

Review of HFIP Applications Development and Diagnostics (ADD) Team Plans

Ed Rappaport and Mark DeMaria

for

**HFIP Ensemble Product Development Workshop
April 20, 2010**



ADD Team Charge

Develop applications of the HFIP numerical model forecasts, including deterministic and ensemble runs.

These applications include (1) advanced diagnostic techniques to better understand the model performance and to provide guidance for model improvement to other HFIP teams, and (2) post-processing applications that optimize use of HFIP advances by operational forecast offices (e.g., National Hurricane Center).



ADD Team Members

Co-Leads:

Mark DeMaria (NESDIS/STAR) and Ed Rappaport (NWS/NHC)

Focal Points:

Richard Pasch (NHC), Vijay Tallapragada (EMC), Mark DeMaria (NESDIS), Rob Rogers (AOML/HRD), Buck Sampson (NRL), Louisa Nance (DTC/TCMT), Michael Fiorino (ESRL/GSD), T. Krishnamurti (FSU), T. Eckel (NWS/OST)

Contractors:

Ann Schrader (began 11/09), Wallace Hogsett (began 2/10)

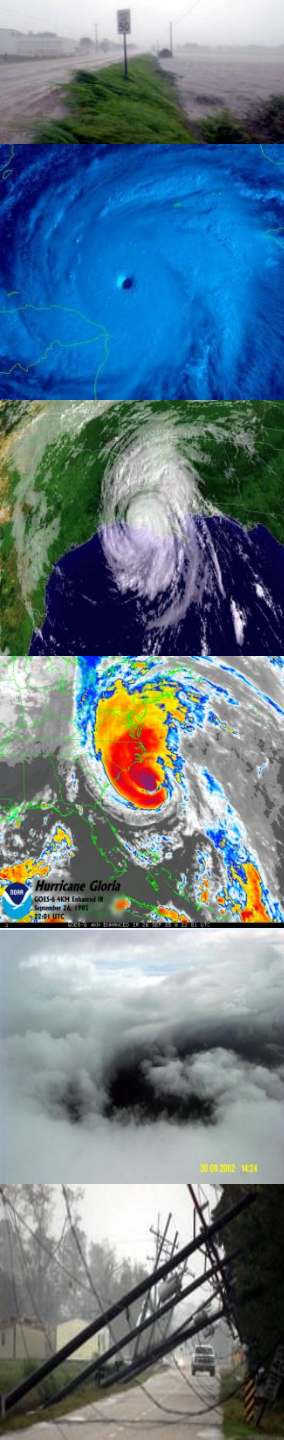
Other Participants:

Chris Sisko, Bob Tuleya, Hui-ya Chuang, John Knaff, Brian McNoldy, Kate Musgrave, Sundararaman Gopalakrishnan, Jim Hansen, Yi Jin, Barb Brown, Zoltan Toth, M. K. Biswas



ADD Key FY10 Tasks

- ② **Develop Stream 1.5 concept of operations (NHC, TCMT, NESDIS)**
 - Design full capability process for 2011 and beyond
 - Establish initial operating capability for 2010
- ② **Develop first version of software library to create synthetic IR and microwave satellite imagery from model output (EMC, NESDIS, NHC, NRL, AOML)**
- ② **Develop first HFIP model output products for NHC (NHC, EMC, NESDIS, ESRL)**



Hurricane Specialists' Top Product Development Requests and Priorities

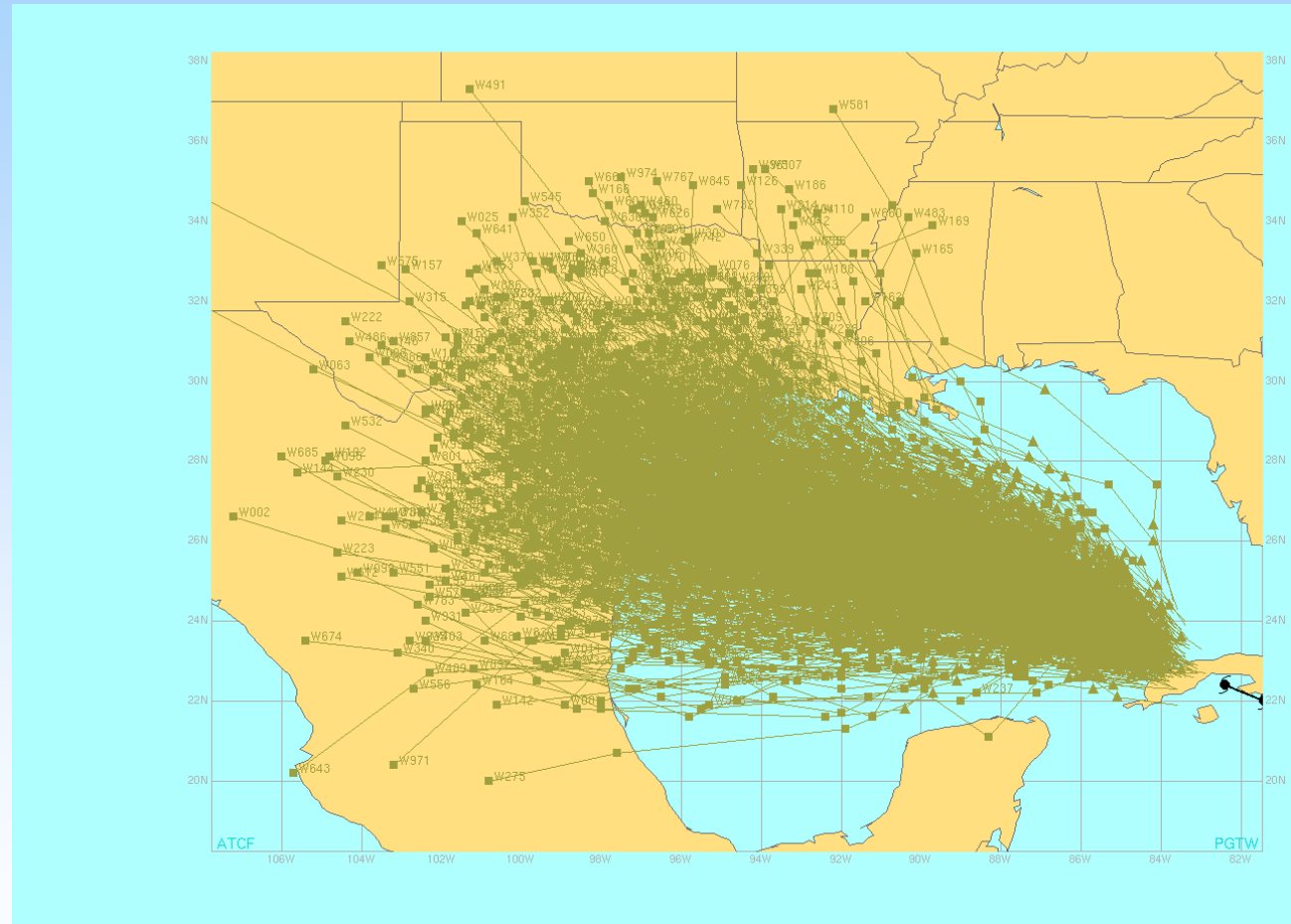
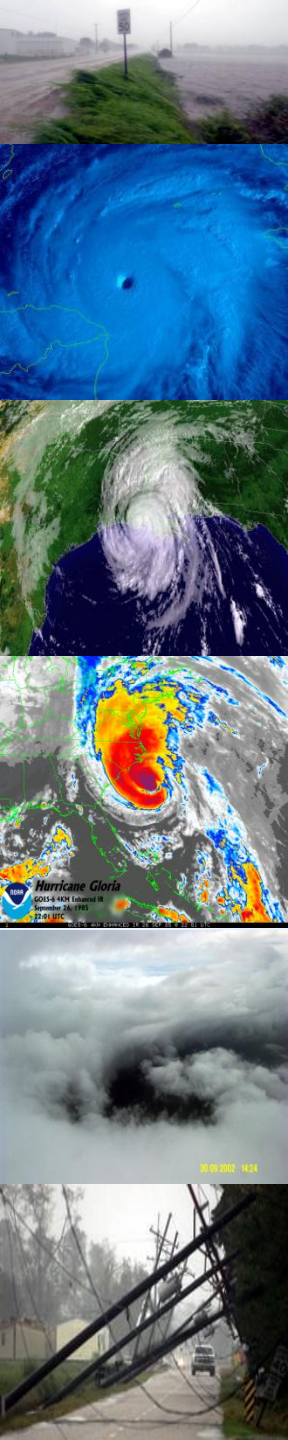
1. **Shear analysis for user-specified layers (FY10) (HFIP/NHC)**
2. **User-selectable (e.g., point and click) vertical cross sections of any field or combination of fields (FY10) (HFIP/NHC)**
3. **Genesis probabilities derived from global model ensembles and possibly high resolution pre-TC models (capability to record probabilistic information in ATCF in (FY10) (HFIP/NHC)**
4. **Magnitude and location of max. 1-min sustained surface (10 m) wind speed for each minute of integration (for operations and diagnostics); full surface wind field at hour intervals**
5. **Probability distribution of intensity change (including RI)**
6. **Guidance on the best locations for additional observations, e.g., supplemental soundings, G-IV dropsondes, C-130 data. (NHC)**
7. **Ensemble-based probabilistic guidance for track, intensity, wind structure, storm surge, rainfall, as well as support for existing products**



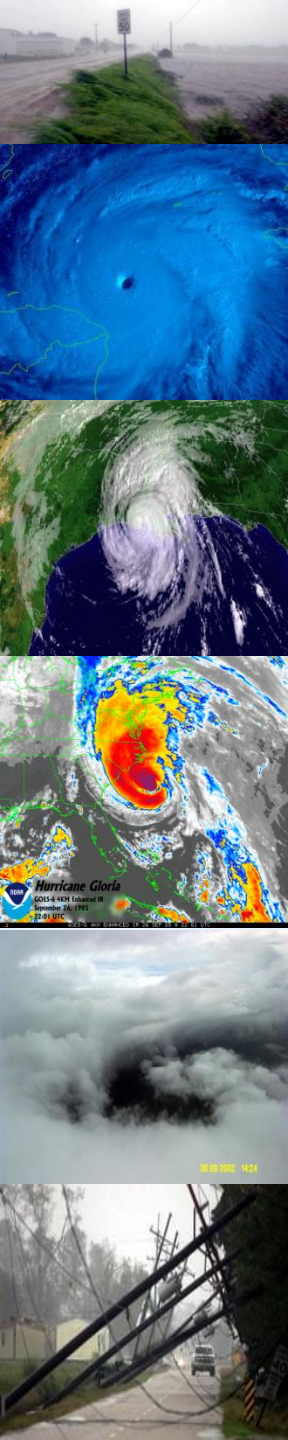
Hurricane Specialists' Top Product Development Requests and Priorities

8. Structural analyses using the mass and motion forecast fields to help diagnose tropical, subtropical and extratropical stages (e.g., phase space)
9. Capability to make model comparisons (contemporary and sequential runs of any combination of models)
10. Global model tropical cyclone (TC) formation index/indicator and verification methods.
11. **Model originated simulated radar/microwave imagery (FY10)** (EMC, NESDIS, NHC, NRL, AOML)
12. Center locations at multiple vertical levels and depiction of vertical coherence
13. **Ensemble**-mean track (high priority “automatic” output)
14. Surface map of accumulated forecast rainfall

Capability to view 1000+ model runs (Joint HFIP and JHT work by Schrader)



Capability for NHC to generate Day 6 and 7 forecasts for internal testing (Joint HFIP and JHT work by Schrader)



Forecast Track Dialog - TEST al802010

Tau Labels
 Complete Tracks
 Consensus Aids
 GPCE Prob.
 GPCE Climatology
 GPCE-AX

Forecast
Delete

TAU: 12
24
36
48
72
96
120
144
168

Other Aids...

TAU (hours)	LAT.	Lon.	DIR.	SPEED (knots)
0	19.6N	52.1W	284	24
3	19.3N	50.4W	100	33
12	19.9N	51.2W	308	6
24	20.6N	52.3W	304	6
36	21.4N	53.3W	310	6
48	22.2N	54.4W	308	6
72	23.7N	56.6W	306	6
96	25.3N	58.7W	310	6
120	26.8N	60.9W	307	6

Help Apply OK Cancel

ATCF - OFCL - Area of Operations (NHC) - TEST al802010

File Tools Fixes Track Aids Fields Forecast Advisory Graphic | Manage-Storms Statistics Messages

Configure Help

Zoom In
Zoom Out
Full Map

select storm
select map
best tracks
b-track labels
b-track wind radii
b-track intensities

fixes
fix wind radii
fix labels
fix autolabel
fix confidences
obj best track
obj best track labe
obj aids

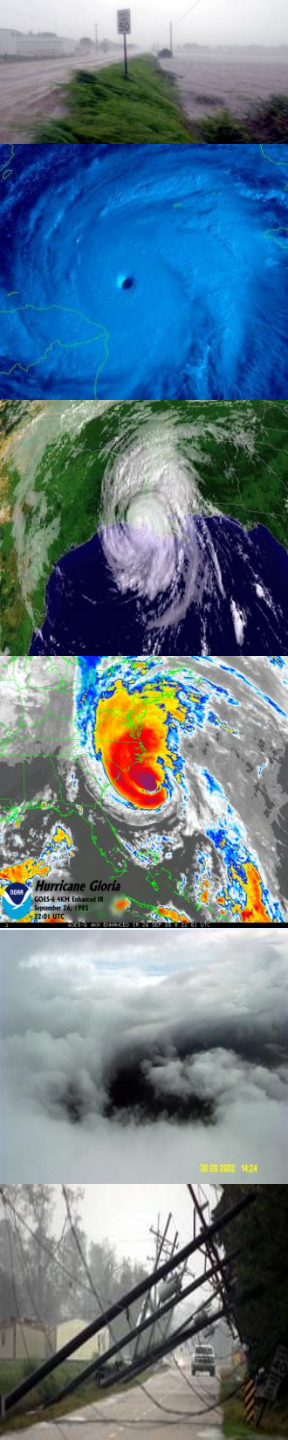
Added capability to create Day 6 and Day 7 forecast positions.

ATCF KNHC

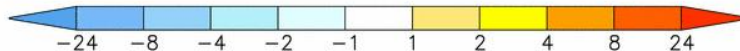
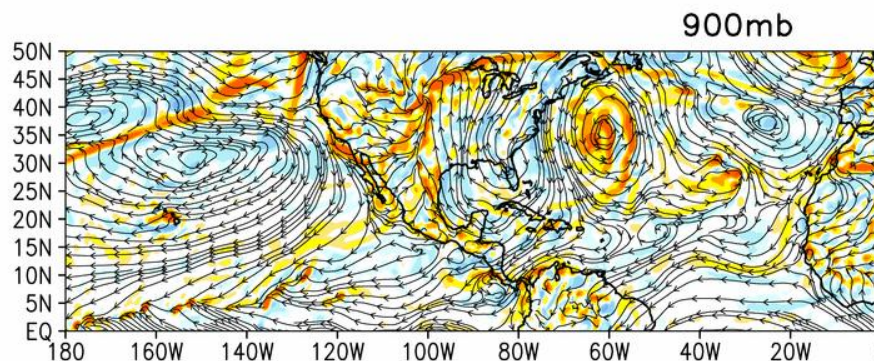
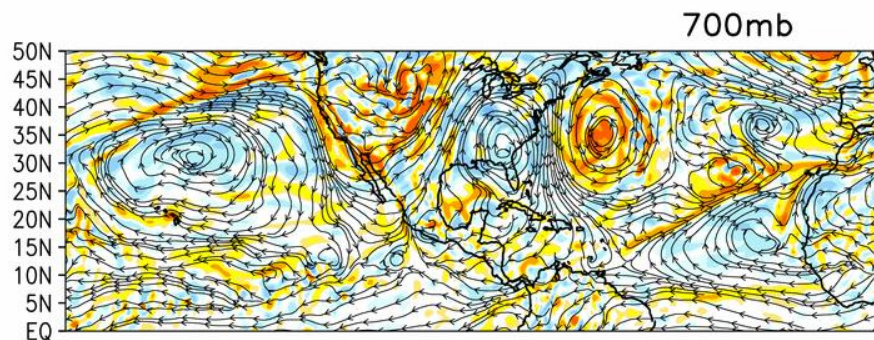
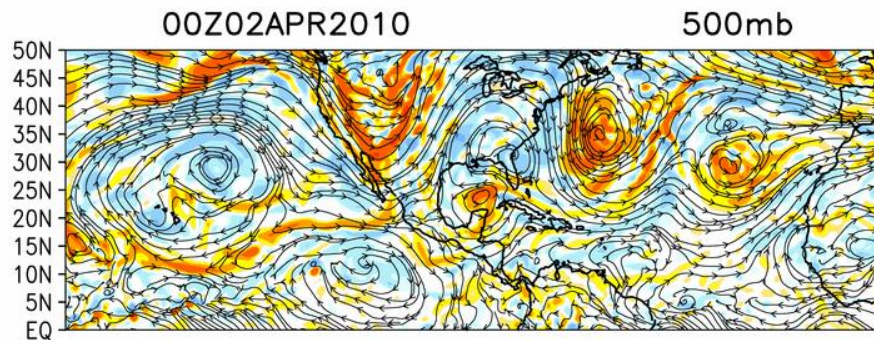
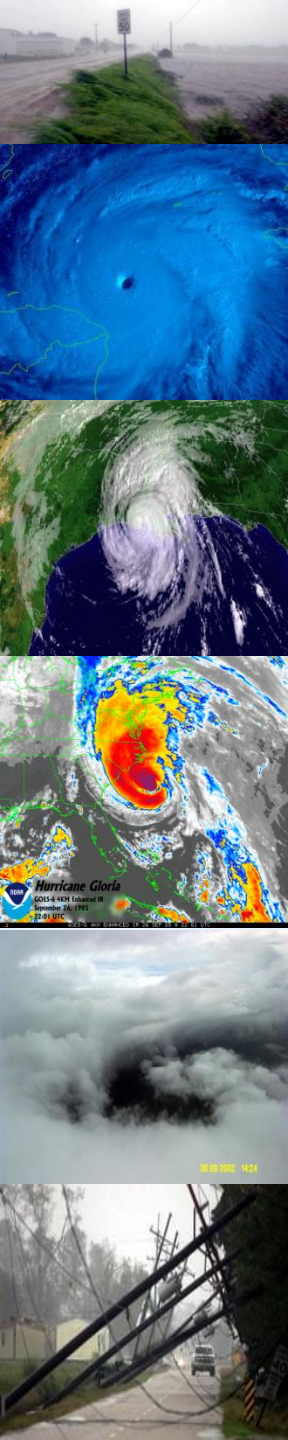
25.9N-75.7W

ADD Key FY10 Tasks

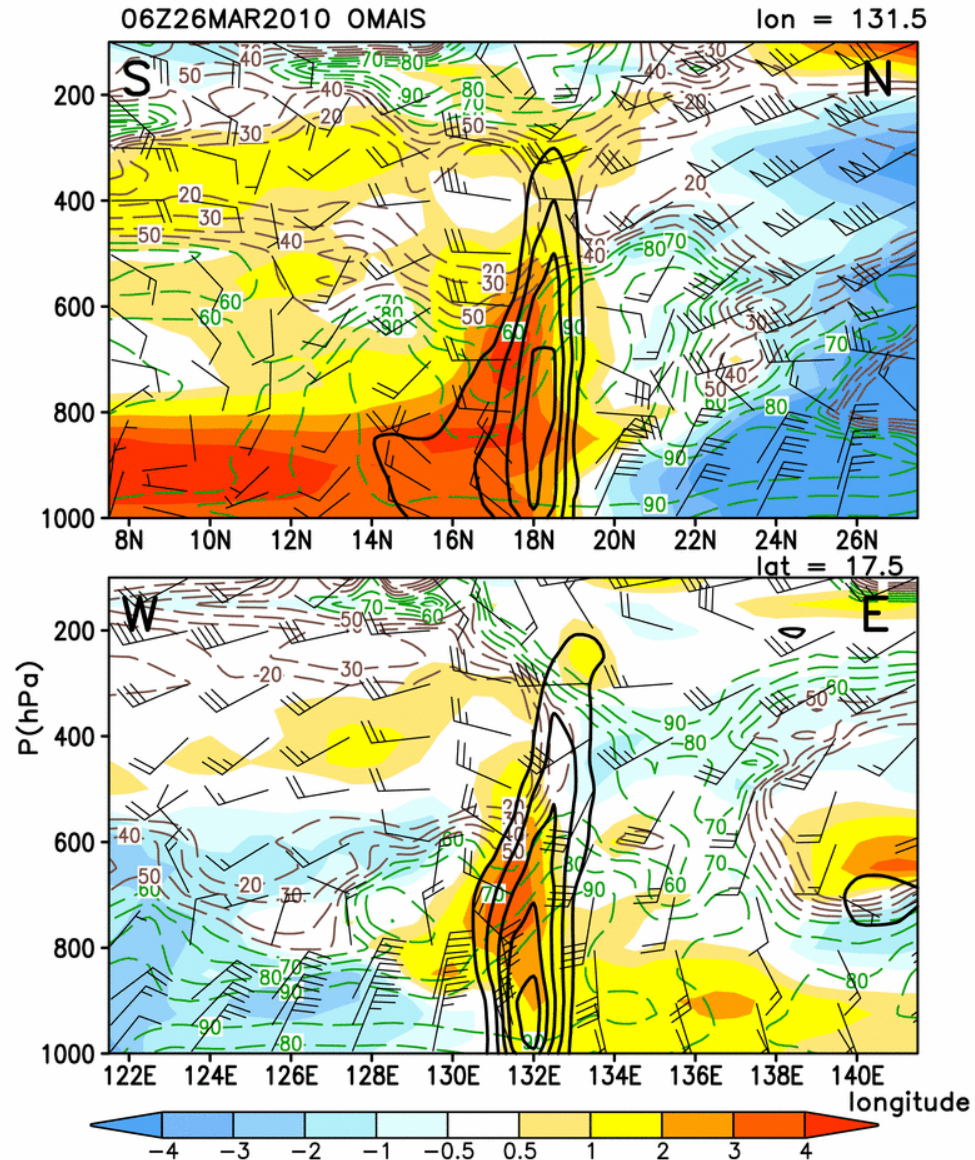
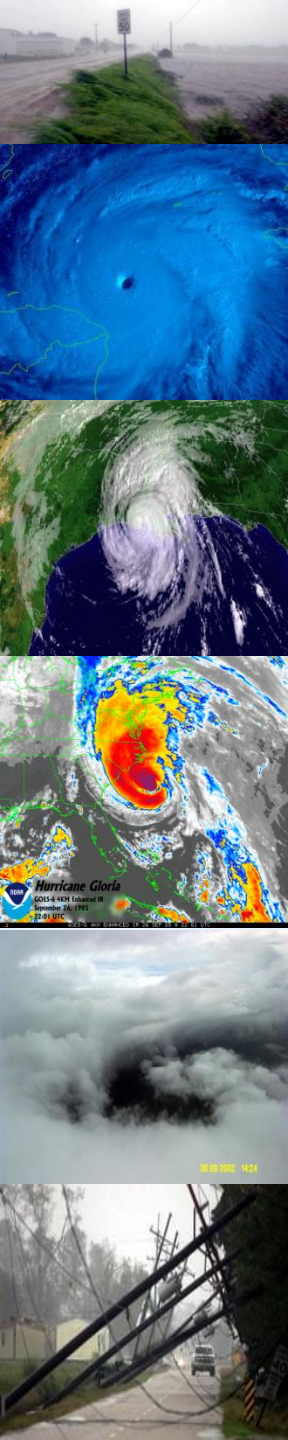
- ① Develop capability to use aircraft data in model diagnostics routines (AOML)
- ① Perform operational model diagnostic studies including initial storm structure, vortex evolution, storm environmental variables such as vertical shear and steering flow, impact of boundary conditions, impact of physics (EMC priority) (NHC, EMC, NESDIS, NRL, AOML)

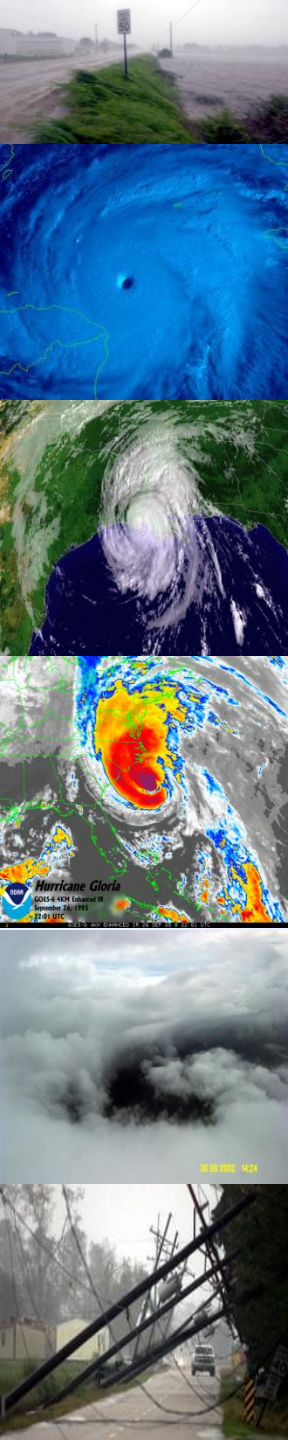


Prototype automated and archived model output for multiple pressure levels (by Hogsett)



Prototype Automated Vertical Cross Sections From WPAC Omais (by Hogsett)





ADD Key FY10 Tasks

- ② **Complete first version of web-based ATCF for remote use by HFIP researchers (NRL)**
- ② **Establish first generation HFIP data service (TCMT)**
- ② **Test embedding statistical intensity forecast models in global and regional models, including ensembles, and perform statistical intensity model predictability studies (ESRL, NESDIS)**

ADD Key FY10 Tasks

- ① Develop statistical analysis system for assessing source of model errors (FSU)

