ECMWF surface temperature model change of 30 Sep 2008

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February 26, 2009

2) Introduction

- A significant change in the ECMWF surface temperature model occured on 30 September 2008
- From the ECMWF evolution web page

  http://www.ecmwf.int/products/data/operational_system/evolution/evolution_2008.html
- "[A] new sea-surface temperature analysis product is being implemented, providing higher-resolution and more frequently updated information, in particular in cloudy situations, based on a range of satellite and in-situ observations."
- "[T]he largest SST differences are also in the Polar Regions, as well as in the meanders of the major currents such as the Gulf Stream."
- The effects of the ECMWF surface temperature changes were immediately apparent in our monthly stats files of clear FOV obs-cal BT spectra.

3) Overview of ECMWF surface variable SKT

- The ECMWF model is available for 00, 03, 06, 09, 12, 15, 18, and 21z UTC each day. Hours 00 and 12z are "analysis" models, while hours 03, 09, 15, and 21z are "forecast" models initialized from the most recent 00 or 12z analysis. The 06 and 18z models are nominally analysis, but are not used as a starting point for the forecasts.
- The "SKT" skin temperature (data everywhere) is the ECMWF surface temperature variable we use in our RTA calculations.
- Old ECMWF SKT was updated once a day, 00=06z yesterday SKT, and 03=09=12=15=18=21z today SKT.
- New ECMWF SKT is updated every file, but it appears the model is re-initialized with analysis data SST at 12z.
- The new SKT appears to include a diurnal heating and cooling cycle.

4) Plots of delta SKT

- The following seven plots show how the sea surface SKT changes every 3 hours as we step thru the eight daily ECWMF models for one randomly chosen day of the year. The top panel (2007) is the old model, and the bottom panel (2008) is the new model.
- The plots show a map of the worlds oceans with delta SKT displayed as a color (-1 to +1 Kelvin). Orange means heating and blue means cooling.
- Step thru the plots quickly and notice how the bottom panel shows areas of heating and cooling that move with longitude as time passes. The changes in the old ECMWF SKT, if any, are simply the change in the daily sea surface SKT from one day to the next.

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5)SKT 03z - SKT 00z

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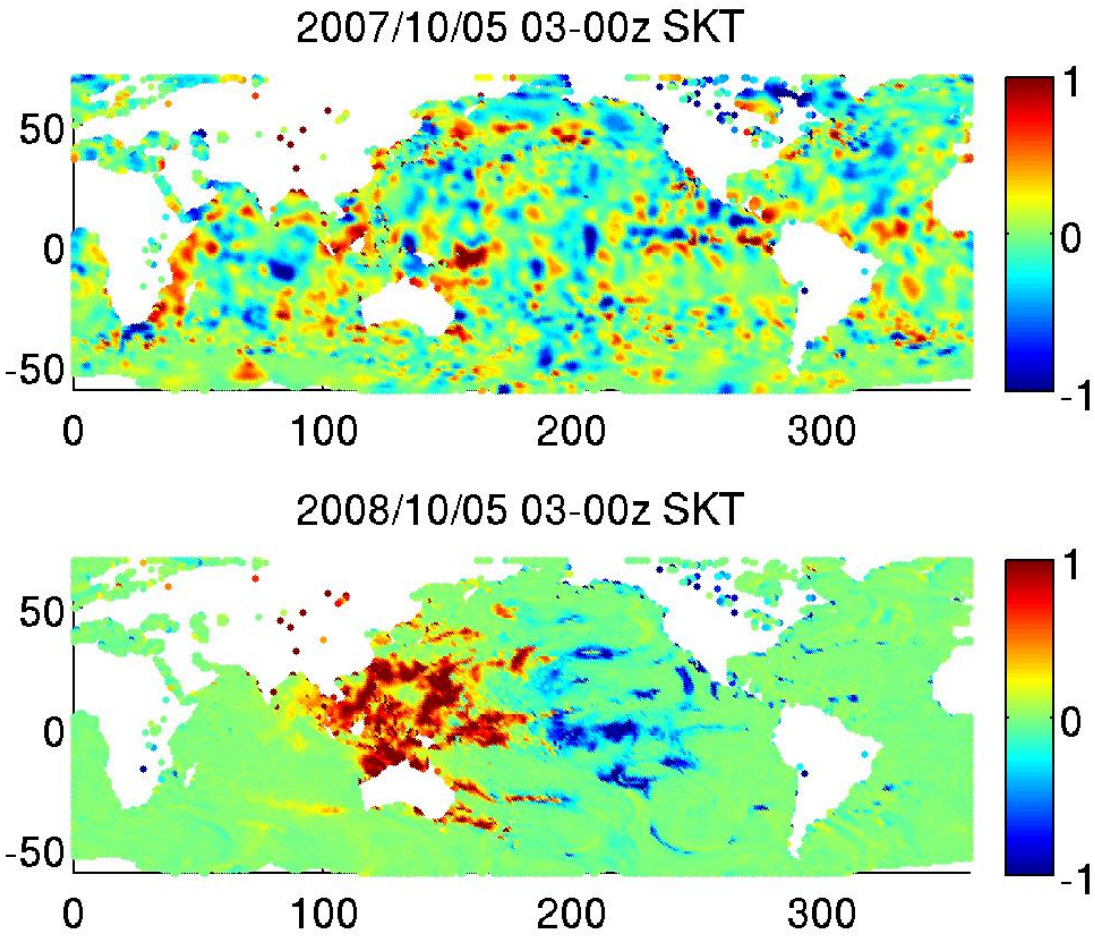

6)SKT 06z - SKT 03z

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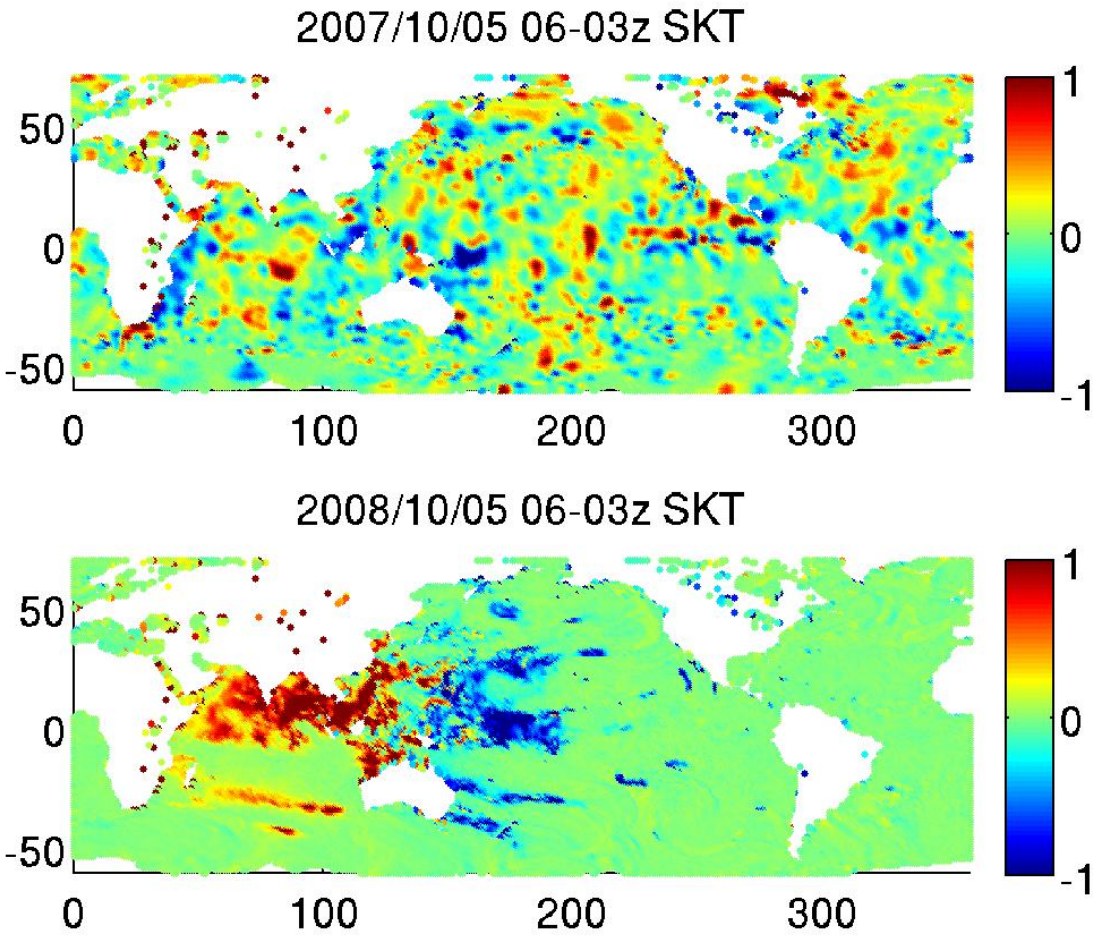

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7)SKT 09z - SKT 06z

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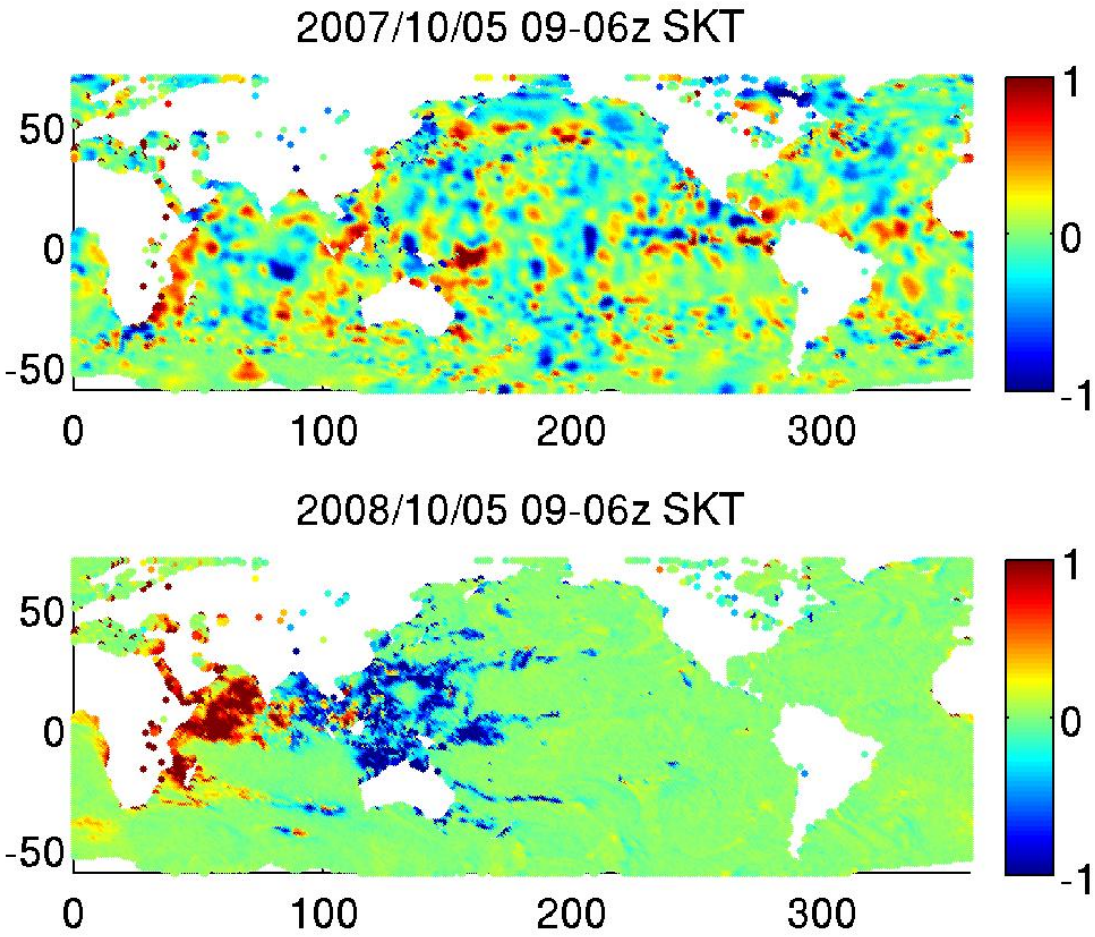

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8)SKT 12z - SKT 09z

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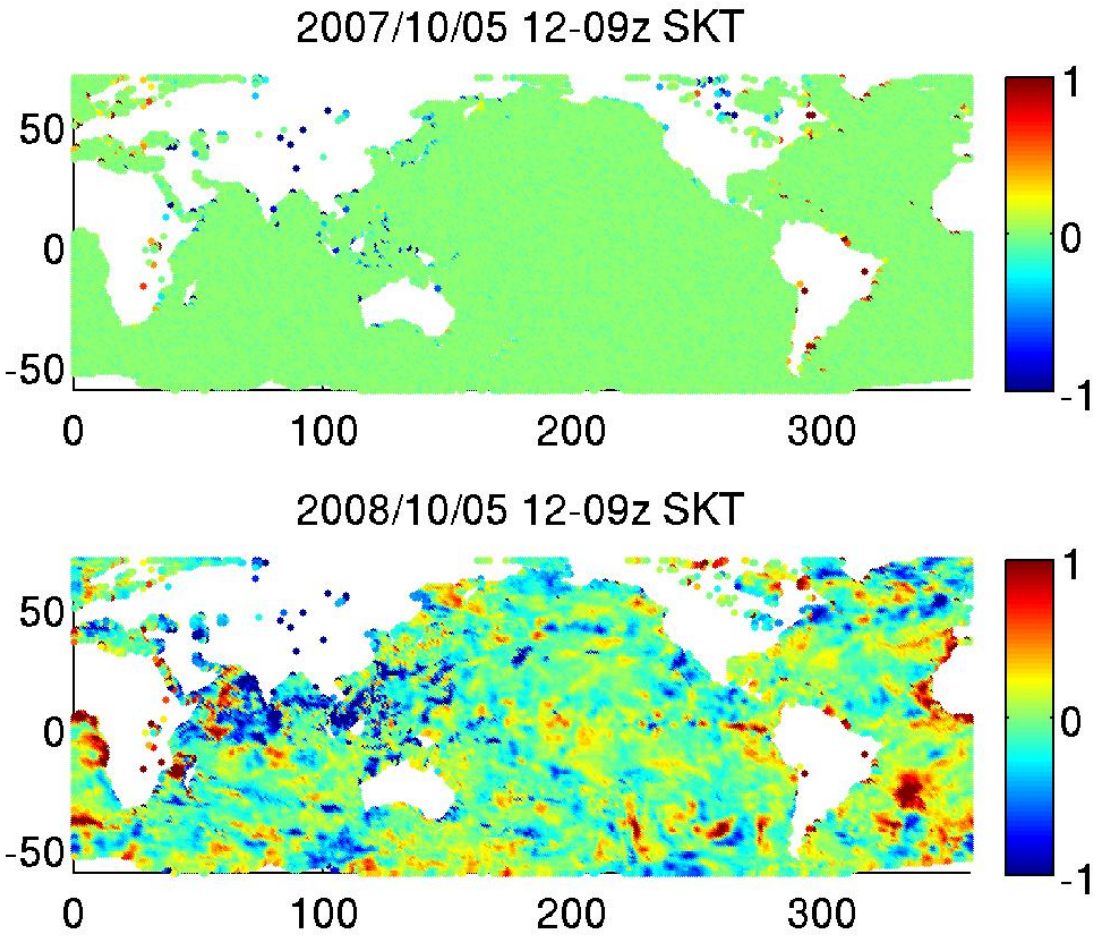

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9)SKT 15z - SKT 12z

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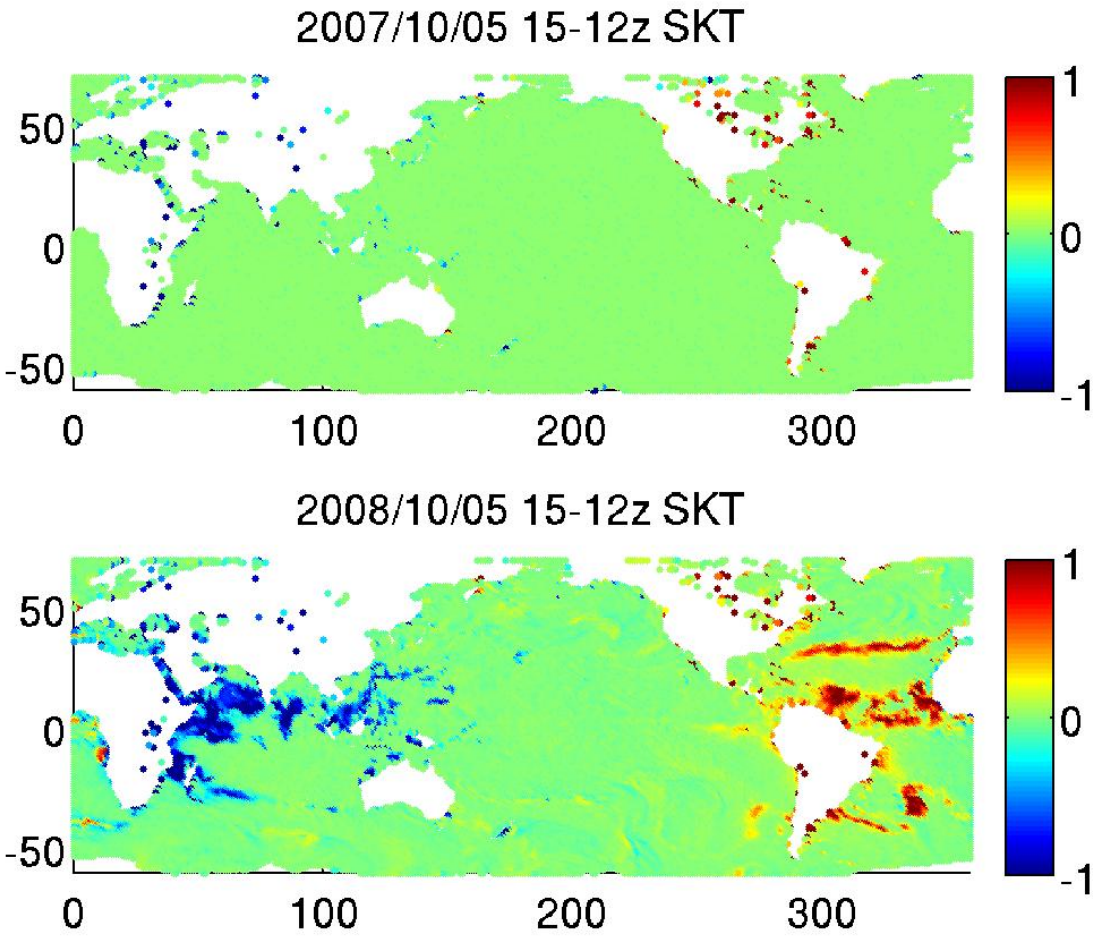

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10)SKT 18z - SKT 15z

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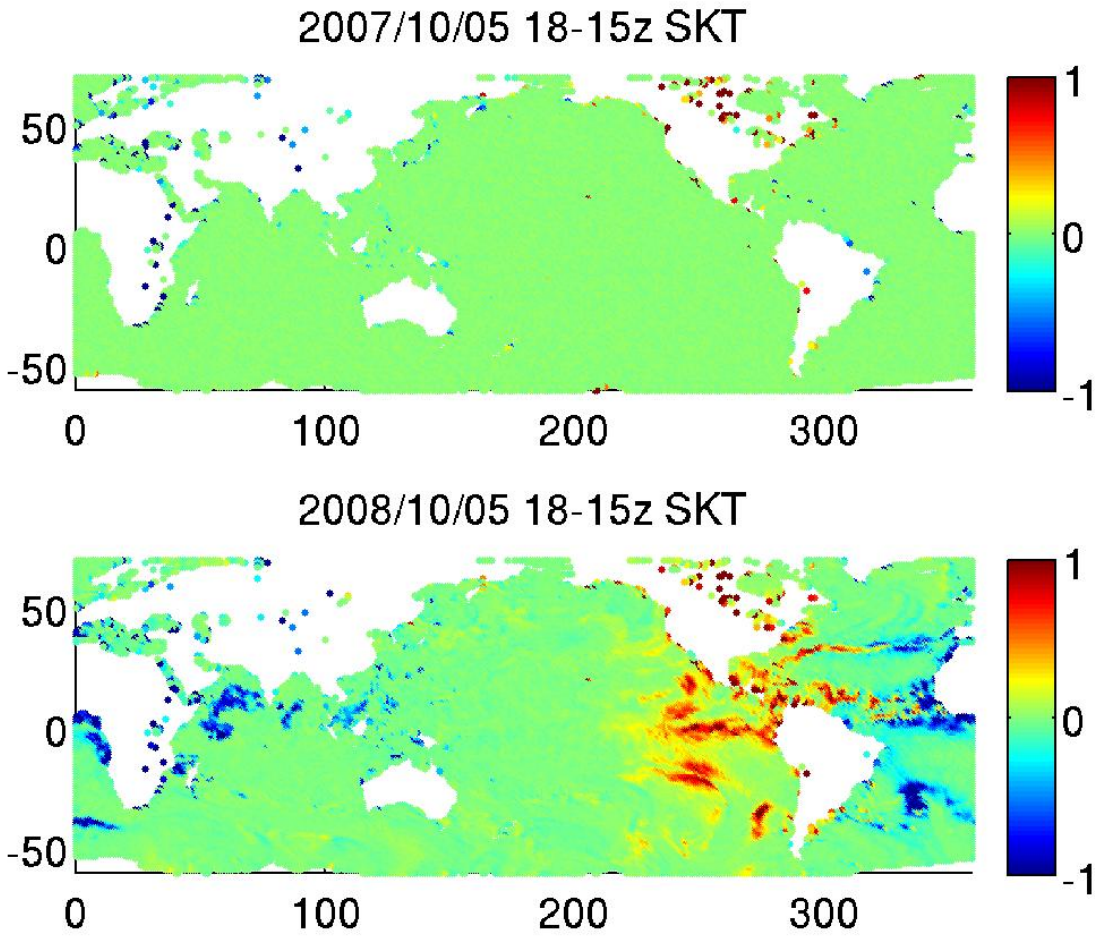

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11)SKT 21z - SKT 18z

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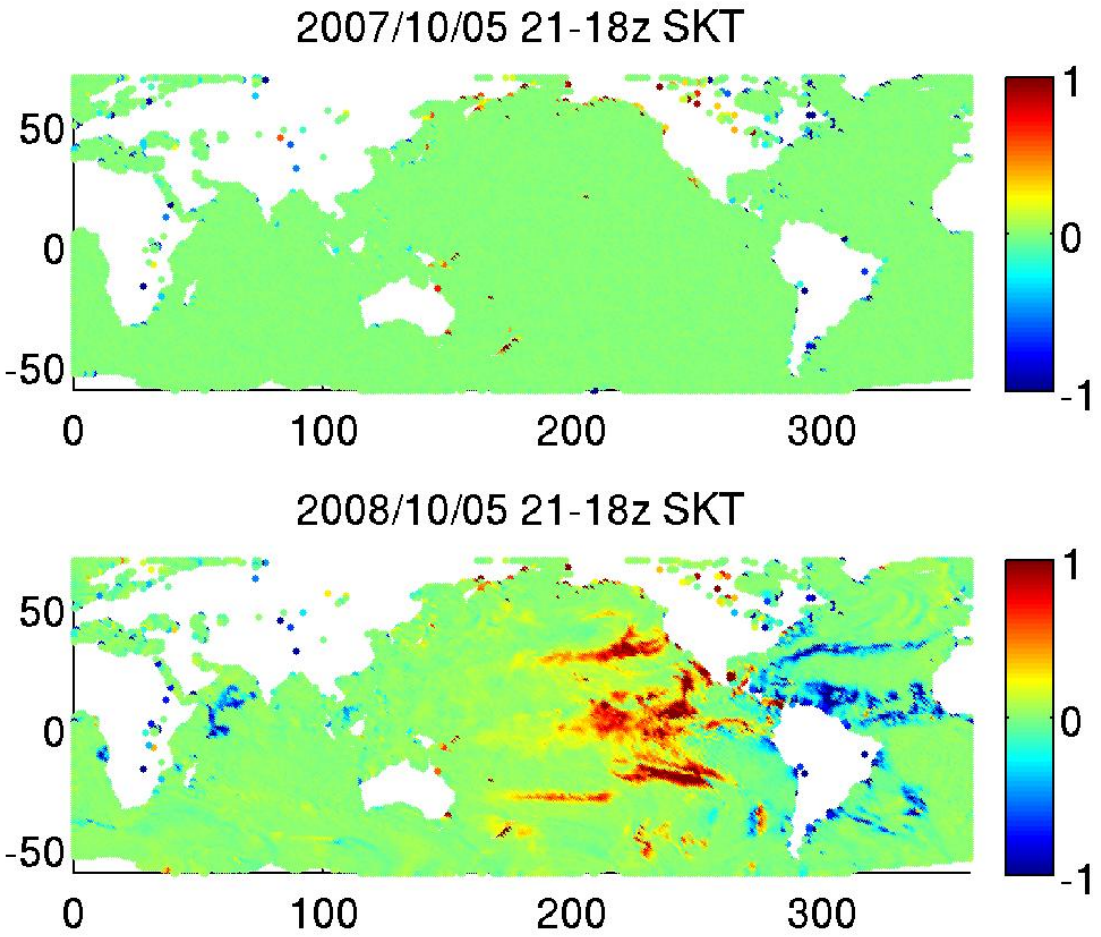

12) Conclusions

- We use ECMWF model to compute clear BT obs-cal.
- New ECWMF SST model introduced 30 Sep 2008.
- New ECMWF SKT changes every file; old SKT was updated only once a day.
- New SKT includes a significant diurnal cycle.
- The changes in new SKT for 12z appear to be due to a once daily update in the SST analysis.
- Since the old ECMWF SKT was updated only once a day, and the delta somewhat random in sign, the SKT was on average a little too cold during AIRS daytime overpass, and a little too hot during the AIRS nighttime overpass.
- We have begun looking at how the obs-cal biases have changed due to the new SKT model, but quantitative results are not yet available.