2011 HFIP Observations Team Recap

HFIP Annual Review Meeting
08 November 2011

Sim Aberson (AOML) and John Knaff (NESDIS/ORA)

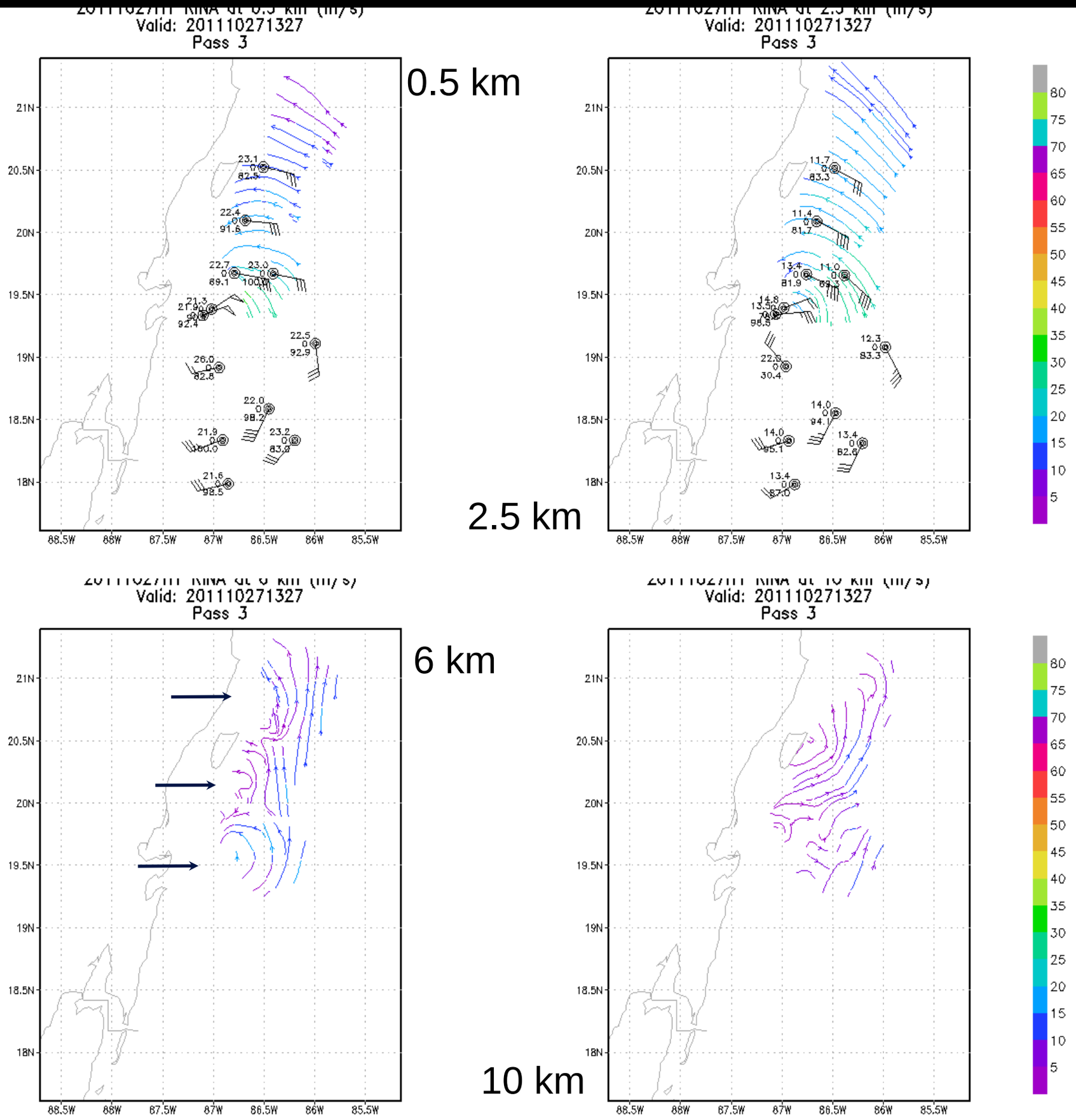
Robert Atlas (AOML), Jack Beven (NHC), John Derber (EMC), Michelle Mainelli (NCO), George Halliwell (AOML), Daniel Melendez (NWS/OST), Jeff Hawkins (NRL), Chris Fairall (ESRL), Isaac Ginis (URI), Nick Shay (RSMAS), Paul Chang (NESDIS), Jim McFadden (AOC), Tara Jensen (NCAR), Thiago Quirino (AOML), Yuanfu Xie (ESRL)

Observations during hurricane season

Aircraft observations were obtained in the Atlantic (Arlene, Bret, **Don**, Emily, Harvey, **Irene**, Katia, **Lee**, Maria, Nate, **Ophelia**, and **Rina**) and the East Pacific (Beatriz, Dora, **Hilary**, Jova).

A loop current ocean measurement was also conducted

Successful Doppler transmission to NCO was accomplished in a number of missions. G-IV Doppler data were obtained in a few cases and is being looked at.



Shallow vortex
Two vortices possible well north of center

HFIP Visiting Scientist Program

HFIP sponsored some scientists to participate in NOAA aircraft missions when seats were available.

Participants during 2011:

Wallace Hogsett, Jeff Pereira, Lisha Roubert, Stacy Stewart (2).

Others were alerted, but sometimes the mission does not go as planned due to aircraft troubles or non-cooperative weather. There are also some logistical issues with travel that need to be addressed.

http://www.aos.wisc.edu/~roubert

New instrument status

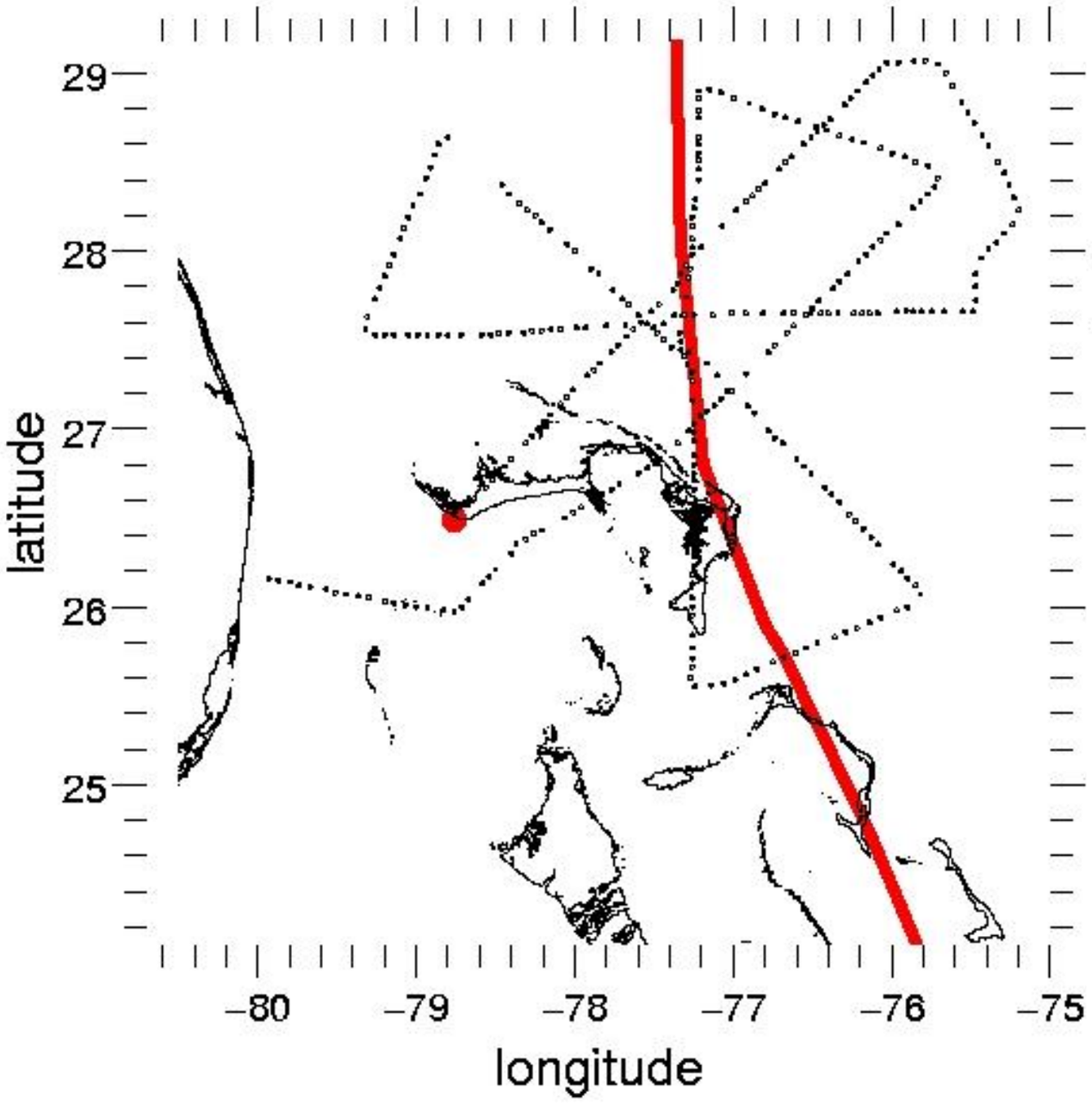
Repackaged W-band shipboard cloud radar for profiling of sea spray, to be deployed at sea during DYNAMO and delivered in 2012.

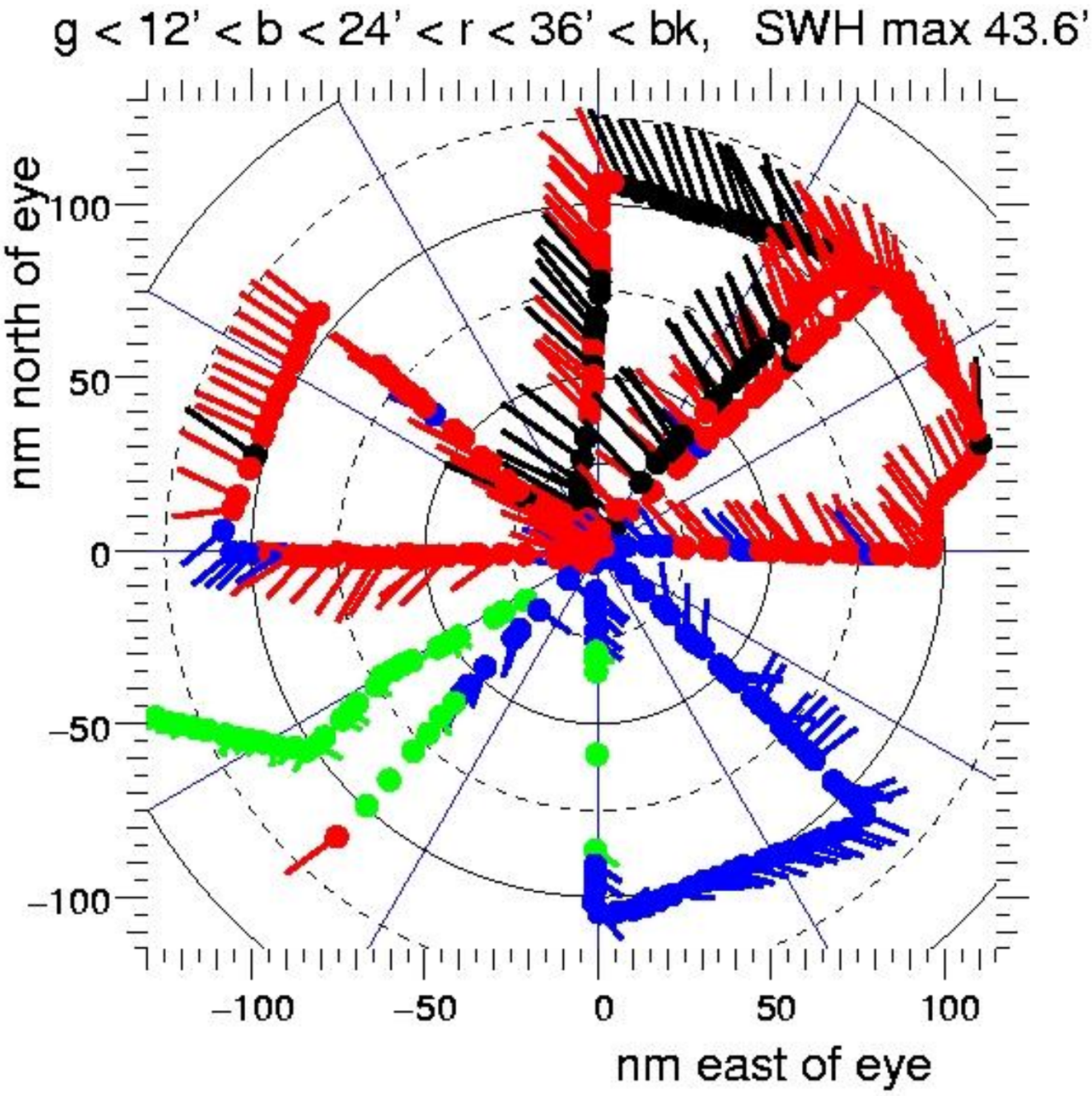
Doppler wind lidar partly installed but not yet functional

G-IV Doppler radar in final testing

NOAA Wide Swath Radar Altimeter (WSRA) achieved unattended operation in 2011

Radar signals processed into wave topography and directional wave spectra during the flights, spectra and extracted wave parameters transmitted to NHC and wave height data formatted in NAWIPS.





N42RF flight into Hurricane Irene on 25-26 August 2011. Red dot indicates most recent data location. Radials in storm-relative plot extend in the dominant wave propagation direction a distance proportional to wave height. Direction fluctuations on SE leg were due to multiple wave components trading dominance.

Ground-based Observations

Extreme Turbulence probes

- One probe on Tennessee Reef in Florida Keys.
- Deployed in late August.
- Will be taken down in mid November.

- Higher winds (15-20 m/s) than past years but no direct hits by tropical cyclones.
- Only one short period of power loss during extended cloudy period with ~1 ft of rain.

Satellite observations

CIRA/RAMMB - NESDIS

- Maintain and populate real-time TC website
- Develop geostationary datasets and Fortran90 code for reading
  - Storm-scale, Mercator projection, IR channels 2-6
  - full-disk, satellite projection, channels 3 (Water Vapor) and 4 (IR Window), from both GOES.
  - Fortran 90 code developed and tested… being readied for distribution.

CIMSS

- Maintain and populate real-time TC website
- Transition newest version of ADT to operations
- Test and demonstrate objective consensus intensity method (SATCON)
- Objective center fixing routine (ARCHER)
- Experimental microwave rapid intensification predictors for SHIPS

NRL

- Maintain and populate real-time TC website
- Create NCODA-based ocean heat content products on 0.25 degree grid in near real-time, available in GRIB format and in ASCII by request.

HFIP Observations Workshop
11-12 May, Virginia Key

http://noaahrd.wordpress.com/2011/05/16/hrd-and-aoml-hosts-hfip-observation-team-workshop-11-12-may-2011/

The purpose of the meeting was:

(1) for those gathering observations (aircraft, satellite,ocean) to present current data types to potential users, including information on data quality, availability, and access, (2) for users to present their current and future observational needs in the areas of Physics, Diagnostics, Verification, and Data Assimilation.

Data Assimilation Issues

1. Any data assimilation system is only as good as the model that provides the vast majority of the data. Biases must be smaller than innovations, so model estimates of measured quantities must be evaluated before assimilation. Modelers and data assimilation experts should work together to improve the model so that the data assimilation systems can properly use observations.2. Currently satellite data are under-utilized by global and regional models due to difficulties in assimilating data in cloudy regions and routine thinning of the data. Specifically assimilation of data from microwave sounders/imagers, infrared imagers, and mesoscale atmospheric motion vectors have great potential to improve model initialization and forecasts.

3. Low-earth orbit satellite data have latency issues that may make assimilation into operational models difficult. Is this a severe problem, and is there anything HFIP can do to improve this situation?

4. HDOBS from all aircraft should be put into BUFR format so that they can be assimilated using GSI and related data assimilation systems.5. Dropwindsonde data should be converted to BUFR format with location and time information so that they can be better assimilated into high-resolution regional models.6. Currently, only thinned satellite data in are available in BUFR format. Non-thinned data should be made available in BUFR format so that different resolutions of the data can be tested in global and regional models, and improved as model resolution changes.

7. Satellite cloud motion vectors currently have their error set to 7m/s in GSI. This is probably too large, and this value should be revisited to improve the assimilation of these data, especially in the hurricane outflow. In addition, the increases in the spatial and temporal resolutions of these data and production of additional datasets in tropical cyclones by relaxing geostrophic constraints should be tested.

8. Obtain improved error statistics for operational tcvitals values.

9. Work toward optimization of data gathering in sensitive areas to improve models.

10. The vast majority of data obtained by research aircraft are wind data. Work toward optimizing the acquisition of thermodynamic data and getting more of it.

Physics Issues

1. More ocean mixed layer observations are needed during storm passage. IFEX will work on gathering more such data incoming years.2. Obtain a better downward video system for the P3s. This would allow for direct observation of wave properties that are generally parameterized in models, including dissipation terms, momentum flux, and whitecap fraction. This will only give results in reasonably cloud-free conditions, but no cloud-penetrating (microwave) technologies currently exist with the pixel resolution necessary to track individual breaking waves.

Diagnostics/Verification Issues

1. NHC should work toward getting concentric eyewall and other structural information from microwave satellites into the f-decks, much like they are available from aircraft reconnaissance.2. NHC only provides maximum wind speed radii in four quadrants. We should determine whether a full two-dimensional analysis of surface winds are important, and, if so, determine how to obtain the data necessary for these analyses.

Observations Issues

1. The Scanning Radar Altimeter data from P3 flights are available at ftp://ftp1.esrl.noaa.gov/psd3/archive/ewalsh/sra/. A plan to make these data more readily available to users was agreed upon by HRD and ESRL. a. ESRL will create a web page with the data and documentation, and code to read the data. This will be linked to HRD's current aircraft data archive.

b. HRD will then integrate the data into the data portal for display and integration with other data types.In addition, a plan for making WSRA data available must be created.2. IWRAP data from P3 flights are available at http://warehouse.ecs.umass.edu/iwrap. HRD and UMASS will work on making these data more available to users, similar to what was done for SRA data.