BUFR formatted data files to an equivalent HDF-EOS point structure data format. Requirements for conversion are defined in the ECS Technical Directive Number 74 (ECS TD-74, PREPQC BUFR Converter Direction, Sept. 29, 2000, see Appendix G.). This document is based on the original requirements as specified in the AIRS Design File Memorandum 451 (ADFM 451), Stephen Leroy, JPL Sept. 6, 2000. Only the items specified in TD-74 are implemented with the following exceptions. Item 4 of TD-4 was not implemented since it would have had an impact on the cost and schedule. In addition, item 3 of TD-74 was followed. All RAOB soundings are kept. Although ADFM 451 requested to retain only those raob soundings with valid temperatures and specific humidities, ECS determined that this implementation would require significant modifications to the converter code, which was not authorized in TD-74.

Four PREPQC files are generated each day by NOAA and transferred to the GSFC DAAC (GDAAC) Data Link Server, currently known as the LARRY Server. For information on the BUFR format and documentation see http://dao.gsfc.nasa.gov/data_stuff/formatPages/BUFR.html.

The conversion process and description of the PGE are discussed in Section 7.2. A sample test scenario is discussed in Section 7.3. A brief discussion of sample read programs are discussed in Section 7.4. Appendix G contains a copy of TD 74. Appendices H and I contain sample C programs for reading the output HDF-EOS files.

7.2 PREPQC Conversion Procedure

The purpose of the BUFR PREPQC converter is to take the PREPQC data files located on the LARRY server at the GSFC DAAC and convert the data to an HDF-EOS point structure. The conversion of these PREPQC files to HDF-EOS will be accomplished by running an ECS PGE within the PDPS system. The PGE consists of three basic parts:

- K-shell script (PREPQCConverterPGE.ksh)
- FORTRAN program to read the PREPQC data and BUFR Section 1 metadata (ReadPREPQCData.f and subroutine ReadPREPQCMetadata.f)
- C program which reads the output from the read program and generates an HDF-EOS point file (WritePREPQCDataToHDFEOS.c)

The procedure for converting the PREPQC data to an HDF-EOS file format requires two basic steps, reading the PREPQC data, and writing the data to an HDF-EOS file. A flow diagram of the conversion process is shown in Figure 1. The PGE is initiated by invoking the K-shell script. The script gets the input PREPQC file from the PCF and invokes the necessary UNIX commands (see Section 7.2.2) to allow the PREPQC read program to execute properly. The script calls the PREPQC read program that generates an ASCII file called "BUFR_ADPUPA_ASCII.temp". Next, the script calls the HDF-EOS write program which sets up the point structure and associated levels, reads the ASCII file, writes the data to the HDF-EOS file, and write the necessary ECS inventory and archived metadata. The inputs to this program are the HDF-EOS file name and MCF file name that are extracted from the PCF. The HDF-EOS output files will be written as <PREPQC file name>.hdfeos, and <PREPQC file name>.hdfeos.met. The associated ECS ESDT that is to be used with this PGE has the short name "PREPQCH".

The underlying assumption in this conversion process is that the format of the PREPQC input data files are consistent with the current FORTRAN BUFR library read routines. The BUFR library used has a date version of 15 JAN 1999.

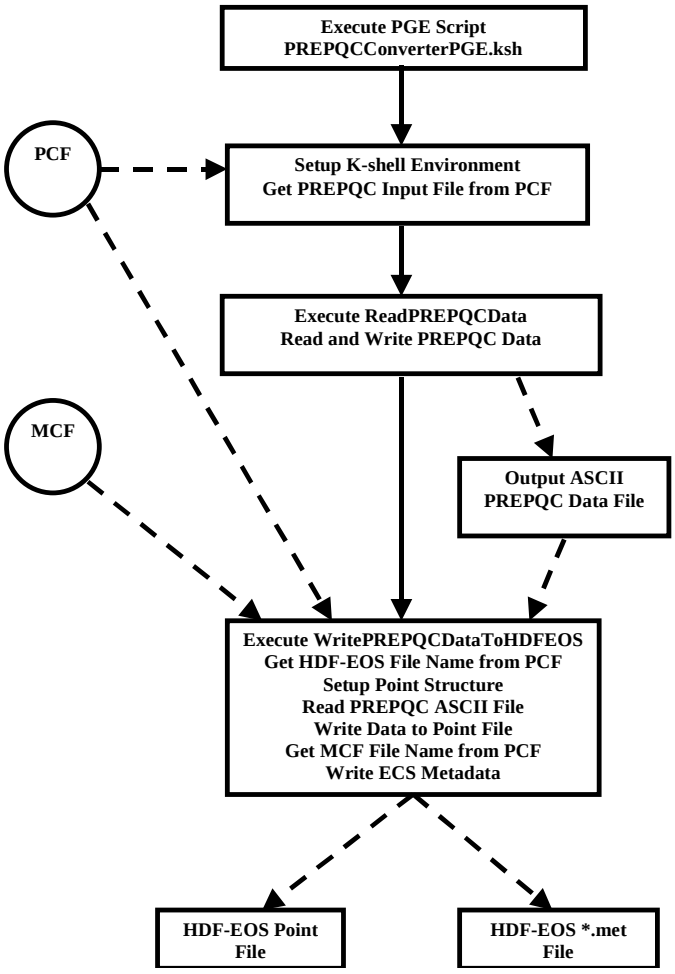

Figure 7-1. BUFR Converter Flow Diagram

7.2.1 Required Input Parameters

The three PGE specific input parameters required to run the conversion process are:

- PREPQC input file name (e.g., fnl.gdas1.THHZ.BufPREPda.unblok.YYMMDD)
- MCF file name
- HDF-EOS file name

All required inputs are obtained from the PCF. The PCF logical IDs are as follows:

- PREPQC input file assigned to PCF logical ID 399
- HDF-EOS output file assigned to PCF logical ID 22222
- MCF file assigned to PCF logical ID 10250

In addition to being the standard receptacle for ECS Toolkit error messages, the standard "LogReport" file (PCF logical ID 10101) in the ./runtime directory is designated in the K-shell script as the capture file for possible error messages written to screen by the FORTRAN program.

7.2.2 K-Shell Script

The K-shell script initiates the conversion process. The use of a script allows for a straightforward method to invoke UNIX commands prior to execution of the two main programs. The BUFR FORTRAN library routines require a special set of commands in order to open and read the PREPQC data files. In particular, the UNIX "assign" command is required, which is currently only available on SGI platforms in a K-shell environment.

The script, using ECS Toolkit calls, designates the standard LogReport file as the collection point for possible output written to screen during execution of the PREPQC read program, which will only occur upon detection of an error in the reading of the PREPQC file or the BUFR section 1 metadata. The script also extracts the PREPQC input file name from the PCF using an ECS Toolkit routine (see 6A SDP Toolkit Users Guide - 333-CD-600-001, November 2000), whereupon it executes the following two UNIX commands:

export= FILENV=$HOME/.assign, and,

assign -a <PREPQC file name> -s unblocked u:10,

which are necessary to allow the BUFR library routines to read from this file. The file logical is hardwired into the program and is equal to 10. If there is no error in the PCF extraction, the script initiates the PREPQC read program and upon a successful read of the PREPQC data file, the script then calls the HDF-EOS write program.

7.2.3 PREPQC Read Program

The reading of the data will incorporate the heritage FORTRAN subroutines available on the LARRY server at the GSFC DAAC. Due the complexity of this fairly large FORTRAN library of routines (bufr_990115.f), ECS was directed to use this library as is. A front-end FORTRAN driver program (ReadPREPQCData) was developed by ECS to extract the AIRS specified PREPQC data from the data file, using the various subroutines defined in the FORTRAN library. A separate program was obtained from Jack Woollen at NCEP to read the BUFR section 1 metadata (ReadBUFRMetadata.f). This program was converted to a FORTRAN subroutine and is called by the main read program. This read program generates an ASCII output file (BUFR_ADPUPA_ASCII.temp), which is the input data file read by the HDF-EOS write program.

7.2.4 HDF-EOS Write Program

This program reads the PREPQC ASCII file and writes these data to an HDF-EOS file. This program was designed by ECS using the specifications defined by the AIRS team (see Appendix F and Appendix G). The structure of this HDF-EOS file is discussed in Sections 6.2 and 6.3. The only other inputs required by this program are the name of the HDF-EOS output file and the MCF file. For details about the HDF-EOS interface, see HDF-EOS Library User's Guide Volume 1 and 2, 170-TP-600-001 and 170-TP-601-001, Nov. 2000.

7.2.5 Error Handling

The write program uses the standard ECS TOOLKIT calls to handle error messages, which upon encountering an error will write it to the LogReport file and returns an error code. For the read program, standard error handling is not possible due to complexity of the BUFR FORTRAN library error message setup. This library has over 100 different possible error messages distributed throughout the library. This library is designed to stop execution when any error is encountered. Any error messages generated by the read program will be dumped to the PGE LogReport file.

Since the read program, after encountering an error, stops execution immediately (i.e., program execution control is not returned to the main program), a special error handling procedure was designed. When the read program has successfully read the input data, the read program will open a “control” file called “PREPQCSuccessFile.temp”. The PGE script is designed to search for this file and if found, will then call the HDF-EOS write program. If this file is not found, the script is designed to skip the write program and write an error message to the LogReport file in the ./runtime directory indicating that there were problems in the read program.

7.2.6 PGE Compilation (Command Line Procedure)

The current Product Generation Executable (PGE) has two makefiles, “MakeRead” and “MakeWrite”. The MakeRead makefile compiles and links the main FORTRAN read program (ReadPREPQCData.f) with the BUFR metadata code (ReadBUFRMetadata.f)

and FORTRAN BUFR library (bufr_990115.f) using the FORTRAN-90 compiler. The MakeWrite makefile compiles and links the HDF-EOS write program (WritePREPQCDataToHDFEOS.c) with the standard ECS libraries (HDF, TOOLKIT, HDF-EOS). Hence, all ECS environmental variables must be setup correctly. These makefiles are executed as follows:

- make -f MakeRead
- make -f MakeWrite

or a k-shell script called "PREPQCMakeFile.ksh" can be executed which compiles and links both make files.

7.3 Sample HDF-EOS Read Programs

Two sample read programs (written in C) are provided to allow the user to understand the structure and contents of the HDF-EOS file. These are: (1) a program to extract general information and ECS metadata (see Appendix G), and; (2) a program to extract all data from the various levels (see Appendix H). These programs are provided for reference only. They are not formally supported by ECS. In addition the user can also use the ECS EOSview program to view the various components of the HDF-EOS file.

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8. References

- Conversion of the BUFR PREPQC Data to an HDF-EOS Format, Wayne L. Waldron and Larry Klein
- http://dao.gsfc.nasa.gov/data_stuff/formatPages/BUFR.html
- http://daac.gsfc.nasa.gov/TECHNICAL/larry_info/
- ftp://ftp.ncep.noaa.gov/pub/nws/nmc/docs/gribed1/
- http://hdfeos.gsfc.nasa.gov/hdfeos/workshop.cfm
- http://hdfeos.gsfc.nasa.gov/hdfeos/hdfandhdfeos.html
- Release 6A SDP Toolkit User's Guide, 333-CD-600-001, November 2000

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Appendix A. GDAS Ancillary Product Example Metadata

```
GROUP                  = INVENTORYMETADATA
  GROUPTYPE            = MASTERGROUP

  GROUP                  = ECSDATAGRANULE

    OBJECT                 = PRODUCTIONDATETIME
      NUM_VAL              = 1
      VALUE                = "2000-04-06T22:39:47.000Z"
    END_OBJECT             = PRODUCTIONDATETIME

  END_GROUP              = ECSDATAGRANULE

  GROUP                  = COLLECTIONDESCRIPTIONCLASS

    OBJECT                 = VERSIONID
      NUM_VAL              = 1
      VALUE                = 1
    END_OBJECT             = VERSIONID

    OBJECT                 = SHORTNAME
      NUM_VAL              = 1
      VALUE                = "GDAS0ZFH"
    END_OBJECT             = SHORTNAME

  END_GROUP              = COLLECTIONDESCRIPTIONCLASS

  GROUP                  = SPATIALDOMAINCONTAINER

    GROUP                  = HORIZONTALSPATIALDOMAINCONTAINER

      GROUP                  = BOUNDINGRECTANGLE

        OBJECT                 = EASTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = 180.000000
        END_OBJECT             = EASTBOUNDINGCOORDINATE

        OBJECT                 = WESTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = -180.000000
        END_OBJECT             = WESTBOUNDINGCOORDINATE

        OBJECT                 = SOUTHBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = -90.000000
        END_OBJECT             = SOUTHBOUNDINGCOORDINATE
```

```
        OBJECT                  = NORTHBOUNDINGCOORDINATE
          NUM_VAL               = 1
          VALUE                 = 90.000000
        END_OBJECT              = NORTHBOUNDINGCOORDINATE

      END_GROUP               = BOUNDINGRECTANGLE

    END_GROUP               = HORIZONTALSPATIALDOMAINCONTAINER

  END_GROUP               = SPATIALDOMAINCONTAINER

  GROUP                   = SINGLEDATETIME

    OBJECT                  = TIMEOFDAY
      NUM_VAL               = 1
      VALUE                 = "00:00:00.0"
    END_OBJECT              = TIMEOFDAY

    OBJECT                  = CALENDARDATE
      NUM_VAL               = 1
      VALUE                 = "2000-03-30"
    END_OBJECT              = CALENDARDATE

  END_GROUP               = SINGLEDATETIME

END_GROUP               = INVENTORYMETADATA

END
```

```
GROUP=SwathStructure
END_GROUP=SwathStructure
GROUP=GridStructure
      GROUP=GRID_1
            GridName="HGT_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2

                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
```

```
      DimList=("YDim","XDim")
END_OBJECT=DataField_3
OBJECT=DataField_4
      DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_4
OBJECT=DataField_5
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
```

```
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_22
OBJECT=DataField_23
      DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_23
OBJECT=DataField_24
      DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_24
```

```
            OBJECT=DataField_25
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_25
            OBJECT=DataField_26
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_26
            OBJECT=DataField_27
                  DataFieldName="TROPOPAUSE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_27
            OBJECT=DataField_28
                  DataFieldName="MAXIMUM WIND SPEED"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_28
            OBJECT=DataField_29
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_29
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_1
GROUP=GRID_2
      GridName="TMP_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
```

```
OBJECT=DataField_4
      DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_4
OBJECT=DataField_5
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
```

```
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_22
OBJECT=DataField_23
      DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_23
OBJECT=DataField_24
      DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_24
OBJECT=DataField_25
      DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_25
```

```
                  OBJECT=DataField_26
                        DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="GROUND OR WATER SURFACE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
                  OBJECT=DataField_35
                        DataFieldName="DEPTH BELOW LAND SURFACE LAYER BETWEEN 0
(cm) AND 10 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_35
```

```
                  OBJECT=DataField_36
                        DataFieldName="DEPTH BELOW LAND SURFACE LAYER BETWEEN 10
(cm) AND 200 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_36
                  OBJECT=DataField_37
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_37
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_2
      GROUP=GRID_3
            GridName="V VEL_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
                        DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_4
                  OBJECT=DataField_5
                        DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_5
                  OBJECT=DataField_6
                        DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_6

                  OBJECT=DataField_7
                        DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                        DataType=DFNT_FLOAT32
```

```
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
```

```
            OBJECT=DataField_18
                  DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_18
            OBJECT=DataField_19
                  DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_19
            OBJECT=DataField_20
                  DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_20
            OBJECT=DataField_21
                  DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_21
            OBJECT=DataField_22
                  DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_22
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_3
GROUP=GRID_4
      GridName="R H_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
```

```
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
```

```
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_17
                  OBJECT=DataField_18
                        DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_18
                  OBJECT=DataField_19
                        DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_19
                  OBJECT=DataField_20
                        DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_20
                  OBJECT=DataField_21
                        DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_21
                  OBJECT=DataField_22
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="SIGMA LAYER BETWEEN 72 (1/100) AND 94
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 72
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="SIGMA LAYER BETWEEN 33 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
```

```
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_4
      GROUP=GRID_5
            GridName="ABS V_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
                        DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_4
                  OBJECT=DataField_5
                        DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_5
                  OBJECT=DataField_6
                        DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_6
                  OBJECT=DataField_7
                        DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_7
                  OBJECT=DataField_8
                        DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                        DataType=DFNT_FLOAT32
```

```
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
```

```
            END_OBJECT=DataField_20
            OBJECT=DataField_21
                  DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_21
            OBJECT=DataField_22
                  DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_22
            OBJECT=DataField_23
                  DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_23
            OBJECT=DataField_24
                  DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_24
            OBJECT=DataField_25
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_25
            OBJECT=DataField_26
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_26
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_5
GROUP=GRID_6
      GridName="O3MR_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
```

```
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_6
GROUP=GRID_7
      GridName="5WAVH_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_7
GROUP=GRID_8
      GridName="U GRD_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
```

```
      DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_3
OBJECT=DataField_4
      DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_4
OBJECT=DataField_5
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
```

```
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_15
      OBJECT=DataField_16
            DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_16
      OBJECT=DataField_17
            DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_17
      OBJECT=DataField_18
            DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_18
      OBJECT=DataField_19
            DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_19
      OBJECT=DataField_20
            DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_20
      OBJECT=DataField_21
            DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_21
      OBJECT=DataField_22
            DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_22
      OBJECT=DataField_23
            DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_23
      OBJECT=DataField_24
            DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_24
      OBJECT=DataField_25
            DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_25
      OBJECT=DataField_26
            DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_26
      OBJECT=DataField_27
            DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
```

```
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 10
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_8
      GROUP=GRID_9
            GridName="V GRD_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
```

```
      END_OBJECT=DataField_1
      OBJECT=DataField_2
            DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_2
      OBJECT=DataField_3
            DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_3
      OBJECT=DataField_4
            DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_4


OBJECT=DataField_5
            DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_5
      OBJECT=DataField_6
            DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_6
      OBJECT=DataField_7
            DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_7
      OBJECT=DataField_8
            DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_8
      OBJECT=DataField_9
            DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_9
      OBJECT=DataField_10
            DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_10
      OBJECT=DataField_11
            DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_11
      OBJECT=DataField_12
            DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_12
      OBJECT=DataField_13
            DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
            DataType=DFNT_FLOAT32
```

```
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_22
OBJECT=DataField_23
      DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_23
OBJECT=DataField_24
      DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_24
OBJECT=DataField_25
      DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
```

```
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 10
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_9
      GROUP=GRID_10
            GridName="SPF H_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
```

```
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_10
      GROUP=GRID_11
            GridName="PRES_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="GROUND OR WATER SURFACE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
                        DataFieldName="CONVECTIVE CLOUD TOP"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_4
                  OBJECT=DataField_5
                        DataFieldName="CONVECTIVE CLOUD BOTTOM"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_5
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_11
```

```
GROUP=GRID_12
      GridName="P WAT_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_12
GROUP=GRID_13
      GridName="VW SH_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="TROPOPAUSE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_13
GROUP=GRID_14
      GridName="LFT X_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_14
GROUP=GRID_15
```

```
            GridName="CAPE_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="GROUND OR WATER SURFACE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 180 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_15
      GROUP=GRID_16
            GridName="CIN_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="GROUND OR WATER SURFACE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 180 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_16
      GROUP=GRID_17
            GridName="4LFTX_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
```

```
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_17
GROUP=GRID_18
      GridName="PRMSL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="MEAN SEA LEVEL"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_18
GROUP=GRID_19
      GridName="POT_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_19
GROUP=GRID_20
      GridName="TOZNE_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
```

```
                  OBJECT=DataField_1
                        DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_20
      GROUP=GRID_21
            GridName="SOILW_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="DEPTH BELOW LAND SURFACE LAYER BETWEEN 0
(cm) AND 10 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="DEPTH BELOW LAND SURFACE LAYER BETWEEN 10
(cm) AND 200 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_21
      GROUP=GRID_22
            GridName="WEASD_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="GROUND OR WATER SURFACE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_22
      GROUP=GRID_23
            GridName="LAND_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
```

```
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_23
GROUP=GRID_24
      GridName="ICE C_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_24
GROUP=GRID_25
      GridName="HPBL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="GROUND OR WATER SURFACE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_25
GROUP=GRID_26
      GridName="T CDC_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
```

```
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="CONVECTIVE CLOUD"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_26
      GROUP=GRID_27
            GridName="GP A_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_27
      GROUP=GRID_28
            GridName="5WAVA_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_28
END_GROUP=GridStructure
GROUP=PointStructure
```

```
END_GROUP=PointStructure
END
`ist=("YDim","XDim")
                    END_OBJECT=DataField_7
                    OBJECT=DataField_8
                          DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_8
                    OBJECT=DataField_9
                          DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_9
                    OBJECT=DataField_10
                          DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_10
                    OBJECT=DataField_11
                          DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_11
                    OBJECT=DataField_12
                          DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_12
                    OBJECT=DataField_13
                          DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_13
                    OBJECT=DataField_14
                          DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_14
                    OBJECT=DataField_15
                          DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_15
                    OBJECT=DataField_16
                          DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_16
                    OBJECT=DataField_17
                          DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_17
                    OBJECT=DataField_18
                          DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_18
                    OBJECT=DataField_19
                          DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
```

```
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_19
                  OBJECT=DataField_20
                        DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_20
                  OBJECT=DataField_21
                        DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_21
                  OBJECT=DataField_22
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="SIGMA LAYER BETWEEN 72 (1/100) AND 94
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 72
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="SIGMA LAYER BETWEEN 33 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
            END_GROUP=DataField
            GROUP=MergedFields
```

```
      END_GROUP=MergedFields
END_GROUP=GRID_4
GROUP=GRID_5
      GridName="ABS V_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
            OBJECT=DataField_7
                  DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_7
            OBJECT=DataField_8
                  DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_8
            OBJECT=DataField_9
                  DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_9
            OBJECT=DataField_10
                  DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
                  DataType=DFNT_FLOAT32
```

```
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
```

```
            END_OBJECT=DataField_22
            OBJECT=DataField_23
                  DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_23
            OBJECT=DataField_24
                  DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_24
            OBJECT=DataField_25
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_25
            OBJECT=DataField_26
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_26
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_5
GROUP=GRID_6
      GridName="O3MR_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
```

```
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_6
GROUP=GRID_7
      GridName="5WAVH_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_7
GROUP=GRID_8
      GridName="U GRD_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
```

```
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
```

```
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_17
                  OBJECT=DataField_18
                        DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_18
                  OBJECT=DataField_19
                        DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_19
                  OBJECT=DataField_20
                        DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_20
                  OBJECT=DataField_21
                        DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_21
                  OBJECT=DataField_22
                        DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="PRESSURE DIFFERENCE FROM GROUND LAYER
BETWEEN 30 (hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
```

```
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="SPECIFIED HEIGHT ABOVE GROUND LEVEL AT 10
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_8
      GROUP=GRID_9
            GridName="V GRD_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_9
END_GROUP=GridStructure
GROUP=PointStructure
END_GROUP=PointStructure
END
```

Appendix B. AVN Ancillary Product Example Metadata

```
GROUP                  = INVENTORYMETADATA
  GROUPTYPE            = MASTERGROUP

  GROUP                  = ECSDATAGRANULE

    OBJECT                 = PRODUCTIONDATETIME
      NUM_VAL              = 1
      VALUE                = "2000-08-08T15:55:48.000Z"
    END_OBJECT             = PRODUCTIONDATETIME

  END_GROUP              = ECSDATAGRANULE

  GROUP                  = COLLECTIONDESCRIPTIONCLASS

    OBJECT                 = SHORTNAME
      NUM_VAL              = 1
      VALUE                = "GDAS_0ZF"
    END_OBJECT             = SHORTNAME

    OBJECT                 = VERSIONID
      NUM_VAL              = 1
      VALUE                = 0
    END_OBJECT             = VERSIONID

  END_GROUP              = COLLECTIONDESCRIPTIONCLASS

  GROUP                  = SPATIALDOMAINCONTAINER

    GROUP                  = HORIZONTALSPATIALDOMAINCONTAINER

      GROUP                  = BOUNDINGRECTANGLE

        OBJECT                 = WESTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALIDRULE            = "Range(-180.0,+180.0)"
          VALUE                = -180.000000
        END_OBJECT             = WESTBOUNDINGCOORDINATE

        OBJECT                 = NORTHBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALIDRULE            = "Range(-90.0,+90.0)"
          VALUE                = 90.000000
        END_OBJECT             = NORTHBOUNDINGCOORDINATE

        OBJECT                 = EASTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALIDRULE            = "Range(-180.0,+180.0)"
          VALUE                = 180.000000
        END_OBJECT             = EASTBOUNDINGCOORDINATE
```

```
        OBJECT                  = SOUTHBOUNDINGCOORDINATE
          NUM_VAL               = 1
          VALIDRULE             = "Range(-90.0,+90.0)"
          VALUE                 = -90.000000
        END_OBJECT              = SOUTHBOUNDINGCOORDINATE

      END_GROUP               = BOUNDINGRECTANGLE

    END_GROUP               = HORIZONTALSPATIALDOMAINCONTAINER

  END_GROUP               = SPATIALDOMAINCONTAINER

  GROUP                   = SINGLEDATETIME

    OBJECT                  = TIMEOFDAY
      NUM_VAL               = 1
      VALUE                 = "12:00:00.0"
    END_OBJECT              = TIMEOFDAY

    OBJECT                  = CALENDARDATE
      NUM_VAL               = 1
      VALUE                 = "1999-09-13"
    END_OBJECT              = CALENDARDATE

  END_GROUP               = SINGLEDATETIME

END_GROUP               = INVENTORYMETADATA

END


GROUP=SwathStructure
END_GROUP=SwathStructure
GROUP=GridStructure
      GROUP=GRID_1
            GridName="HGT_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
```

```
      DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_4
OBJECT=DataField_5
      DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_5
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
```

```
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_22
OBJECT=DataField_23
      DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_23
OBJECT=DataField_24
      DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_24
OBJECT=DataField_25
      DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_25
OBJECT=DataField_26
      DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_26
OBJECT=DataField_27
      DataFieldName="TROPOPAUSE"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_27
OBJECT=DataField_28
      DataFieldName="MAXIMUM WIND SPEED"
      DataType=DFNT_FLOAT32
```

```
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_28
            OBJECT=DataField_29
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_29
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_1
GROUP=GRID_2
      GridName="U GRD_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
            OBJECT=DataField_7
                  DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_7
            OBJECT=DataField_8
                  DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
```

```
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
```

```
                    OBJECT=DataField_21
                          DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_21
                    OBJECT=DataField_22
                          DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_22
                    OBJECT=DataField_23
                          DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_23
                    OBJECT=DataField_24
                          DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_24
                    OBJECT=DataField_25
                          DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_25
                    OBJECT=DataField_26
                          DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_26
                    OBJECT=DataField_27
                          DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 30
(hPa) AND 0 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_27
                    OBJECT=DataField_28
                          DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_28
                    OBJECT=DataField_29
                          DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_29
                    OBJECT=DataField_30
                          DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_30
                    OBJECT=DataField_31
                          DataFieldName="TROPOPAUSE"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_31
                    OBJECT=DataField_32
                          DataFieldName="MAXIMUM WIND SPEED"
```

```
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 10
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_2
      GROUP=GRID_3
            GridName="V GRD_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
                        DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_4
                  OBJECT=DataField_5
                        DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_5
                  OBJECT=DataField_6
                        DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_6
                  OBJECT=DataField_7
                        DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
```

```
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
```

```
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_19
                  OBJECT=DataField_20
                        DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_20
                  OBJECT=DataField_21
                        DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_21
                  OBJECT=DataField_22
                        DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 30
(hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
```

```
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 10
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_3
      GROUP=GRID_4
            GridName="TMP_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
                  OBJECT=DataField_3
                        DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_3
                  OBJECT=DataField_4
                        DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_4
                  OBJECT=DataField_5
                        DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_5
```

```
OBJECT=DataField_6
      DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_6
OBJECT=DataField_7
      DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_7
OBJECT=DataField_8
      DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_8
OBJECT=DataField_9
      DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
```

```
                        DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_18
                  OBJECT=DataField_19
                        DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_19
                  OBJECT=DataField_20
                        DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_20
                  OBJECT=DataField_21
                        DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_21
                  OBJECT=DataField_22
                        DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 30
(hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 1829 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 2743 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
```

```
                  END_OBJECT=DataField_29
                  OBJECT=DataField_30
                        DataFieldName="FIXED HEIGHT ABOVE MEAN SEA LEVEL LEVEL
AT 3658 (meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_30
                  OBJECT=DataField_31
                        DataFieldName="TROPOPAUSE"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_31
                  OBJECT=DataField_32
                        DataFieldName="MAXIMUM WIND SPEED"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_32
                  OBJECT=DataField_33
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_33
                  OBJECT=DataField_34
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_34
                  OBJECT=DataField_35
                        DataFieldName="DEPTH BELOW LAND SURF LAYER BETWEEN 0
(cm) AND 10 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_35
                  OBJECT=DataField_36
                        DataFieldName="DEPTH BELOW LAND SURF LAYER BETWEEN 10
(cm) AND 200 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_36
                  OBJECT=DataField_37
                        DataFieldName="HIGH CLOUD TOP"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_37
                  OBJECT=DataField_38
                        DataFieldName="MIDDLE CLOUD TOP"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_38
                  OBJECT=DataField_39
                        DataFieldName="LOW CLOUD TOP"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_39
                  OBJECT=DataField_40
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_40
            END_GROUP=DataField
```

```
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_4
GROUP=GRID_5
      GridName="V VEL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
            OBJECT=DataField_7
                  DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_7
            OBJECT=DataField_8
                  DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_8
            OBJECT=DataField_9
                  DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_9
            OBJECT=DataField_10
                  DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
```

```
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
      DataType=DFNT_FLOAT32
```

```
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_22
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_5
GROUP=GRID_6
      GridName="R H_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 900 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
            OBJECT=DataField_7
                  DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_7
            OBJECT=DataField_8
                  DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_8
            OBJECT=DataField_9
                  DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
```

```
END_OBJECT=DataField_9
OBJECT=DataField_10
      DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_10
OBJECT=DataField_11
      DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_11
OBJECT=DataField_12
      DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
```

```
                  OBJECT=DataField_22
                        DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 30
(hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_22
                  OBJECT=DataField_23
                        DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_23
                  OBJECT=DataField_24
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_24
                  OBJECT=DataField_25
                        DataFieldName="SIGMA LAYER BETWEEN 72 (1/100) AND 94
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_25
                  OBJECT=DataField_26
                        DataFieldName="SIGMA LAYER BETWEEN 44 (1/100) AND 72
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_26
                  OBJECT=DataField_27
                        DataFieldName="SIGMA LAYER BETWEEN 33 (1/100) AND 100
(1/100)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_27
                  OBJECT=DataField_28
                        DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_28
                  OBJECT=DataField_29
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_29
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_6
      GROUP=GRID_7
            GridName="ABS V_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
```

```
                    OBJECT=DataField_1
                          DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_1
                    OBJECT=DataField_2
                          DataFieldName="ISOBARIC LEVEL AT 975 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_2
                    OBJECT=DataField_3
                          DataFieldName="ISOBARIC LEVEL AT 950 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_3
                    OBJECT=DataField_4
                          DataFieldName="ISOBARIC LEVEL AT 925 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_4
                    OBJECT=DataField_5
                          DataFieldName="ISOBARIC LEVEL AT 900 (hPa)

"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_5
                    OBJECT=DataField_6
                          DataFieldName="ISOBARIC LEVEL AT 850 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_6
                    OBJECT=DataField_7
                          DataFieldName="ISOBARIC LEVEL AT 800 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_7
                    OBJECT=DataField_8
                          DataFieldName="ISOBARIC LEVEL AT 750 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_8
                    OBJECT=DataField_9
                          DataFieldName="ISOBARIC LEVEL AT 700 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_9
                    OBJECT=DataField_10
                          DataFieldName="ISOBARIC LEVEL AT 650 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_10
                    OBJECT=DataField_11
                          DataFieldName="ISOBARIC LEVEL AT 600 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
                    END_OBJECT=DataField_11
                    OBJECT=DataField_12
                          DataFieldName="ISOBARIC LEVEL AT 550 (hPa)"
                          DataType=DFNT_FLOAT32
                          DimList=("YDim","XDim")
```

```
END_OBJECT=DataField_12
OBJECT=DataField_13
      DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_13
OBJECT=DataField_14
      DataFieldName="ISOBARIC LEVEL AT 450 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_14
OBJECT=DataField_15
      DataFieldName="ISOBARIC LEVEL AT 400 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_15
OBJECT=DataField_16
      DataFieldName="ISOBARIC LEVEL AT 350 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_16
OBJECT=DataField_17
      DataFieldName="ISOBARIC LEVEL AT 300 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_17
OBJECT=DataField_18
      DataFieldName="ISOBARIC LEVEL AT 250 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_18
OBJECT=DataField_19
      DataFieldName="ISOBARIC LEVEL AT 200 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_19
OBJECT=DataField_20
      DataFieldName="ISOBARIC LEVEL AT 150 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_20
OBJECT=DataField_21
      DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_21
OBJECT=DataField_22
      DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_22
OBJECT=DataField_23
      DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_23
OBJECT=DataField_24
      DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
      DataType=DFNT_FLOAT32
      DimList=("YDim","XDim")
END_OBJECT=DataField_24
```

```
            OBJECT=DataField_25
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_25
            OBJECT=DataField_26
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_26
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_7
GROUP=GRID_8
      GridName="O3MR_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 100 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="ISOBARIC LEVEL AT 70 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="ISOBARIC LEVEL AT 50 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ISOBARIC LEVEL AT 30 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="ISOBARIC LEVEL AT 20 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="ISOBARIC LEVEL AT 10 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_8
GROUP=GRID_9
      GridName="PRES_3"
```

```
XDim=360
YDim=181
UpperLeftPointMtrs=(-30000.000000,90030000.000000)
LowerRightMtrs=(359030000.000000,-90030000.000000)
Projection=GCTP_GEO
GridOrigin=HDFE_GD_UL
GROUP=Dimension
END_GROUP=Dimension
GROUP=DataField
      OBJECT=DataField_1
            DataFieldName="SURFACE OF EARTH"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_1
      OBJECT=DataField_2
            DataFieldName="TROPOPAUSE"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_2
      OBJECT=DataField_3
            DataFieldName="MAXIMUM WIND SPEED"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_3
      OBJECT=DataField_4
            DataFieldName="HIGH CLOUD TOP"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_4
      OBJECT=DataField_5
            DataFieldName="HIGH CLOUD BOTTOM"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_5
      OBJECT=DataField_6
            DataFieldName="MIDDLE CLOUD TOP"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_6
      OBJECT=DataField_7
            DataFieldName="MIDDLE CLOUD BOTTOM"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_7
      OBJECT=DataField_8
            DataFieldName="LOW CLOUD TOP"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_8
      OBJECT=DataField_9
            DataFieldName="LOW CLOUD BOTTOM"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_9
      OBJECT=DataField_10
            DataFieldName="CONVECTIVE CLOUD TOP"
            DataType=DFNT_FLOAT32
            DimList=("YDim","XDim")
      END_OBJECT=DataField_10
      OBJECT=DataField_11
            DataFieldName="CONVECTIVE CLOUD BOTTOM"
```

```
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_11
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_9
GROUP=GRID_10
      GridName="P WAT_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_10
GROUP=GRID_11
      GridName="VW SH_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="TROPOPAUSE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_11
GROUP=GRID_12
      GridName="LFT X_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
```

```
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_12
      GROUP=GRID_13
            GridName="CAPE_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 180
(hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_13
      GROUP=GRID_14
            GridName="CIN_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="PRES DIFF FROM GROUND LAYER BETWEEN 180
(hPa) AND 0 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_14
      GROUP=GRID_15
            GridName="4LFTX_3"
            XDim=360
```

```
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_15
GROUP=GRID_16
      GridName="PRMSL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="MEAN SEA LEVEL"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_16
GROUP=GRID_17
      GridName="POT_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SIGMA LEVEL AT 9950 (1/10000)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_17
GROUP=GRID_18
      GridName="TOZNE_3"
      XDim=360
      YDim=181
```

```
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_18
GROUP=GRID_19
      GridName="5WAVH_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_19
GROUP=GRID_20
      GridName="U FLX_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_20
GROUP=GRID_21
      GridName="V FLX_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
```

```
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_21
GROUP=GRID_22
      GridName="SHTFL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_22
GROUP=GRID_23
      GridName="LHTFL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_23
GROUP=GRID_24
      GridName="SOILW_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
```

```
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="DEPTH BELOW LAND SURF LAYER BETWEEN 0
(cm) AND 10 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="DEPTH BELOW LAND SURF LAYER BETWEEN 10
(cm) AND 200 (cm)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_24
      GROUP=GRID_25
            GridName="WEASD_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_25
      GROUP=GRID_26
            GridName="DLWRF_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_26
```

```
GROUP=GRID_27
      GridName="ULWRF_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="TOP OF ATMOSPHERE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_27
GROUP=GRID_28
      GridName="USWRF_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="TOP OF ATMOSPHERE"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_28
GROUP=GRID_29
      GridName="DSWRF_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
```

```
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_29
GROUP=GRID_30
      GridName="T CDC_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="HIGH CLOUD"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
            OBJECT=DataField_2
                  DataFieldName="MIDDLE CLOUD"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_2
            OBJECT=DataField_3
                  DataFieldName="LOW CLOUD"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_3
            OBJECT=DataField_4
                  DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_4
            OBJECT=DataField_5
                  DataFieldName="CONVECTIVE CLOUD"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_5
            OBJECT=DataField_6
                  DataFieldName="BOUNDARY LAYER CLOUD"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_6
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_30
GROUP=GRID_31
      GridName="A PCP_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
```

```
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_31
GROUP=GRID_32
      GridName="ACPCP_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_32
GROUP=GRID_33
      GridName="GFLUX_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_33
GROUP=GRID_34
      GridName="LAND_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
```

```
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_34
      GROUP=GRID_35
            GridName="ICE C_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_35
      GROUP=GRID_36
            GridName="SPF H_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_36
      GROUP=GRID_37
            GridName="T MAX_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
```

```
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_37
      GROUP=GRID_38
            GridName="T MIN_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="FIXED HEIGHT ABOVE GROUND LEVEL AT 2
(meters)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_38
      GROUP=GRID_39
            GridName="WATR_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="SURFACE OF EARTH"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_39
      GROUP=GRID_40
            GridName="PEVPR_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
```

```
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_40
GROUP=GRID_41
      GridName="CWORK_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_41
GROUP=GRID_42
      GridName="U-GWD_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_42
GROUP=GRID_43
      GridName="V-GWD_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
```

```
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_43
GROUP=GRID_44
      GridName="HPBL_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_44
GROUP=GRID_45
      GridName="ALBDO_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
      END_GROUP=Dimension
      GROUP=DataField
            OBJECT=DataField_1
                  DataFieldName="SURFACE OF EARTH"
                  DataType=DFNT_FLOAT32
                  DimList=("YDim","XDim")
            END_OBJECT=DataField_1
      END_GROUP=DataField
      GROUP=MergedFields
      END_GROUP=MergedFields
END_GROUP=GRID_45
GROUP=GRID_46
      GridName="GP A_3"
      XDim=360
      YDim=181
      UpperLeftPointMtrs=(-30000.000000,90030000.000000)
      LowerRightMtrs=(359030000.000000,-90030000.000000)
      Projection=GCTP_GEO
      GridOrigin=HDFE_GD_UL
      GROUP=Dimension
```

```
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 1000 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
                  OBJECT=DataField_2
                        DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_2
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_46
      GROUP=GRID_47
            GridName="5WAVA_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ISOBARIC LEVEL AT 500 (hPa)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_47
END_GROUP=GridStructure
GROUP=PointStructure
END_GROUP=PointStructure
END
```

Appendix C. TOVS Daily OZONE Ancillary Product Example Metadata

```
GROUP                  = INVENTORYMETADATA
  GROUPTYPE            = MASTERGROUP

  GROUP                  = ECSDATAGRANULE

    OBJECT                 = PRODUCTIONDATETIME
      NUM_VAL              = 1
      VALUE                = "2000-04-03T13:50:11.000Z"
    END_OBJECT             = PRODUCTIONDATETIME

  END_GROUP              = ECSDATAGRANULE

  GROUP                  = COLLECTIONDESCRIPTIONCLASS

    OBJECT                 = VERSIONID
      NUM_VAL              = 1
      VALUE                = 1
    END_OBJECT             = VERSIONID

    OBJECT                 = SHORTNAME
      NUM_VAL              = 1
      VALUE                = "OZ_DLYH"
    END_OBJECT             = SHORTNAME

  END_GROUP              = COLLECTIONDESCRIPTIONCLASS

  GROUP                  = SPATIALDOMAINCONTAINER

    GROUP                  = HORIZONTALSPATIALDOMAINCONTAINER

      GROUP                  = BOUNDINGRECTANGLE

        OBJECT                 = EASTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = 180.000000
        END_OBJECT             = EASTBOUNDINGCOORDINATE

        OBJECT                 = WESTBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = -180.000000
        END_OBJECT             = WESTBOUNDINGCOORDINATE

        OBJECT                 = SOUTHBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = -90.000000
        END_OBJECT             = SOUTHBOUNDINGCOORDINATE

        OBJECT                 = NORTHBOUNDINGCOORDINATE
          NUM_VAL              = 1
          VALUE                = 90.000000
        END_OBJECT             = NORTHBOUNDINGCOORDINATE

      END_GROUP              = BOUNDINGRECTANGLE
```

```
    END_GROUP              = HORIZONTALSPATIALDOMAINCONTAINER

  END_GROUP              = SPATIALDOMAINCONTAINER

  GROUP                  = SINGLEDATETIME

    OBJECT                 = TIMEOFDAY
      NUM_VAL              = 1
      VALUE                = "12:00:00.0"
    END_OBJECT             = TIMEOFDAY

    OBJECT                 = CALENDARDATE
      NUM_VAL              = 1
      VALUE                = "2000-03-30"
    END_OBJECT             = CALENDARDATE

  END_GROUP              = SINGLEDATETIME

END_GROUP              = INVENTORYMETADATA

END


GROUP=SwathStructure
END_GROUP=SwathStructure
GROUP=GridStructure
      GROUP=GRID_1
            GridName="TOZNE_3"
            XDim=360
            YDim=181
            UpperLeftPointMtrs=(-30000.000000,90030000.000000)
            LowerRightMtrs=(359030000.000000,-90030000.000000)
            Projection=GCTP_GEO
            GridOrigin=HDFE_GD_UL
            GROUP=Dimension
            END_GROUP=Dimension
            GROUP=DataField
                  OBJECT=DataField_1
                        DataFieldName="ENTIRE ATMOSPHERE (SINGLE LAYER)"
                        DataType=DFNT_FLOAT32
                        DimList=("YDim","XDim")
                  END_OBJECT=DataField_1
            END_GROUP=DataField
            GROUP=MergedFields
            END_GROUP=MergedFields
      END_GROUP=GRID_1
END_GROUP=GridStructure
GROUP=PointStructure
END_GROUP=PointStructure
END
```

Appendix D. PREPQC Ancillary Product Example Metadata

```
GROUP=SwathStructure
END_GROUP=SwathStructure
GROUP=GridStructure
END_GROUP=GridStructure
GROUP=PointStructure
      GROUP=POINT_1
            PointName="ADPUPA"
            GROUP=Level
                  GROUP=Level_0
                        LevelName="GeolocationData"
                        OBJECT=PointField_1
                              PointFieldName="SID"
                              DataType=DFNT_CHAR8
                              Order=8
                        END_OBJECT=PointField_1
                        OBJECT=PointField_2
                              PointFieldName="XOB"
                              DataType=DFNT_FLOAT32
                              Order=1
                        END_OBJECT=PointField_2
                        OBJECT=PointField_3
                              PointFieldName="YOB"
                              DataType=DFNT_FLOAT32
                              Order=1
                        END_OBJECT=PointField_3
                        OBJECT=PointField_4
                              PointFieldName="DHR"
                              DataType=DFNT_FLOAT32
                              Order=1
                        END_OBJECT=PointField_4
                        OBJECT=PointField_5
                              PointFieldName="ELV"
                              DataType=DFNT_FLOAT32
                              Order=1
                        END_OBJECT=PointField_5
                        OBJECT=PointField_6
                              PointFieldName="TYP"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_6
                        OBJECT=PointField_7
                              PointFieldName="T29"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_7
                        OBJECT=PointField_8
                              PointFieldName="TSB"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_8
                        OBJECT=PointField_9
                              PointFieldName="ITP"
                              DataType=DFNT_INT32
```

```
            Order=1
      END_OBJECT=PointField_9
      OBJECT=PointField_10
            PointFieldName="SQN"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_10
      OBJECT=PointField_11
            PointFieldName="RQM"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_11
      OBJECT=PointField_12
            PointFieldName="DUP"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_12
      OBJECT=PointField_13
            PointFieldName="SIRC"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_13
      OBJECT=PointField_14
            PointFieldName="NLEVEL"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_14
      OBJECT=PointField_15
            PointFieldName="LINKID"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_15
END_GROUP=Level_0
GROUP=Level_1
      LevelName="PressureWater"
      OBJECT=PointField_1
            PointFieldName="POB"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_1
      OBJECT=PointField_2
            PointFieldName="QOB"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_2
      OBJECT=PointField_3
            PointFieldName="QOE"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_3
      OBJECT=PointField_4
            PointFieldName="CAT"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_4
      OBJECT=PointField_5
            PointFieldName="PQM"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_5
      OBJECT=PointField_6
```

```
            PointFieldName="PPC"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_6
      OBJECT=PointField_7
            PointFieldName="PRC"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_7
      OBJECT=PointField_8
            PointFieldName="QQM"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_8
      OBJECT=PointField_9
            PointFieldName="QPC"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_9
      OBJECT=PointField_10
            PointFieldName="QRC"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_10
      OBJECT=PointField_11
            PointFieldName="LINKID"
            DataType=DFNT_INT32
            Order=1
      END_OBJECT=PointField_11
END_GROUP=Level_1
GROUP=Level_2
      LevelName="HeightTemperature"
      OBJECT=PointField_1
            PointFieldName="ZOB"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_1
      OBJECT=PointField_2
            PointFieldName="ZOE"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_2
      OBJECT=PointField_3
            PointFieldName="TDO"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_3
      OBJECT=PointField_4
            PointFieldName="TOB"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_4
      OBJECT=PointField_5
            PointFieldName="TOE"
            DataType=DFNT_FLOAT32
            Order=1
      END_OBJECT=PointField_5
      OBJECT=PointField_6
            PointFieldName="ZQM"
            DataType=DFNT_INT32
            Order=1
```

```
                        END_OBJECT=PointField_6
                        OBJECT=PointField_7
                              PointFieldName="ZPC"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_7
                        OBJECT=PointField_8
                              PointFieldName="ZRC"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_8
                        OBJECT=PointField_9
                              PointFieldName="TQM"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_9
                        OBJECT=PointField_10
                              PointFieldName="TPC"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_10
                        OBJECT=PointField_11
                              PointFieldName="TRC"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_11
                        OBJECT=PointField_12
                              PointFieldName="LINKID"
                              DataType=DFNT_INT32
                              Order=1
                        END_OBJECT=PointField_12
                  END_GROUP=Level_2
            END_GROUP=Level
            GROUP=LevelLink
                  OBJECT=LevelLink_1
                        Parent="PressureWater"
                        Child="HeightTemperature"
                        LinkField="LINKID"
                  END_OBJECT=LevelLink_1
                  OBJECT=LevelLink_2
                        Parent="GeolocationData"
                        Child="PressureWater"
                        LinkField="LINKID"
                  END_OBJECT=LevelLink_2
            END_GROUP=LevelLink
      END_GROUP=POINT_1
END_GROUP=PointStructure
END


GROUP                   = INVENTORYMETADATA
  GROUPTYPE             = MASTERGROUP

  GROUP                   = ECSDATAGRANULE

    OBJECT                  = PRODUCTIONDATETIME
      NUM_VAL               = 1
      VALUE                 = "2001-04-04T21:20:18.000Z"
    END_OBJECT              = PRODUCTIONDATETIME

  END_GROUP               = ECSDATAGRANULE
```

```
GROUP                  = COLLECTIONDESCRIPTIONCLASS

  OBJECT                 = VERSIONID
    NUM_VAL              = 1
    VALUE                = 1
  END_OBJECT             = VERSIONID

  OBJECT                 = SHORTNAME
    NUM_VAL              = 1
    VALUE                = "PREPQCH"
  END_OBJECT             = SHORTNAME

END_GROUP              = COLLECTIONDESCRIPTIONCLASS

GROUP                  = SPATIALDOMAINCONTAINER

  GROUP                  = HORIZONTALSPATIALDOMAINCONTAINER

    GROUP                  = BOUNDINGRECTANGLE

      OBJECT                 = EASTBOUNDINGCOORDINATE
        NUM_VAL              = 1
        VALUE                = 180.000000
      END_OBJECT             = EASTBOUNDINGCOORDINATE

      OBJECT                 = WESTBOUNDINGCOORDINATE
        NUM_VAL              = 1
        VALUE                = -180.000000
      END_OBJECT             = WESTBOUNDINGCOORDINATE

      OBJECT                 = SOUTHBOUNDINGCOORDINATE
        NUM_VAL              = 1
        VALUE                = -90.000000
      END_OBJECT             = SOUTHBOUNDINGCOORDINATE

      OBJECT                 = NORTHBOUNDINGCOORDINATE
        NUM_VAL              = 1
        VALUE                = 90.000000
      END_OBJECT             = NORTHBOUNDINGCOORDINATE

    END_GROUP              = BOUNDINGRECTANGLE

  END_GROUP              = HORIZONTALSPATIALDOMAINCONTAINER

END_GROUP              = SPATIALDOMAINCONTAINER

GROUP                  = SINGLEDATETIME

  OBJECT                 = TIMEOFDAY
    NUM_VAL              = 1
    VALUE                = "00:00:00.00Z"
  END_OBJECT             = TIMEOFDAY

  OBJECT                 = CALENDARDATE
    NUM_VAL              = 1
    VALUE                = "2000-12-05"
  END_OBJECT             = CALENDARDATE

END_GROUP              = SINGLEDATETIME
```

```
END_GROUP               = INVENTORYMETADATA

END


GROUP                   = ARCHIVEDMETADATA
  GROUPTYPE             = MASTERGROUP

  OBJECT                  = OBSERVATION
    NUM_VAL               = 1
    VALUE                 = "T"
  END_OBJECT              = OBSERVATION

  OBJECT                  = COMPRESSION
    NUM_VAL               = 1
    VALUE                 = "F"
  END_OBJECT              = COMPRESSION

  OBJECT                  = BUFR_MASTER_TABLE
    NUM_VAL               = 1
    VALUE                 = 0
  END_OBJECT              = BUFR_MASTER_TABLE

  OBJECT                  = ORIGINATING_CENTER
    NUM_VAL               = 1
    VALUE                 = 7
  END_OBJECT              = ORIGINATING_CENTER

  OBJECT                  = UPDATE_SEQUENCE_NUMBER
    NUM_VAL               = 1
    VALUE                 = 0
  END_OBJECT              = UPDATE_SEQUENCE_NUMBER

  OBJECT                  = DATA_CATEGORY_TYPE
    NUM_VAL               = 1
    VALUE                 = 240
  END_OBJECT              = DATA_CATEGORY_TYPE

  OBJECT                  = DATA_CATEGORY_SUBTYPE
    NUM_VAL               = 1
    VALUE                 = 0
  END_OBJECT              = DATA_CATEGORY_SUBTYPE

  OBJECT                  = MASTER_TABLE_VERSION
    NUM_VAL               = 1
    VALUE                 = 4
  END_OBJECT              = MASTER_TABLE_VERSION

  OBJECT                  = LOCAL_TABLE_VERSION
    NUM_VAL               = 1
    VALUE                 = 0
  END_OBJECT              = LOCAL_TABLE_VERSION

  OBJECT                  = YEAR_OF_CENTURY
    NUM_VAL               = 1
    VALUE                 = 100
  END_OBJECT              = YEAR_OF_CENTURY

  OBJECT                  = MONTH
    NUM_VAL               = 1
    VALUE                 = 12
```

```
  END_OBJECT             = MONTH

  OBJECT                 = DAY
    NUM_VAL              = 1
    VALUE                = 5
  END_OBJECT             = DAY

  OBJECT                 = HOUR
    NUM_VAL              = 1
    VALUE                = 0
  END_OBJECT             = HOUR

  OBJECT                 = MINUTE
    NUM_VAL              = 1
    VALUE                = 0
  END_OBJECT             = MINUTE

END_GROUP              = ARCHIVEDMETADATA

END
```

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Appendix E. Sample Program to Access HDF-EOS Grid Data

The example programs contained in this appendix reads a HDF-EOS grid data file that contains three V-groups: UTMGrid, PolarGrid and GeoGrid respectively.

UTMGrid

Fields	Datatype	Dimension list
Pollution	float32	Time(10), Ydim(200), Xdim(120)
Vegetation	float32	Ydim(200), Xdim(120)
Extern	float32	Ydim(200), Xdim(120)

PolarGrid

Fields	Datatype	Dimension list
Temperature	float32	Ydim(100), Xdim(100)
Pressure	float32	Ydim(100), Xdim(100)
Soil Dryness	float32	Ydim(100), Xdim(100)
Spectra	float32	Bands(3), Ydim(100), Xdim(100)

GeoGrid

Fields	Datatype	Dimension list
Empty	Empty	Empty

```
#include "hdf.h"
#include "HdfEosDef.h"

/*
 * In this example we will retrieve (1) information about the
dimensions,
 * (2) the dimension mappings (geolocation relations), and (3) the grid
 * fields.
 */


main()
{

    intn            status, i;
    int32           gdfid, GDid1, ndim, nmap, nfld, rk, nt, nflds;
    int32           dims[32], rank[32], ntype[32];
    int32           n, strbufsize, sizes[16], GDid2;
    int32           xdimsize, ydimsize, dimsize, projcode, zonecode;
    int32           spherecode;

    float64         upleftpt[2], lowrightpt[2], projparm[16];

    char            dimname[1024], fieldlist[1024];


    /*
     * Open the Grid File for read only access
     */

    gdfid = GDopen("GridFile.hdf", DFACC_READ);


    if (gdfid != -1)
    {

      /* Attach to the grids in the file */
        /* ============================== */
      GDid1 = GDattach(gdfid, "UTMGrid");
      GDid2 = GDattach(gdfid, "PolarGrid");

        /* Get list of dimensions in UTMGrid Grid */
        /* ====================================== */
      ndim = GDinqdims(GDid1, dimname, dims);
      printf("Dimension list (UTMGrid): %s\n", dimname);
      for (i=0;i<ndim;i++) printf("dim size: %d\n", dims[i]);

        /* Get list of dimensions in PolarGrid Grid */
        /* ======================================== */
      ndim = GDinqdims(GDid2, dimname, dims);
      printf("Dimension list (PolarGrid): %s\n", dimname);
      for (i=0;i<ndim;i++) printf("dim size: %d\n", dims[i]);

        /* Get size of dimension Time */
        /* ========================== */
      dimsize = GDdiminfo(GDid1, "Time");
      printf("Size of \"Time\" Array: %d\n", dimsize);

        /* Get size of dimension Bands */
        /* =========================== */
      dimsize = GDdiminfo(GDid2, "Bands");
```

```
      printf("Size of \"Bands\" Array: %d\n", dimsize);


      /* Get the size of the Grid and the upper left and */
        /* lower right coordinates of the Grid
        /* ============================================== */
      status = GDgridinfo(GDid1, &xdimsize, &ydimsize,
                      upleftpt, lowrightpt);
      printf("X dim size, Y dim size (UTMGrid): %d %d\n",
             xdimsize, ydimsize);
      printf("Up left pt (UTMGrid): %lf %lf\n",
             upleftpt[0], upleftpt[1]);
      printf("Low right pt (UTMGrid): %lf %lf\n",
             lowrightpt[0], lowrightpt[1]);

      /* Get the size of the Grid and the upper left and */
        /* lower right coordinates of the Grid
        /* ============================================== */
      status = GDgridinfo(GDid2, &xdimsize, &ydimsize,
                      upleftpt, lowrightpt);
      printf("X dim size, Y dim size (PolarGrid): %d %d\n",
             xdimsize, ydimsize);
      printf("Up left pt (PolarGrid): %lf %lf\n",
             upleftpt[0], upleftpt[1]);
      printf("Low right pt (PolarGrid): %lf %lf\n",
             lowrightpt[0], lowrightpt[1]);


      /* Get the projection parameters of the Grid and */
        /* other appropriate projection parameters       */
        /* ============================================= */
      status = GDprojinfo(GDid1, &projcode, &zonecode,
                      &spherecode, NULL);
      printf("projcode , zonecode (UTMGrid): %d %d\n", projcode,
zonecode);
      printf("spherecode (UTMGrid): %d\n", spherecode);


      /* Get the projection parameters of the Grid and */
        /* other appropriate projection parameters       */
        /* ============================================= */
      status = GDprojinfo(GDid2, &projcode, NULL,
                      &spherecode, projparm);
      printf("projcode (PolarGrid): %d\n", projcode);
      printf("spherecode (PolarGrid): %d\n", spherecode);
      for (i=0; i<13; i++)
          printf("Projection Parameter: %d %lf\n",i,projparm[i]);

        /* Get list of fields in Grid */
        /* ========================== */
      nflds = GDinqfields(GDid1, fieldlist, rank, ntype);
      if (nflds != 0)
      {
          printf("Data fields (UTMGrid): %s\n", fieldlist);
          for (i=0;i<nflds;i++)
            printf("rank type: %d %d\n",rank[i],ntype[i]);
      }

        /* Get list of fields in Grid */
        /* ========================== */
      nflds = GDinqfields(GDid2, fieldlist, rank, ntype);
```

```
      if (nflds != 0)
      {
          printf("Data fields (PolarGrid): %s\n", fieldlist);
          for (i=0;i<nflds;i++)
            printf("rank type: %d %d\n",rank[i],ntype[i]);
      }

      /* Get information for field Spectra */
        /* ================================= */
      status = GDfieldinfo(GDid2, "Spectra", rank,
                       dims, ntype, dimname);
      printf("Spectra rank dims: %d\n",rank[0]);
      for (i=0; i<rank[0]; i++)
          printf("Spectra dims: %d %d\n",i,dims[i]);
      printf("Spectra dims: %s\n", dimname);

      /* Get number of dimensions and length of dimension */
        /* list in Grid                                    */
        /* ================================================ */
      n = GDnentries(GDid1, HDFE_NENTDIM, &strbufsize);
      printf("Number of dimension entries (UTMGrid): %d\n", n);
      printf("Length of Dimension List (UTMGrid): %d\n", strbufsize);

        /* Get the number of data fields and length of field */
        /* list in Grid                                      */
        /* ================================================= */
      n = GDnentries(GDid1, HDFE_NENTDFLD, &strbufsize);
      printf("Number of data fields (UTMGrid): %d\n", n);
      printf("Length of Field List (UTMGrid): %d\n", strbufsize);

    }
    status = GDdetach(GDid1);
    status = GDdetach(GDid2);
    status = GDclose(gdfid);

    return;
}
```

```
#include "hdf.h"


/*
 * In this example we will (1) open the "GridFile" HDF file, (2) attach
to
 * the "UTMGrid", and (3) read data from the "Vegetation" field.
 */


main()
{

    intn            i, j, status;

    int32           gdfid, GDid;

    float32         f32=1.0;
    float32         veg[200][120];


    /*
     * Open the HDF grid file, "GridFile.hdf".
     */

    gdfid = GDopen("GridFile.hdf", DFACC_RDWR);


    if (gdfid != -1)
    {

      /*
       * Attach the "UTMGrid".
       */

      GDid = GDattach(gdfid, "UTMGrid");

      if (GDid != -1)
      {
        status = GDreadfield(GDid, "Vegetation",
                        NULL, NULL, NULL, veg);

          status = GDreadattr(GDid, "float32", &f32);

      }
    }

    GDdetach(GDid);

    GDclose(gdfid);

    return;
}
```

```
#include "hdf.h"
#include <math.h>

/*
 * In this example we will (1) open the "GridFile" HDF file, (2) attach
to
 * the "PolarGrid", and (3) subset data from the "Temperature" field.
 */


main()
{

    intn            i, j, status;

    int32           gdfid, GDid, regionID, size, dims[8], ntype, rank;

    float32        *datbuf32;

    float64         cornerlon[2], cornerlat[2];
    float64        *datbuf64, upleft[2], lowright[2];



    /*
     * Open the HDF grid file, "GridFile.hdf".
     */

    gdfid = GDopen("GridFile.hdf", DFACC_RDWR);


    if (gdfid != -1)
    {

      GDid = GDattach(gdfid, "PolarGrid");

      if (GDid != -1)
      {
          cornerlon[0] = 57.;
          cornerlat[0] = 23.;
          cornerlon[1] = 59.;
          cornerlat[1] = 35.;

          cornerlon[0] = 0.;
          cornerlat[0] = 90.;
          cornerlon[1] = 90.;
          cornerlat[1] = 0.;


          regionID = GDdefboxregion(GDid, cornerlon, cornerlat);

          status = GDregioninfo(GDid, regionID, "Temperature", &ntype,
                          &rank, dims, &size, upleft, lowright);
          printf("size: %d\n",size);

          datbuf32 = (float32 *) calloc(size, 1);

          status = GDextractregion(GDid, regionID, "Temperature",
                              datbuf32);

          free(datbuf32);
```

```
      }
    }

    GDdetach(GDid);

    GDclose(gdfid);

    return;
}
```

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Appendix F. BUFR User Definition Tables

USER DEFINITIONS FOR TABLE-A TABLE-B TABLE D		
MNEMONIC	NUMBER	DESCRIPTION
ADPUPA	A60240	TABLE A ENTRY - UPPER-AIR (RAOB, PIBAL, RECCO) REPORTS
AIRCAR	A60241	TABLE A ENTRY - ACARS AIRCRAFT REPORTS
AIRCFT	A60242	TABLE A ENTRY - CONV'L(AIREP/PIREP) AND ASDAR ACFT RPTS
SATWND	A60243	TABLE A ENTRY - SATELLITE WIND REPORTS
PROFLR	A60244	TABLE A ENTRY - WIND PROFILER REPORTS
VADWND	A60245	TABLE A ENTRY - VAD (NEXRAD) WIND REPORTS
SATBOG	A60246	TABLE A ENTRY - SATELLITE MOISTURE BOGUS REPORTS
SATEMP	A60247	TABLE A ENTRY - TOVS SATELLITE SNDGS/RETR./RADIANCES
ADPSFC	A60248	TABLE A ENTRY - SURFACE LAND (SYNOPTIC/AIRWAYS) REPORTS
SFCSHP	A60249	TABLE A ENTRY - SURFACE MARINE(SHIP/BUOY/PLATFORM) RPTS
SFCBOG	A60250	TABLE A ENTRY - MEAN SEA-LEVEL PRESSURE BOGUS REPORTS
SPSSMI	A60251	TABLE A ENTRY - SSM/I (SUPEROBED) RETRIEVALS
SYNDAT	A60252	TABLE A ENTRY - SYNTHETIC BOGUS REPORTS
ERS1DA	A60253	TABLE A ENTRY - ERS SCATTEROMETER DATA
GOESND	A60254	TABLE A ENTRY - GOES SATELLITE SNDGS/RETR./RADIANCES
HEADR	361001	TABLE D ENTRY - REPORT HEADER SEQUENCE
PLEVL	361002	TABLE D ENTRY - PRESSURE LEVEL SEQUENCE
PMSL	361003	TABLE D ENTRY - MEAN SEA LEVEL PRESSURE SEQUENCE
BTLEVL	361004	TABLE D ENTRY - BRIGHTNESS TEMPERATURE "LEVEL" SEQUENCE
PINFO	362001	TABLE D ENTRY - PRESSURE INFORMATION
QINFO	362002	TABLE D ENTRY - SPECIFIC HUMIDITY INFORMATION
TINFO	362003	TABLE D ENTRY - TEMPERATURE INFORMATION
ZINFO	362004	TABLE D ENTRY - HEIGHT INFORMATION
WINFO	362005	TABLE D ENTRY - WIND INFORMATION
PWINFO	362006	TABLE D ENTRY - PRECIPITABLE WATER INFORMATION
PWTINF	362007	TABLE D ENTRY - TOTAL PRECIPITABLE WATER INFORMATION
PWLINF	362008	TABLE D ENTRY - LAYER PRECIPITABLE WATER INFORMATION
PW1INF	362009	TABLE D ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER INFO
PW2INF	362010	TABLE D ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER INFO
PW3INF	362011	TABLE D ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER INFO
PW4INF	362012	TABLE D ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER INFO
RHINFO	362013	TABLE D ENTRY - RELATIVE HUMIDITY INFORMATION
BTINFO	362014	TABLE D ENTRY - TOVS BRIGHTNESS TEMPERATURE INFORMATION
SCINFO	362015	TABLE D ENTRY - SCATTEROMETER DATA INFORMATION
PEVN	362101	TABLE D ENTRY - PRESSURE EVENT SEQUENCE
QEVN	362102	TABLE D ENTRY - SPECIFIC HUMIDITY EVENT SEQUENCE
TEVN	362103	TABLE D ENTRY - TEMPERATURE EVENT SEQUENCE
ZEVN	362104	TABLE D ENTRY - HEIGHT EVENT SEQUENCE
WEVN	362105	TABLE D ENTRY - WIND EVENT SEQUENCE
DFEVN	362106	TABLE D ENTRY - WIND (DIR/SPD) EVENT SEQUENCE
PWTEVN	362107	TABLE D ENTRY - TOTAL PRECIP. WATER EVENT SEQUENCE
PW1EVN	362108	TABLE D ENTRY - 1. TO .9 PRECIP. WATER EVENT SEQUENCE
PW2EVN	362109	TABLE D ENTRY - .9 TO .7 PRECIP. WATER EVENT SEQUENCE
PW3EVN	362110	TABLE D ENTRY - .7 TO .3 PRECIP. WATER EVENT SEQUENCE
PW4EVN	362111	TABLE D ENTRY - .3 TO .0 PRECIP. WATER EVENT SEQUENCE
RHEVN	362112	TABLE D ENTRY - RELATIVE HUMIDITY EVENT SEQUENCE
PBAK	362201	TABLE D ENTRY - PRESSURE BACKGROUND SEQUENCE
QBAK	362202	TABLE D ENTRY - SPECIFIC HUMIDITY BACKGROUND SEQUENCE
TBAK	362203	TABLE D ENTRY - TEMPERATURE BACKGROUND SEQUENCE
ZBAK	362204	TABLE D ENTRY - HEIGHT BACKGROUND SEQUENCE
WBAK	362205	TABLE D ENTRY - WIND BACKGROUND SEQUENCE
PWTBA	362206	TABLE D ENTRY - TOTAL PRECIP. WATER BACKGROUND SEQUENCE
PW1BA	362207	TABLE D ENTRY - 1. TO .9 SIGMA LAYER P. WATER BCK SEQ.
PW2BA	362208	TABLE D ENTRY - .9 TO .7 SIGMA LAYER P. WATER BCK SEQ.
PW3BA	362209	TABLE D ENTRY - .7 TO .3 SIGMA LAYER P. WATER BCK SEQ.
PW4BA	362210	TABLE D ENTRY - .3 TO .0 SIGMA LAYER P. WATER BCK SEQ.

RHBA	362211	TABLE D ENTRY - RELATIVE HUMIDITY BACKGROUND SEQUENCE
PREPRO	363001	TABLE D ENTRY - DATA PREPROCESSOR PROGRAM EVENTS CODE
SYNDATA	363002	TABLE D ENTRY - SYNDATA PROGRAM EVENTS CODE
CLIMO	363003	TABLE D ENTRY - CLIMO PROGRAM EVENTS CODE
PREVENT	363004	TABLE D ENTRY - PRE-EVENT PROGRAM EVENTS CODE
CQCHT	363005	TABLE D ENTRY - CQC RADIOSONDE HGHT/TEMP PGM EVENTS CODE
RADCOR	363006	TABLE D ENTRY - RADIATION CORRECTION PROGRAM EVENTS CODE
PREPACQC	363007	TABLE D ENTRY - AIRCRAFT QUAL. CNTRL. PGM EVENTS CODE
VIRTMP	363008	TABLE D ENTRY - VIRTMP PROGRAM EVENTS CODE
CQCPROF	363009	TABLE D ENTRY - CQC WIND PROFILER PROGRAM EVENTS CODE
OIQC	363010	TABLE D ENTRY - OIQC PROGRAM EVENTS CODE
SSI	363011	TABLE D ENTRY - SSI ANALYSIS PROGRAM EVENTS CODE
SID	001192	TABLE B ENTRY - STATION IDENTIFICATION
TYP	001193	TABLE B ENTRY - OI/SSI REPORT TYPE
CAT	001194	TABLE B ENTRY - NMC OFFICE NOTE 29 CATEGORY
RQM	001195	TABLE B ENTRY - REPORT QUALITY MARK
DUP	001196	TABLE B ENTRY - MESSAGE NUMBER OF DUPLICATE
PRG	001197	TABLE B ENTRY - TRANSLATOR PROGRAM NAME
SRC	001198	TABLE B ENTRY - FILE NAME OF DATA SOURCE
RUD	001199	TABLE B ENTRY - RUN DATE OF TRANSLATE PROGRAM
ITP	002001	TABLE B ENTRY - INSTRUMENT TYPE
DHR	004192	TABLE B ENTRY - OBSERVATION TIME MINUS CYCLE TIME
RCT	004193	TABLE B ENTRY - RECEIPT TIME
YOB	005002	TABLE B ENTRY - LATITUDE
XOB	006002	TABLE B ENTRY - LONGITUDE
SQN	050001	TABLE B ENTRY - REPORT SEQUENCE NUMBER
T29	055006	TABLE B ENTRY - NMC OFFICE NOTE 29 REPORT TYPE
TSB	055192	TABLE B ENTRY - REPORT SUB-TYPE
POB	007192	TABLE B ENTRY - PRESSURE OBSERVATION
PQM	007193	TABLE B ENTRY - PRESSURE (QUALITY) MARKER
PPC	007194	TABLE B ENTRY - PRESSURE PROGRAM CODE
PRC	007195	TABLE B ENTRY - PRESSURE REASON CODE
PFC	007196	TABLE B ENTRY - PRESSURE FORECAST VALUE
POE	007197	TABLE B ENTRY - PRESSURE OBSERVATION ERROR
PAN	007198	TABLE B ENTRY - PRESSURE ANALYSED VALUE
PCL	007199	TABLE B ENTRY - PRESSURE CLIMATOLOGY
PCS	007200	TABLE B ENTRY - PRESSURE CLIMATOLOGY SD
PMO	010192	TABLE B ENTRY - MEAN SEA-LEVEL PRESSURE OBSERVATION
PMQ	010193	TABLE B ENTRY - MEAN SEA-LVL PRESSURE (QUALITY) MARKER
ELV	010194	TABLE B ENTRY - STATION ELEVATION
ZOB	010195	TABLE B ENTRY - HEIGHT OBSERVATION
ZQM	010196	TABLE B ENTRY - HEIGHT (QUALITY) MARKER
ZPC	010197	TABLE B ENTRY - HEIGHT PROGRAM CODE
ZRC	010198	TABLE B ENTRY - HEIGHT REASON CODE
ZFC	010199	TABLE B ENTRY - HEIGHT FORECAST VALUE
ZAN	010200	TABLE B ENTRY - HEIGHT ANALYSED VALUE
ZOE	010201	TABLE B ENTRY - HEIGHT OBSERVATION ERROR
ZCL	010202	TABLE B ENTRY - HEIGHT CLIMATOLOGY
ZCS	010203	TABLE B ENTRY - HEIGHT CLIMATOLOGY SD
DDO	011001	TABLE B ENTRY - WIND DIRECTION OBSERVATION
UOB	011003	TABLE B ENTRY - U-COMPONENT WIND OBSERVATION
VOB	011004	TABLE B ENTRY - V-COMPONENT WIND OBSERVATION
FFO	011191	TABLE B ENTRY - WIND SPEED OBSERVATION
WQM	011192	TABLE B ENTRY - WIND (QUALITY) MARKER
WPC	011193	TABLE B ENTRY - WIND PROGRAM CODE
WRC	011194	TABLE B ENTRY - WIND REASON CODE
UFC	011195	TABLE B ENTRY - U-COMPONENT FORECAST VALUE
VFC	011196	TABLE B ENTRY - V-COMPONENT FORECAST VALUE
UAN	011197	TABLE B ENTRY - U-COMPONENT ANALYSED VALUE
VAN	011198	TABLE B ENTRY - V-COMPONENT ANALYSED VALUE
WOE	011199	TABLE B ENTRY - WIND OBSERVATION ERROR
UCL	011200	TABLE B ENTRY - U-COMPONENT CLIMATOLOGY
VCL	011201	TABLE B ENTRY - V-COMPONENT CLIMATOLOGY
UCS	011202	TABLE B ENTRY - U-COMPONENT CLIMATOLOGY SD
VCS	011203	TABLE B ENTRY - V-COMPONENT CLIMATOLOGY SD
DFQ	011204	TABLE B ENTRY - WIND (DIR/SPD) (QUALITY) MARKER
DFR	011205	TABLE B ENTRY - WIND (DIR/SPD) PROGRAM CODE
DFP	011206	TABLE B ENTRY - WIND (DIR/SPD) REASON CODE
TOB	012192	TABLE B ENTRY - REPORTED TEMPERATURE OBSERVATION LATER
		CHANGED TO VIRTUAL TEMP. BY PREVENTS EXCEPT FOR

		ADPUPA WHICH ARE CHANGED TO VIRTUAL TEMP. BY CQCHT
TVO	012193	TABLE B ENTRY - NON-QC'D VIRTUAL TEMPERATURE OBS.
TDO	012194	TABLE B ENTRY - DEWPOINT TEMPERATURE OBSERVATION
TQM	012195	TABLE B ENTRY - REPORTED TEMPERATURE (QUALITY) MARKER
TPC	012196	TABLE B ENTRY - REPORTED TEMPERATURE PROGRAM CODE
TRC	012197	TABLE B ENTRY - REPORTED TEMPERATURE REASON CODE
TFC	012198	TABLE B ENTRY - REPORTED TEMPERATURE FORECAST VALUE
TAN	012199	TABLE B ENTRY - REPORTED TEMPERATURE ANALYSED VALUE
TOE	012200	TABLE B ENTRY - REPORTED TEMPERATURE OBSERVATION ERROR
TCL	012201	TABLE B ENTRY - REPORTED TEMPERATURE CLIMATOLOGY
TCS	012202	TABLE B ENTRY - REPORTED TEMPERATURE CLIMATOLOGY SD
QOB	013192	TABLE B ENTRY - SPECIFIC HUMIDITY OBSERVATION
QQM	013193	TABLE B ENTRY - SPECIFIC HUMIDITY (QUALITY) MARKER
QPC	013194	TABLE B ENTRY - SPECIFIC HUMIDITY PROGRAM CODE
QRC	013195	TABLE B ENTRY - SPECIFIC HUMIDITY REASON CODE
QFC	013196	TABLE B ENTRY - SPECIFIC HUMIDITY FORECAST VALUE
QAN	013197	TABLE B ENTRY - SPECIFIC HUMIDITY ANALYSED VALUE
QOE	013198	TABLE B ENTRY - SPECIFIC HUMIDITY OBSERVATION ERROR
QCL	013199	TABLE B ENTRY - SPECIFIC HUMIDITY CLIMATOLOGY
QCS	013200	TABLE B ENTRY - SPECIFIC HUMIDITY CLIMATOLOGY SD
RHO	013201	TABLE B ENTRY - RELATIVE HUMIDITY OBSERVATION
RHQ	013202	TABLE B ENTRY - RELATIVE HUMIDITY (QUALITY) MARKER
RHP	013203	TABLE B ENTRY - RELATIVE HUMIDITY PROGRAM CODE
RHR	013204	TABLE B ENTRY - RELATIVE HUMIDITY REASON CODE
RHF	013205	TABLE B ENTRY - RELATIVE HUMIDITY FORECAST VALUE
RHA	013206	TABLE B ENTRY - RELATIVE HUMIDITY ANALYSED VALUE
RHE	013207	TABLE B ENTRY - RELATIVE HUMIDITY OBSERVATION ERROR
PWO	013208	TABLE B ENTRY - TOTAL PRECIPITABLE WATER OBSERVATION
PWQ	013209	TABLE B ENTRY - TOTAL PRECIP. WATER (QUALITY) MARKER
PWP	013210	TABLE B ENTRY - TOTAL PRECIPITABLE WATER PROGRAM CODE
PWR	013211	TABLE B ENTRY - TOTAL PRECIPITABLE WATER REASON CODE
PWF	013212	TABLE B ENTRY - TOTAL PRECIPITABLE WATER FORECAST VALUE
PWA	013213	TABLE B ENTRY - TOTAL PRECIPITABLE WATER ANALYSED VALUE
PWE	013214	TABLE B ENTRY - TOTAL PRECIP. WATER OBSERVATION ERROR
PW1O	013215	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER OBS.
PW1Q	013216	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER MARKER
PW1P	013217	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER P. CODE
PW1R	013218	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER R. CODE
PW1F	013219	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER FCST
PW1A	013220	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER ANAL
PW1E	013221	TABLE B ENTRY - 1.0 TO 0.9 SIGMA LAYER P. WATER OBS ERR
PW2O	013222	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER OBS.
PW2Q	013223	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER MARKER
PW2P	013224	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER P. CODE
PW2R	013225	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER R. CODE
PW2F	013226	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER FCST
PW2A	013227	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER ANAL
PW2E	013228	TABLE B ENTRY - 0.9 TO 0.7 SIGMA LAYER P. WATER OBS ERR
PW3O	013229	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER OBS.
PW3Q	013230	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER MARKER
PW3P	013231	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER P. CODE
PW3R	013232	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER R. CODE
PW3F	013233	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER FCST
PW3A	013234	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER ANAL
PW3E	013235	TABLE B ENTRY - 0.7 TO 0.3 SIGMA LAYER P. WATER OBS ERR
PW4O	013236	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER OBS.
PW4Q	013237	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER MARKER
PW4P	013238	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER P. CODE
PW4R	013239	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER R. CODE
PW4F	013240	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER FCST
PW4A	013241	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER ANAL
PW4E	013242	TABLE B ENTRY - 0.3 TO 0.0 SIGMA LAYER P. WATER OBS ERR
SOEL	007022	TABLE B ENTRY - SOLAR ELEVATION (ZENITH ANGLE)
SIDU	002021	TABLE B ENTRY - SAT. INSTR. USED (SSU AVAIL./TARM PATH)
OZON	015001	TABLE B ENTRY - OZONE
SALC	027020	TABLE B ENTRY - SATELLITE LOCATION COUNTER (NADIR)
TMSK	012061	TABLE B ENTRY - SKIN TEMPERATURE
CHNM	005042	TABLE B ENTRY - CHANNEL NUMBER
TMBR	012063	TABLE B ENTRY - BRIGHTNESS TEMPERATURE
A1	048001	TABLE B ENTRY - ERS INCIDENT ANGLE #1
A2	048002	TABLE B ENTRY - ERS INCIDENT ANGLE #2

A3	048003	TABLE B ENTRY - ERS INCIDENT ANGLE #3
B1	048004	TABLE B ENTRY - ERS AZIMUTH ANGLE #1
B2	048005	TABLE B ENTRY - ERS AZIMUTH ANGLE #2
B3	048006	TABLE B ENTRY - ERS AZIMUTH ANGLE #3
S1	048007	TABLE B ENTRY - ERS BACKSCATTER #1
S2	048008	TABLE B ENTRY - ERS BACKSCATTER #2
S3	048009	TABLE B ENTRY - ERS BACKSCATTER #3
E1	048010	TABLE B ENTRY - ERS ERROR ESTIMATE #1
E2	048011	TABLE B ENTRY - ERS ERROR ESTIMATE #2
E3	048012	TABLE B ENTRY - ERS ERROR ESTIMATE #3

MNEMONIC	SEQUENCE
ADPUPA	HEADR {PLEVL}
AIRCAR	HEADR PLEVL
AIRCFT	HEADR PLEVL RCT
SATWND	HEADR PLEVL
PROFLR	HEADR {PLEVL}
VADWND	HEADR {PLEVL}
SATBOG	HEADR {PLEVL}
SATEMP	HEADR {PLEVL} <BTINFO> {BTLEVL}
GOESND	HEADR {PLEVL} <BTINFO> {BTLEVL}
ADPSFC	HEADR PLEVL <PMSL>
SFCSHP	HEADR PLEVL <PMSL>
SFCBOG	HEADR PLEVL
SPSSMI	HEADR CAT <PINFO> <WINFO> <PWINFO> {BTLEVL}
SYNDAT	HEADR {PLEVL}
ERS1DA	HEADR CAT [PEVN] [ZINFO] [WINFO] SCINFO
HEADR	SID XOB YOB DHR ELV TYP T29 TSB ITP SQN RQM DUP PRG SRC RUD
PLEVL	CAT <PINFO> <QINFO> <TINFO> <ZINFO> <WINFO> <RHINFO> <PWINFO>
BTLEVL	CHNM TMBR
PINFO	[PEVN] <PBAK>
QINFO	[QEVN] <QBAK> QOE QFC TDO
TINFO	[TEVN] <TBAK> TOE TFC TVO
ZINFO	[ZEVN] <ZBAK> ZOE ZFC
WINFO	[WEVN] <WBAK> WOE UFC VFC [DFEVN]
RHINFO	[RHEVN] <RHBA> RHE RHF
PWINFO	<PWTINF> <PWLINF>
PWTINF	[PWTEVN] <PWTBA> PWE PWF
PWLINF	<PW1INF> <PW2INF> <PW3INF> <PW4INF>
PW1INF	[PW1EVN] <PW1BA> PW1E PW1F
PW2INF	[PW2EVN] <PW2BA> PW2E PW2F
PW3INF	[PW3EVN] <PW3BA> PW3E PW3F
PW4INF	[PW4EVN] <PW4BA> PW4E PW4F
BTINFO	SOEL SIDU OZON SALC TMSK
SCINFO	A1 A2 A3 B1 B2 B3 S1 S2 S3 E1 E2 E3
PMSL	PMO PMQ
PEVN	POB PQM PPC PRC
QEVN	QOB QQM QPC QRC
TEVN	TOB TQM TPC TRC
ZEVN	ZOB ZQM ZPC ZRC
WEVN	UOB WQM WPC WRC VOB
DFEVN	DDO FFO DFQ DFR DFP
PWTEVN	PWO PWQ PWP PWR
PW1EVN	PW1O PW1Q PW1P PW1R
PW2EVN	PW2O PW2Q PW2P PW2R
PW3EVN	PW3O PW3Q PW3P PW3R
PW4EVN	PW4O PW4Q PW4P PW4R
RHEVN	RHO RHQ RHP RHR
PBAK	PAN PCL PCS POE PFC
QBAK	QAN QCL QCS
TBAK	TAN TCL TCS
ZBAK	ZAN ZCL ZCS
WBAK	UAN UCL UCS VAN VCL VCS
RHBA	RHA
PWTBA	PWA
PW1BA	PW1A

PW2BA	PW2A				
PW3BA	PW3A				
PW4BA	PW4A				

MNEMONIC	SCAL	REFERENCE	BIT	UNITS
SID	0	0	64	CCITT IA5
XOB	2	-18000	16	DEG E
YOB	2	-9000	15	DEG N
DHR	3	-24000	16	HOURS
RCT	2	0	12	HOURS
ELV	0	-1000	17	METER
TYP	0	0	9	CODE TABLE
T29	0	0	10	CODE TABLE
TSB	0	0	2	CODE TABLE
ITP	0	0	8	CODE TABLE
SQN	0	0	17	CODE TABLE
RQM	0	0	5	CODE TABLE
DUP	0	0	14	CODE TABLE
PRG	0	0	64	CCITT IA5
SRC	0	0	64	CCITT IA5
RUD	0	0	64	CCITT IA5
CAT	0	0	6	CODE TABLE
POB	1	0	14	MB
PFC	1	0	14	MB
PAN	1	0	14	MB
PCL	1	0	14	MB
POE	1	0	14	MB
PCS	1	0	14	MB
PMO	1	0	14	MB
PQM	0	0	5	CODE TABLE
PMQ	0	0	5	CODE TABLE
PPC	0	0	4	CODE TABLE
PRC	0	0	10	CODE TABLE
QOB	0	0	16	MG/KG
QFC	0	0	16	MG/KG
QAN	0	0	16	MG/KG
QCL	0	0	16	MG/KG
QOE	0	0	16	MG/KG
QCS	0	0	16	MG/KG
QQM	0	0	5	CODE TABLE
QPC	0	0	4	CODE TABLE
QRC	0	0	10	CODE TABLE
TOB	1	-2732	14	DEG C
TVO	1	-2732	14	DEG C
TDO	1	-2732	14	DEG C
TFC	1	-2732	14	DEG C
TAN	1	-2732	14	DEG C
TCL	1	-2732	14	DEG C
TOE	1	0	10	DEG C
TCS	1	0	10	DEG C
TQM	0	0	5	CODE TABLE
TPC	0	0	4	CODE TABLE
TRC	0	0	10	CODE TABLE
ZOB	0	-1000	17	METER
ZFC	0	-1000	17	METER
ZAN	0	-1000	17	METER
ZCL	0	-1000	17	METER
ZOE	0	0	10	METER
ZCS	0	0	10	METER
ZQM	0	0	5	CODE TABLE
ZPC	0	0	4	CODE TABLE
ZRC	0	0	10	CODE TABLE
DDO	0	0	9	DEGREES
UOB	1	-4096	13	M/S
VOB	1	-4096	13	M/S
FFO	0	0	9	KNOTS
UFC	1	-4096	13	M/S

VFC	1	-4096	13	M/S	
UAN	1	-4096	13	M/S	
VAN	1	-4096	13	M/S	
UCL	1	-4096	13	M/S	
VCL	1	-4096	13	M/S	
WOE	1	0	10	M/S	
UCS	1	0	10	M/S	
VCS	1	0	10	M/S	
WQM	0	0	5	CODE TABLE	
WPC	0	0	4	CODE TABLE	
WRC	0	0	10	CODE TABLE	
DFQ	0	0	5	CODE TABLE	
DFP	0	0	4	CODE TABLE	
DFR	0	0	10	CODE TABLE	
RHO	1	0	10	PER CENT	
RHF	1	0	10	PER CENT	
RHA	1	0	10	PER CENT	
RHE	1	0	10	PER CENT	
RHQ	0	0	5	CODE TABLE	
RHP	0	0	4	CODE TABLE	
RHR	0	0	10	CODE TABLE	
PWO	1	0	10	MM	
PWF	1	0	10	MM	
PWA	1	0	10	MM	
PWE	1	0	10	MM	
PWQ	0	0	5	CODE TABLE	
PWP	0	0	4	CODE TABLE	
PWR	0	0	10	CODE TABLE	
PW1O	1	0	10	MM	
PW1F	1	0	10	MM	
PW1A	1	0	10	MM	
PW1E	1	0	10	MM	
PW1Q	0	0	5	CODE TABLE	
PW1P	0	0	4	CODE TABLE	
PW1R	0	0	10	CODE TABLE	
PW2O	1	0	10	MM	
PW2F	1	0	10	MM	
PW2A	1	0	10	MM	
PW2E	1	0	10	MM	
PW2Q	0	0	5	CODE TABLE	
PW2P	0	0	4	CODE TABLE	
PW2R	0	0	10	CODE TABLE	
PW3O	1	0	10	MM	
PW3F	1	0	10	MM	
PW3A	1	0	10	MM	
PW3E	1	0	10	MM	
PW3Q	0	0	5	CODE TABLE	
PW3P	0	0	4	CODE TABLE	
PW3R	0	0	10	CODE TABLE	
PW4O	1	0	10	MM	
PW4F	1	0	10	MM	
PW4A	1	0	10	MM	
PW4E	1	0	10	MM	
PW4Q	0	0	5	CODE TABLE	
PW4P	0	0	4	CODE TABLE	
PW4R	0	0	10	CODE TABLE	
SOEL	2	-9000	15	DEGREES	
SIDU	0	0	9	FLAG TABLE	
OZON	0	0	10	DOBSON UNITS	
SALC	0	0	16	NUMERIC	
TMSK	1	0	12	DEGREES KELVIN	
CHNM	0	0	6	NUMERIC	
TMBR	2	0	19	KELVIN	
A1	1	0	12	DEGREE	
A2	1	0	12	DEGREE	
A3	1	0	12	DEGREE	
B1	1	0	12	DEGREE	
B2	1	0	12	DEGREE	
B3	1	0	12	DEGREE	
S1	2	-5000	13	BACKSCATTER	

S2	2	-5000	13	BACKSCATTER	
S3	2	-5000	13	BACKSCATTER	
E1	0	0	7	PERCENT	
E2	0	0	7	PERCENT	
E3	0	0	7	PERCENT	

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Appendix. G. ECS Technical Directive Number 74

PREPQC BUFR Conversion Direction **9/29/00**

D. Marinelli

The attached paper, AIRS Design File Memorandum 451, describes the AIRS requirements for parameters to be added, and to be removed from the current implementation of the PREPQC BUFR to HDF-EOS conversion software.

A summary of how the current implementation of the conversion software differs from HDF-EOS PREPQC as in ADFM 451 is as follows:

1) Currently, all possible BUFR Section 4 variables are read. ADFM calls for a subset of those variables.

2) Currently, all raob soundings are kept. ADFM calls for retaining only those with valid temperatures and specific humidities.

3) Currently, only BUFR Section 4 data is translated. ADFM calls for reading of Section 1 BUFR message contents (BUFR metadata) as well.

4) HDF-EOS variable names are the 3/4 letter BUFR mnemonics. ADFM calls for more descriptive variable names.

5) Currently, the radiosonde HDF-EOS point type is split into four levels. AIRS desires just three levels defined as follows: (1) BUFR metadata, (2) radiosonde scalar data, and (3) radiosonde array data.

This Technical Directive is to implement items 1), 2), and 3) of this list. Item 4) can be implemented only if there is no extra cost or schedule impact. Item 5) should not be implemented at this time as it would add cost and impact schedule.

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Appendix H. Sample HDF-EOS Read Program for General Information

```
/*************************************************************************
 * Sample Program to read the HDF-EOS Point file generated by the
 * write HDF-EOS PGE program which converts the NCEP PREPQC BUFR file
 * to an HDF-EOS point structure.
 *
 * Version Date: 04/27/2000
 * Updated:      12/15/2000
 * Updated:      08/02/2001 - added more error checking output
 *                            for each HDF-EOS call standard ECS
 *                            error messages are written to default
 *                            log file in ./runtime.
 *
 * This program reads basic information about the HDF-EOS point file
 * and dumps output to the screen (it can easily modified to dump this
 * information to a file).
 *
 * This program must be complied using the standard ECS environmental
 * setup and the TOOLKIT, HDF-EOS, HDF libraries.
 *************************************************************************/

#include "hdf.h"
#include "mfhdf.h"
#include <PGS_MET.h>
#include <PGS_SMF.h>
#include <PGS_IO.h>
#include <string.h>
#include <math.h>
#include <stdio.h>

#define IN_FILE     11111

main( int argc, char *argv[] )
{
   int          rc = 0;
   intn         i, j, k, n, level, status, length, count;
   int32        PTid, ptfid;
   int32        Npoints, Nlevels, Nattrs, Nfields, Nrecords;
   int32        PointListSize, AttrListSize, LevelListSize,
                FieldListSize, AttrNumbType, AttrValue;
   int32        FieldType[50], FieldOrder[50];
   PGSt_integer AttrValInt, version;
   PGSt_double  AttrValFloat;
   char         PointList[255], PointName[255], AttrList[255],
AttrName[255],
                LevelList[255], LevelName[255], FieldList[255],
                FieldName[255], dummy[255];
   char         filename[40], line[255];
   char         AttrValString[255];
   char         *first_ptr;
   char         *last_ptr;
   char         *cptr;
   char         message[255];
```

```
   PGSt_SMF_status status = PGS_S_SUCCESS;


   rc = 0;

/* Open the HDF-EOS point file. Since this file already exists we use
 * the DFACC_RDWR access code */

      strcpy ( filename, argv[1] );

      ptfid = PTopen ( filename, DFACC_RDWR );

      printf ( " File Name             = %s\n", filename );
      printf ( " PTopen                = %d\n", ptfid );

      PGS_SMF_GetMsgByCode ( ptfid, message);
      if ( ptfid == FAIL )
      {
           sprintf ( message, "** PTopen failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

/* Determine number of point structures and names */

      Npoints = PTinqpoint ( filename, PointList, &PointListSize );

      PGS_SMF_GetMsgByCode ( Npoints, message);
      if ( Npoints == FAIL )
      {
           sprintf ( message, "** PTinqpoint failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      printf ( " # of Point Structures = %d\n", Npoints );
      printf ( " PointList Length      = %d\n", PointListSize );
      printf ( " Point Names           = %s\n", PointList );

/* Cycle through Point Structure extracting information */

      strcpy ( dummy, " " );
      strcpy ( dummy, PointList );
      strcat ( dummy, "," );
      last_ptr = dummy;
      i = 0;

      while ( i < Npoints )
      {
          first_ptr = strchr ( last_ptr, ',' );
          *first_ptr = '\0';
          ++first_ptr;
          strcpy ( PointName, last_ptr );

          length    = strlen       ( PointName );
          PTid      = PTattach     ( ptfid, PointName );

          PGS_SMF_GetMsgByCode ( PTid, message);
          if ( PTid == FAIL )
```

```
  {
       sprintf ( message, "** PTattach failed **" );
       PGS_SMF_GenerateStatusReport ( message );
       rc = 1;
       return ( rc );
  }

  Nattrs    = PTinqattrs   ( PTid, AttrList, &AttrListSize );

  PGS_SMF_GetMsgByCode ( Nattrs, message);
  if ( Nattrs == FAIL )
  {
       sprintf ( message, "** PTinqattrs failed **" );
       PGS_SMF_GenerateStatusReport ( message );
       rc = 1;
       return ( rc );
  }

  Nlevels   = PTnlevels    ( PTid );

  PGS_SMF_GetMsgByCode ( Nlevels, message);
  if ( Nlevels == FAIL )
  {
       sprintf ( message, "** PTnlevels failed **" );
       PGS_SMF_GenerateStatusReport ( message );
       rc = 1;
       return ( rc );
  }

  printf ( "%s\n", "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$" );
  printf ( " Point Number          = %d\n", i );
  printf ( " Point Name Length     = %d\n", length );
  printf ( " Point Name            = %s\n", PointName );
  printf ( " PTattach              = %d\n", PTid );
  printf ( " # of Attributes       = %d\n", Nattrs );
  printf ( " # of Levels           = %d\n", Nlevels );
  i = i + 1;
last_ptr = first_ptr;

  j = 0;

  while ( j < Nlevels )
  {
      Nfields  = PTnfields   ( PTid, j, &FieldListSize );

      PGS_SMF_GetMsgByCode ( Nfields, message);
      if ( Nfields == FAIL )
      {
           sprintf ( message, "** PTnfields failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      Nfields  = PTlevelinfo ( PTid, j, FieldList,
                               FieldType, FieldOrder );

      PGS_SMF_GetMsgByCode ( Nfields, message);
      if ( Nfields == FAIL )
      {
           sprintf ( message, "** PTlevelinfo failed **" );
```

```
                    PGS_SMF_GenerateStatusReport ( message );
                    rc = 1;
                    return ( rc );
               }

               Nrecords = PTnrecs     ( PTid, j );

               PGS_SMF_GetMsgByCode ( Nrecords, message);
               if ( Nrecords == FAIL )
               {
                    sprintf ( message, "** PTnrecs failed **" );
                    PGS_SMF_GenerateStatusReport ( message );
                    rc = 1;
                    return ( rc );
               }

               printf ( "%s\n", "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$" );
             printf ( " Level #               = %d\n", j );
               printf ( " # of Fields           = %d\n", Nfields );
               printf ( " # of Records          = %d\n", Nrecords );
               printf ( " Field List Length     = %d\n", FieldListSize );
               printf ( " Field List            = %s\n", FieldList );
               printf ( " Field Type            = " );
             for ( k = 0; k < Nfields; ++k)
               {
               printf ( "%5d", FieldType[k] );
               }
             printf ( " \n" );
               printf ( " Field Order           = " );
             for ( k = 0; k < Nfields; ++k)
               {
                   printf ( "%5d", FieldOrder[k] );
               }
             printf ( " \n" );

               j = j + 1;
         }

           /* Detach point */

           status = PTdetach ( PTid );

           printf ( " PTdettach             = %d\n", status );

           PGS_SMF_GetMsgByCode ( status, message);
           if ( status != PGS_S_SUCCESS )
           {
                sprintf ( message, "** PTdetach failed **" );
                PGS_SMF_GenerateStatusReport ( message );
                rc = 1;
                return ( rc );
           }
       }

/* Close HDF-EOS file */

       status = PTclose ( ptfid );

       printf ( " PTclose               = %d\n", status );

       PGS_SMF_GetMsgByCode ( status, message);
```

```
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PTclose failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

/* Read ECS Metadata */

      version = 1;

      strcpy  ( AttrName, "ShortName" );
      cptr    = AttrValString;
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                    AttrName, &cptr );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %s\n", AttrName,
AttrValString );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      strcpy  ( AttrName, "VersionID" );
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                    AttrName, &AttrValInt );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %d\n", AttrName, AttrValInt
);

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      strcpy  ( AttrName, "ProductionDateTime" );
      cptr    = AttrValString;
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                    AttrName, &cptr );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %s\n", AttrName,
AttrValString );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
```

```
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "TimeofDay" );
        cptr    = AttrValString;
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                      AttrName, &cptr );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %s\n", AttrName,
AttrValString );

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "CalendarDate" );
        cptr    = AttrValString;
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                      AttrName, &cptr );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %s\n", AttrName,
AttrValString );

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "NorthBoundingCoordinate" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                      AttrName, &AttrValFloat );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %lf\n", AttrName,
AttrValFloat );

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "SouthBoundingCoordinate" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                      AttrName, &AttrValFloat );
        printf                      ( " status = %d\n", status );
```

```
      printf                      ( " %s = %lf\n", AttrName,
AttrValFloat );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      strcpy  ( AttrName, "EastBoundingCoordinate" );
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                    AttrName, &AttrValFloat );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %lf\n", AttrName,
AttrValFloat );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      strcpy  ( AttrName, "WestBoundingCoordinate" );
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "coremetadata",
                                    AttrName, &AttrValFloat );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %lf\n", AttrName,
AttrValFloat );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      strcpy  ( AttrName, "observation" );
      cptr    = AttrValString;
      status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                    AttrName, &cptr );
      printf                      ( " status = %d\n", status );
      printf                      ( " %s = %s\n", AttrName,
AttrValString );

      PGS_SMF_GetMsgByCode     ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                     AttrName );
           PGS_SMF_GenerateStatusReport ( message );
```

```
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "compression" );
        cptr    = AttrValString;
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &cptr );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %s\n", AttrName,
AttrValString );

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "bufr_master_table" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "originating_center" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
            sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                      AttrName );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

        strcpy  ( AttrName, "update_sequence_number" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
```

```
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        strcpy  ( AttrName, "data_category_type" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        strcpy  ( AttrName, "data_category_subtype" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        strcpy  ( AttrName, "master_table_version" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
```

```
          return ( rc );
     }

     strcpy  ( AttrName, "local_table_version" );
     status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                   AttrName, &AttrValInt );
     printf                     ( " status = %d\n", status );
     printf                     ( " %s = %d\n", AttrName, AttrValInt
);

     PGS_SMF_GetMsgByCode     ( status, message);
     if ( status != PGS_S_SUCCESS )
     {
          sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                    AttrName );
          PGS_SMF_GenerateStatusReport ( message );
          rc = 1;
          return ( rc );
     }

     strcpy  ( AttrName, "year_of_century" );
     status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                   AttrName, &AttrValInt );
     printf                     ( " status = %d\n", status );
     printf                     ( " %s = %d\n", AttrName, AttrValInt
);

     PGS_SMF_GetMsgByCode     ( status, message);
     if ( status != PGS_S_SUCCESS )
     {
          sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                    AttrName );
          PGS_SMF_GenerateStatusReport ( message );
          rc = 1;
          return ( rc );
     }

     strcpy  ( AttrName, "month" );
     status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                   AttrName, &AttrValInt );
     printf                     ( " status = %d\n", status );
     printf                     ( " %s = %d\n", AttrName, AttrValInt
);

     PGS_SMF_GetMsgByCode     ( status, message);
     if ( status != PGS_S_SUCCESS )
     {
          sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                    AttrName );
          PGS_SMF_GenerateStatusReport ( message );
          rc = 1;
          return ( rc );
     }

     strcpy  ( AttrName, "day" );
     status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                   AttrName, &AttrValInt );
     printf                     ( " status = %d\n", status );
     printf                     ( " %s = %d\n", AttrName, AttrValInt
);
```

```
        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        strcpy  ( AttrName, "hour" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        strcpy  ( AttrName, "minute" );
        status  = PGS_MET_GetPCAttr ( IN_FILE, version, "ProductMetadata",
                                      AttrName, &AttrValInt );
        printf                      ( " status = %d\n", status );
        printf                      ( " %s = %d\n", AttrName, AttrValInt
);

        PGS_SMF_GetMsgByCode     ( status, message);
        if ( status != PGS_S_SUCCESS )
        {
             sprintf ( message, "** PGS_MET_GetPCAttr failed for '%s' **",
                       AttrName );
             PGS_SMF_GenerateStatusReport ( message );
             rc = 1;
             return ( rc );
        }

        return (rc);
```

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Appendix I. Sample HDF-EOS Read Program for Data Tables and Metadata

```
/*************************************************************************
 * Sample Program to read the HDF-EOS Point file generated by the
 * write HDF-EOS PGE program which converts the NCEP PREPQC BUFR file
 * to an HDF-EOS point structure.
 *
 * Version Date: 04/27/2000
 * Updated:      12/15/2000
 * Updated:      08/02/2001 - added more error checking output
 *                            for each HDF-EOS call standard ECS
 *                            error messages are written to default
 *                            log file in ./runtime.
 *
 * This program dumps all point level data to separate ASCII output
 * files for each level displaying the values of all variables
 * contained in the level.
 * The current program dumps each level into a separate file:
 *
 *        1. Level 0 = ADPUPA-Level00.out
 *        2. Level 1 = ADPUPA-Level01.out
 *        3. Level 2 = ADPUPA-Level02.out
 *
 * This program must be complied using the standard ECS environmental
 * setup and the TOOLKIT, HDF-EOS, and HDF libraries.
 *************************************************************************/

#include "hdf.h"
#include "mfhdf.h"
#include <PGS_MET.h>
#include <PGS_SMF.h>
#include <string.h>
#include <math.h>
#include <stdio.h>

void main( int argc, char *argv[] )
{
   int         rc;
   intn        i, k, is, status;
   uint8       *buffer0, *buffer1, *buffer2;
   uint8       *buffer_pntr0, *buffer_pntr1, *buffer_pntr2;
   int32       ptfid, PTid;
   int32       Npoints, Nlevels, Nrecords, Nfields, PointListSize,
               level;
   int32       FieldType[20], FieldOrder[20];
   int32       Records[200000];

   int32       Nlevel, LinkID;
   int32       TYP, T29, TSB, ITP, SQN, RQM, DUP, SIRC;
   int32       CAT, PQM, PPC, PRC, QQM, QPC, QRC;
   int32       TQM, TPC, TRC, ZQM, ZPC, ZRC;

   float32     XOB, YOB, DHR, ELV;
   float32     POB, QOB, QOE;
   float32     ZOB, ZOE, TDO, TOB, TOE;
```

```
   char        SID[9], DumString[9];
   char        PointList[255], PointName[255], FieldList[255];
   char        subset[255];
   char        filename[255], outfile[255];
   char        line[80];
   char        message[255];

   FILE        *fp;

   PGSt_SMF_status status = PGS_S_SUCCESS;

   rc = 0;

/* Open the HDF-EOS point file. Since this file already exists we use
 * the DFACC_RDWR access code */

      strcpy ( filename, argv[1] );

      ptfid = PTopen ( filename, DFACC_RDWR );

      printf ( " File Name             = %s\n", filename );
      printf ( " PTopen                = %d\n", ptfid );

      PGS_SMF_GetMsgByCode ( ptfid, message);
      if ( ptfid == FAIL )
      {
           sprintf ( message, "** PTopen failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

/* Determine number of point structures and names */

      Npoints = PTinqpoint ( filename, PointList, &PointListSize );

      printf ( " # of Point Structures = %d\n", Npoints );
      printf ( " PointList Length      = %d\n", PointListSize );
      printf ( " Point Names           = %s\n", PointList );

      PGS_SMF_GetMsgByCode ( Npoints, message);
      if ( Npoints == FAIL )
      {
           sprintf ( message, "** PTinqpoint failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

/* Extract data from PointName = ADPUPA */

      strcpy ( PointName, "ADPUPA" );

      PTid    = PTattach  ( ptfid, PointName );

      PGS_SMF_GetMsgByCode ( PTid, message);
      if ( PTid == FAIL )
      {
           sprintf ( message, "** PTattach failed **" );
           PGS_SMF_GenerateStatusReport ( message );
```

```
            rc = 1;
            return ( rc );
        }
        Nlevels = PTnlevels ( PTid );

        PGS_SMF_GetMsgByCode ( Nlevels, message);
        if ( Nlevels == FAIL )
        {
            sprintf ( message, "** PTnlevels failed **" );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
        }

/* Allocate buffer space for the 3 levels of output data */

        buffer0 = (uint8*) malloc ( (9 + 10*sizeof(int32) +
                                     4*sizeof(float32))*2000000 );
        buffer1 = (uint8*) malloc ( (8*sizeof(int32) +
                                     3*sizeof(float32))*2000000 );
        buffer2 = (uint8*) malloc ( (7*sizeof(int32) +
                                     5*sizeof(float32))*2000000 );

/* Now cycle through all 3 levels, determine number of fields and
 * records and write data to appropriate output file */

        for ( level = 0; level < Nlevels; ++level )
        {
            Nfields  = PTlevelinfo ( PTid, level, FieldList,
                                     FieldType, FieldOrder );

            PGS_SMF_GetMsgByCode ( Nfields, message);
            if ( Nfields == FAIL )
            {
                sprintf ( message, "** PTlevelinfo failed **" );
                PGS_SMF_GenerateStatusReport ( message );
                rc = 1;
                return ( rc );
            }

            Nrecords = PTnrecs     ( PTid, level );

            PGS_SMF_GetMsgByCode ( Nrecords, message);
            if ( Nrecords == FAIL )
            {
                sprintf ( message, "** PTnrecs failed **" );
                PGS_SMF_GenerateStatusReport ( message );
                rc = 1;
                return ( rc );
            }

            k = 0;
            while ( k < Nrecords )
            {
                Records[k] = k;
                k          = k + 1;
            }
            if ( level == 0 )
            {
                strcpy ( outfile, "ADPUPA" );
                strcat ( outfile, "-Level00.out" );
```

```
                    fp     = fopen ( outfile, "w" );

                    if ( fp == NULL )
                    {
                         sprintf ( message, "** Error Opening ASCII input file '%s'
**",
                                   outfile );
                         PGS_SMF_GenerateStatusReport ( message );
                         rc = 1;
                         return ( rc );
                    }

                    status = PTreadlevel ( PTid, level, FieldList,
                                           Nrecords, Records, buffer0 );
                    printf    ( "Read Status 0 = %d\n", status );
                    fprintf   ( fp," %d\n", Nrecords );
                    fprintf   ( fp," %s\n", FieldList );

                    PGS_SMF_GetMsgByCode ( status, message);
                    if ( status != PGS_S_SUCCESS )
                    {
                         sprintf ( message, "** PTreadlevel failed **" );
                         PGS_SMF_GenerateStatusReport ( message );
                         rc = 1;
                         return ( rc );
                    }

                    buffer_pntr0 = buffer0;
                    for ( k = 0; k < Nrecords; ++k )
                    {
                       memcpy  ( SID, buffer_pntr0, 8 );
                       buffer_pntr0 += 8;
                       memcpy  ( &XOB, buffer_pntr0, sizeof(XOB) );
                       buffer_pntr0 += sizeof(XOB);
                       memcpy  ( &YOB, buffer_pntr0, sizeof(YOB) );
                       buffer_pntr0 += sizeof(YOB);
                       memcpy  ( &DHR, buffer_pntr0, sizeof(DHR) );
                       buffer_pntr0 += sizeof(DHR);
                       memcpy  ( &ELV, buffer_pntr0, sizeof(ELV) );
                       buffer_pntr0 += sizeof(ELV);
                       memcpy  ( &TYP, buffer_pntr0, sizeof(TYP) );
                       buffer_pntr0 += sizeof(TYP);
                       memcpy  ( &T29, buffer_pntr0, sizeof(T29) );
                       buffer_pntr0 += sizeof(T29);
                       memcpy  ( &TSB, buffer_pntr0, sizeof(TSB) );
                       buffer_pntr0 += sizeof(TSB);
                       memcpy  ( &ITP, buffer_pntr0, sizeof(ITP) );
                       buffer_pntr0 += sizeof(ITP);
                       memcpy  ( &SQN, buffer_pntr0, sizeof(SQN) );
                       buffer_pntr0 += sizeof(SQN);
                       memcpy  ( &RQM, buffer_pntr0, sizeof(RQM) );
                       buffer_pntr0 += sizeof(RQM);
                       memcpy  ( &DUP, buffer_pntr0, sizeof(DUP) );
                       buffer_pntr0 += sizeof(DUP);
                       memcpy  ( &SIRC, buffer_pntr0, sizeof(SIRC) );
                       buffer_pntr0 += sizeof(SIRC);
                       memcpy  ( &Nlevel, buffer_pntr0, sizeof(Nlevel) );
                       buffer_pntr0 += sizeof(Nlevel);
                       memcpy  ( &LinkID, buffer_pntr0, sizeof(LinkID) );
                       buffer_pntr0 += sizeof(LinkID);
```

```
                    /* Special handling of string variable required */

                    strcpy ( DumString, "         " );
                    DumString[8] = '\0';
                    is = 0;
                    for (is = 0; is < strlen ( SID ); is++)
                    {
                         DumString[is] = SID[is];
                   }
                    DumString[8] = '\0';

                    fprintf ( fp," %s %e %e %e %e %d %d %d %d %d %d %d %d %d
%d\n",
                              DumString, XOB, YOB, DHR, ELV, TYP, T29,
                              TSB, ITP, SQN, RQM, DUP, SIRC, Nlevel, LinkID );
                }
            }
            if ( level == 1 )
            {
                strcpy ( outfile, "ADPUPA" );
                strcat ( outfile, "-Level01.out" );
                fp     = fopen ( outfile, "w" );
                status = PTreadlevel ( PTid, level, FieldList,
                                       Nrecords, Records, buffer1 );
                printf    ( "Read Status 1 = %d\n", status );
                fprintf   ( fp," %d\n", Nrecords );
                fprintf   ( fp," %s\n", FieldList );

                PGS_SMF_GetMsgByCode ( status, message);
                if ( status != PGS_S_SUCCESS )
                {
                     sprintf ( message, "** PTreadlevel failed **" );
                     PGS_SMF_GenerateStatusReport ( message );
                     rc = 1;
                     return ( rc );
                }

                buffer_pntr1 = buffer1;
                for ( k = 0; k < Nrecords; ++k )
                {
                   memcpy  ( &POB, buffer_pntr1, sizeof(POB) );
                   buffer_pntr1 += sizeof(POB);
                   memcpy  ( &QOB, buffer_pntr1, sizeof(QOB) );
                   buffer_pntr1 += sizeof(QOB);
                   memcpy  ( &QOE, buffer_pntr1, sizeof(QOE) );
                   buffer_pntr1 += sizeof(QOE);
                   memcpy  ( &CAT, buffer_pntr1, sizeof(CAT) );
                   buffer_pntr1 += sizeof(CAT);
                   memcpy  ( &PQM, buffer_pntr1, sizeof(PQM) );
                   buffer_pntr1 += sizeof(PQM);
                   memcpy  ( &PPC, buffer_pntr1, sizeof(PPC) );
                   buffer_pntr1 += sizeof(PPC);
                   memcpy  ( &PRC, buffer_pntr1, sizeof(PRC) );
                   buffer_pntr1 += sizeof(PRC);
                   memcpy  ( &QQM, buffer_pntr1, sizeof(QQM) );
                   buffer_pntr1 += sizeof(QQM);
                   memcpy  ( &QPC, buffer_pntr1, sizeof(QPC) );
                   buffer_pntr1 += sizeof(QPC);
                   memcpy  ( &QRC, buffer_pntr1, sizeof(QRC) );
                   buffer_pntr1 += sizeof(QRC);
                   memcpy  ( &LinkID, buffer_pntr1, sizeof(LinkID) );
```

```
            buffer_pntr1 += sizeof(LinkID);
            fprintf ( fp, "%e %e %e %d %d %d %d %d %d %d %d\n",
                      POB, QOB, QOE, CAT, PQM, PPC, PRC,
                      QQM, QPC, QRC, LinkID );
         }
      }
      if ( level == 2 )
      {
         strcpy ( outfile, "ADPUPA" );
         strcat ( outfile, "-Level02.out" );
         fp     = fopen ( outfile, "w" );
         status = PTreadlevel ( PTid, level, FieldList,
                                Nrecords, Records, buffer2 );
         printf    ( "Read Status 2 = %d\n", status );
         fprintf   ( fp," %d\n", Nrecords );
         fprintf   ( fp," %s\n", FieldList );

         PGS_SMF_GetMsgByCode ( status, message);
         if ( status != PGS_S_SUCCESS )
         {
            sprintf ( message, "** PTreadlevel failed **" );
            PGS_SMF_GenerateStatusReport ( message );
            rc = 1;
            return ( rc );
         }

         buffer_pntr2 = buffer2;
         for ( k = 0; k < Nrecords; ++k )
         {
            memcpy  ( &ZOB, buffer_pntr2, sizeof(ZOB) );
            buffer_pntr2 += sizeof(ZOB);
            memcpy  ( &ZOE, buffer_pntr2, sizeof(ZOE) );
            buffer_pntr2 += sizeof(ZOE);
            memcpy  ( &TDO, buffer_pntr2, sizeof(TDO) );
            buffer_pntr2 += sizeof(TDO);
            memcpy  ( &TOB, buffer_pntr2, sizeof(TOB) );
            buffer_pntr2 += sizeof(TOB);
            memcpy  ( &TOE, buffer_pntr2, sizeof(TOE) );
            buffer_pntr2 += sizeof(TOE);
            memcpy  ( &ZQM, buffer_pntr2, sizeof(ZQM) );
            buffer_pntr2 += sizeof(ZQM);
            memcpy  ( &ZPC, buffer_pntr2, sizeof(ZPC) );
            buffer_pntr2 += sizeof(ZPC);
            memcpy  ( &ZRC, buffer_pntr2, sizeof(ZRC) );
            buffer_pntr2 += sizeof(ZRC);
            memcpy  ( &TQM, buffer_pntr2, sizeof(TQM) );
            buffer_pntr2 += sizeof(TQM);
            memcpy  ( &TPC, buffer_pntr2, sizeof(TPC) );
            buffer_pntr2 += sizeof(TPC);
            memcpy  ( &TRC, buffer_pntr2, sizeof(TRC) );
            buffer_pntr2 += sizeof(TRC);
            memcpy  ( &LinkID, buffer_pntr2, sizeof(LinkID) );
            buffer_pntr2 += sizeof(LinkID);
            fprintf ( fp, "%e %e %e %e %e %d %d %d %d %d %d %d\n",
                      ZOB, ZOE, TDO, TOB, TOE,
                      ZQM, ZPC, ZRC, TQM, TPC, TRC, LinkID );
         }
      }
      fclose ( fp );
}
```

```
/* Detach point and close HDF-EOS file */

      status = PTdetach ( PTid );
               printf   ( "PTdetach = %d\n", status );

      PGS_SMF_GetMsgByCode ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PTdetach failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

      status = PTclose  ( ptfid );
               printf   ( "PTclose = %d\n", status );

      PGS_SMF_GetMsgByCode ( status, message);
      if ( status != PGS_S_SUCCESS )
      {
           sprintf ( message, "** PTclose failed **" );
           PGS_SMF_GenerateStatusReport ( message );
           rc = 1;
           return ( rc );
      }

   return ( rc );
}
```

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