

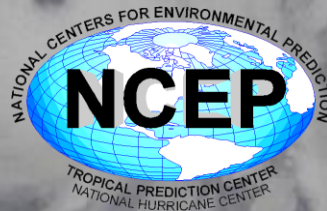
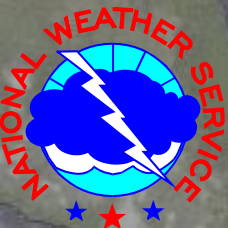
2005

The Visiting Scientist Program at the National Hurricane Center

10 November 2009

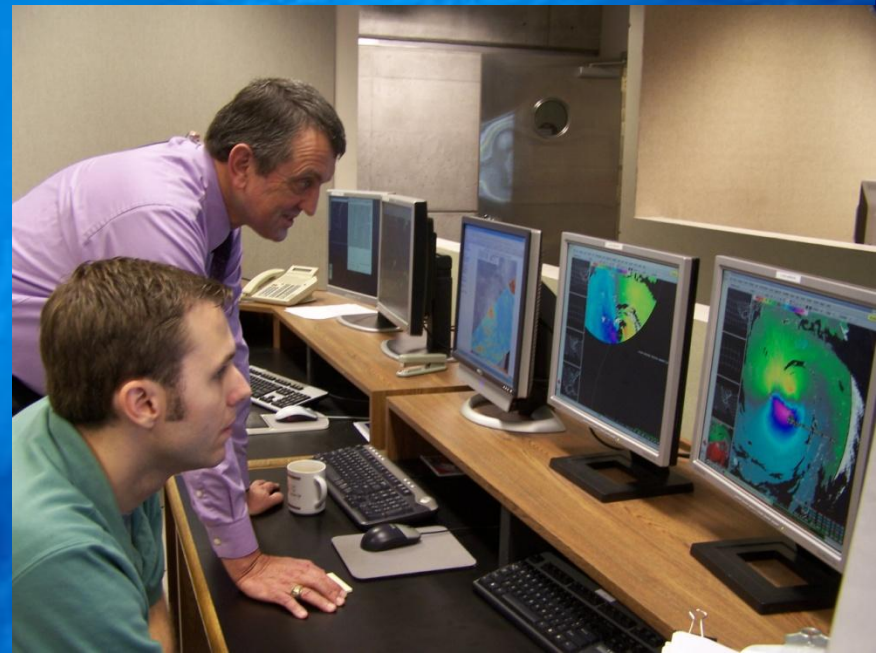
Chris Landsea

National Hurricane Center, Miami



How does NHC analyze and forecast hurricanes?

How do the forecasters blend the various (surface obs, satellite, and aircraft) observations to derive the TC Vitals? How is a working best track derived? What models are relied upon? What are the time constraints? What is the process of the genesis, track, intensity, and size predictions?...



Goals for the NHC Visiting Scientist Program

- To facilitate better understanding by researchers/outside forecasters of the NHC hurricane forecasting process including the tools and techniques utilized by the Hurricane Specialists;
- To open additional dialog between NHC and the research/outside forecast community that could lead to improvements in our analysis and predictions methodologies

Visiting Scientist Program Guidelines

- ☐ Program restricted to scientists that have interest/expertise in day-to-day hurricane forecasting operations
- ☐ VS shadows the Hurricane Specialists during the swing shift from 7-11pm
 - ☐ 7-7:30pm: Digest new model guidance
 - ☐ 7:30-8pm: Prepare Tropical Weather Outlooks (and graphics)
 - ☐ 8-9pm: Analyze the tropical cyclone (position, intensity, size, structure)
 - ☐ 8:30pm: Receive Tropical Analysis and Forecast Branch and Satellite Analysis Branch Dvorak analyses
 - ☐ 9pm: Initialize guidance
 - ☐ 9-10pm: Generate track, intensity, size, and structure forecasts
 - ☐ 10pm: Conference call (for Atlantic tropical cyclones)
 - ☐ 10-11pm: Refine analyses and forecasts; write Public Advisory and Discussion
 - ☐ 11pm: Release Advisory package and produce graphics

Visiting Scientist Program Guidelines

- ❑ Program restricted to scientists that have interest/expertise in day-to-day hurricane forecasting operations
- ❑ VS shadows the Hurricane Specialists during the swing shift from 7-11pm
- ❑ VS participated with representatives from WFOs, RFCs, NCEPs, government labs, academia, and international forecasting centers
- ❑ Each VS would participate for one to five days
- ❑ Scheduled developed for participants from late July to October peak of the season
- ❑ VS would not be performing any operational duties

Visiting Scientist Program Guidelines

- If a major hurricane threatened the US, the shadowing would be postponed/canceled
- If there were no active tropical cyclones, the shadowing could be postponed and/or shifted to be with forecasters in our Tropical Analysis and Forecast Branch (NHC's marine prediction and Dvorak classifications)
- VS that are in Miami for the full five days spend at least one evening with TAFB forecasters
- VS given opportunity to give a seminar on topic of their choosing
- VS encouraged to visit WFO Miami/HRD/U Miami/FIU if opportunity and interest allowed

Visiting Scientist Program Guidelines

- **No funding was available to assist scientists for their visit (in 2008)**



2008 Participants

- 30 researchers/outside forecasters asked to participate
- Jamie Rhome (then Hurricane Specialist), Robbie Berg (then TAFB Forecaster), and I selected the 11 participants to maximize the variety of groups represented:
 - Hurricane Research Division (Shirley Murillo, Sim Aberson)
 - Naval Research Laboratory (Jim Hansen)
 - University professor (Bob Houze – U Washington)
 - University grad student (Kevin Talgo – NCSU, Jon Moskaitis – MIT)
 - Weather Forecast Offices (Andy Devanas – Key West, Robert Bright – Charleston, Erik Pytlak – Tucson)
 - Cooperative Institute for Research in the Atmosphere (Andrea Schumacher)
 - Canadian Hurricane Center (Chris Fogarty)

Visiting Scientist Programs within HFIP and NWS/NCEP



NOAA
HURRICANE FORECAST IMPROVEMENT PROJECT

The logo for the Hurricane Forecast Improvement Project (HFIP) features the NOAA logo on the left, followed by the text "HURRICANE FORECAST IMPROVEMENT PROJECT" in a bold, sans-serif font. A red, stylized hurricane symbol is positioned between the words "FORECAST" and "IMPROVEMENT".

Summer of 2008, the HFIP plan included: “to support research and technology development and training activities for external community at NOAA operational facilities (e.g., **visiting scientists**, Post-Docs, graduate students, professors)”



Spring of 2008, the NCEP Strategic Plan included: “expand the **visiting scientist program** at NCEP to leverage from the external community”

Visiting Scientist Program Guidelines

- **Funding through HFIP made available in 2009 to support NHC Visiting Scientist Program (travel and per diem costs for out of towners)**

2009 Participants

Robbie Berg (Hurricane Specialist) and John Cangialosi (then TAFB Forecaster), and I selected the 12 participants to maximize the variety of groups represented:

- Shuyi Chen - University of Miami (professor - hurricane modeler)
- Jesse Feyen - National Ocean Services (storm surge modeler)
- Kimberley Zuill - Bermuda Weather Service (deputy director)
- John Knaff - NOAA/NESDIS/RAMM (structure and satellite researcher)
- David Novak - Hydrometeorological Prediction Center (SOO)
- Mark Jelinek - Georgia Tech (genesis researcher)
- Mike Turk - Satellite Analysis Branch (lead for tropical)
- Rob Rogers - NOAA/Hurricane Research Division (hurricane modeler)
- Jeral Estupiñán - Brownsville WFO (SOO)
- Jim Hudgins - Blacksburg WFO (senior forecaster)
- Tom Birchard - Honolulu WFO/CPHC (senior forecaster)
- Greg Waller - West Gulf RFC (senior hydrometeorology and support forecaster)

2009 Presentations

- ☐ **Shuyi Chen** - "Large-scale control or convective upscaling? That is the question."
- ☐ **Jesse Feyen** – “An Evaluation of SLOSH and ADCIRC for Two Storm Surge Events: Hurricanes Ivan and Isabel”
- ☐ **Kimberley Zuill** - "Weather and Marine Forecasting in Bermuda: Our Experiences with Hurricane Bill and Other Cyclones"
- ☐ **John Knaff** - "Improving Intensity Estimates using Operational Information"
- ☐ **David Novak** – “The HPC Tropical Cyclone Program and Associated Collaborative Opportunities”
- ☐ **Mark Jelinek** – “Tropical Cyclone Forecastability - How far out can we really forecast?”
- ☐ **Mike Turk** - "On the NESDIS Reorg and Changes to Satellite Analysis Branch (SAB) Ops"
- ☐ **Jeral Estupiñán** - "Societal Vulnerability and Response to Hurricane Dolly in the Lower Rio Grande Valley"
- ☐ **Jim Hudgins** – “Climatology of Heavy Rainfall associated with Tropical Cyclones affecting the Central Appalachians”
- ☐ **Greg Waller** - "River Forecasting at the West Gulf River Forecast Center: Tools/Products, Operations during Hurricane Ike, and Future Changes"

2009 Visiting Scientist Comments

“I am very grateful to have had this opportunity, and I sincerely hope that the Visiting Scientist program becomes a firmly established program. It seems I was very fortunate to be able to not only be there during a week of tropical cyclone activity but to be able to sit in on the HRD de-brief of Ana & Bill, as well as hear the presentations by RSMAS Graduate students and get to chat with professors... I offer no ideas of enhancements, because the week I had far exceeded my expectations!” – Kimberley Zuill

“My visit with TAFB was very instructional - I was able to learn about their range of responsibilities, what data and techniques they use (e.g. NAWIPS, GFE), and about the value of Dvorak classifications. I found sitting in with the Hurricane Specialists' shifts was very exciting and interesting despite the low activity (which was fine as I appreciated the opportunity to ask questions, but could easily imagine the intensity - no pun intended - during a big event.) It was very illustrative to observe all the data that goes into the forecasts, and how they are generated. Also, I understand more clearly the role of the models by seeing them in use will directly tie in to our storm surge modeling efforts.” – Jesse Feyen

2009 Visiting Scientist Comments

“By being able to observe the hurricane specialists, I gained valuable insight that enabled me to propose solutions to a number of concerns regarding SAB’s operations that were revealed during the shadowing process. The Visiting Scientist program also provided an opportunity to lay the groundwork for enhancing NESDIS support of HSU. At the same time, I hope that TPC has a better understanding of the SAB work environment and how it strives to enhance customer satisfaction while working with limited resources.” – Mike Turk

“Everyone was very gracious and helpful (and patient) during my four days. Please give my thanks again to Eric, Mike, Todd, and Jessica for making my stay informative and enjoyable. I got some good ideas on things we can try to do here at HRD from a modeling and diagnostics perspective as well as some ideas for genesis work that hopefully will help you guys some day.” – Rob Rogers

2009 Visiting Scientist Comments

“My stay at NHC was superb. It was very valuable for me to see the different steps involved in creating the NHC forecasts. I learned a lot of the importance of the use of the microwave imagery and the importance of QuikScat and ASCAT. Now I have a better appreciation of the difficulties involved with ocean storm forecasting both at the Hurricane Specialist Unit and at TAFB. This information is extremely important for me at an early stage in my career at the NWS. Now I have a real appreciation of the different tools and techniques used.” –Jeral Estupinan

“The best part of the shadowing involved working alongside the specialists during advisories for TS Henri. During a couple of these shifts I was able to go through the Dvorak technique, and then the entire process of updating the evening advisory package including the TWO. This allowed me to get a feel for the range of science and modeling involved to how these products are produced/disseminated.” –
Rob Hudgins

2009 Visiting Scientist Comments

“The most beneficial gain from the visiting scientist is the exposure to other forecast operations. Seeing the forecast process, from observation to coordination to the final product, gives the visiting scientist the appreciation of the dedication of the staff (both within the HSU and between HSU and TAFB)...The preparation of the tropical forecast package highlights the coordination and the critical value of the information in the forecast. Arguably, no other single weather forecast is scrutinized (both good and bad) more than a tropical cyclone forecast. By witnessing the forecast preparation, it gives the visiting scientist an idea of the skill and pressure the HSU deals with every forecast cycle.” –

Greg Waller

“I really enjoyed participating in the visiting forecaster program. As the new SOO of HPC it allowed me to meet a number of key contacts, and develop relationships with TPC, WFO MIA, and HRD that would likely not have been made otherwise. For example, in meeting with HRD, I learned of their HWRFx effort, which will include heavy rainfall diagnostics useful to HPC. In meeting with TAFB I saw first-hand the development efforts regarding GFE. Such efforts are also being started at HPC. I also developed a much better picture of just what TPC is, the resources available, and the operational constraints of TPC.” – Dave

Novak

Visiting Scientist Program

Scenes from NHC, TAFB, Miami WFO and AOML/HRD

Scenes from NHC, TAFB, Miami WFO and AOML/HRD



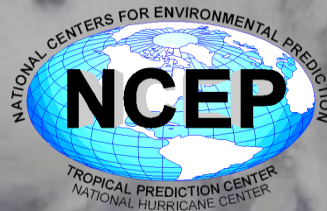
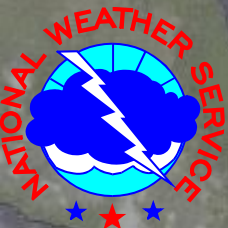
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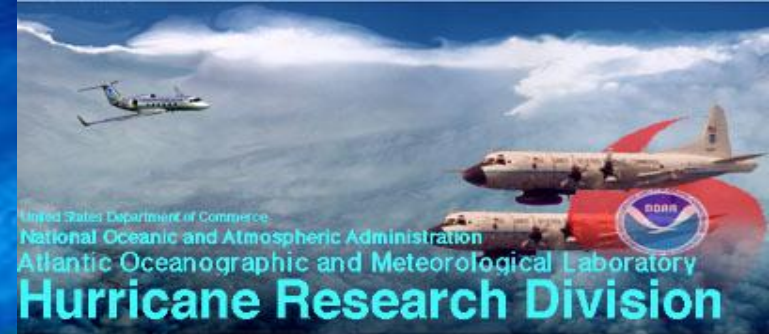
Chris Landsea

National Hurricane Center, Miami



2007 HRD

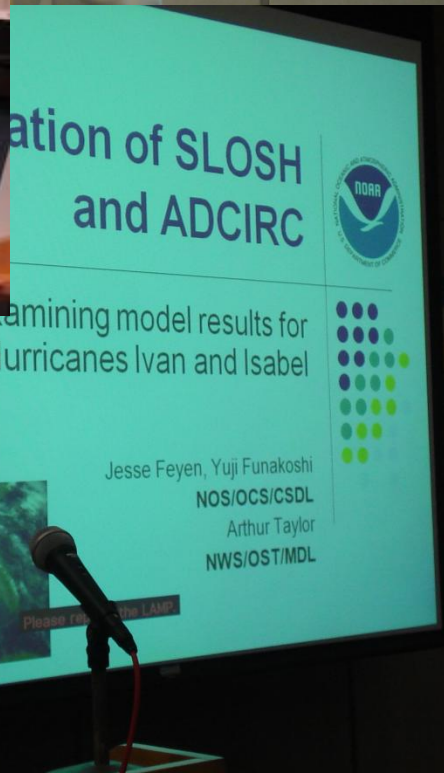
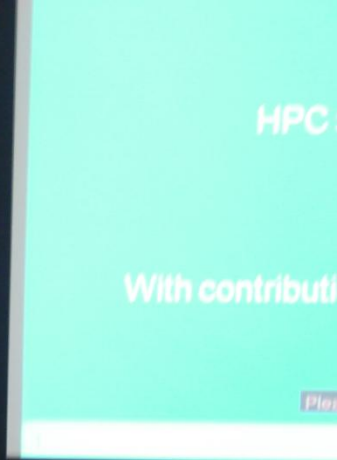
Shadowing Program



- In 2007, seven HRD researchers “shadowed” the Hurricane Specialists during swing shifts
- Goals were to: 1) facilitate better understanding by HRD researchers of the NHC hurricane forecasting process including the tools and techniques used by the Hurricane Specialists; 2) open additional dialog between NHC-HRD that could lead to improvements in NHC’s analysis and prediction methodologies
- HRD participants unanimously thought the program to be extremely beneficial
- NHC Hurricane Specialists feedback was primarily favorable with several comments for improvements



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Changes for 2009

- ☐ More formal interaction designed specifically with our Tropical Analysis and Forecast Branch for full week visitors
- ☐ Make available opportunity to visit WFO Miami/HRD/U Miami/FIU in situations with no tropical cyclone activity
- ☐ Include participation from other NOAA groups such as national centers, River Forecast Centers, Satellite Analysis Branch and Aircraft Operations Center
- ☐ Provide more NHC background information for VS participants
- ☐ Provide funding from NCEP SOO pot-o-money for WFO participation
- ☐ **Guarantee that there will be an active tropical cyclone during the VS stay...**

2008 Presentations

- Bob Houze - "Convective Contribution to the Genesis of Hurricane Ophelia (2005)"
- Jim Hansen - "Advances in tropical cyclone track uncertainty guidance: Understanding why uncertainty looks the way it does"
- Jon Moskaitis - "Verification of deterministic TC intensity forecasts: Beyond summary accuracy measures"
- Andrea Schumacher – "Hurricane research in the Rockies: An overview of recent research to operations activities at CIRA"
- Erik Pytlak - "Northeast Pacific Tropical Cyclones in the Southwest US - Climatology, Impacts and Forecasting"
- Chris Fogarty - "Canadian Hurricane Centre - Ongoing Operational and Development Activities"

2008 Visiting Scientist Comments

“The NHC Visiting Scientist Program was a fantastic experience. In my view there is no way a research scientist can understand the operational problem unless he/she spends time in an operational environment observing and asking questions. The NHC employees were all very generous with their time and insights, and lessons learned during the trip have already modified my research agenda.”

“As a graduate student in the field of tropical meteorology, it was an excellent learning experience for myself and also of great benefit to the NC State meteorology department...It was fascinating to witness first-hand the challenges and pressure encountered by forecasters when a tropical cyclone is bearing down on the U.S. coast.”

“I learned a lot more about NHC and TAFB products and services, the research NHC and universities are conducting on ET transitions, and the delicate workload balance NHC forecasters have to juggle when systems are affecting both the Atlantic and East Pacific.”

“It was an outstanding opportunity, and I found my visit to be both enjoyable and productive...Overall, I believe the visiting scientist program to be an important step to increasing awareness of the NHC in the operational and academic meteorological communities.”