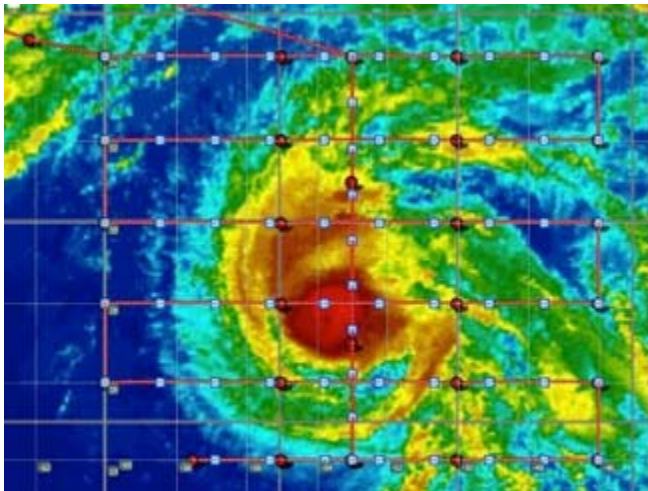


Hurricane and Severe Storm Sentinel : Results from the 2013 Deployment and Plans for 2014



3/5/2013

Scott Braun
Paul Newman
(NASA/GSFC)

67th IHC: TC Research Forum

1

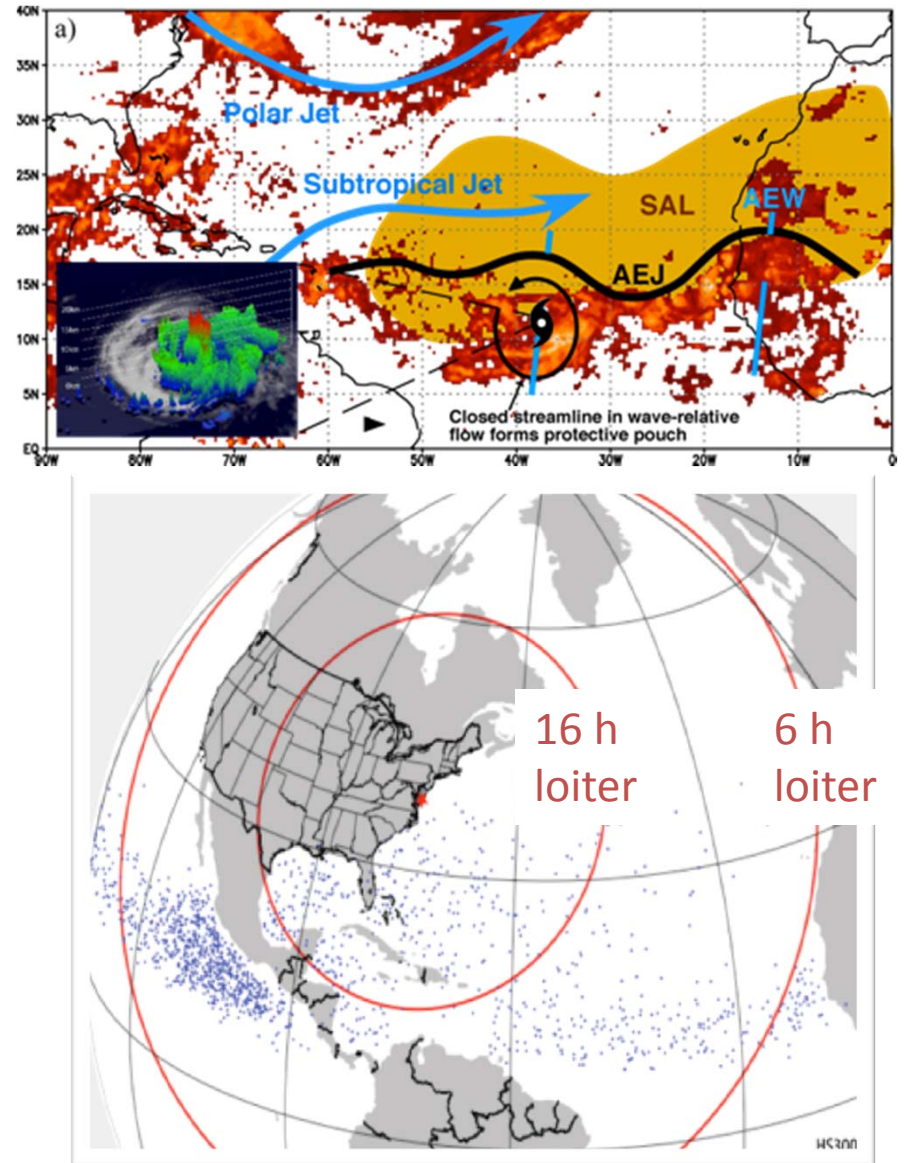
HS3 Summary

GOALS:

- ◆ What is the role of the Saharan Air Layer?
- ◆ What is the role of upper-level wind patterns?
- ◆ Are intense convective bursts key to formation/intensification?

DEPLOYMENT DETAILS

- ◆ Two Global Hawks, one for the environment, one for inner-core measurements
- ◆ Deployed from Wallops, VA
- ◆ 5 week deployments

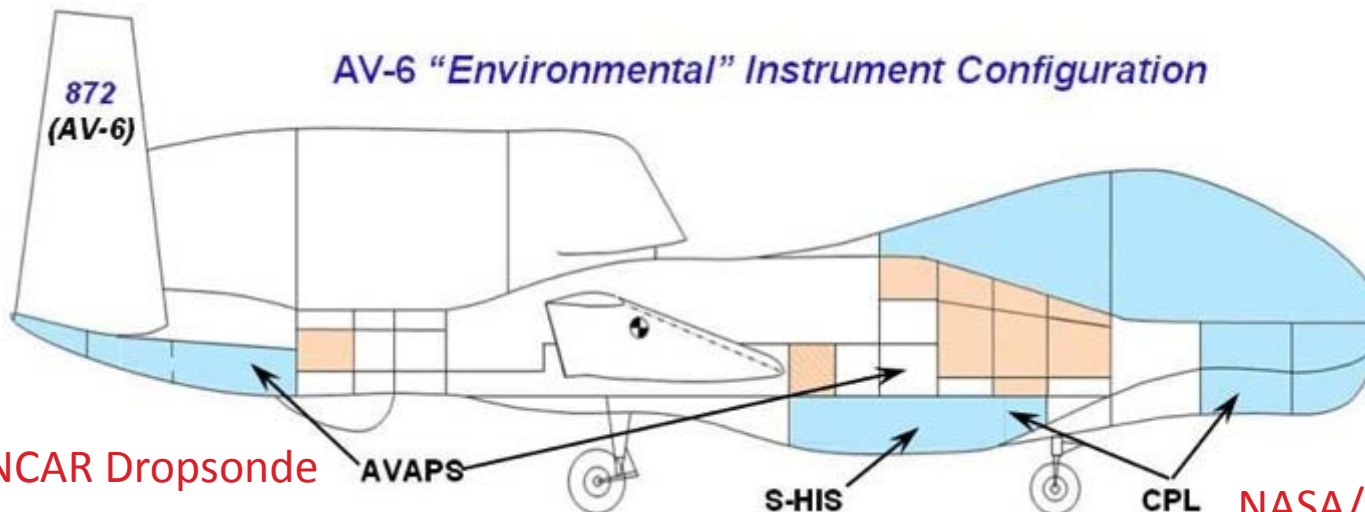




Payloads



AV-6 "Environmental" Instrument Configuration



NOAA/NCAR Dropsonde

AVAPS

S-HIS

CPL

NASA/GSFC
Cloud Physics
Lidar

U. Wisc. Interferometer sounder

AV-1 "Over Storm" Instrument Configuration



HIRAD

HIWRAP

HAMSRL

NASA/MSFC SFMR-type scanning
radiometer

NASA/GSFC Doppler radar

JPL microwave
sounder



2013 Successes and Operations Improvements

- First two-Global Hawk operations
- Demonstrated back-to-back and back-to-back-to-back flights possible (two-plane operations)
- Effective crew management allowed for no hard down days
- Only need to identify region of flight 2 **business** days before flight, detailed plan at 1 day prior

Summary of 2013 Flights

Date	Aircraft	Storm	Description
August 20-21	AV-6	Ex-Erin/SAL	Environmental sampling of shallow former TS Erin and SAL air mass
August 24-25	AV-6	SAL	SAL flight in weak African wave disturbance
August 29-30	AV-6	Pre-Gabrielle/SAL	Pre-Gabrielle African wave with SAL air
Sept. 3-4	AV-1	Pre-Gabrielle	Measurement of convective structure of Pre-Gabrielle and adjacent convective disturbance
Sept. 4-5	AV-6	TS Gabrielle	Environmental sampling of TS Gabrielle and adjacent convective disturbance
Sept. 7-8	AV-6	Ex-Gabrielle	Potential redevelopment of former TS Gabrielle
Sept. 15-16	AV-1	Hurricane Ingrid	Precipitation and wind structure measurements in H. Ingrid. Flight cut short due to fuel temperature problems.
Sept. 16-17	AV-6	TS Humberto	Redevelopment of TS Humberto. Hybrid low-level warm/upper-level cold structure observed.
Sept. 19-20	AV-6	Invest 95L	Environmental measurements of Invest 95L that, despite a good low-level circulation and moisture, failed to develop into a tropical depression.

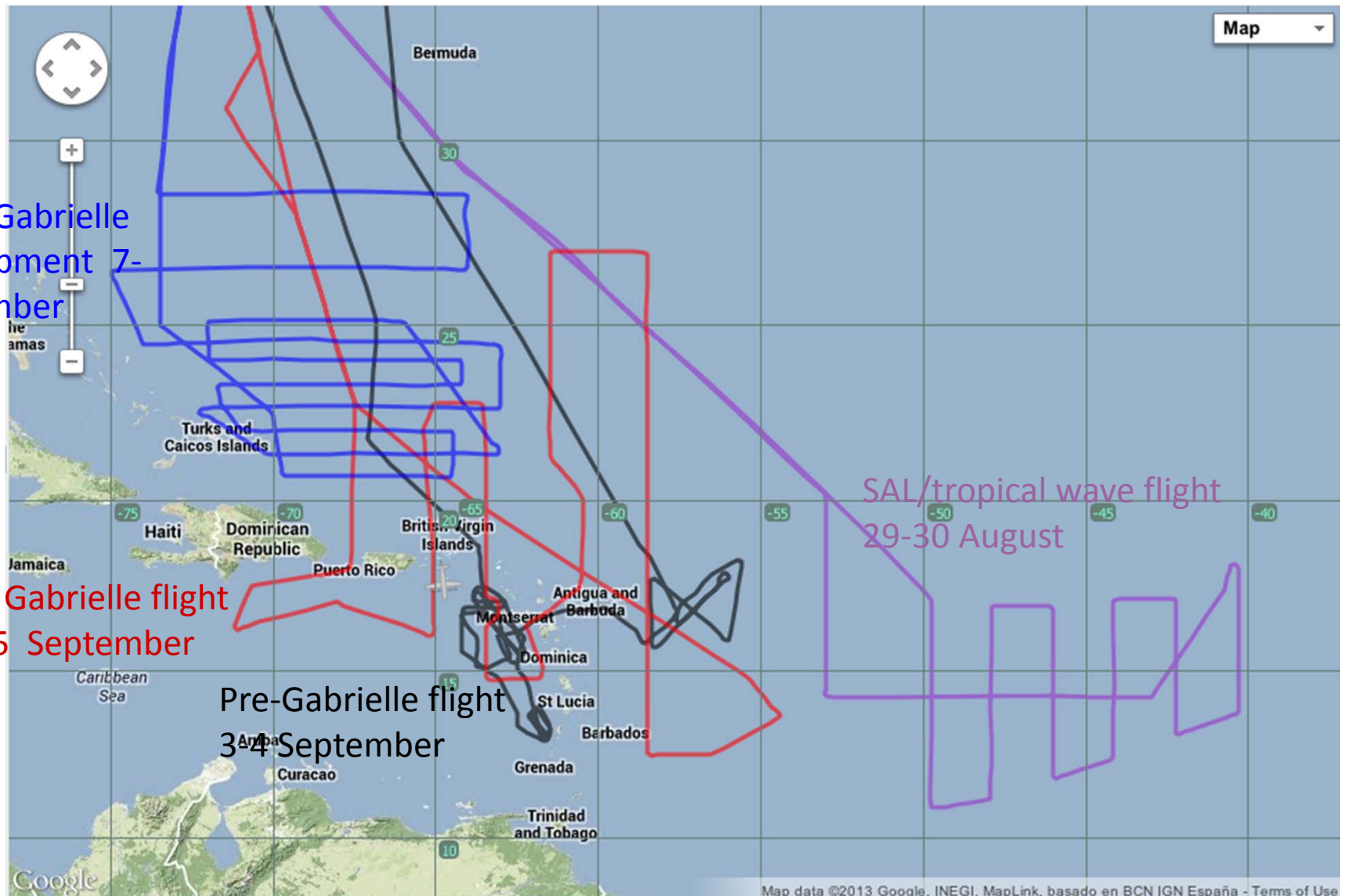
Tropical Storm Gabrielle Flights

Possible Gabrielle redevelopment 7-8 September

TS Gabrielle flight 4-5 September

Pre-Gabrielle flight 3-4 September

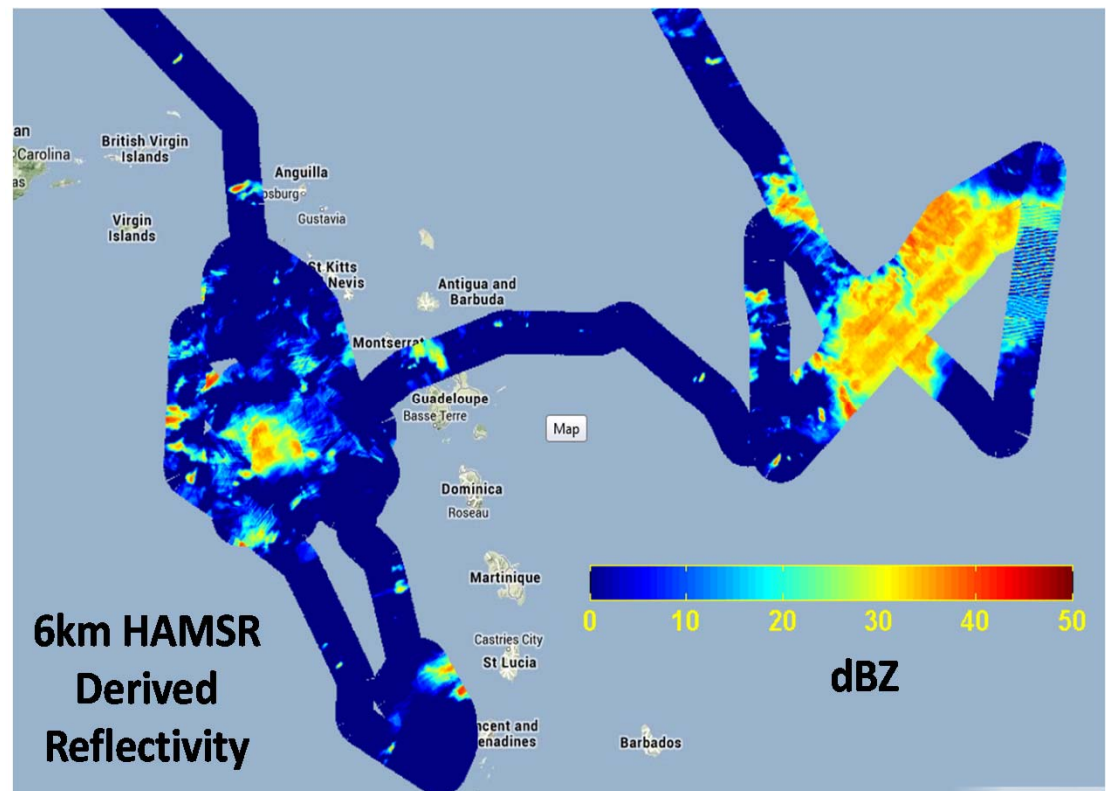
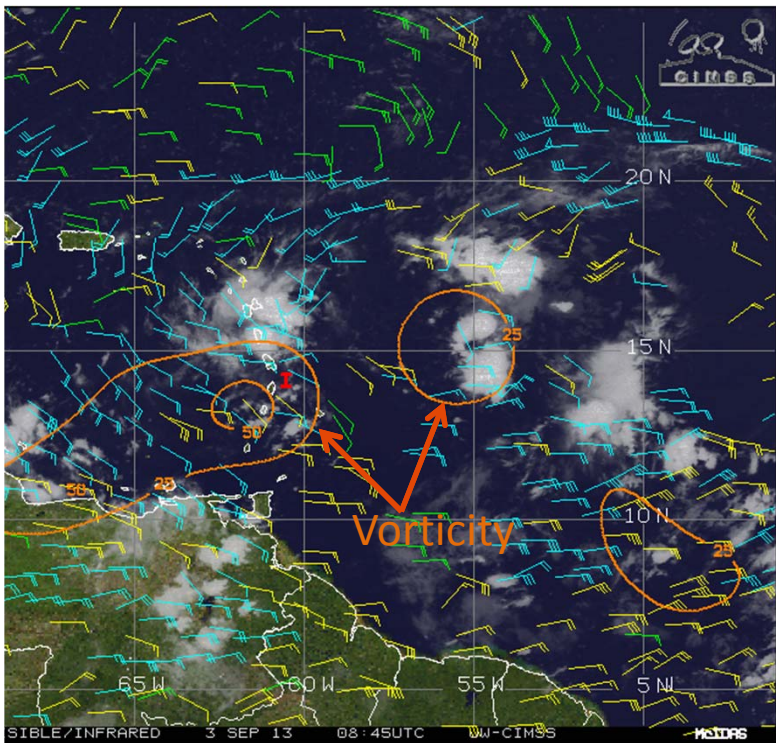
SAI/tropical wave flight 29-30 August



Tropical Storm Gabrielle Flights

3-4 September

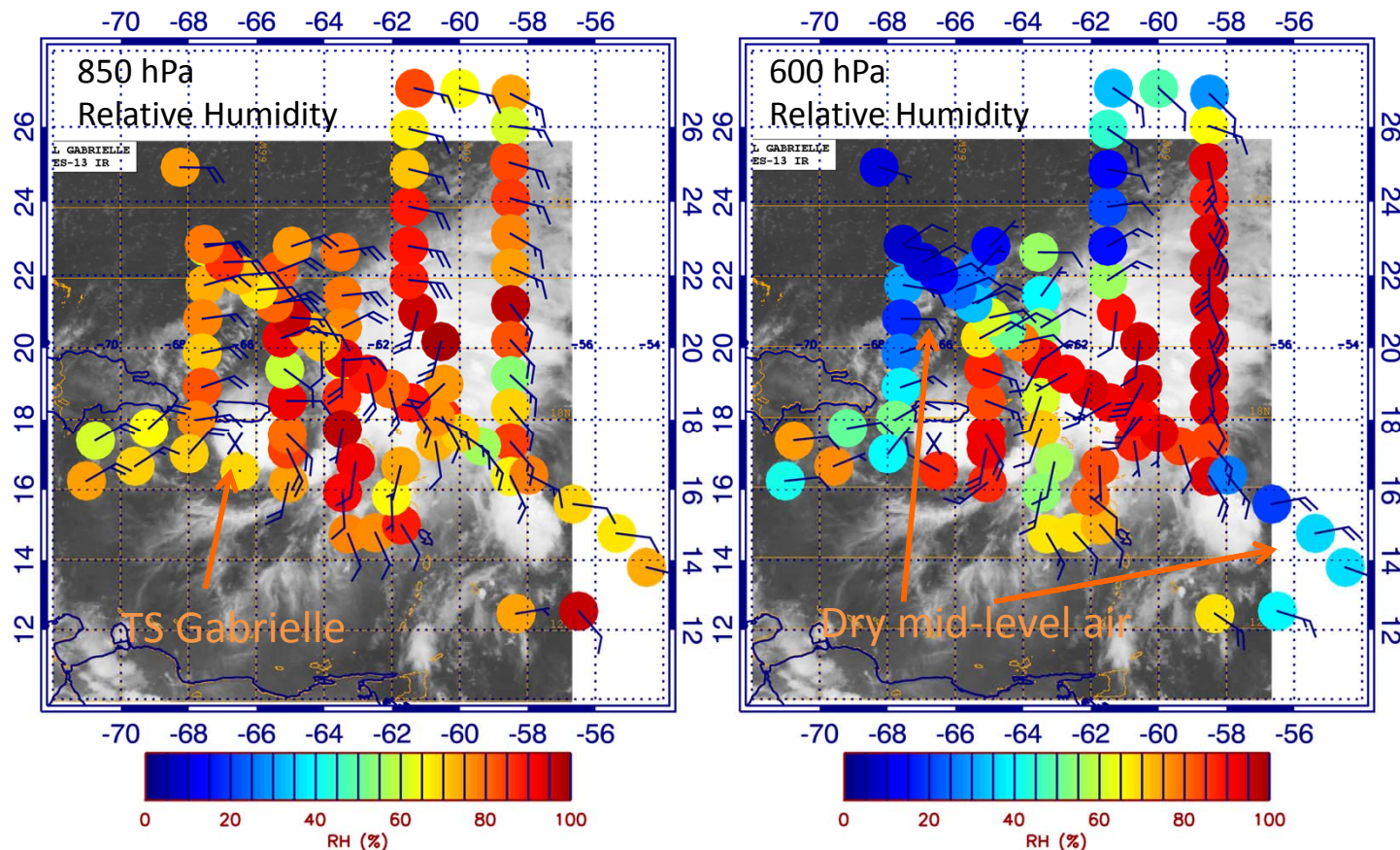
- First AV-1 flight of HS3
- Two disturbances seen in satellite image corresponding to waves observed earlier with AV-6
- Both disturbances were sampled, with the eastern one showing greater overall rainfall



Tropical Storm Gabrielle Flights

4-5 September

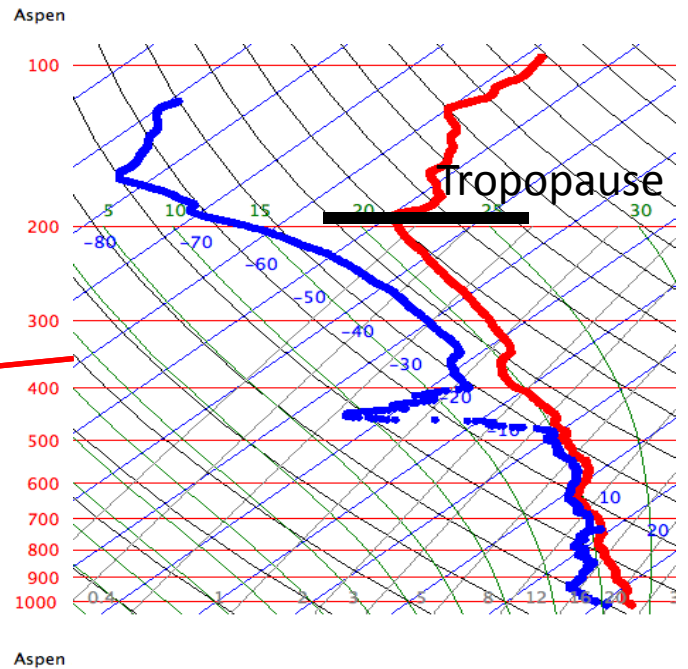
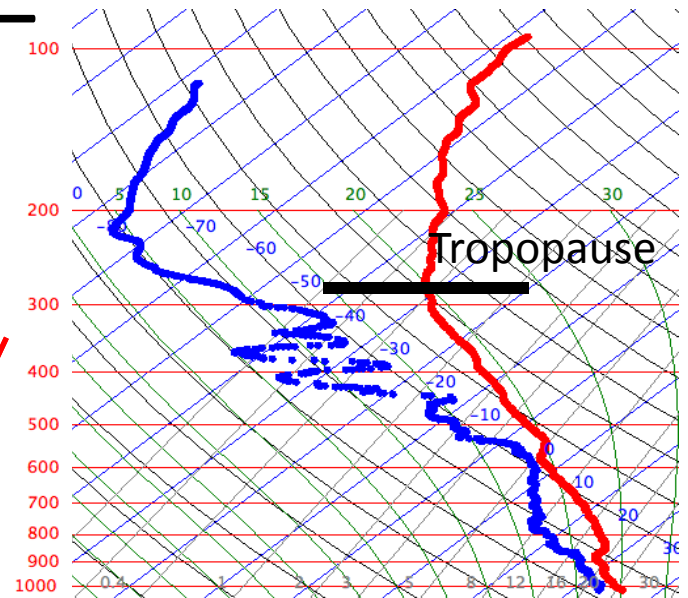
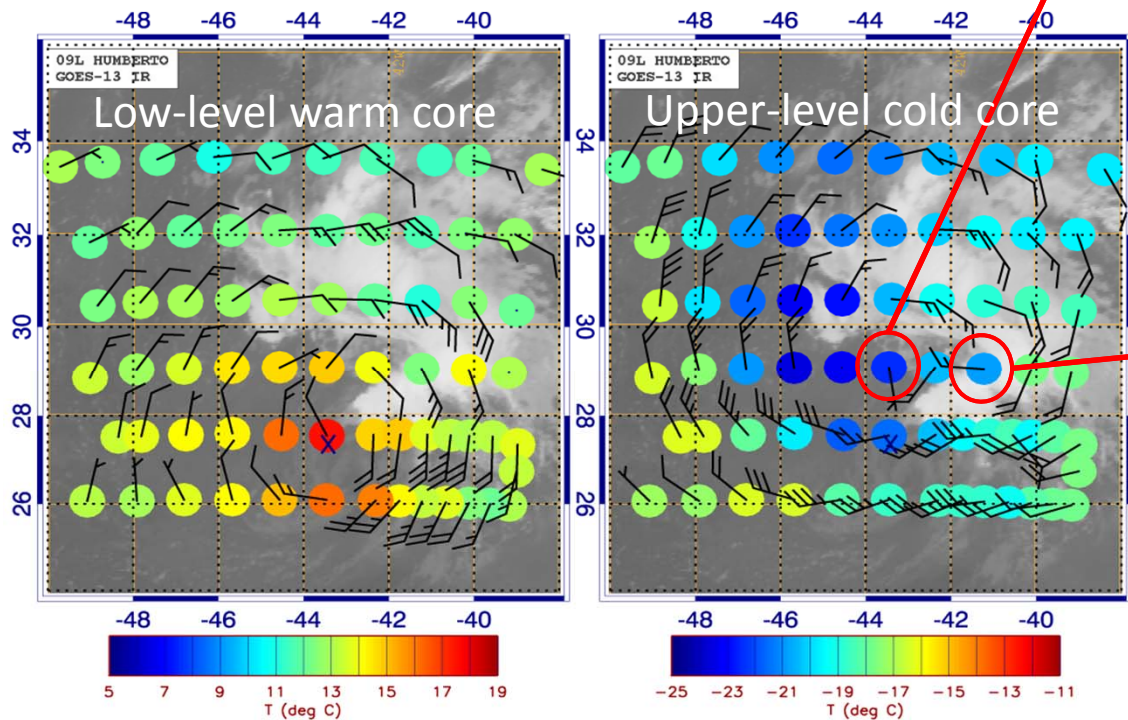
- GEOS-5 dust forecast showed SAL dust layer wrapping around area of convection and into the storm circulation
- Two disturbances seen in the dropsonde winds
- The leading wave had somewhat drier conditions, the more eastern wave was very moist



Tropical Storm Humberto— A Hybrid Storm

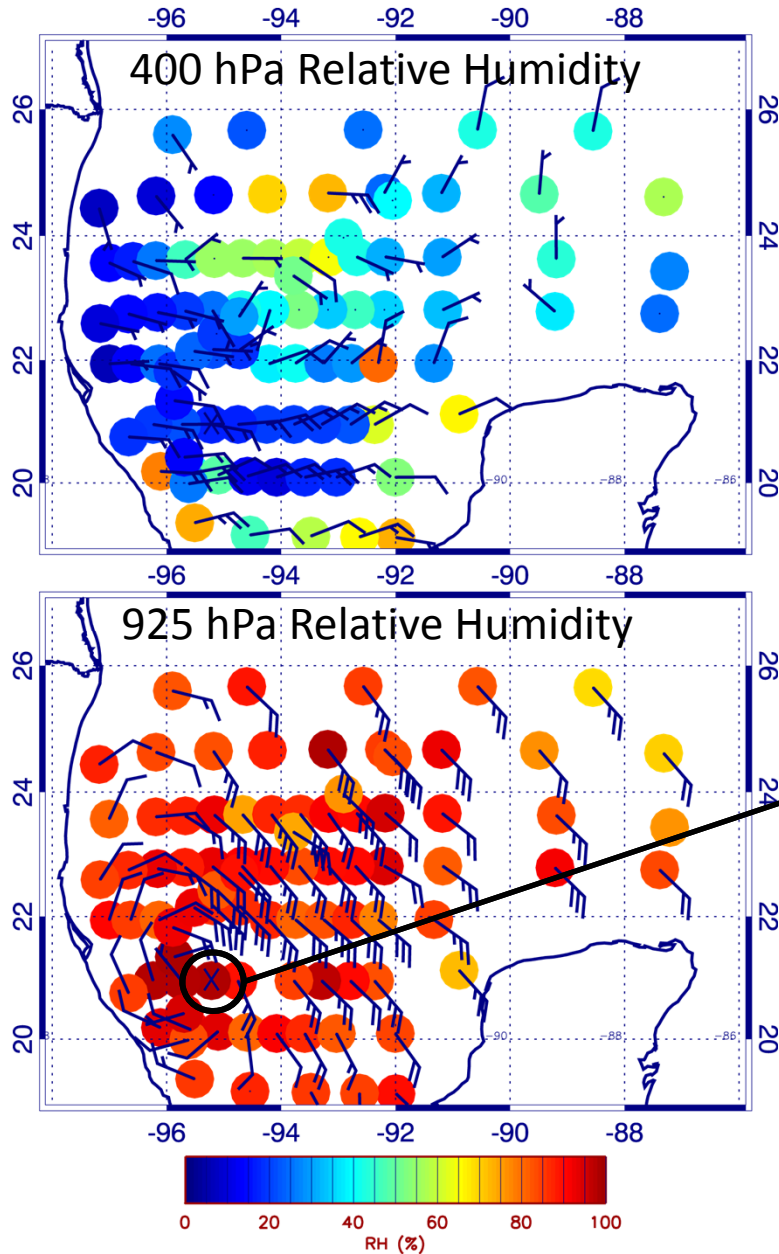
16-17 September

- Humberto became a hurricane close to African, then dissipated. It reformed a TS the day of the flight
- Low-level warm core, upper-level cold core reveals the hybrid (tropical/extratropical) structure of the storm
- Dropsondes show clear dip of the tropopause near the upper center

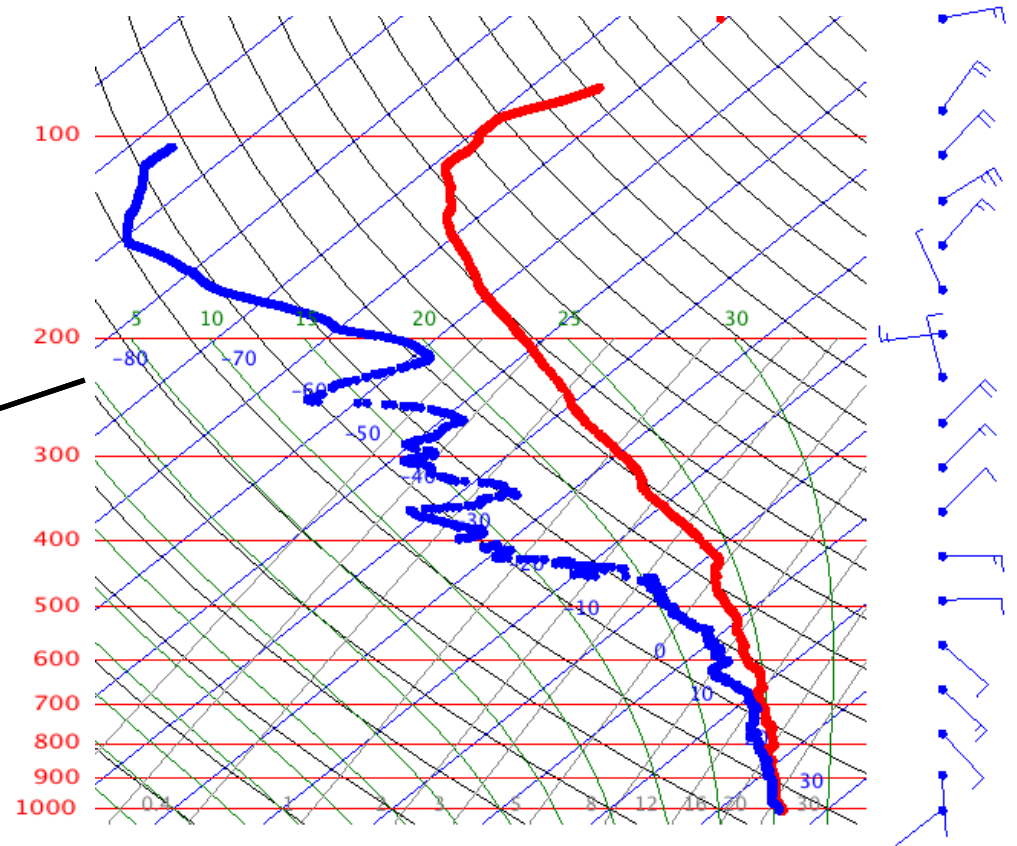


Invest 95L

19-20 September



- NHC forecasted 70% chance of development, but failed to form
- Lots of dry air at mid-upper levels
- Dropsonde data suggests deep subsidence layer aloft





2013 HS3 Data

- 2013 HS3 data freely available
 - 2013 CPL, AVAPS, S-HIS, and HAMSR data now available
 - HIRAD and HIWRAP data still being QC'd/processed
- For complete information on HS3 and links to data, go to

<http://espo.nasa.gov/missions/hs3/>

The 2014 HS3 Campaign



- Science Operations Period ~AUG 26-SEPT 29
- Originally planned 4 weeks, NOAA funding extension of operations
 - 5th week of aircraft/science operations
 - Up to 5 flights (3 environmental, 2 over storm)
 - Contributing mission scientists to participate at Wallops Island

<http://espo.nasa.gov/missions/hs3/>

Questions?

First Global Hawk landing at Wallops
Flight Facility, Sept. 7, 2012.