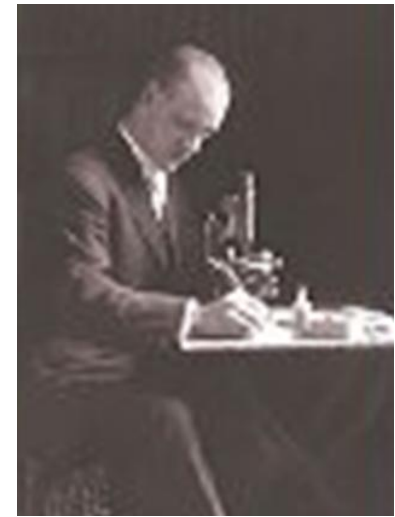


Hurricane Diagnostics and Verification Workshop

Opening Remarks
Mark DeMaria

May 4-6, 2009
National Hurricane Center
Miami, Florida

- Calvert (BAMS, 1920), Diagnosing a Hurricane
 - “The means for detecting ...hurricanes can be compared to a physician who diagnoses a case ...that he recognizes because of his technical skill and experience”.
- Lorenz (Tellus, 1960), Maximum Simplification of the Dynamic Equations
 - Numerical model forecasts, even if they were someday perfect, don't lead to physical insight. “It is only when we use systematically imperfect equations or initial conditions that we can begin to gain further understanding ...”
- Detailed verification and diagnostic procedures are needed to understand nonlinear model errors and identify methods for improvement
 - HFIP diagnostics effort is substantial increase in emphasis on this topic



HFIP Diagnostics Science Team

- Formed Dec 2009
- Members
 - Mark DeMaria (lead), NESDIS/StAR
 - Vijay Tallapragada, NCEP/EMC
 - Richard Pasch, NCEP/TPC
 - Robert Rogers, OAR/AOML
 - James Doyle, NRL
 - Barbara Brown, DTC
 - Ligia Bernardet, OAR/ESRL
- Use May workshop at NHC to coordinate contributions

Year 1 Milestones

- 1) Establishment of periodic team conference calls (NESDIS)
- 2) Obtain initial guidance from NHC on model limitations (global and regional) based upon their operational experience (NCEP, NESDIS)
- 3) Apply storm environment diagnostics to HWRF, COAMPS-TC and HRS models and compare relationships with intensity changes to those identified in statistical intensity models (NCEP, HRD, NESDIS, NRL)
- 4) Perform steering flow evolution and other basic diagnostics inter-comparison between GFDL, HWRF, GFS and ECMWF models for a selected set of cases (NCEP)
- 5) Begin study of impact of forecast error reductions on hurricane warnings using NHC probability model (NESDIS, NCEP)
- 6) Identify diagnostic verification tools that will aid in diagnostic studies (DTC)
- 7) Determine best mechanism for dataset storage and sharing (All)
- 8) Begin diagnostic work for tropical cyclone genesis, with emphasis on determining why the GFS appeared to have greater skill in the eastern Atlantic compared to the Caribbean during the 2008 season (NCEP)
- 9) Arrange workshop with verification team and representatives from other teams (All)
- 10) Provide feedback from items 2 and 3 to model developers (All)

OAR-NESDIS Collaborative Research Project

- Several joint research projects identified at fall 2008 OAR-NESDIS summit
- Hurricane Project
 - Development of Advanced Dynamical Hurricane Model Evaluation and Verification Techniques and Statistical Forecast Algorithms
 - Co-leads: Frank Marks (OAR/HRD), Mark DeMaria (NESDIS/RAMMB), Steve Koch (OAR/GSD)
 - **OAR/NESDIS Collaborators:**
 - AOML/HRD
 - Frank Marks, John Kaplan, Jason Dunion, Robert Rodgers
 - ESRL/GSD
 - Michael Fiorino, Jian-Wen Bao, Ligia Bernardet
 - RAMMB/CIRA
 - Mark DeMaria, John Knaff, Brian McNoldy
 - **Additional Coordination:**
 - NCEP/TPC
 - James Franklin, Richard Pasch
 - NCEP/EMC
 - Naomi Surgi, Vijay Tallapragda

OAR-NESDIS Collaborative Research Project Deliverables

- Development of satellite/in situ data and model databases and diagnostic tools
- Improved statistical model forecast accuracy as determined by standard NHC verification procedure using mean absolute error, bias and comparison with a simple climatology and persistence benchmark
- Identify model deficiencies through application of advanced diagnostic techniques
- Transition successful applications into operations (JHT, JCSDA, DTC, NESDIS satellite algorithm testbed, GOES-R proving ground)