

Headquarters U.S. Air Force

Integrity - Service - Excellence

USAF Tropical Cyclone Support and Needs

**Year of the Air Force
Family**



**Air Force Director
of Weather**

1 March 2010

Report Documentation Page

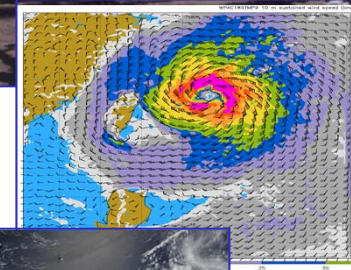
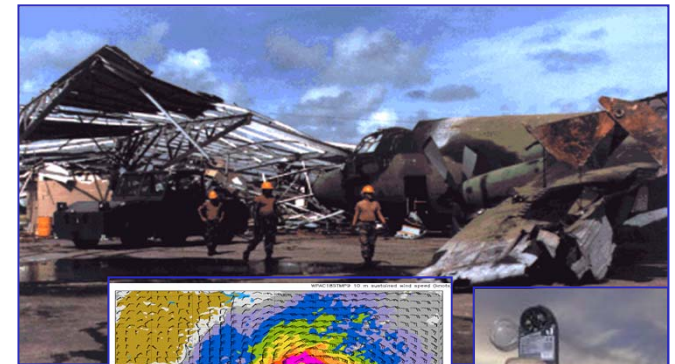
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- Tropical Cyclone Support
- Operational Priorities
- Critical Partnerships
- Strengths for Research
- Research and Ops ... Need your continued support



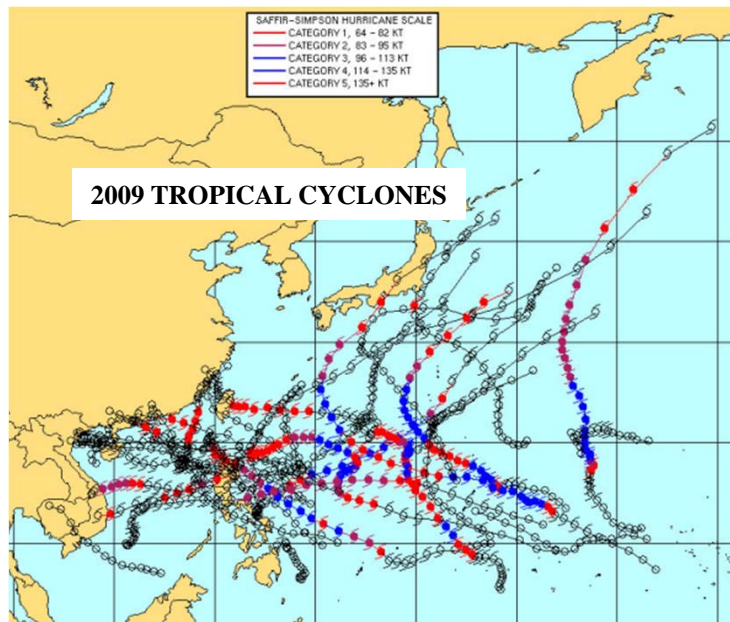
AFW Focused on Supporting the Joint Warfighters

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USAF Tropical Cyclone Support

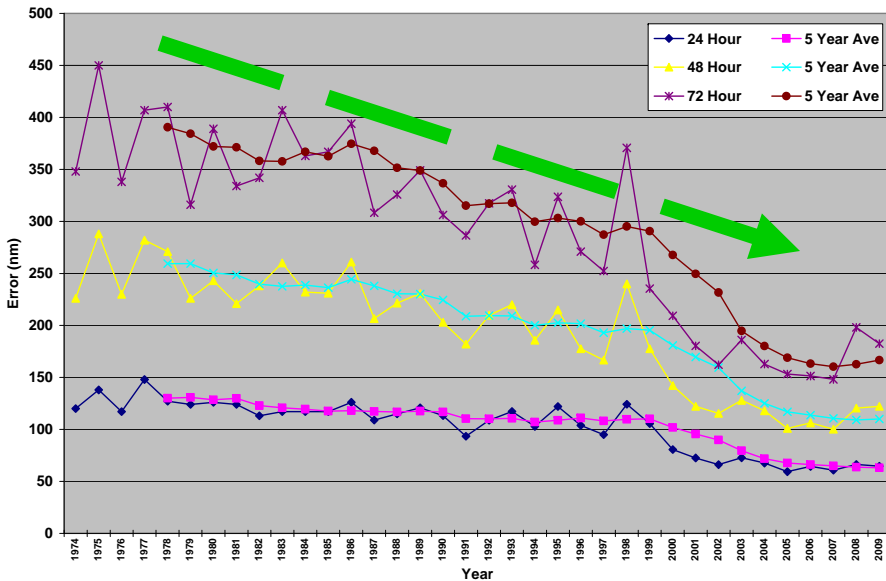
- Typhoon warning capability critical to warfighters in Pacific/Indian Oceans
- Must continue to work *JOINTLY* to improve forecast and warning accuracy
- To improve we need the right mix of research and operational focus with technology as the enabler





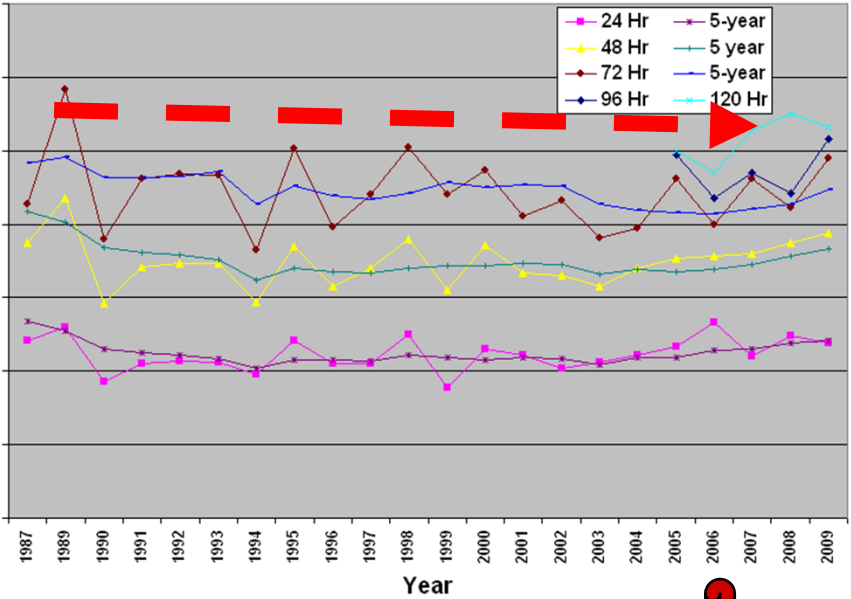
Progress thus far ... 30 years of focused R&D and T2

WPAC Track Error



Impressive!
Improvement factor
2.0 – 2.5!

WPAC Intensity Error

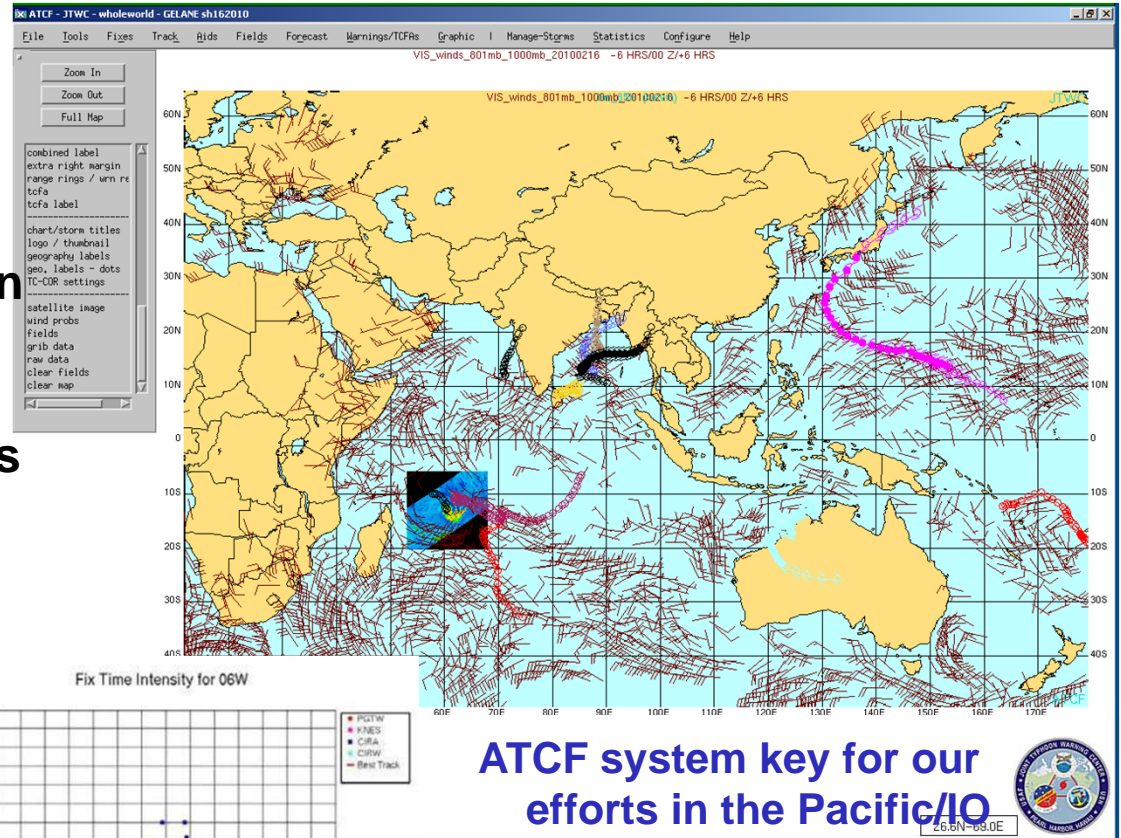


We must work this by 2015

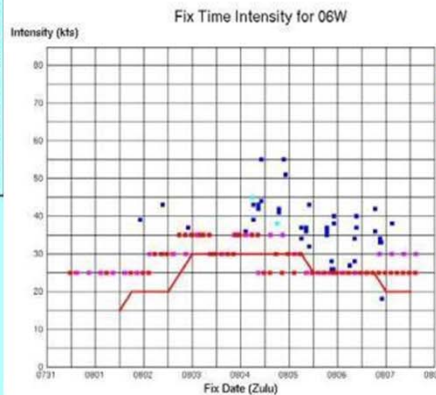
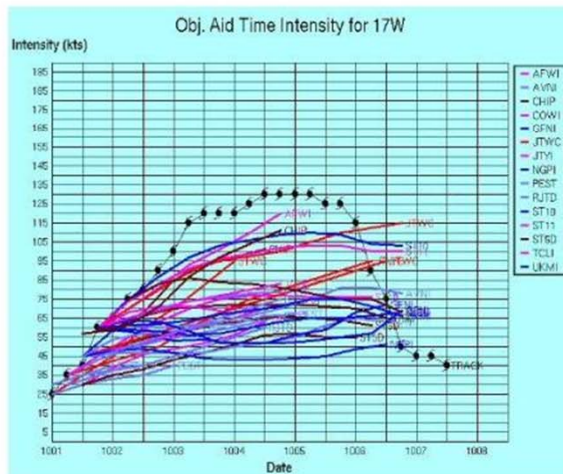


JTWC Operational Priorities

- Intensity guidance/rapid intensification
- TC/environmental characterization/observation
- Genesis guidance
- Enhance TC forecaster tools



ATCF system key for our
efforts in the Pacific/IO

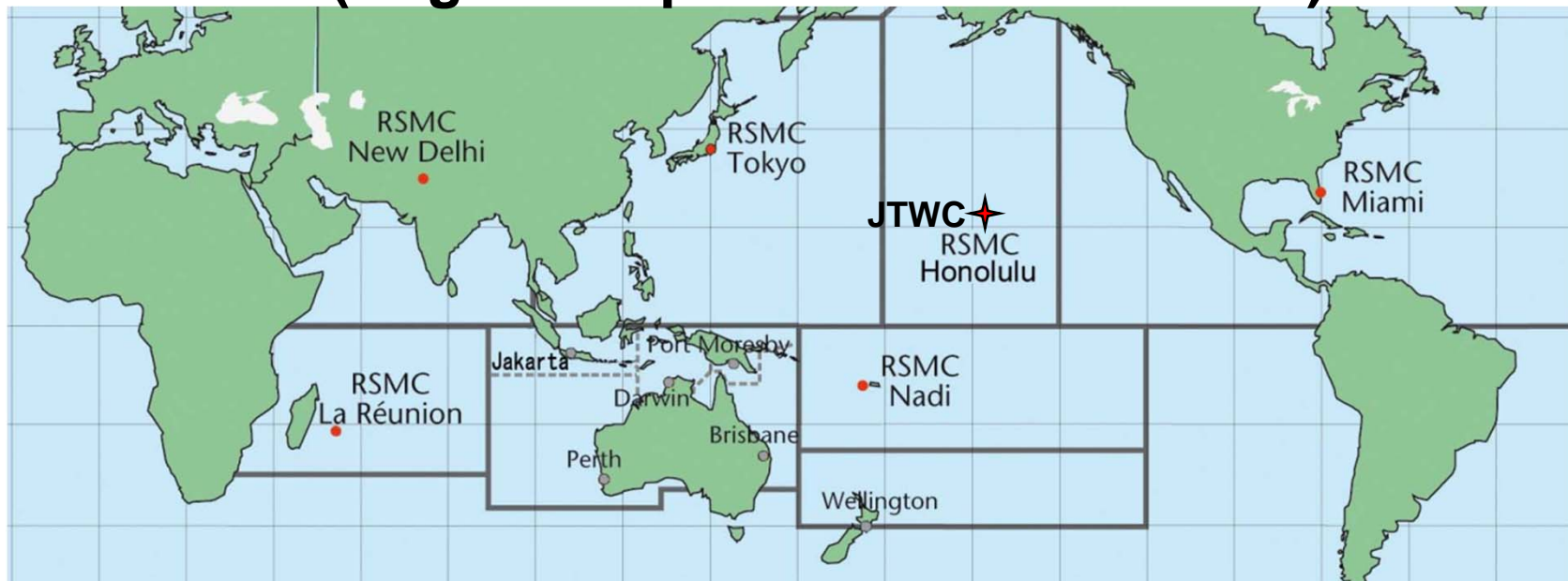




How to get there

Critical Partnerships

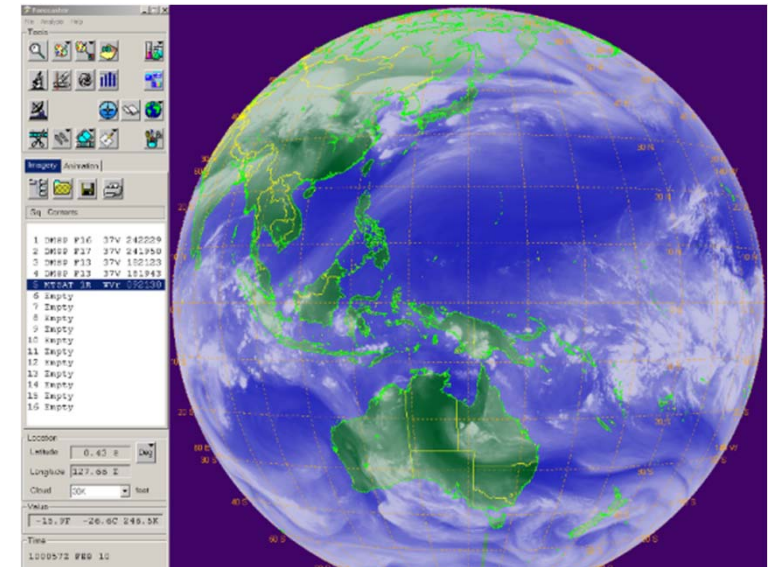
- Operational partnerships
 - USAF/Navy
 - NHC, CPHC
 - NOAA: NWS, NESDIS, OAR
 - RSMCs (Regional Specialized Met Centers)





USAF Tropical Cyclone Support Strengths for Research

- Hurricane Hunters – WC130J
 - AFRC environmental recon mission corrects/validates satellite interrogation techniques
- Leverage RPA capabilities



- AF Weather has near-real time access to global interrogatable imagery
 - Could be formatted and disseminated for research projects



USAF Tropical Cyclone Support

Strengths for Research

- Continue to send AF officers through Naval Post Graduate programs to earn tropical-related masters degrees



- Joint Typhoon Warning Center (JTWC) operationalizes mature research through its techniques development section
- JTWC data available in digital formats
 - Easily leveraged for research

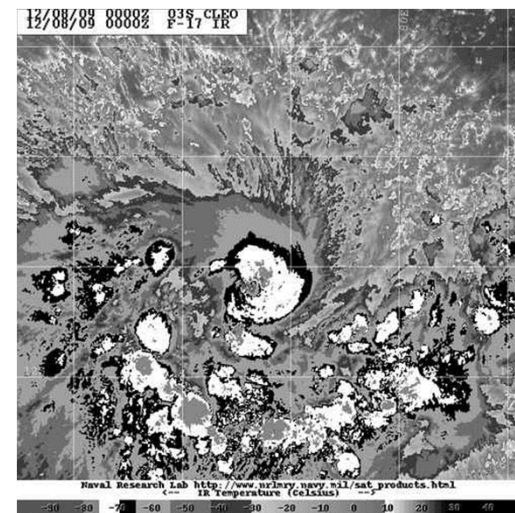




We need research community support

■ Top priority is intensity/structure...need improved:

- Cyclone intensity/structure change
 - Rapid intensification
- Specification of cyclone structure (wind strength and distribution)
- Satellite-based intensity/structure estimates – including microwave



- Climate change influence on cyclone tracks / intensities
 - Impacts on other parts of the world (e.g., Africa, Indian Ocean)



- Typhoon warning capability critical to warfighters in Pacific/Indian Oceans ... important to operations and saving lives!
- Must continue to work *JOINTLY* to improve forecast accuracy... we need to significantly improve intensity forecasts by 2015!!
- This is a **TEAM SPORT** ... Thanks to everyone for the great work!!



Year of the Air Force
Family



Questions?



We Support the Joint Warfighters...7X24!

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USAF Tropical Cyclone Support

AFIT Thesis Topics

- **Develop Improved Methodology to Analyze Tropical Cyclone (TC) Intensity and Wind Distribution from Microwave Imagery**
- **Sensitivity of the Numerical Model Tropical Cyclone Forecasts to Tropical Cyclone Bogus Input**
- **Effect of Ocean Heat Content / Tropical Cyclone Heat Potential on rapid TC intensification or dissipation in the western North Pacific**
- **Diagnose Mechanisms and Synoptic Patterns Associated with Rapid Intensification of Tropical Cyclones in the western North Pacific**
- **Improve 96- and 120-hr JTWC forecast track accuracy during extratropical transition (ET) in the western North Pacific**
- **Diagnosing Preferential Formation of TC from Multiple Circulations**
- **Monsoon Depression Climatology and TC transition mechanisms**



- Operations input into research decisions (OFCM WG/TCR)
- Communications and interoperability (e.g., ATCF, WRF TC Tracker)
- National and international collaboration
 - Data exchange (Collab Website)
 - Space-based sensing (GEO/LEO, JAXA, EUMETSAT, NASA)
 - Modeling (NCEP, BoM, JMA, UKMO, CMA, ECMWF)
- TPARC/TCS-08 & ITOP/TCS-10 (WC-130J, DOTSTAR)
 - JTWC active participation

