

2005 Hurricane Season Impacts on U.S. Navy



Mr. Robert Winokur
Technical Director
Oceanographer of the Navy

60th Interdepartmental Hurricane Conference
March 2006









KATRINA Impacts on NAVO

- **Katrina resulted in significant loss of communications, server outages and widely dispersed personnel (NAVO)**
- **MSRC remained operational**
- **Loss of communications and integral personnel resulted in the following product disruption:**
 - **Ocean Models**
 - **Ice Models**
 - **Tide Models**
 - **Wave Models**
 - **Unique Navy Classified Support**
- **Most model support returned to operational status within two weeks**





NAVO Receives Backup from FNMOC and NOAA during KATRINA

- **MCSST backup from NOAA NESDIS**
- **FNMOC assumed CNMOC central communication and command & control functions and backed up NAVO high priority Ocean products until normal operations were restored:**
 - **WW3 substituted for WAM**
 - **Navy Coupled Ocean Data Assimilation (NCODA) provided a limited replacement for MODAS**



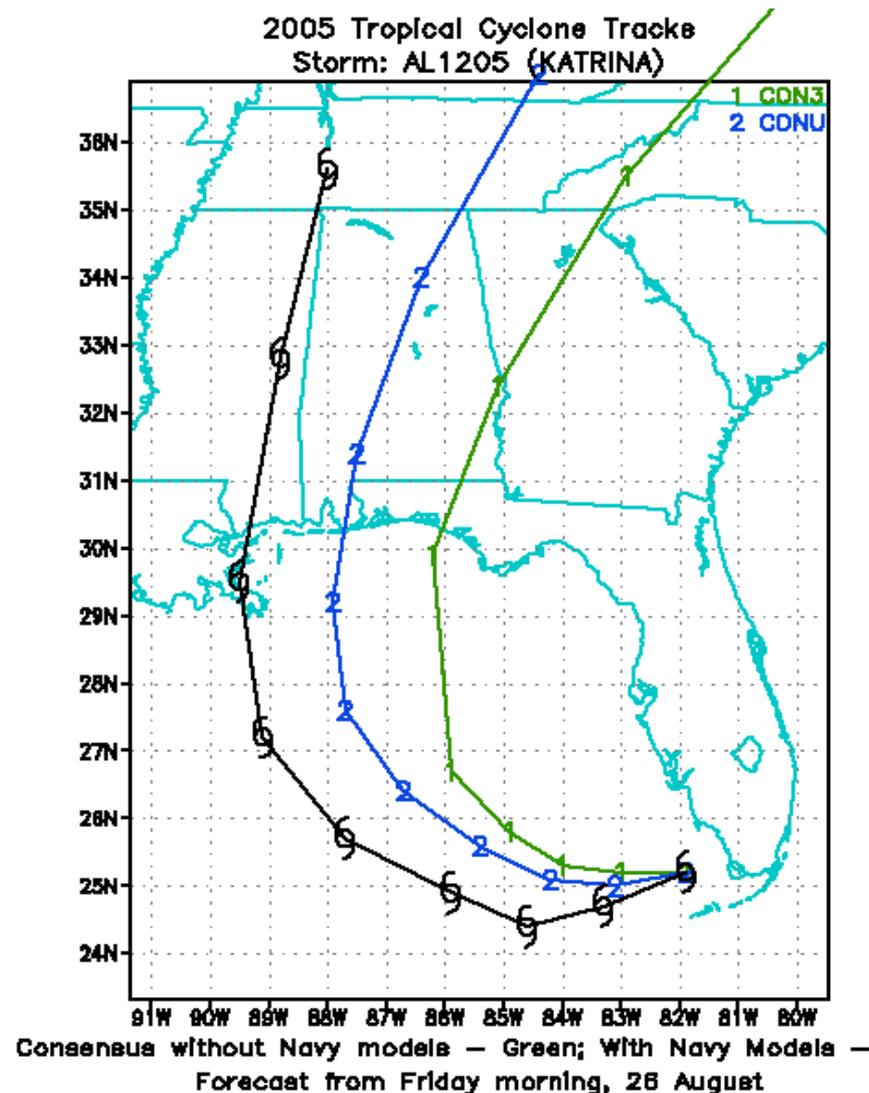


Impact of Removing Navy Models from the Hurricane Katrina Consensus Forecast

The Navy NOGAPS and GFDN models correctly predicted the track and timing of Hurricane Katrina prior to other major models used in the 5-member consensus forecast

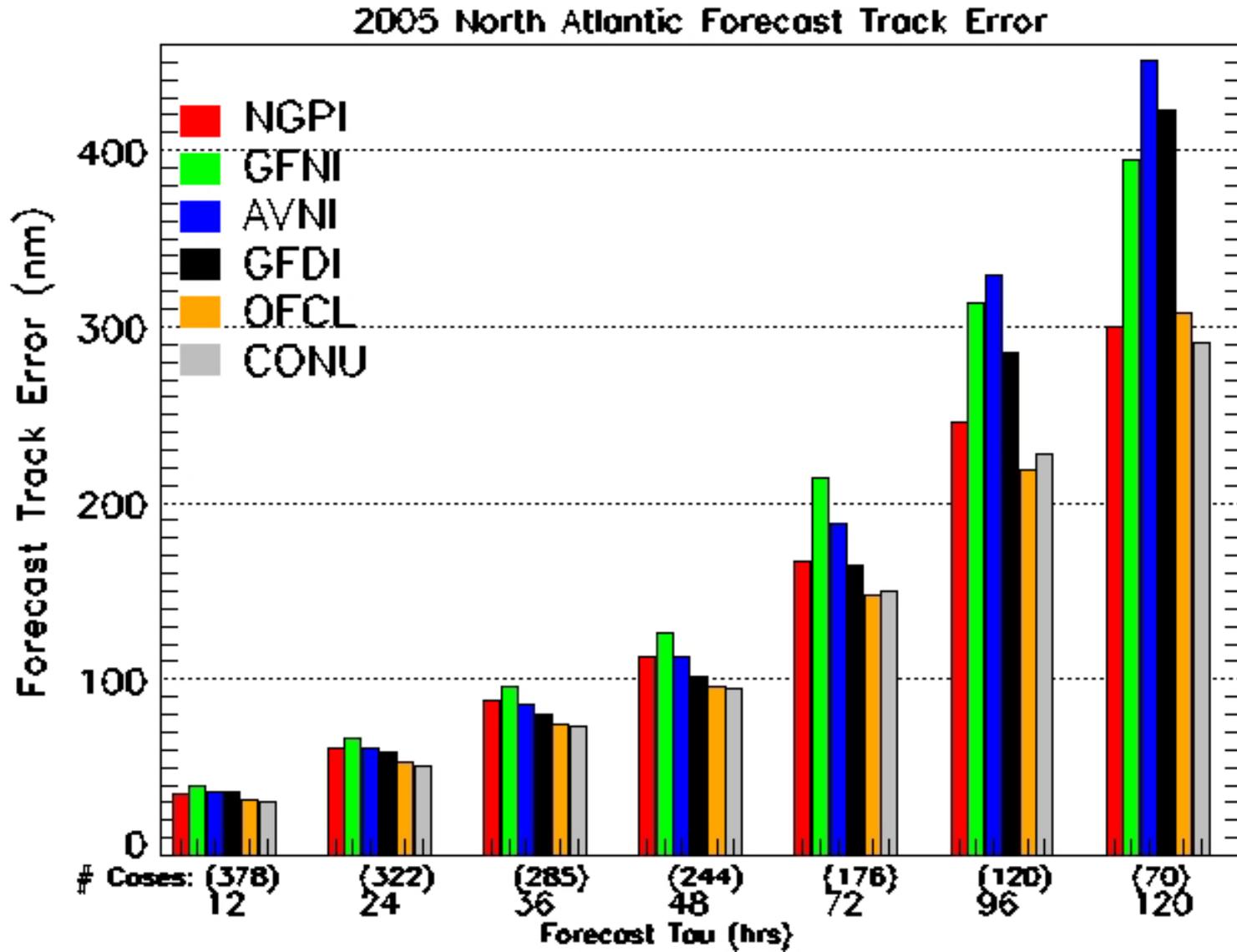
**CONU = NGPS,
GFDN, GFS, GFDL,
UKMO**

**CON3 = GFS, GFDL,
UKMO**





Overall 2005 North Atlantic Tropical Cyclone Model Performance



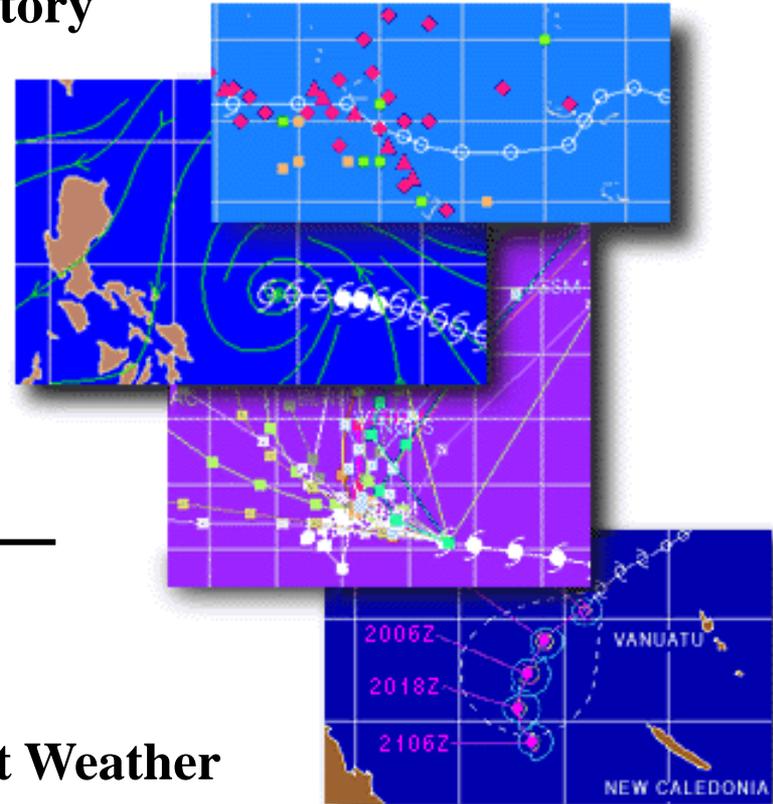


Navy's Research and Development Efforts Enabling Factor for Tropical Meteorology

- **Automated Tropical Cyclone Forecast (ATCF))** system developed by Naval Research Laboratory (NRL), Monterey to optimize the forecasting process.

- **Operational Users include:**
 - **Joint Typhoon Warning Center**
 - **National Hurricane Center**
 - **Central Pacific Hurricane Center**

-
- **Navy sponsored R&D includes:**
 - **Tropical Cyclone Genesis**
 - **Probabilistic Prediction of High Impact Weather**
 - **Multi-Scale Tropical Dynamics**
 - **Developmental efforts in Ocean Coupling and Data Assimilation directly enable TC track and intensity forecasts**





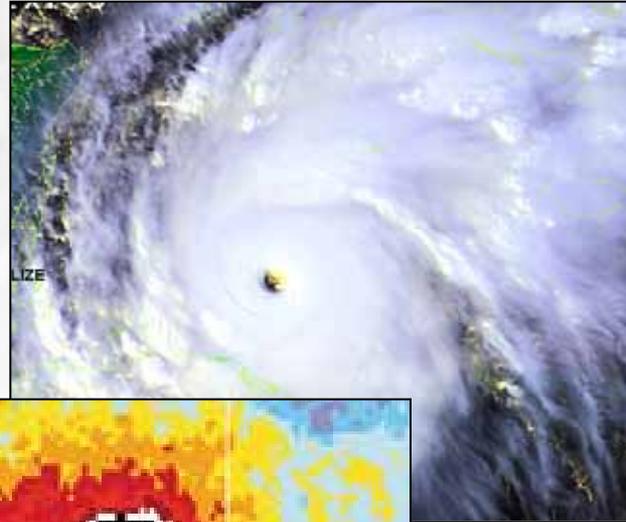
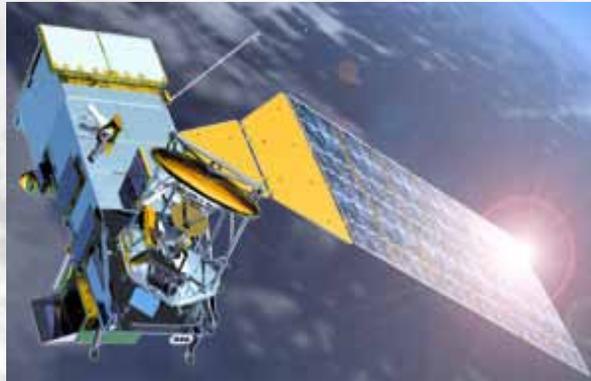
Navy's Partnerships Enable Tropical Met Capabilities

- **Ongoing commitment to Joint Typhoon Warning Center**
- **Naval Officer assigned to TPC/NHC**
- **Naval Research Laboratory modeling initiatives**
- **Tri-Agency community modeling initiative**
- **Committee for Operational Processing Centers (COPC)**
- **NPOESS satellite**

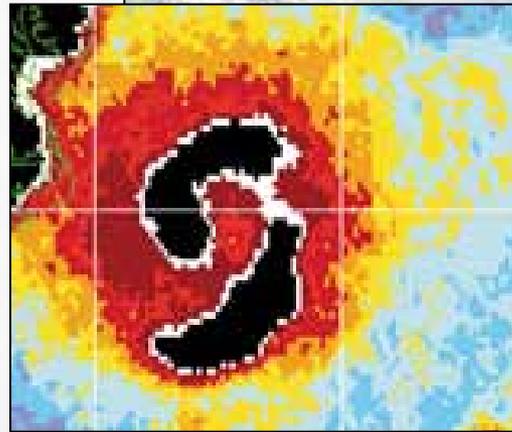
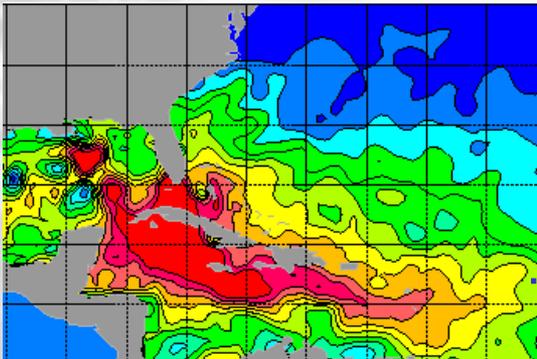




Value of Remote Sensing Navy Commitment to NPOOESS



Multispectral
Imagery



...and Altimeter-Derived
Ocean Heat Content...

...combined with
Microwaves...

... Improves Tropical Cyclone Forecasts
& Reduced Impact on Maritime Forces





Lessons Learned

- **Operational / Production Centers must ensure “back-up” capability and capacity**
 - **computer processing**
 - **communications**
 - **personnel**
- **Comprehensive personnel accountability plan**
- **Maintenance of agency mission unique requirements**
- **Partnerships are key to meeting today’s and tomorrow’s requirements in Tropical Meteorology and specifically Tropical Cyclone forecasting.**



An aerial photograph of a tropical cyclone, showing a well-defined eye and a dense, swirling cloud structure over a dark blue ocean. The text "Questions?" is overlaid in the center of the image.

Questions?



Backup Slides



Overall 2005 Western Pacific Tropical Cyclone Model Performance

