

HFIP

**2011 Real-Time Experimental Forecast System
t-jet meeting**

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HFIP Overall Strategy

- Use global models at as high a resolution as possible to forecast track out to 7 days
- Use regional models at 1-3 km resolution to predict inner core structure to meet intensity goals out to 5 days including rapid intensification
- Hybrid DA for both regional and global using as much satellite and aircraft data as possible
- Both regional and global models run as an ensemble
- Statistical post processing of model output to further increase forecast skill

HFIP 5-year target numerical forecast system

- Global model ensemble with Hybrid Data Assimilation
 - 20 members at 20 km
 - Multi Model (at least two—eg: FIM, GFS, NMMB, Cubed Sphere)
- Regional model ensemble
 - 20 members at 3 km
 - Multi model (at least two—eg: HWRF, AHW, TC-COAMPS)
 - Using all available aircraft and satellite data in core and near environment of hurricane
- Statistical Post processing
 - Bias correction, CBC, LGEM, SHIPS...

Current HFIP development foci

- Development of the Hybrid data assimilation system using a blend of GSI and EnKF. This system will be used for both regional and global models.
- Further develop the ability to assimilate all aircraft derived data from the inner core.
- Incorporate as much satellite data as possible taken around the hurricane core and its environment. The satellite data may further improve intensity forecasts over that provided by the aircraft data and will be necessary for those initializations (the majority) for which no aircraft data is available
- Develop and test ensemble systems
- Create output products from ensemble systems that help forecasters to use ensemble information to improve the official forecast
- Emphasize development of statistical post processing systems using both ensemble and deterministic model information
- Continue testing various physics options in both global and regional models

HFIP Priorities for FY11

- Verify Impact of radar data on intensity forecasts (AOML, PSU, ESRL)
- Develop and test use of high res satellite data in hurricane regional DA (AOML, EMC, Utah, FSU)
- Support continued development of Hybrid DA system (EMC, ESRL)
- Test Hybrid DA system in GFS ensemble system as part of FY11 demo (ESRL)
- Test Multi-Model Regional Ensemble (AOML, EMC, PSU)
- Implement improved HWRF Operational system (EMC, AOML, GFDL)
- Implement improved GFDL Operational system (GFDL, EMC)
- Real-Time runs for NHC (PSU, ESRL, MMM, AOML, GFDL, EMC)
- Provide NHC GFDL Model Ensemble output (GFDL)
- Develop Ensemble products for forecasters (NHC, NESDIS, ESRL)
- Further develop statistical post processing methods (NESDIS, FSU, NHC)

Overall HFIP goals for t-jet experimental forecast system

- Goal is to set up on t-jet an experimental version of the hurricane numerical forecast system that HFIP see as an eventual operational system to meet its goals
- This will consist of
 - Global models run as an (multi model?) ensemble at as high a resolution as possible (15-25 km)
 - Regional models run as a (Multi?) model ensemble (1-3 km)
 - Both using a hybrid DA system and as much as the aircraft and hi res satellite data as possible
- Various post processing of model output including statistical methods.

Timeline

- 2011 set up a preliminary version of the eventual experimental system
 - May include tentative components
 - Hopefully 15,000 cores
- 2012: Full Experimental system
 - Hopefully 20,000 cores
- 2013: Full system with modifications as suggested by previous year
 - 20,000 cores
- 2014-? As long as t-jet remains available
 - Replaced by the operational system?

Meeting Objectives

- Decide on a probable configuration of the HFIP 2011 real-time system (most of it run on t-jet)
- Determine compute requirements for the various components
 - Core requirements
 - Run time
- Priority for the various proposed components
- Configuration of the machine for various scenarios:
 - No storms
 - Multiple storms

Issues to be resolved

- Core requirements may change during a particular model run.
 - We want those cores not being used made available for other runs if possible
 - The various jobs may need to be jigsawed together over a 24 hour period
- Most jobs will not require the full 24 hours
 - What runs in between a given model runs
 - Other initialization times
 - Other models
 - This may be particularly crucial when more than one storm is present.
- What components may be run on other systems. For example will the planned hybrid operational parallel system serve our needs.

HFIP dedicated HPC NOAA T-jet

	Install Date	Cores	Performance (Tflops)	Storage (Tbytes)
Phase 1	Aug 2009	3184	35.6	350
Phase 2	Sep 2010	10600	113.0	416
Phase 3*	July 2011	~16,000	~175	~770

Phase 3* Estimates based on anticipated FY11 funding

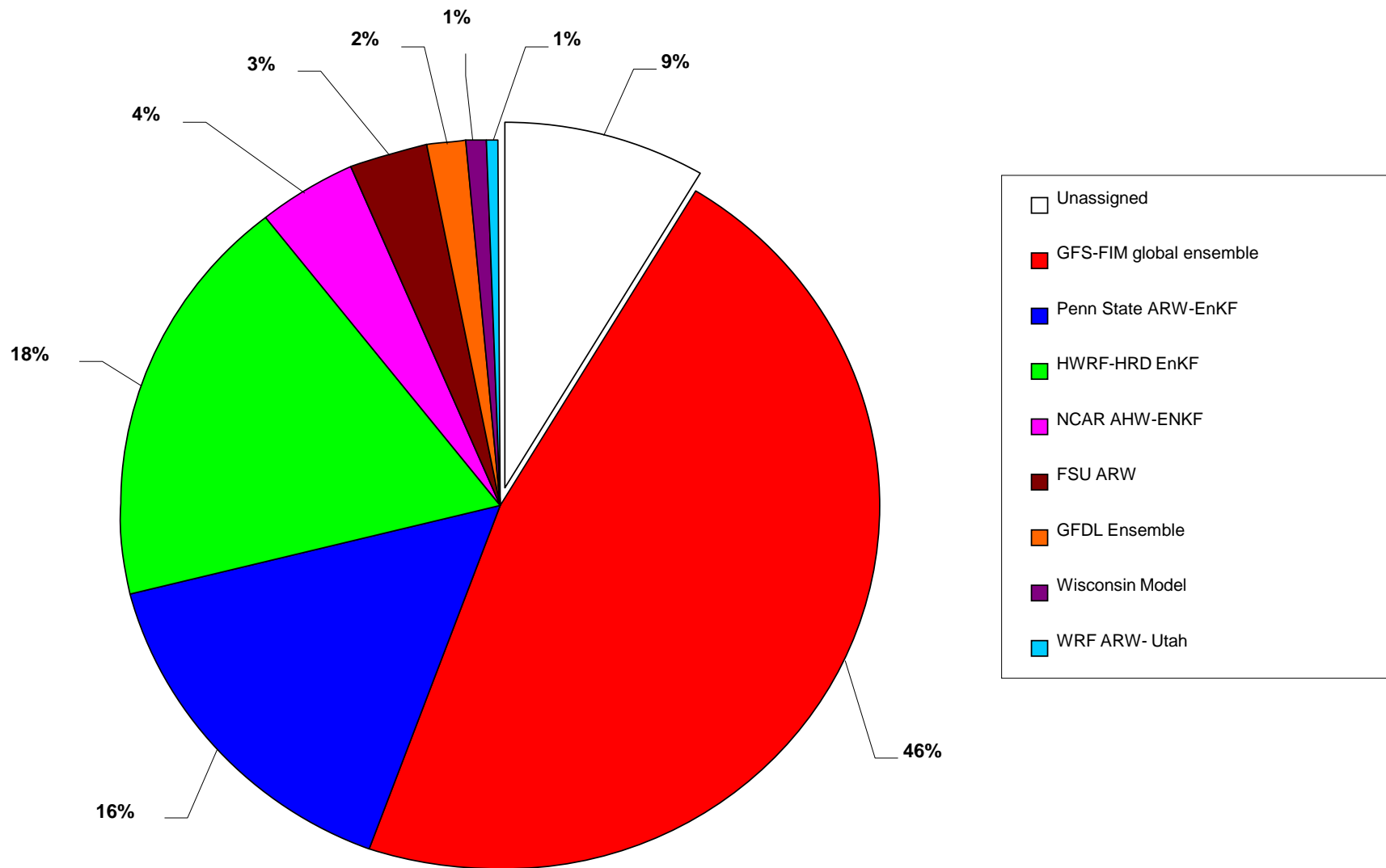
- Linpack result is 126.5 Tflops
- 50th on the Nov 2010 Top 500 list



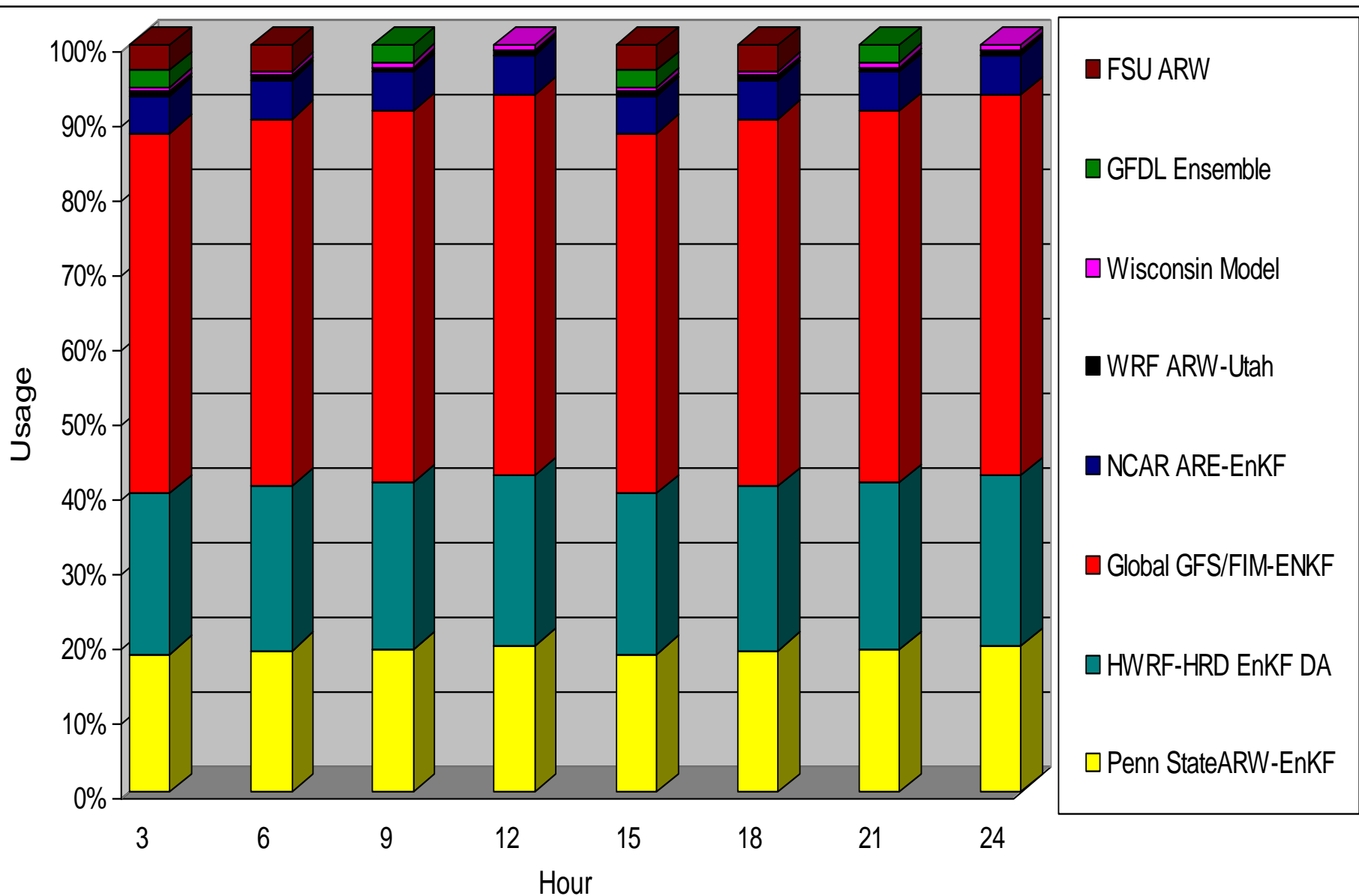
FY11 HFIP T-Jet Target System

- **Global model ensemble with EnKF**
 - 20 members
 - 27 km
 - GFS or FIM or a mix
- **Regional models using EnKF and radar data.**
 - **HWRP (run by HRD)**
 - deterministic at 3 km—prototype operational system
 - Use all aircraft and satellite
 - All storms
 - **ARW (run by PSU)**
 - 30 member ensemble at 4 km
 - Use all aircraft data
 - Run only for storms with aircraft data
- **Other regional model experiments**
 - **GFDL Ensemble**
 - 20 members at 9 km
 - Semi-operational
 - **Multi Model Ensemble**
 - 7 members at 3-9 km
- **Statistical Post processing**
 - **LGEM using products available from the above system**
 - **Correlation Based Correction for Multi-Model Ensemble**

Tentative t-jet usage in 2011



T-Jet Schedule for Demo System



T-Jet Spread Sheet

- [t-jet usage-FY11.xls](#)