Met/Theory Products for ATTREX

Lenny Pfister

and

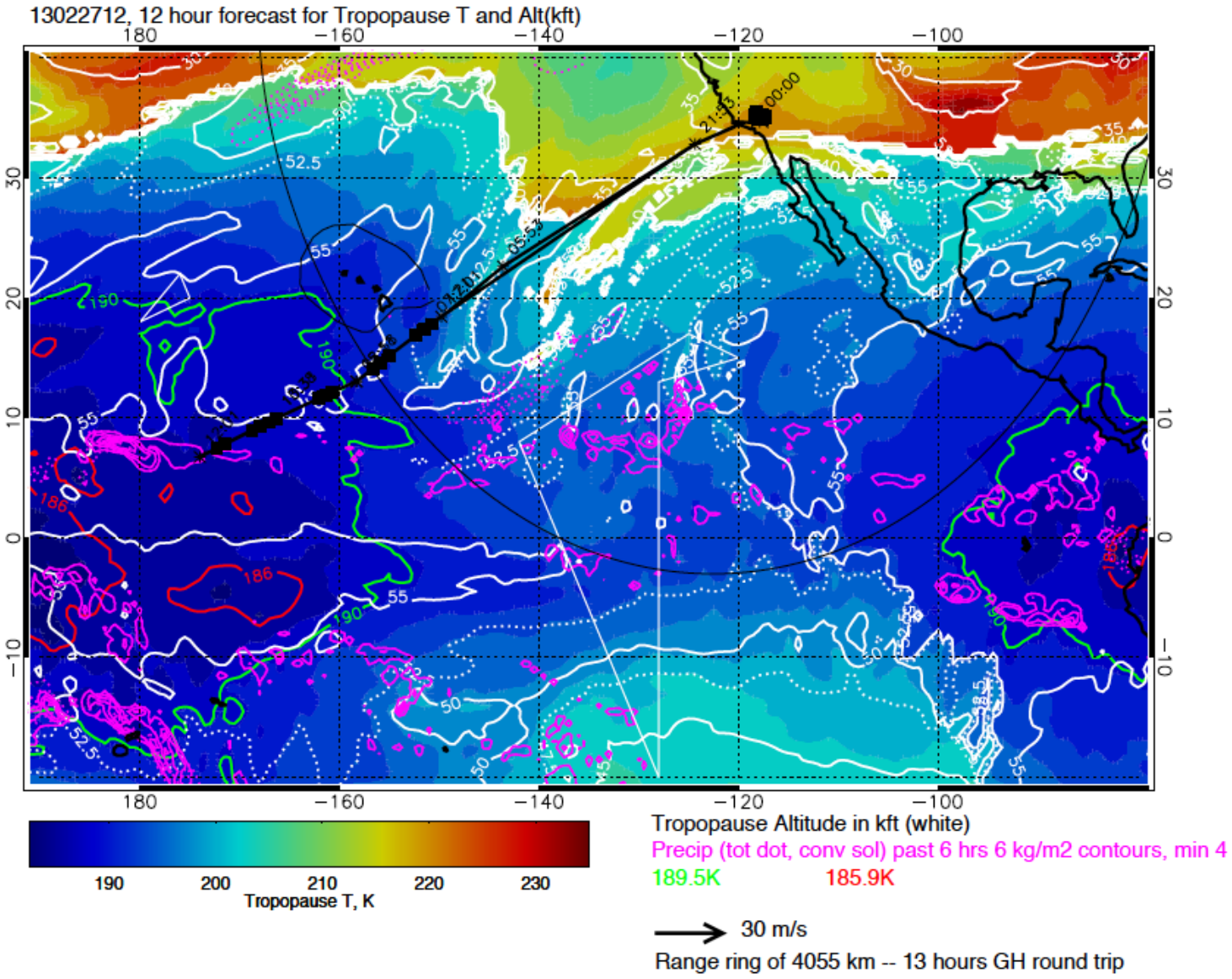
LOTS OF OTHER PEOPLE

- Flight planning forecast products
- Flight planning data products
- Real Time Products

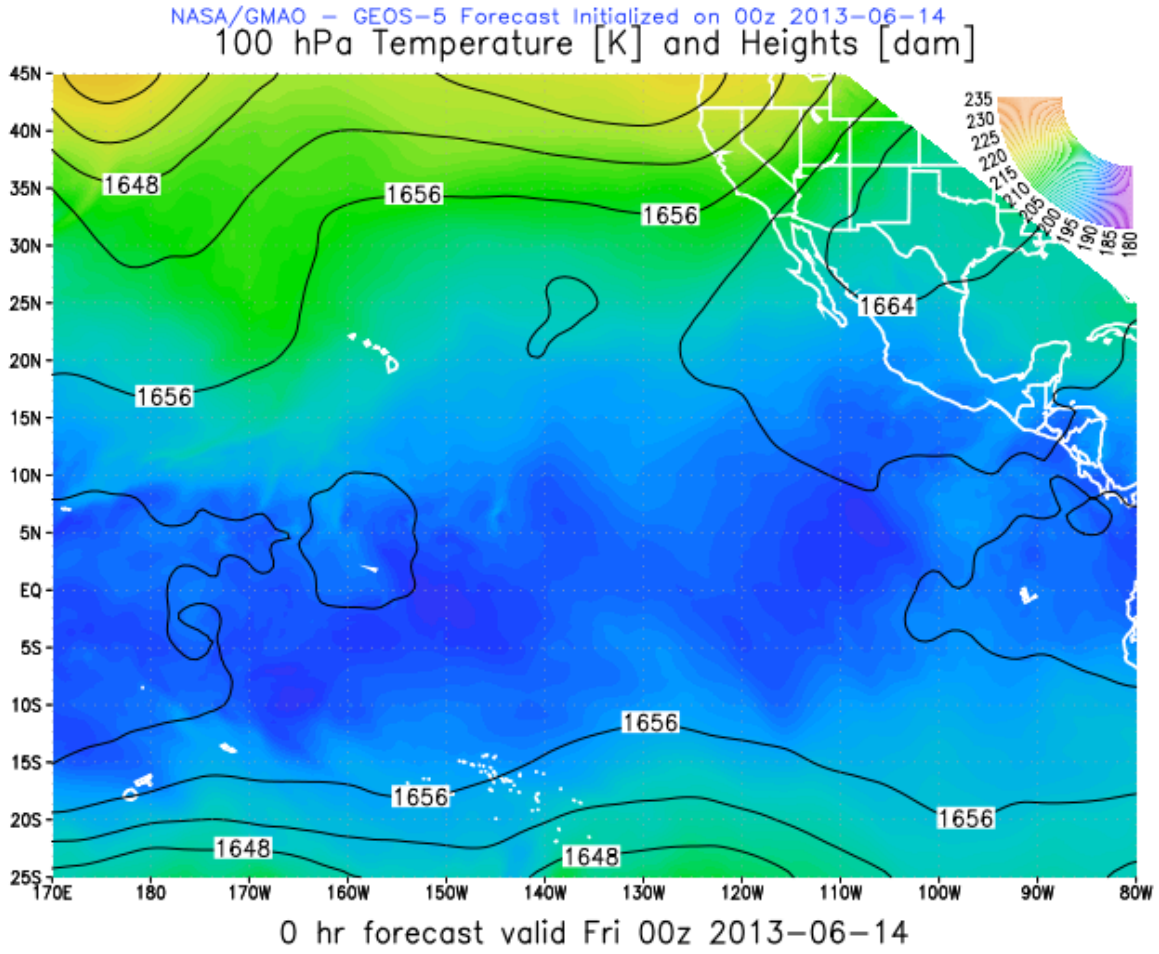
Standard Model forecast products – GFS and GEOS-5 to 120 hours

Available on sites maintained at ARC (both GFS and GEOS-5 products), at GSFC (GEOS-5 only – GMAO and Paul Newman) and NCAR (GFS PV – from Shawn). Sample products include:

- Tropopause altitude, temperature (clouds, dehydration)
- High, Low, and Middle cloud incidence and cloud top altitudes (clouds, dehydration)
- Precipitation, RH (700, 500, 300), vertical velocity (convection locations)
- EPV from 150 to 50 mb (4 levels) (midlatitude transport)
- EPV from 355 to 380K (4 levels) (midlatitude transport)
- Shear-generated turbulence (GH safety)



Sample forecast plot that I generate – note large coverage area, range ring. Plots planned flight tracks automatically. Old forecasts are retained and easily available for comparison.



GMAO WxMaps

Forecast Initial Time

2013-Jun-14 00z

Forecast Lead Hour

000

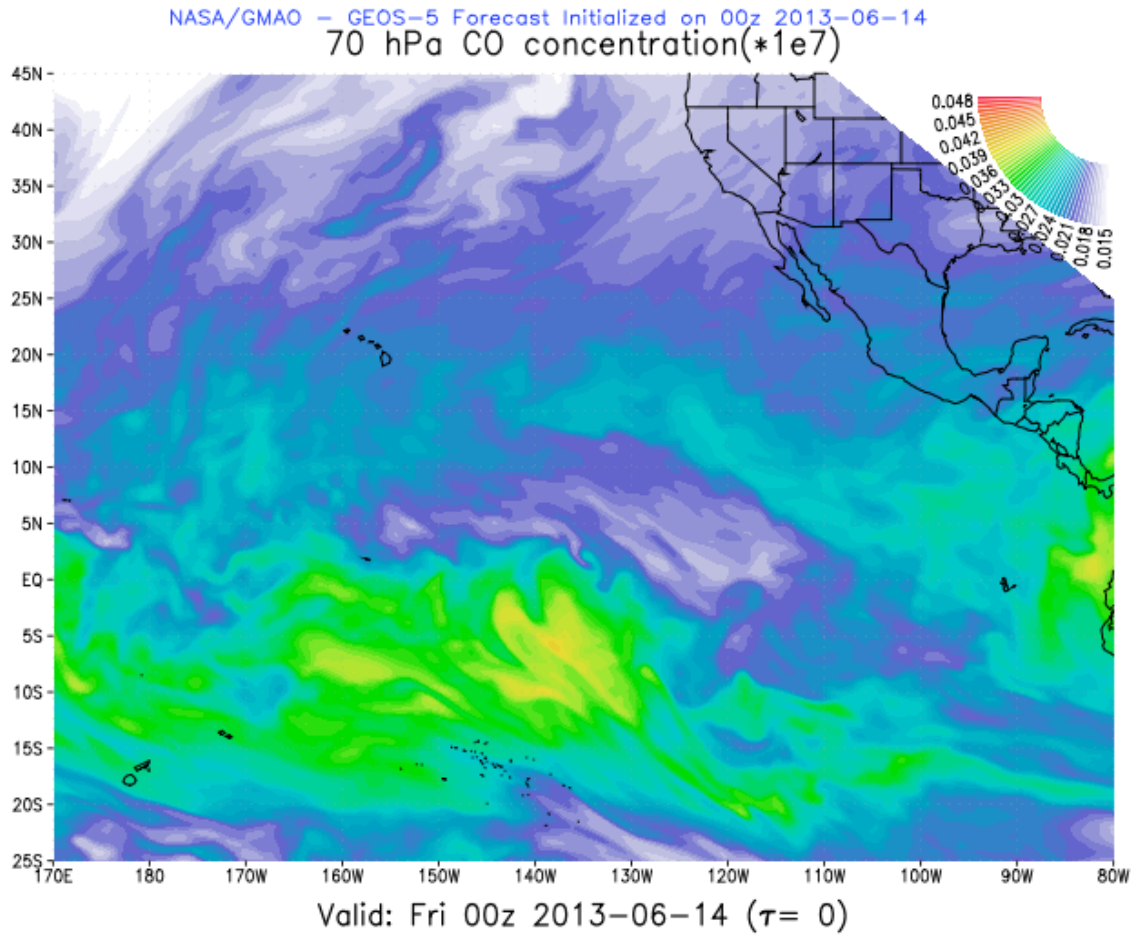
Levels	3D Variables	2D Variables
50	PV	Low Cld
70	Vorticity	Middle Cld
100	Temperature	High Cld
150	Vert Velocity	Cld Op Thk Low
200	Humidity	Cld Op Thk Mid
300	Wind Speed	Cld Op Thk Hgh
500	Cld Frac	Dust AOT
700	Dust Mass	Fine AOT
850		Precip & SLP

Animate

GEOS-5 ATTREX Mission Support
GEOS-5 ATTREX Chem Weather

GMAO met fields animator, with a variety of met products at a variety of altitudes.

CO and Aerosol Forecasts to 120 hours (from GMAO/GSFC)



GMAO Experimental Forecast Suite
GEOS-5 ATTREX Mission Support

GMAO WxMaps

Forecast Initial Time

2013-Jun-14 00z

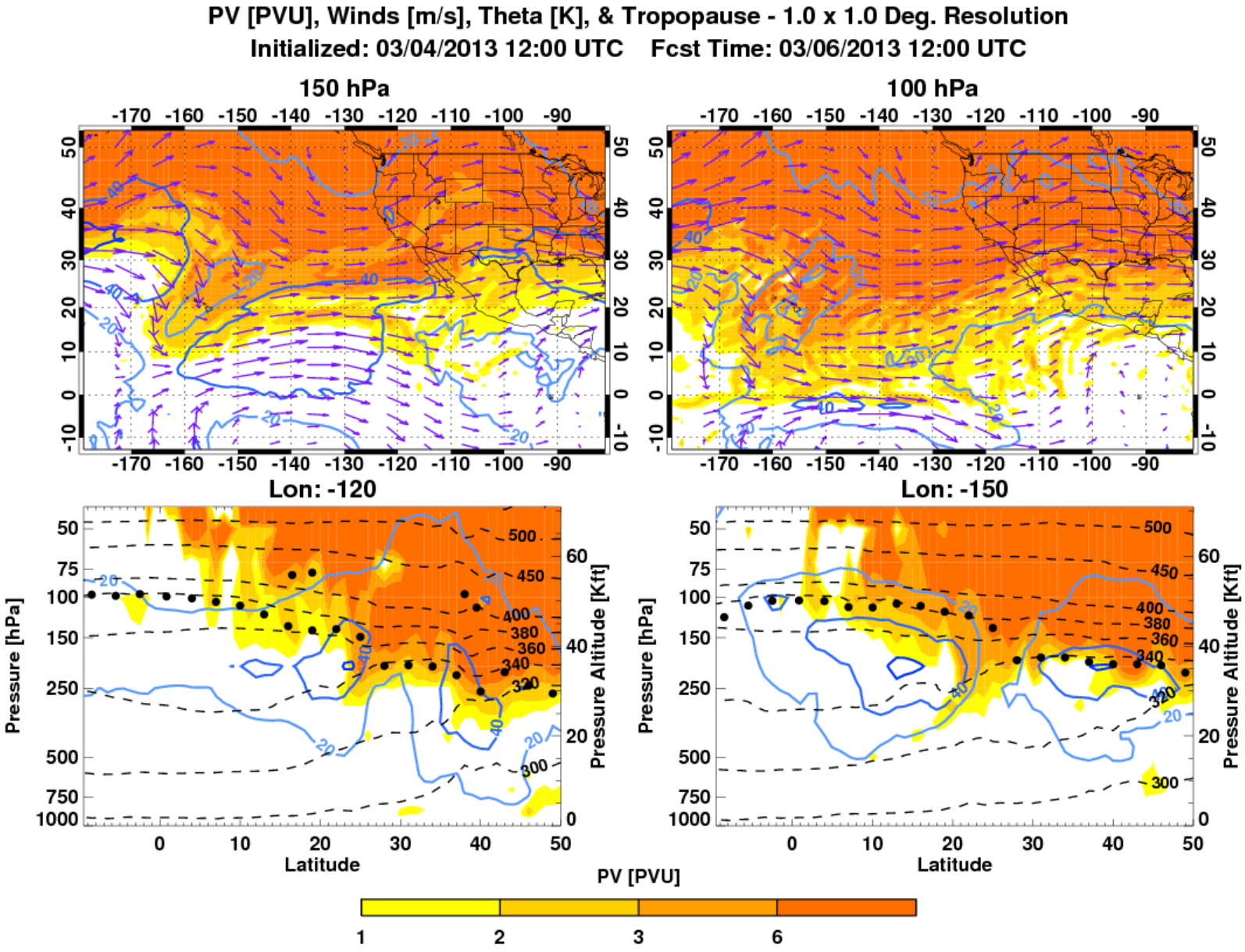
Forecast Lead Hour

000

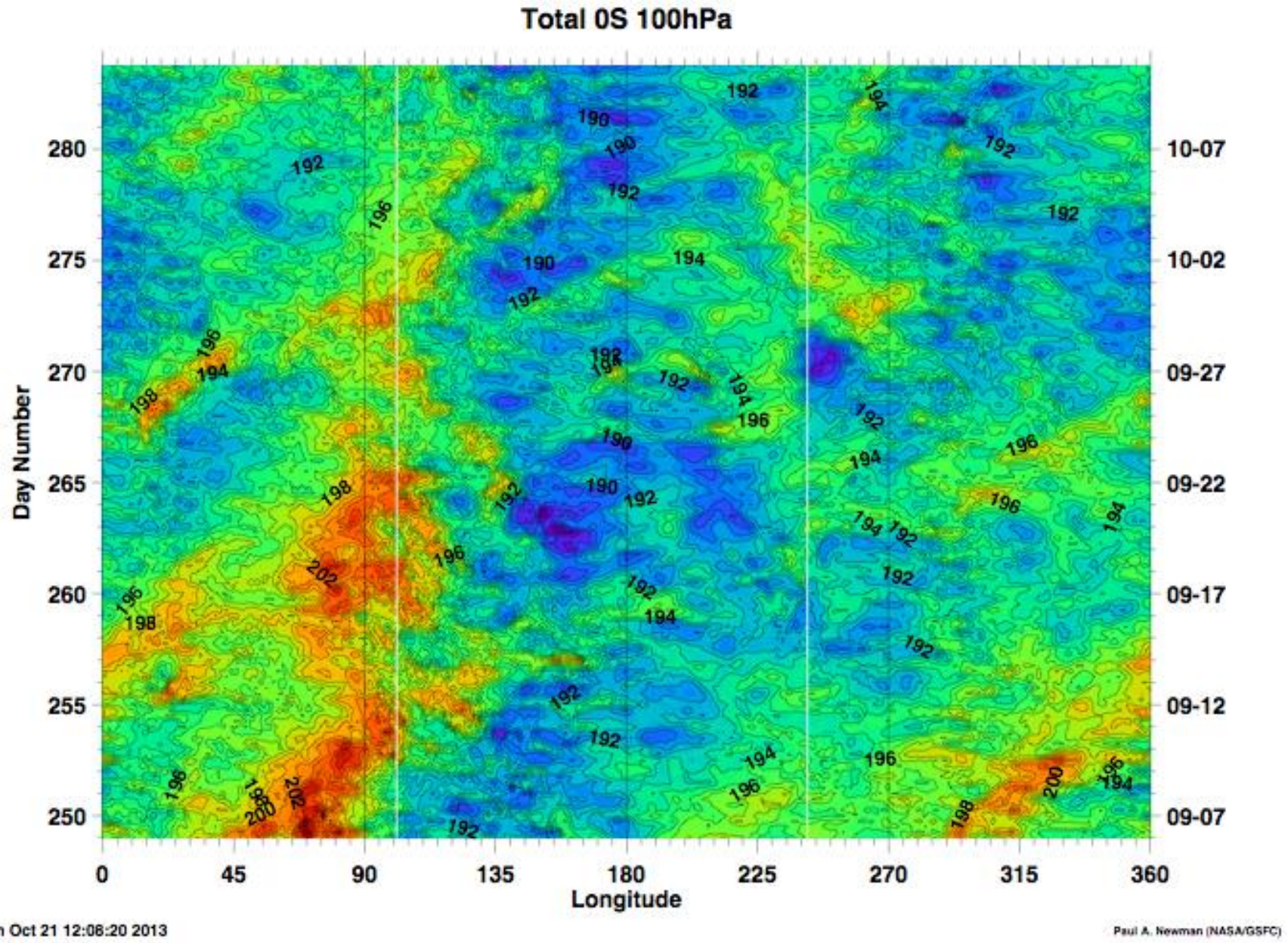
Levels	3D CO	3D Aerosols & Others
50	CO Concentration	Dust Mass
70	CO BB Africa	Black Carbon
100	CO BB Eurasia	Organic Carbon
150	CO BB N. Amer.	SO2
200	CO BB OTHER	SO4
300	CO BB S. Amer.	
500	CO FF Asia	
700	CO FF Europe	
850	CO FF N. Amer.	

Animate

GMAO CO tracer and aerosols animator



Shawn's PV plots and X-sections (animated) to look at transport into the tropics.



Hovmuller diagrams (P Newman) of GEOS-5 temperatures at several latitudes/altitudes – when fully active, includes GEOS-5 forecasts. Purpose is to capture equatorial wave behavior to help interpret forecasts. Also useful for wave component of ATTREX science issues

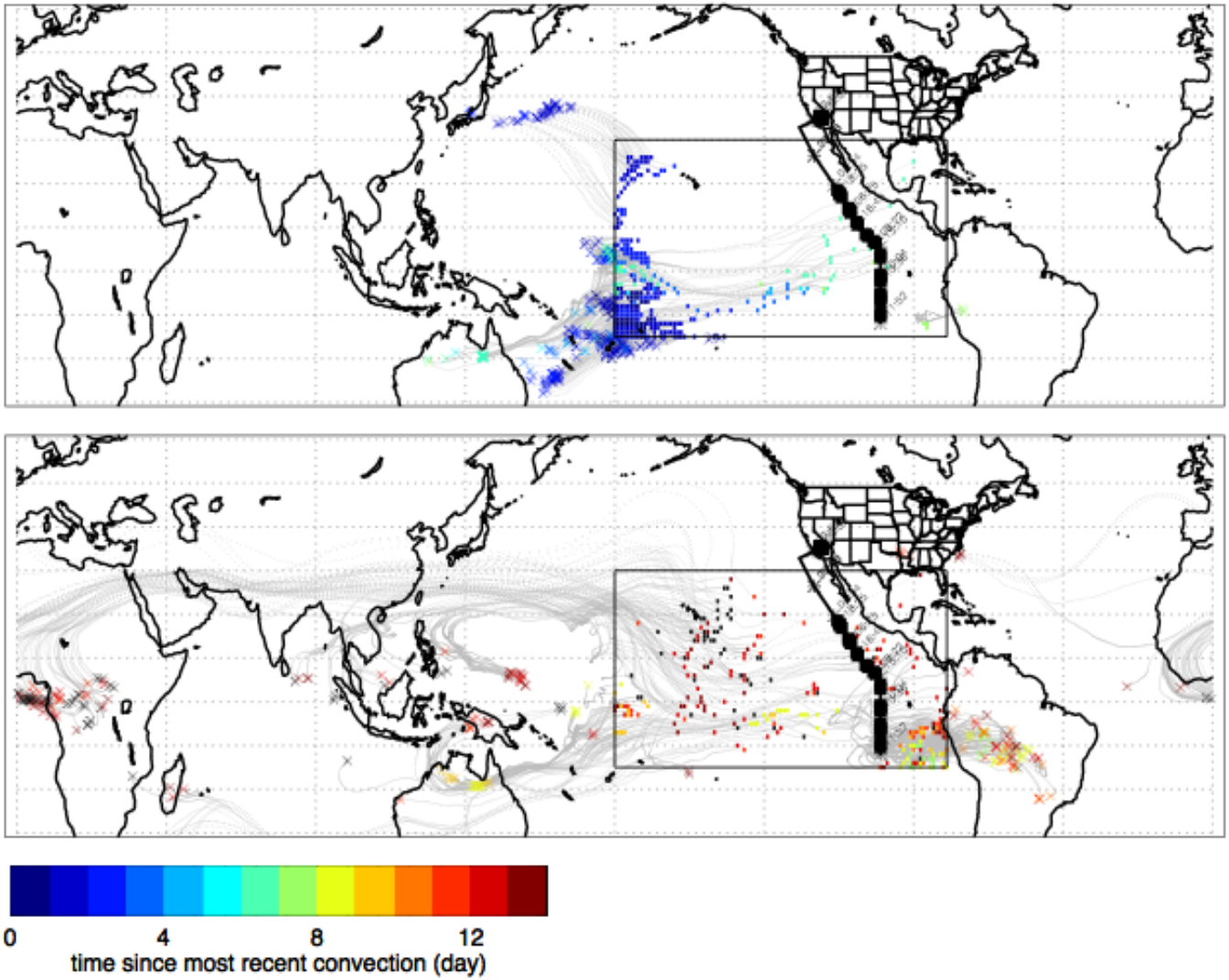
Trajectory based Forecast products

- RDFs (EPV) (Transport from midlatitudes)
- Convective influence (convection)
- Two thin cirrus cloud forecast products (cirrus dehydration)

attre_13022100_NMC_AVN170L42_47_53_57

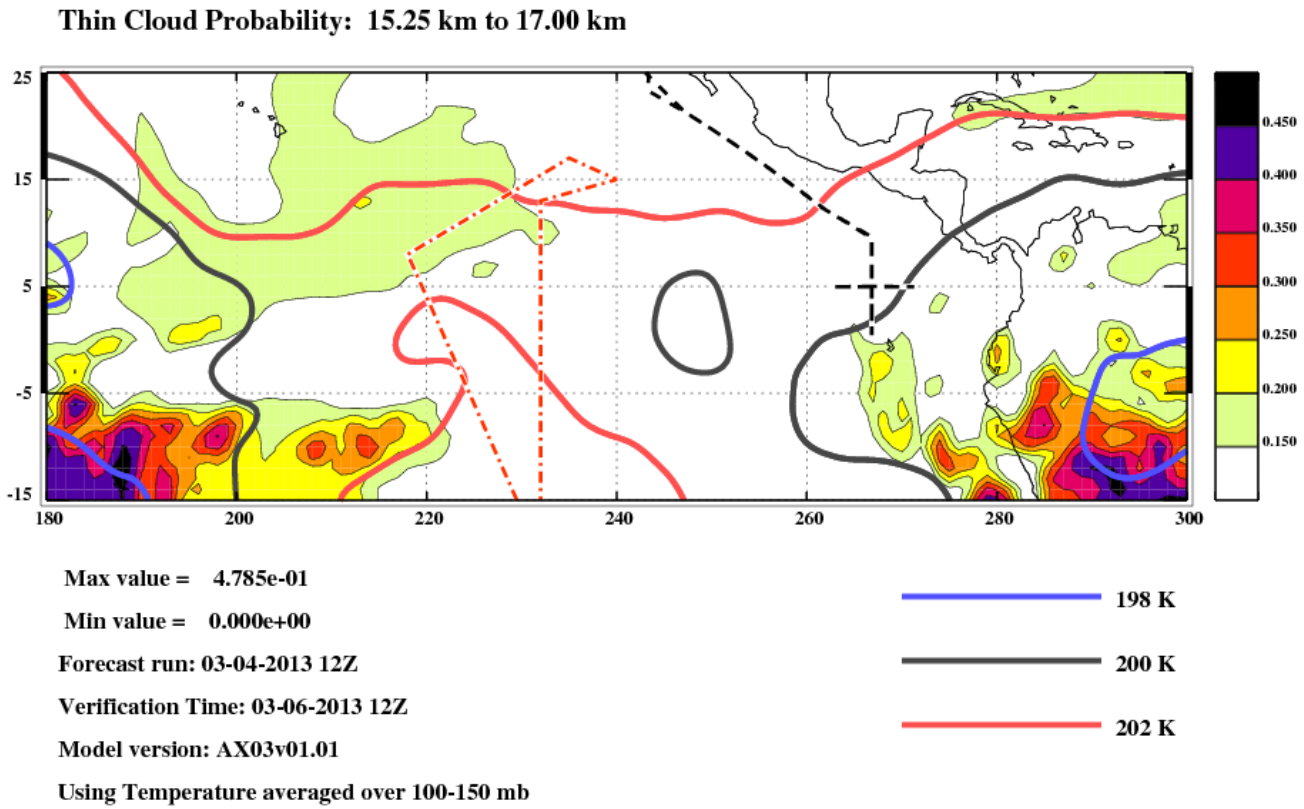
Convectively-influenced 14-day back trajectory at 53 kft level from boxed region on 02/21/2013, 00Z

Fig. 4: Trajectories influenced by most recent convection that occurs outside of boxed region at location X.

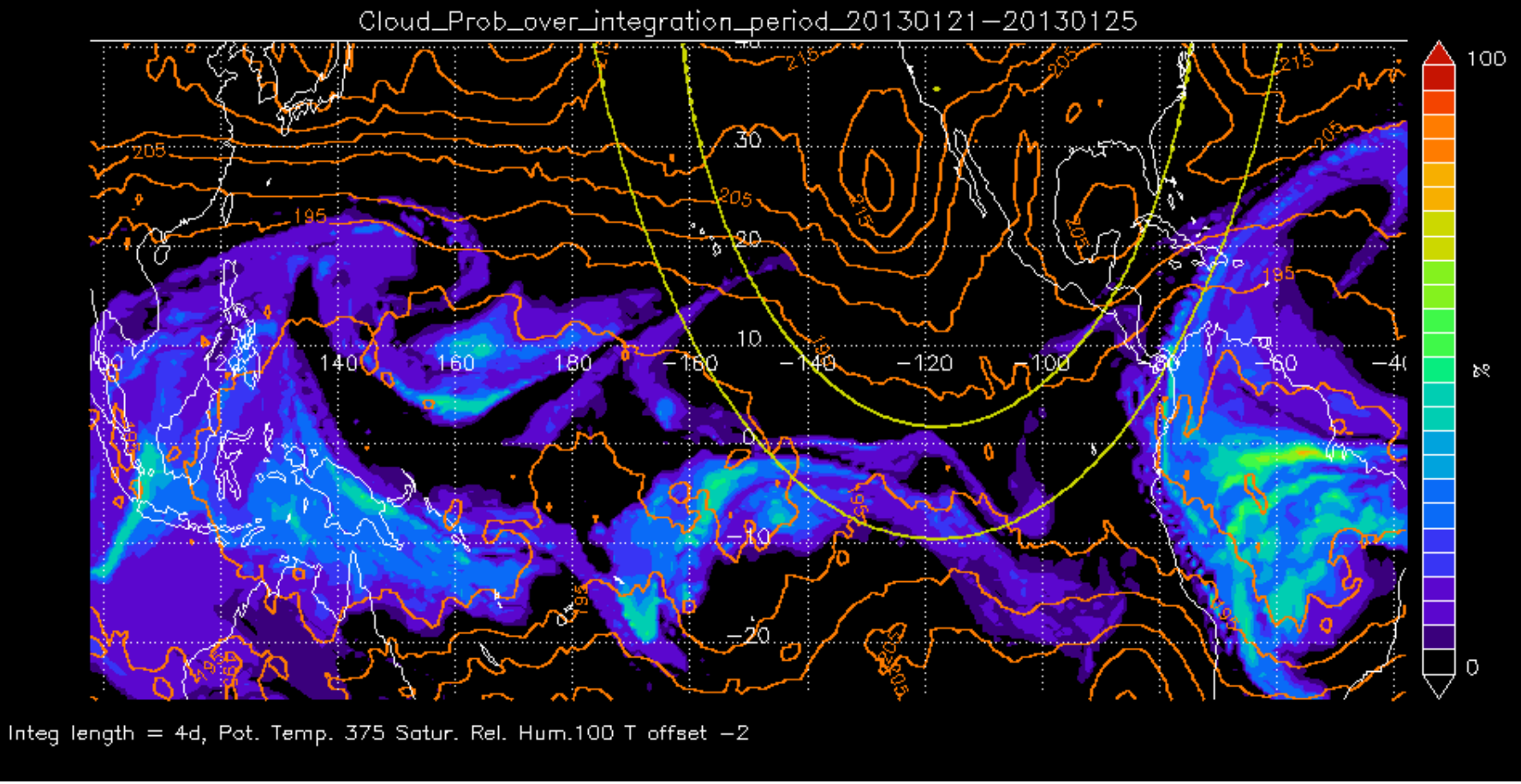


Rei Ueyama's convective influence product.

Air influenced by convection (based on satellite data, forecast convection, and GFS BTs). Top, short term (0-7 days), bottom, long term. Up to two days in advance. Can do this down to 43-45K.



John Bergman's thin cloud probability, based on temperature and altitude history.

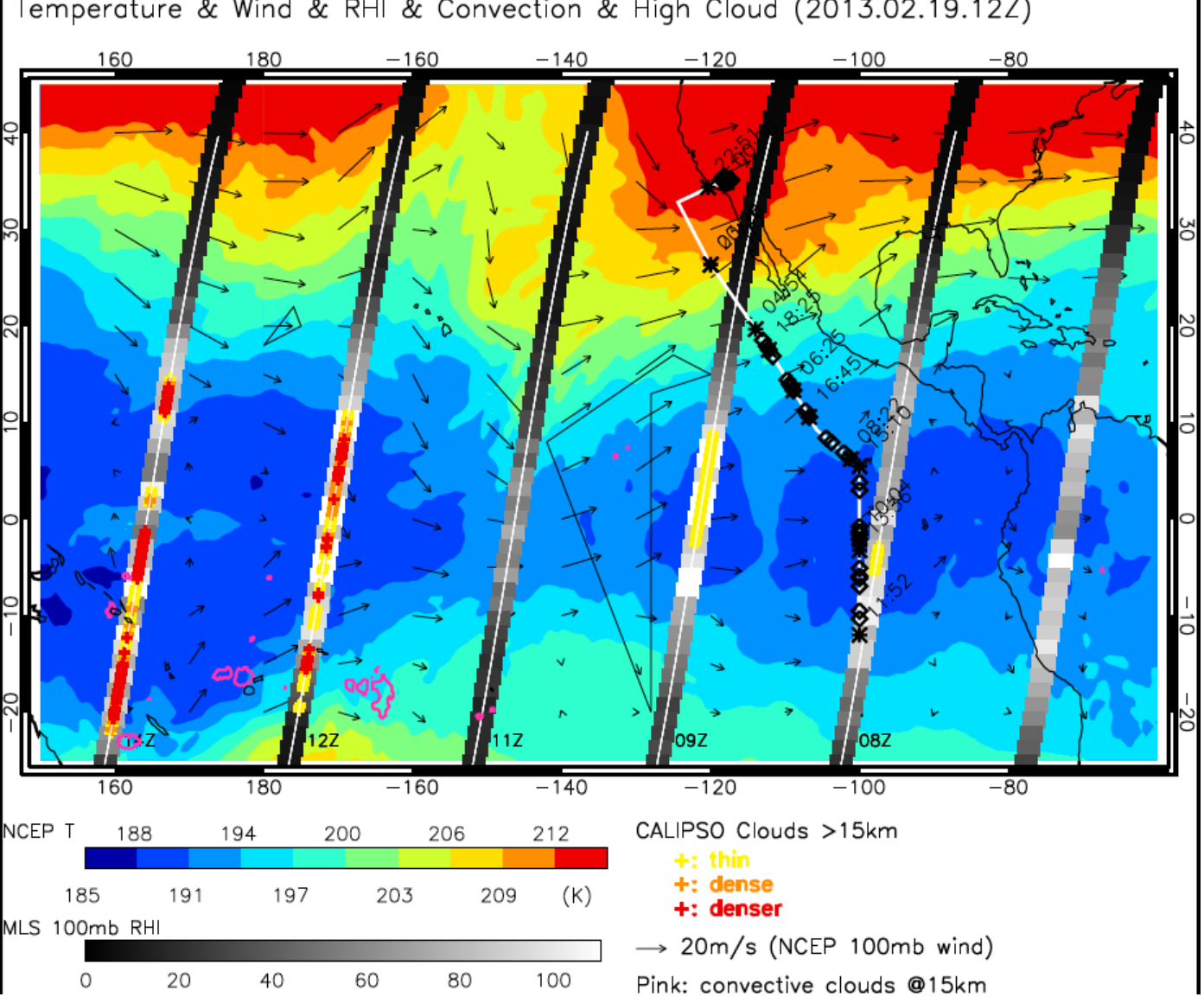


Forecast thin cirrus probability from Mark Schoeberl, based on 3-day back trajectories (temperature history),initialized with MLS water, and fed by forecast and satellite-based convection.

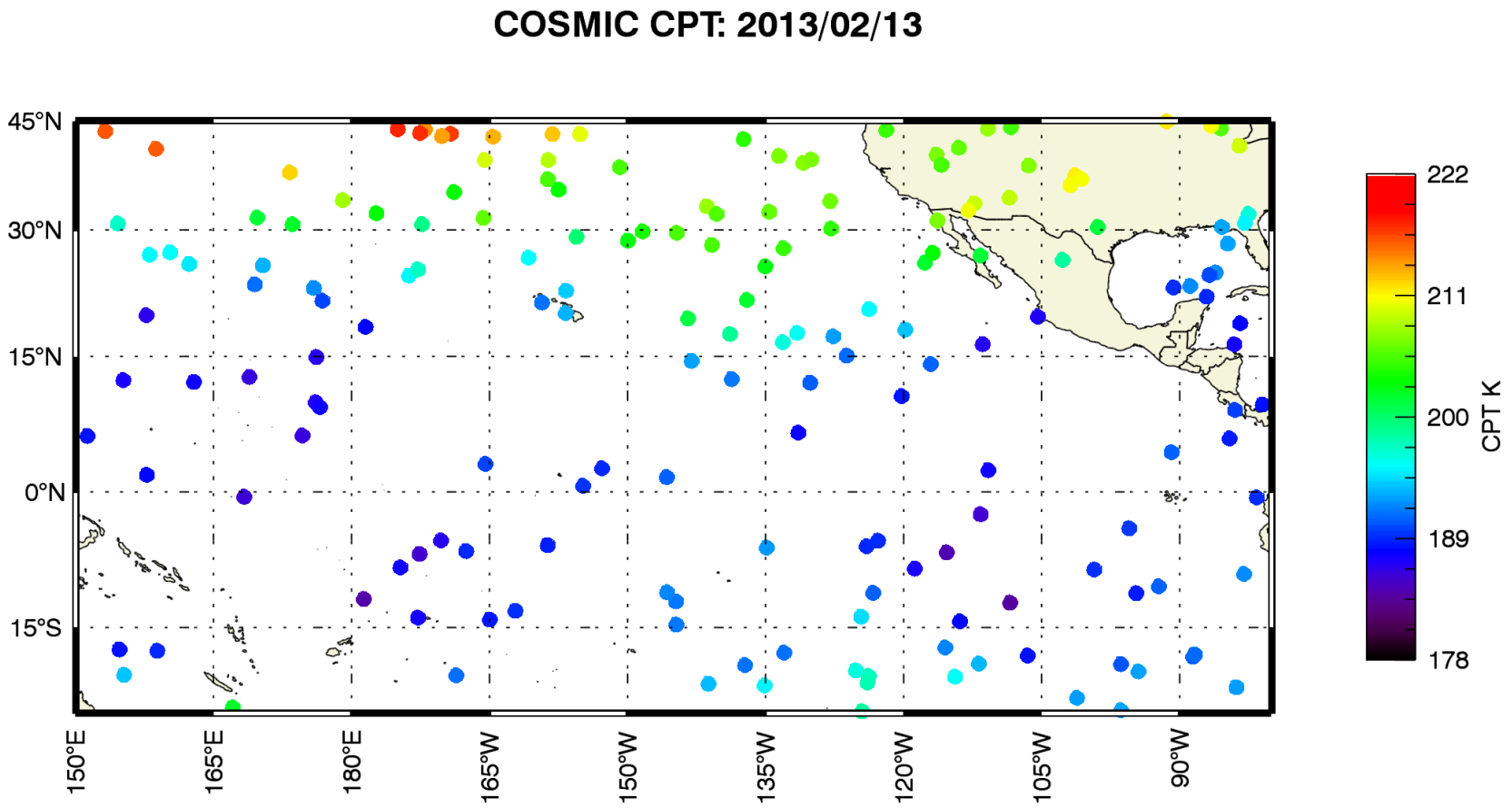
For most of the deployment, John's and Mark's forecasts were broadly similar.

Specialized Data Products

- Calipso thin clouds
- MLS water
- Observed GPS temperatures



Ji-Eun Kim's combined MLS, Calipso, IR imagery, and 100mb temperature product. We also got near real time CALIPSO products from Langley

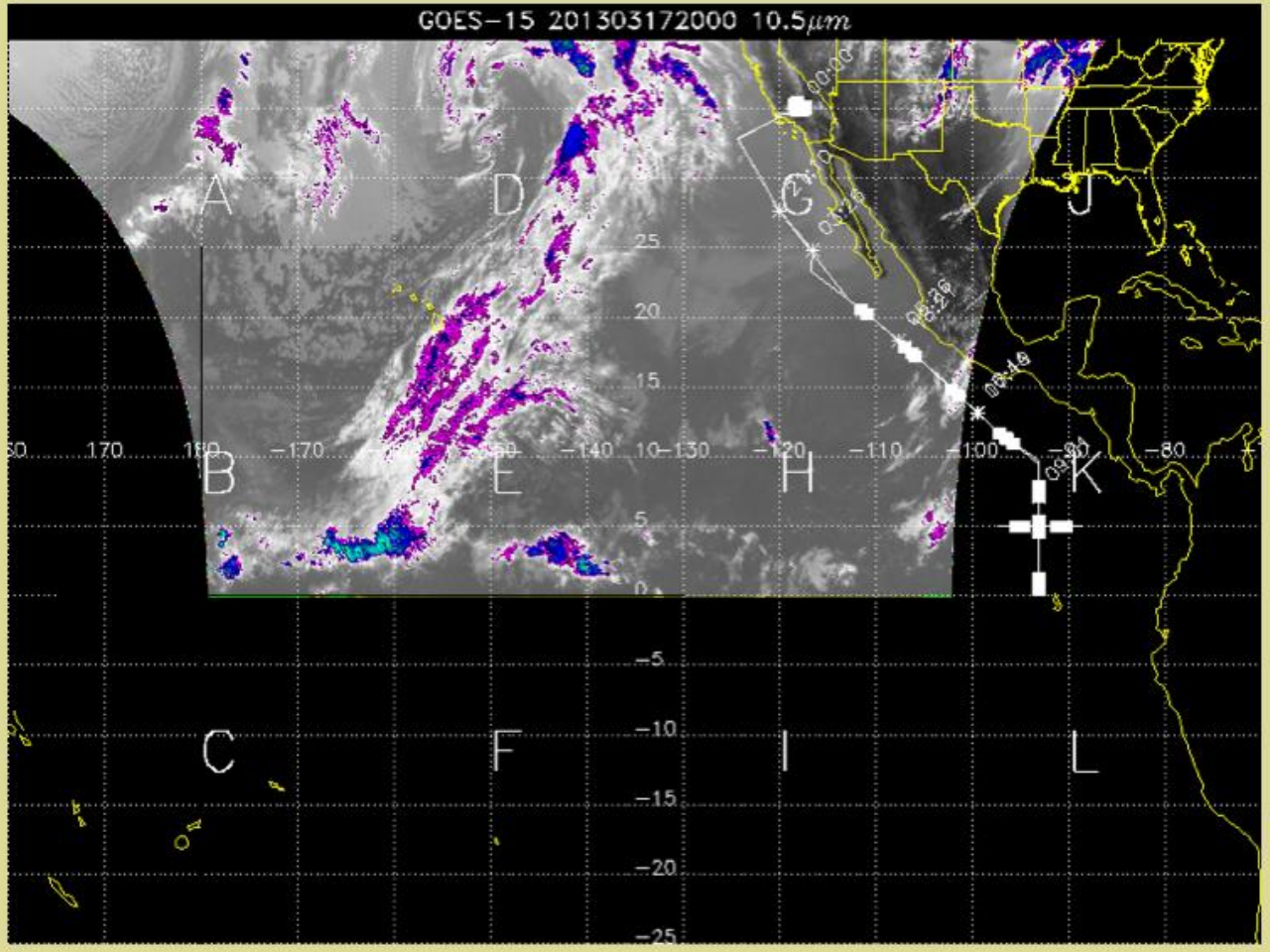


Cold point temps from COSMIC GPS (Stephanie Evan, also Shawn from NCAR)

Real Time Products

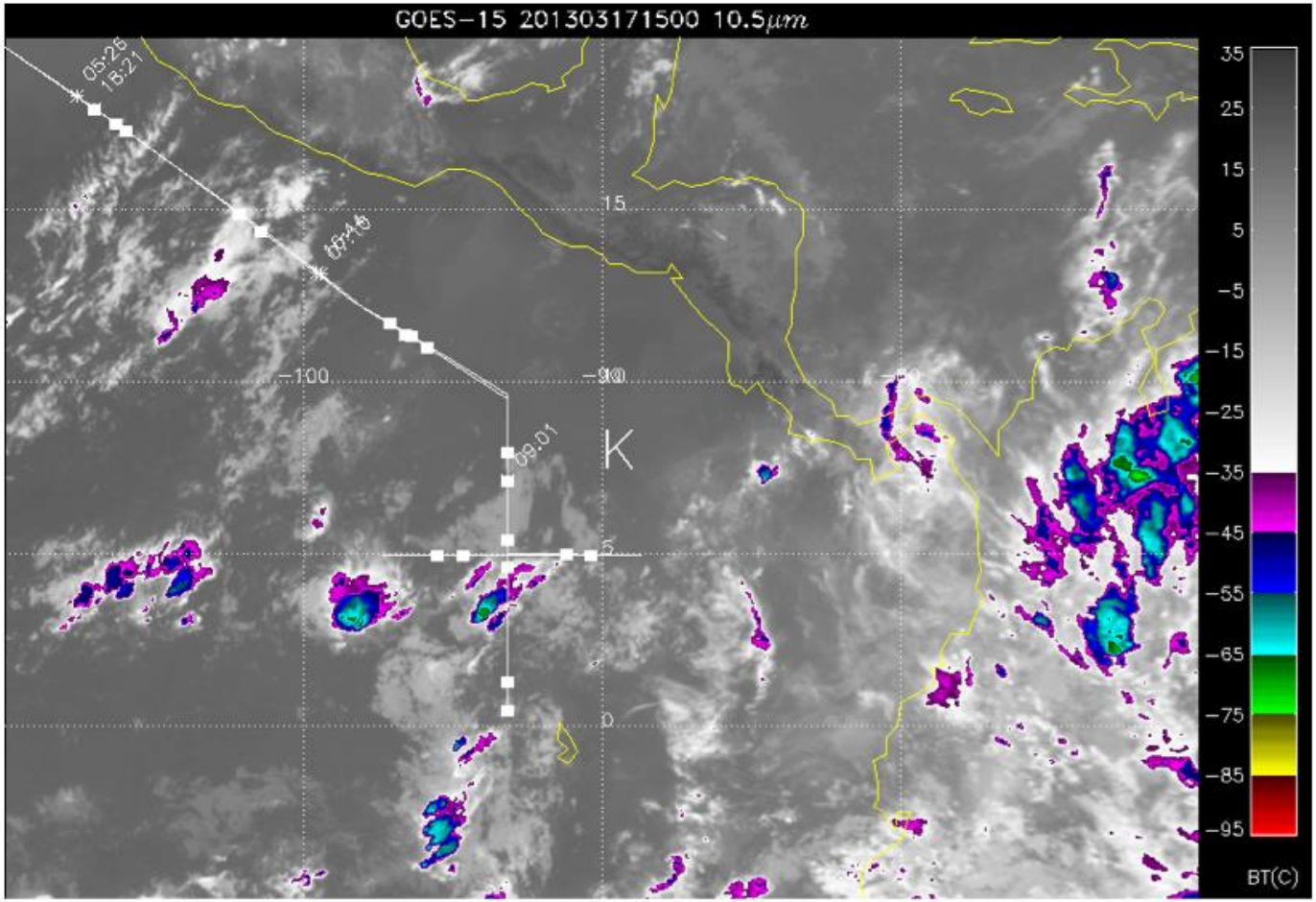
- Satellite imagery (water vapor, visible, IR – MTSAT)
- Mission Tools

There are 12 sectors in image;
Click on Letter to see sub-image loop
each small image is 40 deg wide by 25 deg tall



| ESPO ATTREX home page |

Clickable subsectors, flight track loaded automatically, also current aircraft position.
Developed by Marion Legg and myself.



Start | 1-Step | Stop | Slower | Faster | Backward | Forward | Toggle-2 is OFF

Speed:

Slowest ○ ○ ○ ○ ○ ○ ◉ ○ ○ ○ ○ Fastest

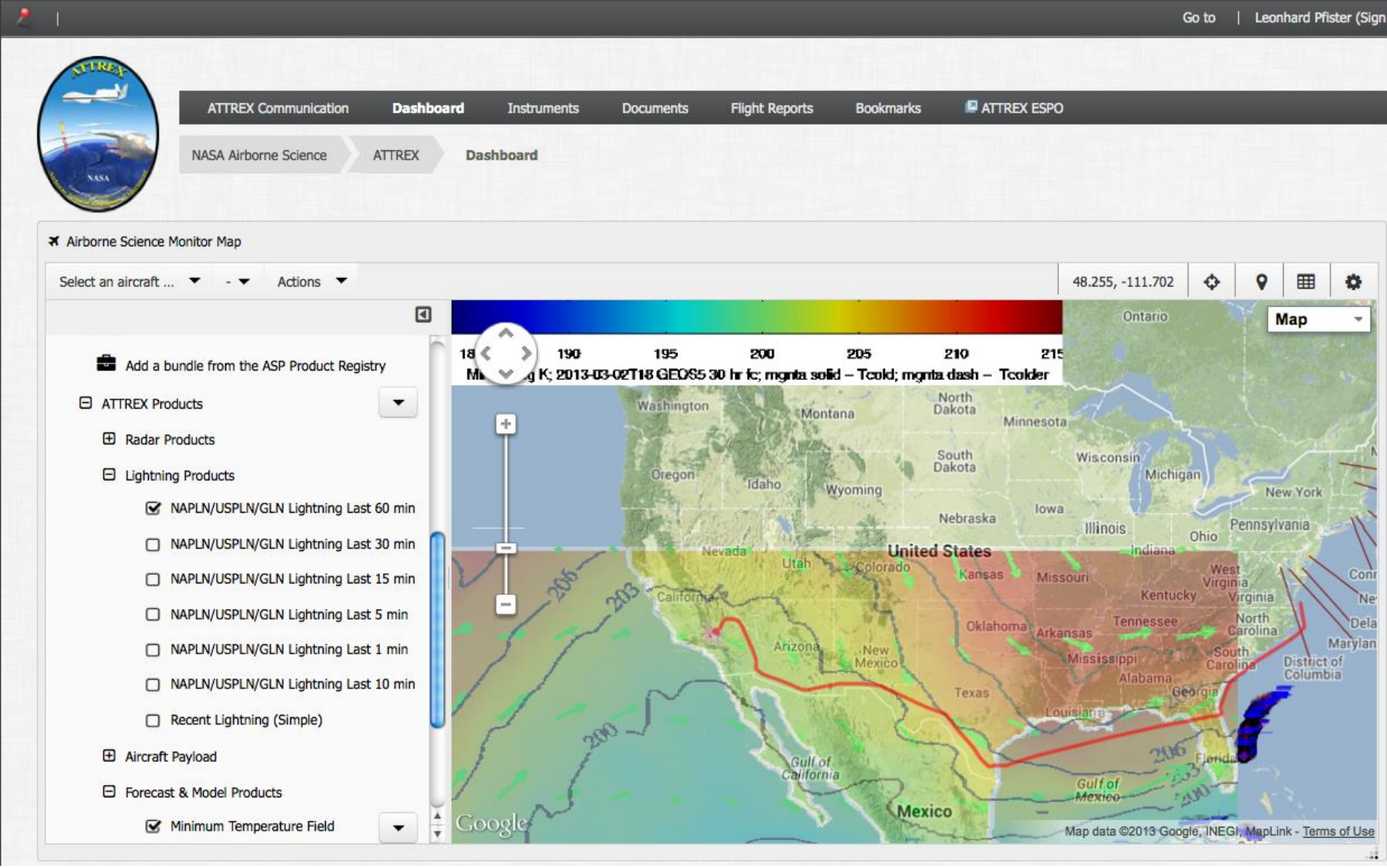
Frame: 2

Delay (millisec): 500

Full-resolution IR subsector, with automatic flight track, aircraft position.

Mission Tools Suite (developed by Aaron Duley at ARC for NASA aircraft field programs)

- Analogous to NCAR's mission coordinator.
- Supports several aircraft at once on a map.
- Standard overlays include radar (US) and lightning (world).
- Project supplied (and "on the web") satellite imagery.
- Any project supplied two-d product (e.g., temperature at the tropopause, forecast PV, or other target).



This shows an example. User supplied 2-D field (my graphic of minimum temperature), along with lightning, and the GH flight path from Wallops to DFRC.

Web page – basically organized bookmarks

Welcome to the
NASA-Ames Airborne Science Meteorological Support
ATTREX 2013

- Google Earth

Satellite Products	Forecast Maps	Met Links/Pacific-Global	Met Links/Dryden-SoCal	Climate/Historical	Meeting Presentations
• ARC IR Imagery • ATTREX CALIPSO Maps • CPS Cosmic Cold Point Temps • LANGLEY CALIPSO • PACIFIC Basin Images • ARC Water Vapor Imagery • NRL Tropical Page • University of Hawaii Weather • NWS Honolulu • NRL NEXSAT Page • Ozone Imagery	• ARC NCEP GFS Forecast Plots • ARC GMAO Movies • ARC Convective Influence Products • Water Vapor RDF Forecsts • NCAR PV, Cloud Forecast Products • GSFC ATTREX forecast plots • GEOS-5 Forecasts from GMAO/GSFC • GEOS-5 ATTREX • NCEP North Pacific • FNMOC(Navy) • Air Force Model Products	• NOAA CPC MJO Page • GSFC Hovmuller plots for ATTREX • NOAA CPC El Nino Page • MJO & Tropical Waves • Atmospheric Soundings • Global Current Lightning • Delta Airlines Meteorology • Pacific Basin Lightning • NWS Aviation WX Products	• EAFB Weather • EAFB Hourly Weather • Relevant Edwards Radiosondes • Southern California Graphical Weather • Edwards Soundings • Edwards Weather System • NWS San Diego • NWS Hanford • NWS LA-Oxnard • Rapid Update Cycle	• GSFC Climatologies for ATTREX • Satellite Movies • MERRA Trajectories	• Met briefing - Feb 20 - Selkirk • Met briefing - Feb 04 - Selkirk • Met briefing - Wed 30 Jan - Selkirk (updated) • Met briefing - Tues 29 Jan - Selkirk • Met briefing - Mon 28 Jan - Selkirk • Met briefing - Sat 26 Jan - Selkirk • Telecon Nov 14, 2012 • Science Flight Cross Sections • Flight Day Movies • Analysis Map Sequences • Planning Movies • Pfister movies for Science Meeting 21 Jan 2013

ESPO ATTREX Home Page

Flight Plan Files

http://bocachica.arc.nasa.gov/ATTREX_2013/attrex.html

Updates for 2014

- In process of shifting map areas to West Pac.
- Shifting to different satellites
- Given size of domain, may go to two areas instead of one.
- Expect phased opening of web site to start in about a month.