

Recent Activities with AIRS Level-2 Profile Data at the SPoRT Center

Bradley Zavodsky: NASA/MSFC/SPoRT

Emily Berndt: ORAU/SPoRT

Clay Blankenship: USRA/SPoRT

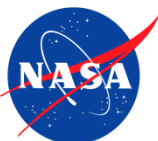
Kevin Fuell: UAHuntsville/SPoRT

Spring 2013 AIRS Science Team Meeting

21 May 2013



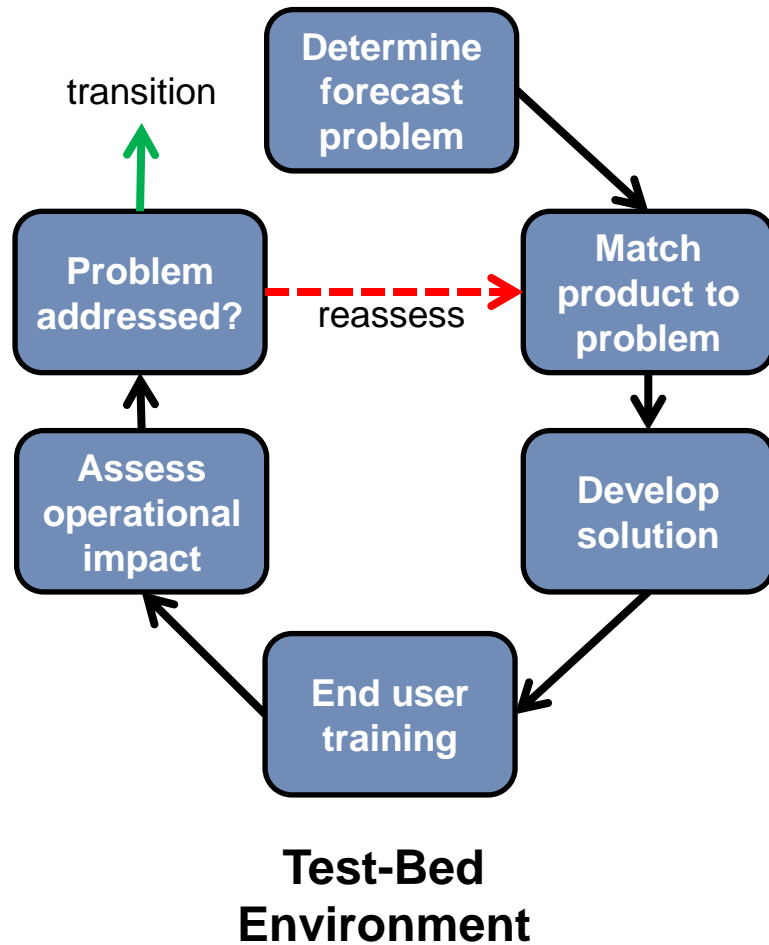
transitioning unique NASA data and research technologies to operations



Outline

- SPoRT Paradigm/Overview
- Situational Awareness Activities
- Data Assimilation Activities

SPoRT Mission and Paradigm

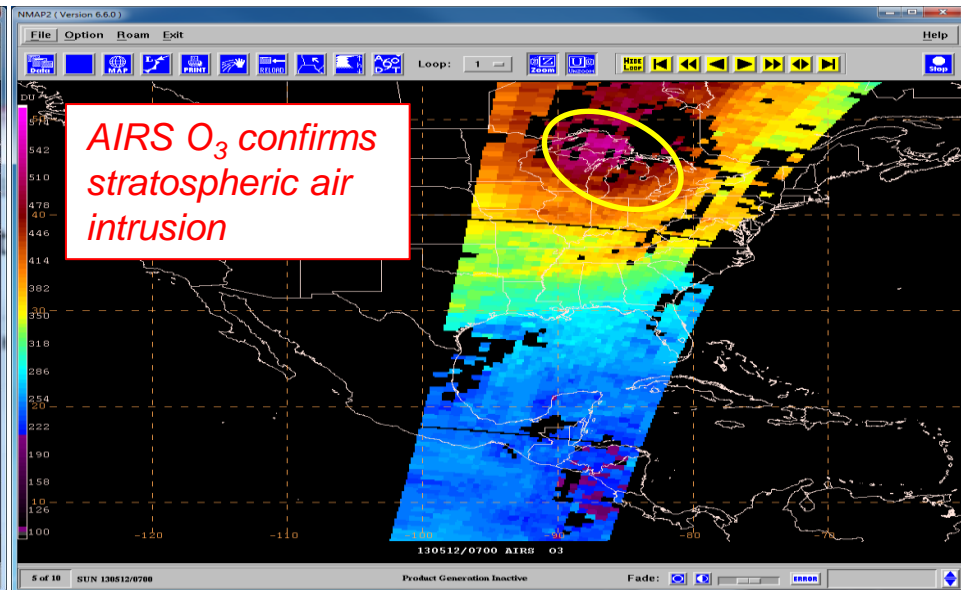
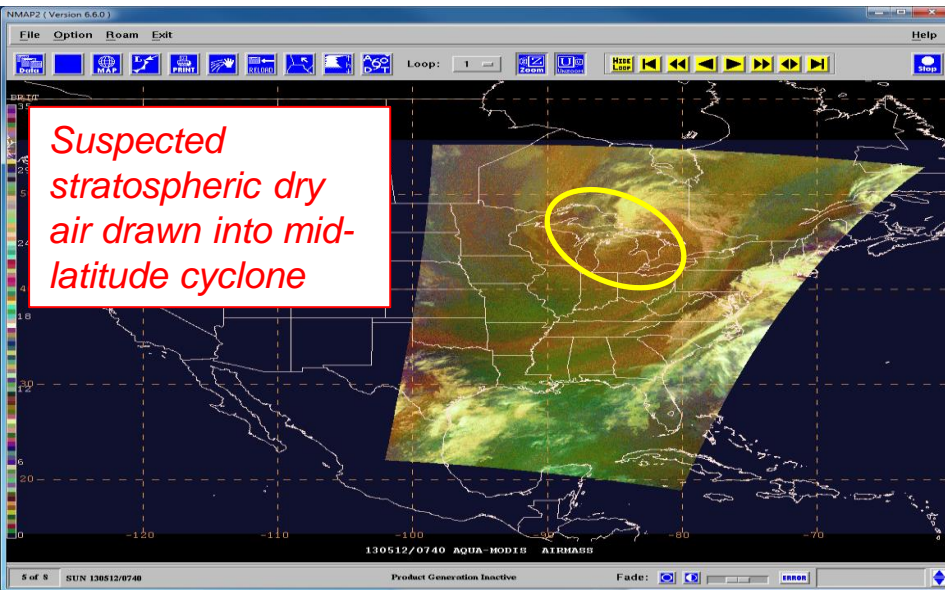


- *Apply satellite measurement systems and unique Earth science research to improve the accuracy of short-term weather prediction at the regional and local scale*
- Bridge the “Valley of Death”
- Can’t just “throw data over the fence”
 - Maintain interactive partnerships with help of specific advocates or “satellite champions”
 - Integrate into user decision support tools
 - Create forecaster training on product utility
 - Perform targeted product assessments with close collaborating partners
- Concept has been used to successfully transition a variety of satellite datasets to operational users for nearly 10 years

Outline

- SPoRT Paradigm/Overview
- Situational Awareness Activities
- Data Assimilation Activities

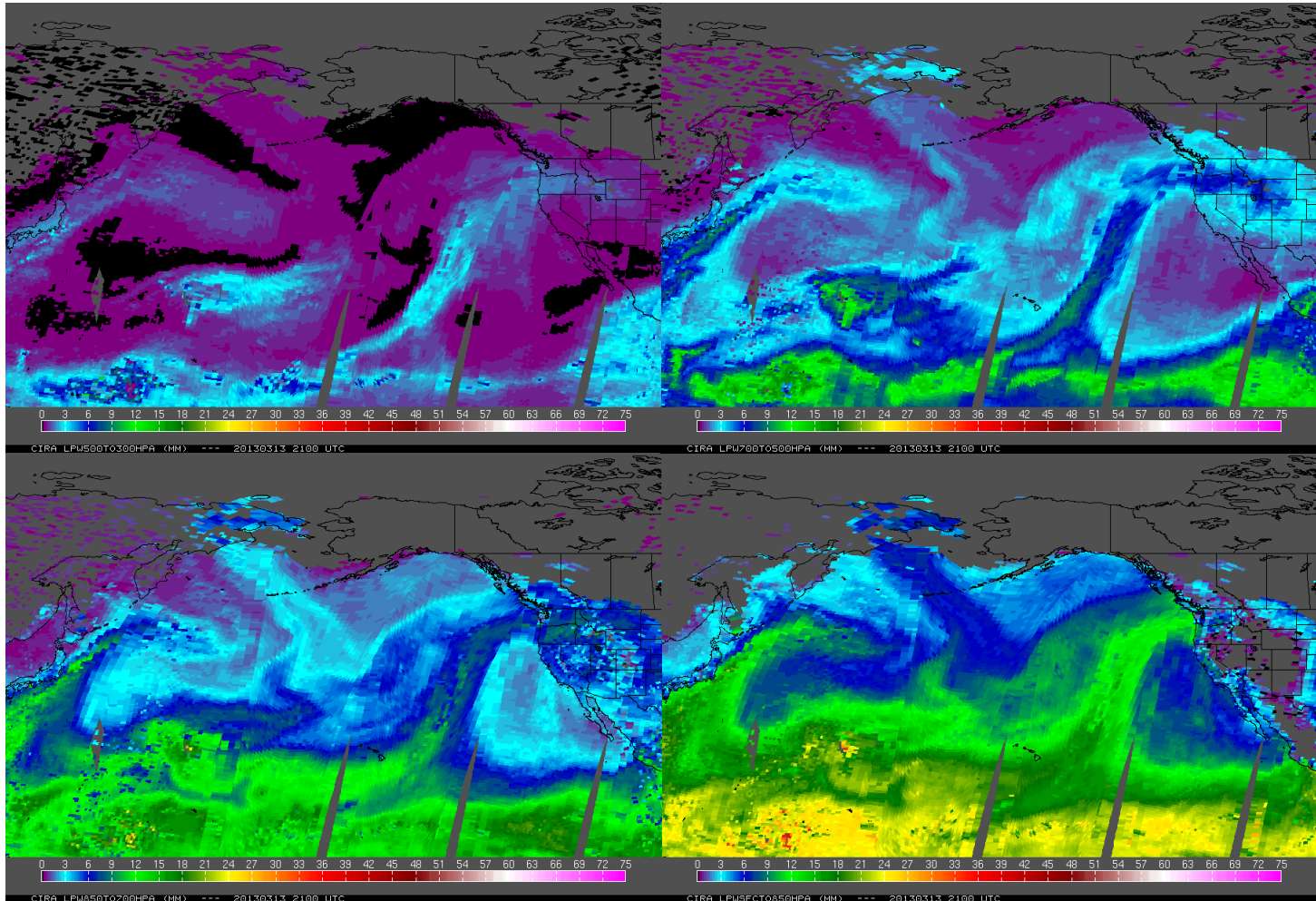
AIRS Total Ozone at HPC/OPC



- AIRS helps determine stratospheric ozone intrusions associated with mid-latitude and extratropical cyclone strengthening and damaging non-convective winds
- Enhances interpretation of RGB products
- Full transition of product to Weather Prediction Center (WPC) and Ocean Prediction Center (OPC) in N-AWIPS decision support system
- Numerous posts on SPoRT and NOAA Proving Ground blogs related to product
- Journal of Operational Meteorology paper on use at WPC/OPC

AIRS Moisture in CIRA LPW

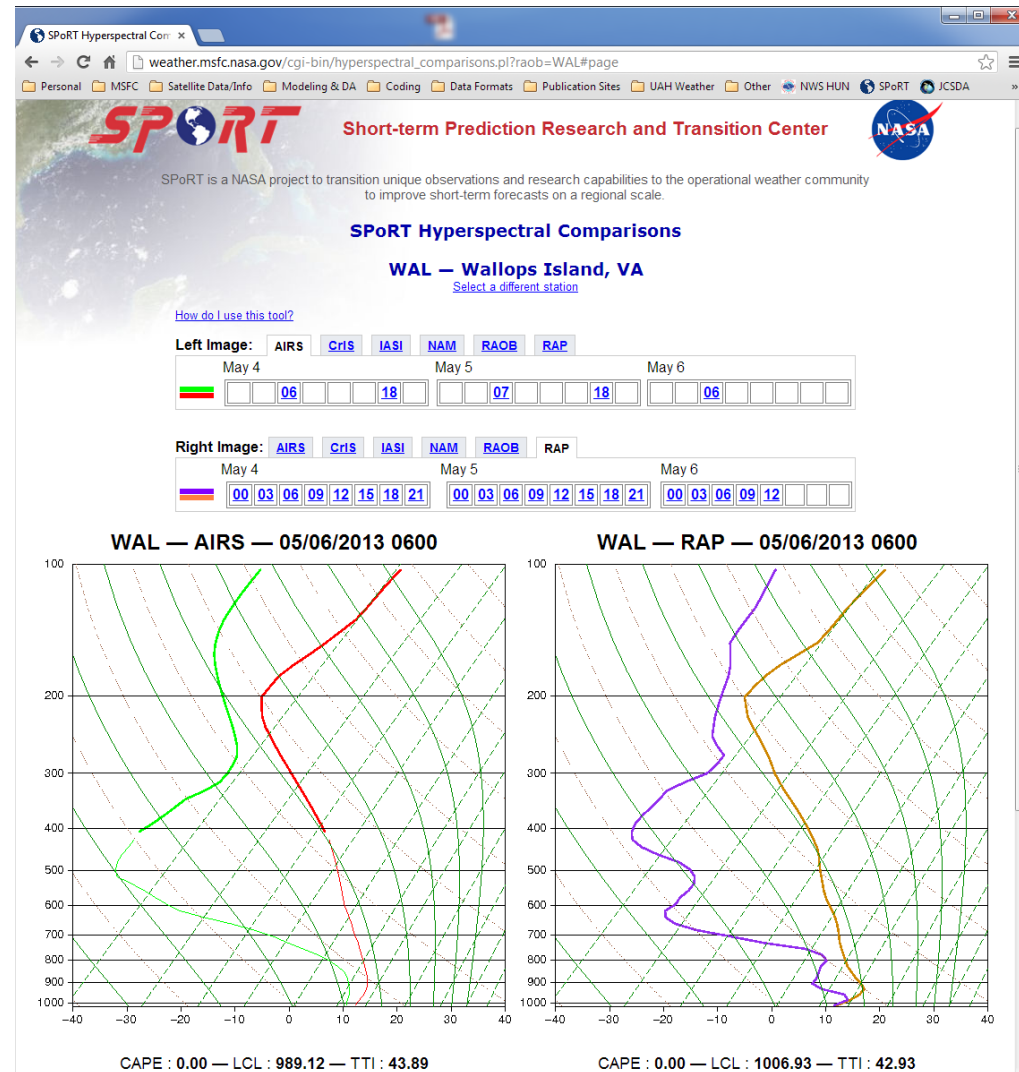
CIRA/SPoRT* developing layer precipitable water (LPW) product that uses vertical information from AIRS; enhances the utility of popular total PW product used operationally by WFOs



* Product development by John Forsythe and Stan Kidder (CIRA); operational assessment by SPoRT; funded by SPoRT

AIRS profiles for convective initiation

- SPoRT is actively working to engage NWS forecasters in the use of soundings from AIRS, IASI, and CrIS for situational awareness of CI
- Mid-level moisture and above PBL lapse rates may be valuable for gaining confidence in regional models where other verifying observations are not available
- Currently developing training to communicate strengths and limitations of hyperspectral IR sounder profiles
- Plan to come up with a strategy for ingesting into AWIPS II

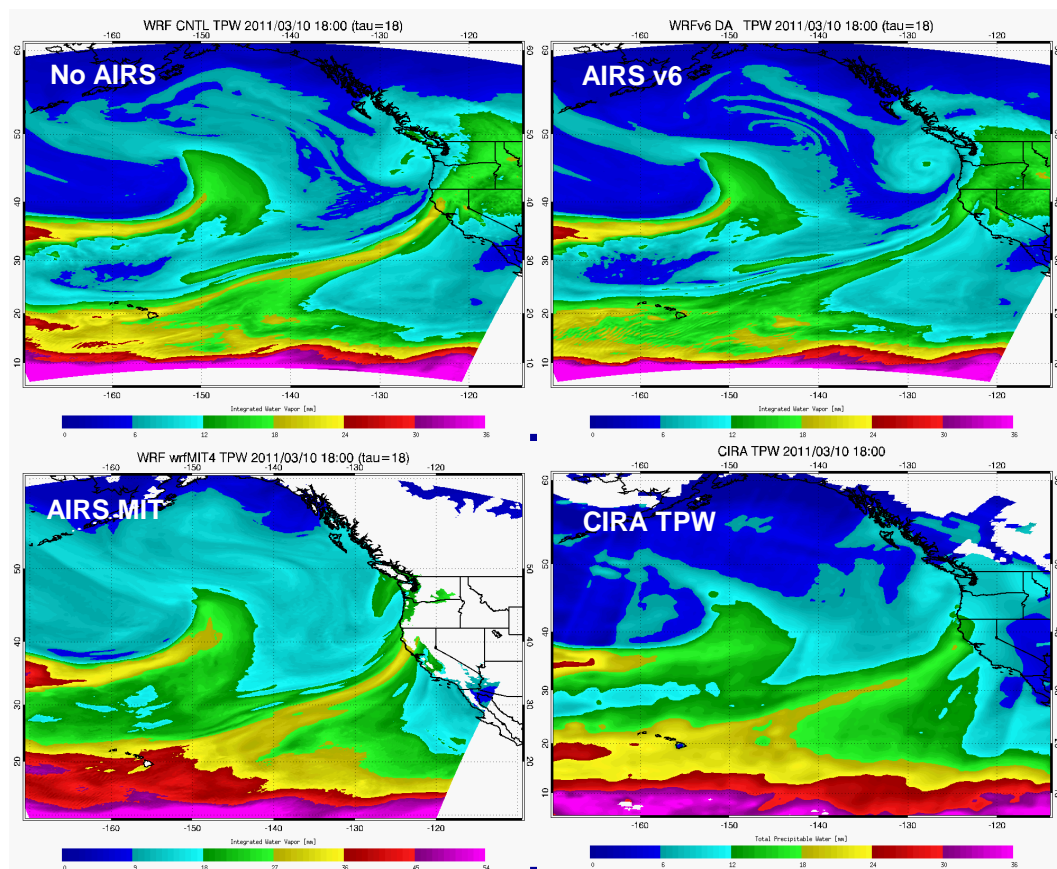


Outline

- SPoRT Paradigm/Overview
- Situational Awareness Activities
- Data Assimilation Activities

AIRS-Enhanced 3D Moisture Analysis

- Only TPW satellite observations available over Pacific to track moisture features; models provide some additional guidance
- AIRS T and q add detail around clouds resulting in more favorable moisture analysis over Pacific than real-time GFS analysis

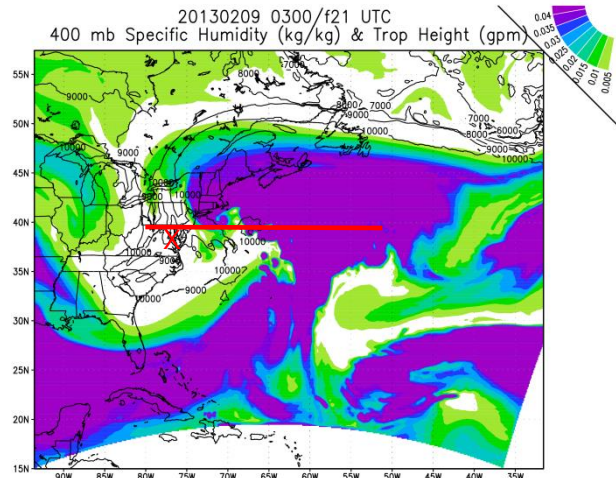


Correlation (r^2) with CIRA TPW

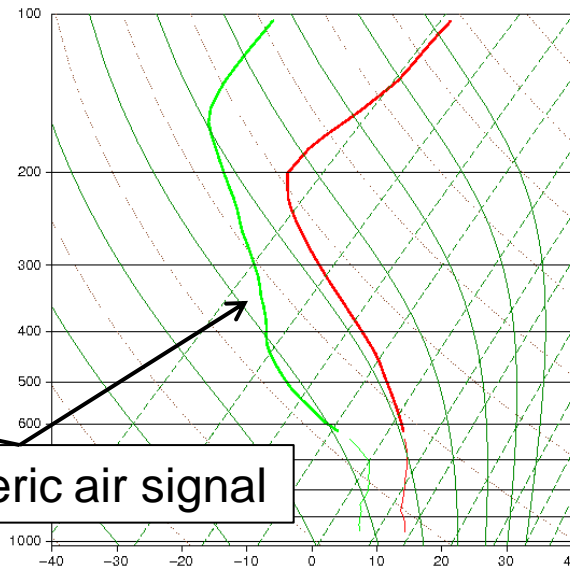
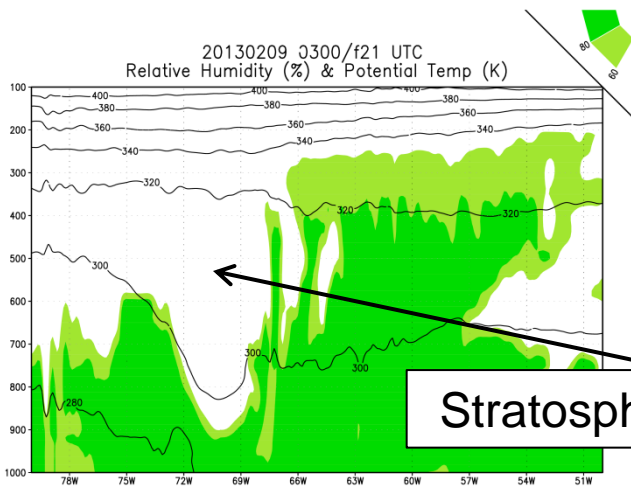
	AIRS v6	AIRS MIT
24-hour	0.679	0.704
48-hour	0.672	0.741

- Current work is focusing on bias correction techniques for the assimilation of the profile data
- Working with the Hydrometeorological Testbed (HMT) to evaluate impact of AIRS on atmospheric river analyses/forecasts

Improving Mid-Latitude Cyclone and “Sting Jet” Forecasts



- Ongoing research includes the assimilation of AIRS T and q profiles into the WRF model to address non-convective wind events called “sting jets”
- Will addition of profiles improve the model representation of T and q and better resolve warm, dry stratospheric air intrusions?

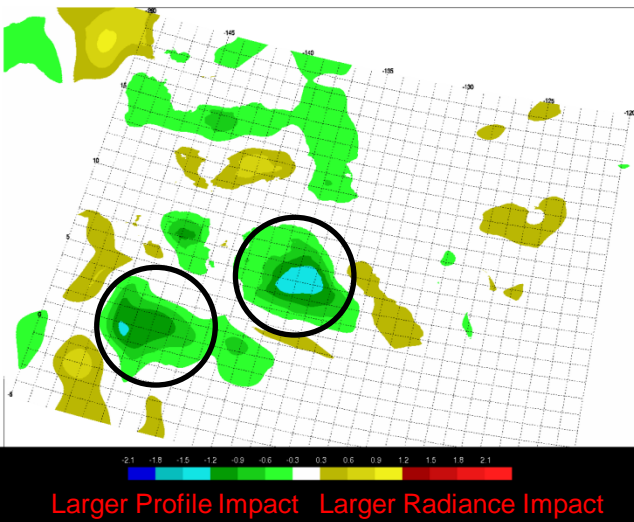


- If stratospheric intrusions are better resolved, will model representation of sting jets improve?
- Additional applications using CrIS soundings

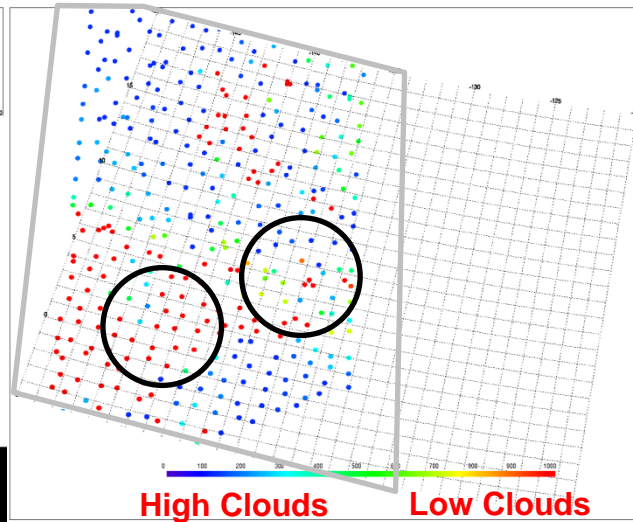
L2 cloud info for L1B assimilation*

- Can we use cloud information (such as cloud top pressure) obtained from the L2 profiles to better characterize which L1B channels are assimilated?
- Comparison of CTP defined within GSI (which determines which radiances are deemed cloud-free) can at times miss some cloud features
- In these regions, assimilation of profiles has shown larger analysis and forecast impact

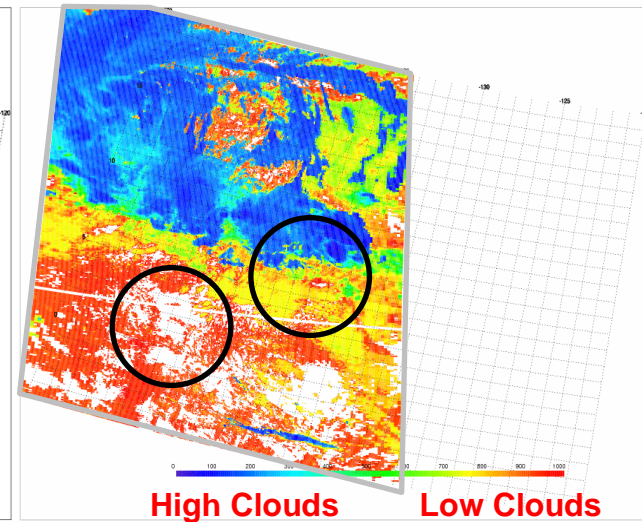
T (K) ID at $\sigma=39$ (≈ 500 hPa) for 0000 UTC analysis 22 November 2011



GSI CTP for 0000 UTC analysis on 22 November 2011



MODIS CTP valid 2240 UTC on 22 November 2011



**This work funded through the JCSDA*

transitioning unique NASA data and research technologies to operations

Summary

- SPOrT is a proven community leader for transitioning satellite products to operational end users and is working hard to bring data from AIRS to forecasters
- SPOrT products using AIRS data are currently or will soon be evaluated at WFOs and National Centers
 - Ozone profiles: HPC/WPC
 - Moisture profiles (as part of CIRA LPW): Western Region WFOs
 - Temperature and moisture profiles: Eastern Region WFOs
- SPOrT also assimilates AIRS into regional models to address specific forecast issues
 - Atmospheric rivers
 - Mid-latitude cyclones/sting jets
- We continue to develop similar capabilities with IASI and CrIS profiles as well

Please contact me if you have an idea for an AIRS-related product that might benefit operational forecasters

Brad.zavodsky@nasa.gov

<http://weather.msfc.nasa.gov/sport/>

<http://nasasport.wordpress.com/>



transitioning unique NASA data and research technologies to operations

