

63rd Interdepartmental Hurricane Conference (IHC) Summary Report

I. OVERVIEW

The purpose of this document is to provide a summary of the 63rd IHC, a conference that was sponsored and chaired by Mr. Samuel P. Williamson, Federal Coordinator for Meteorology, from March 2-5, 2009, in St. Petersburg, Florida. In addition to this Overview (Section I), the summary report contains a Conference Summary (Section II) and Conference Action Items and Conclusion (Section III).

Purpose: Each year, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) sponsors the IHC to provide a forum for the responsible Federal agencies, together with representatives of the user communities such as emergency management, to review the Nation's hurricane forecast and warning program and to make recommendations on how to improve the program. The theme of this year's conference was *Tropical Cyclone Research: Identifying Gaps and Focusing Research on Operational Needs*. With strong partnerships and alliances built over many years, the conference was attended by 200+ personnel for the 10th consecutive year, including representatives from eight federal agencies: DOC/NOAA, DOD (Navy, Air Force, and Army COE), NASA, NSF, DHS (HQ S&T and FEMA), DOT/FAA, DOI (USGS and MMS), and USDA. Attendees also included representatives from academia, industry, and the emergency management community.

Key Takeaways:

Two main objectives of the conference (see "Objectives" in Section II below) were: (1) review and build upon tropical cyclone (TC) partnership alliances, leveraging agency capabilities to meet the operational needs of the TC forecast and warning centers (National Hurricane Center [NHC]/Central Pacific Hurricane Center [CPHC] and Joint Typhoon Warning Center [JTWC]); and (2) review interagency linkages of TC research to the TC forecast and warning center's operational priorities.

For #1 above, the panel discussion held during the Opening Session of the conference, *TC Partnership Alliance: A Senior Leader Perspective*, made it very clear that partnerships, alliances, and collaborations are healthy and extremely vital for improving TC forecasts and warnings. The senior leaders from NOAA (research and operations), NASA, Navy (research and operations) and the Air Force emphasized that they are unified in their commitment to collaboration and interagency cooperation regarding TC research and operations.

For #2 above, the OFCM-sponsored Working Group for TC Research (WG/TCR) summarized their work to date in Session 2 of the conference. Their extensive work resulted in the first-ever, comprehensive interagency linkage of TC research to the TC forecast and warning center's operational priorities. The 2008 snapshot analysis of all agency research efforts mapped against the TC research needs and also against the operational priorities showed a fairly even distribution of TC research investment (i.e., man-years and funding) among the agencies and that the research covered most of the operational priorities, with approximately 35% of the TC research directly related to tackling the #1 operational priority: guidance for tropical cyclone intensity change, with highest priority on the onset, duration, and magnitude of rapid

intensification events. Follow-on work of the WG/TCR includes the development of a set of interagency strategic objectives (intensity/structure, track, RI, genesis) that are driven by requirements, performing a regular update of the 2008 baseline to relate research efforts toward achieving the interagency strategic objectives, and formalizing the executive oversight of their work. Finally, it was very apparent from the work of the WG/TCR that agency partnerships are absolutely vital for the nation’s hurricane program.

A final takeaway is that additional emphasis needs to be placed on the social science and associated decision-making issues related to TC research and transitioning appropriate results into operations. This area was highlighted in Section 5.3, Appendix P, and recommendation 2.a.2 of the 2007 *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*. Conference participants strongly endorsed the formation of a new OFCM-sponsored joint action group to focus in four main areas: decision-making, warning process, behavioral response, and societal impacts.

Sessions Conducted: In addition to the Opening Session on Monday afternoon, the Poster Session on Tuesday evening, and the Plenary Session on Thursday afternoon, there was 13 sessions conducted at the 63rd IHC:

Session #	Title
1	The 2008 TC Season in Review
2	Workshop: <i>Identifying TC Research Needs, Progress and Gaps</i>
3	Observations and Observing Strategies for TCs and their Environment, Part 1
4	Observations and Observing Strategies for TCs and their Environment, Part 2
5	Observations and Observing Strategies for TCs and their Environment, Part 3
6	TC Model Development and Technology Transfer, Part 1
7	TC Model Development and Technology Transfer, Part 2
8	TC Model Development and Technology Transfer, Part 3
9	Other Research to Improve the Prediction of TC Intensity and Structure, Track, Precipitation, Coastal and Inland Inundation, Part 1
10	Other Research to Improve the Prediction of TC Intensity and Structure, Track, Precipitation, Coastal and Inland Inundation, Part 2
11	Joint Hurricane Testbed: Project Updates and Plans for the Future
12	Products, Services, and Lessons Learned during the 2008 TC Season, Part 1
13	Products, Services, and Lessons Learned during the 2008 TC Season, Part 2

Media Coverage: The 63rd IHC had coverage from both TV and print media. Coverage included several local stations: 10-Connects (CBS; BayNews9; BayNews9 Español; Univision Tampa; WFLA-TV8 (NBC); and St. Pete TV (WSPF), the City of St. Petersburg channel. In addition, print media representatives from *The Tampa Tribune*, *The St. Petersburg Times*, and the *Sun-Sentinel* (Ft. Lauderdale) interviewed several attendees and attended parts of the conference. The 63rd IHC received excellent media coverage thanks to the assistance of the Director of Marketing and Communications for the City of St. Petersburg and NOAA Public Affairs.

Location for 2010 IHC: The tentative location for next year’s conference is Savanna, Georgia.

II. CONFERENCE SUMMARY

Objectives: The agenda, to include the workshop (Session 2), was structured to address the conference objectives below:

- Review and build upon TC partnership alliances, leveraging agency capabilities to meet the operational needs of the TC forecast and warning centers.
- Review interagency linkages of TC research to TC forecast and warning center's operational priorities.
- Review the Nation's TC forecast and warning program from end-to-end.
 - Update the National Hurricane Operations Plan for 2009.
- Review the 2008 Joint Hurricane Testbed (JHT) projects, and identify candidates that may be successfully transitioned into operations.

Key Events:

- Conference Opening Remarks: During the opening session, the Mayor of St. Petersburg, The Honorable Rick Baker, welcomed the conference attendees to the city and thanked conference participants for their important work. Mayor Baker noted the importance of hurricane forecasts and warnings to city officials who help prepare their residents. He made special reference to the 2004 Hurricanes Charley, Frances, Ivan, and Jeanne. He encouraged conference participants to explore the city and beaches and wished them a very successful meeting.
- Panel - TC Partnership Alliance: A Senior Leader Perspective. During the opening session on Monday afternoon, a panel of senior agency representatives provided senior leader perspectives on TC Partnership Alliances. The moderator and participants are indicated below.

Moderator: Dr. Kelvin K. Droegemeier, Associate VP for Research and Director, Sasaki Institute, University of Oklahoma

Panelists:

Dr. Richard W. Spinrad, Assistant Administrator for Oceanic and Atmospheric Research, NOAA

Mr. Robert Winokur, Technical Director, Office of the Oceanographer and Navigator of the Navy

Dr. Jack Kaye, Associate Director for Research, Earth Science Division, NASA

Colonel Mark Zettlemyer, Chief, Integration, Plans & Requirements, Directorate of Weather, Headquarters Air Force

RDML David Titley, Commander, Naval Meteorology and Oceanography Command

Dr. John "Jack" Hayes, Assistant Administrator for Weather Services, NOAA

- Dr. Spinard described where NOAA is today with respect to TC research to include areas that deal with TC uncertainty, intensity and structure change, and track. He emphasized research alliances that coordinate across activities, take advantage of existing federal hurricane coordination efforts, and maximize use of non-federal assets. Dr. Spinard reviewed NOAA’s current collaborative programs as well as identifying those that looking promising for the future.
- Mr. Winokur emphasized the Navy’s commitment to TC partnership and research with respect to the Navy’s Maritime Strategy which elevates humanitarian assistance and disaster relief to core elements of maritime power. He indicated the Oceanographer of the Navy is committed to enhancements in TC forecasts. He also mentioned that new opportunities for partnerships exist, especially in observations and modeling. Mr. Winokur emphasized that the Navy is committed to national policy driven collaboration and interagency cooperation and partnerships such as NUOPC, unmanned aerial systems, space (NPOESS, altimeter), improved TC forecasts, and the next generation NWP model.
- Dr. Kaye summarized NASA’s investment in TC research which spanned four major areas: satellite remote sensing, sensor development, NASA-sponsored field campaigns, and numerical modeling. He reviewed NASA’s hurricane related technology investments and highlighted the NRC decadal survey’s long-term recommendations that are most relevant to hurricanes. Dr Kaye indicated that NASA cooperates closely with interagency partners and makes data and tools available to facilitate use and encourage participation.
- Colonel Zettlemoyer summarized the Air Force’s contribution to TC operations and research (i.e., JTWC, 53rd WRS’s WC-130Js, and tropical-related graduate degrees). He stated that the Air Force’s top priority is improvements are TC intensity and structure. He challenged the research community to improve forecast and warning accuracy over the next 10-years by a factor of three. Col Zettlemoyer requested the research community’s support on climate change influences as it relates to TC tracks and intensity. He advocated continued national and international collaboration that covers data exchange, modeling, and space-based sensing.
- Due to illness, RDML Titley was unable to attend. His Deputy, Mr. Ed Gough, was a last minute replacement and stressed that the Navy’s “Battlespace on Demand” vision relies on high quality tropical forecasts. He mentioned that Navy METOC is a small organization and therefore relies on collaboration and partnerships. He emphasized the importance of the 3-5 day TC forecasts as well as the value of the JTWC partnership. The Navy remains committed to excellence in meteorology and emphasized continued cooperation in TC research and operations.
- Dr. Hayes highlighted NWS’ organizational changes and constants to include: new leadership moves, budget concerns, focus on climate change, and economic/societal challenges. He stressed their commitment to hurricane research and forecast improvement and briefly discussed the agency’s current partnerships. He emphasized that advances in science and technology infusion is key to the TC mission, partnerships are essential to optimize results, and forecast investments are crucial to

the nation's public safety and economic well-being.

- Workshop - Workshop: *Identifying TC Research Needs, Progress and Gaps*: A panel consisting of members of the OFCM-sponsored WG/TCR provided a summary of the efforts to date of the group. The moderator and participants are indicated below.

Moderator: Dr. Elizabeth Ritchie, Associate Professor, Department of Atmospheric Sciences, University of Arizona

Panelists: Dr. Frank Marks, Co-Chair, Working Group for TC Research, NOAA AOML/HRD
Dr. Scott Braun, NASA/GSFC
Dr. Brad Smull, NSF/Division of Atmospheric Sciences
Dr. Rob Rogers, NOAA AOML/HRD
Dr. Ronald Ferek, Navy/ONR
CAPT Michael Angove, Co-Chair, Working Group for TC Research, Naval Deputy to NOAA

- Dr. Marks described the evolution of the Joint Action Group for Tropical Cyclone Research (JAG/TCR) to the current WG/TCR. He indicated the JAG/TCR's work culminated in the 2007 publishing of the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*. The driving force behind the formation of the WG/TCR was strong support from members of the Interdepartmental Committee for Meteorological Services and Supporting Research in response to recommendation 2b contained in Table 6-2 of the interagency plan. Dr. Marks concluded his briefing by presenting a set of graphs that was used by each of the participating agencies to evaluate their research activities in each of the primary topic areas: General Research, Model Development, and Observations and Observing Strategies.
- Dr. Braun briefed that NASA's TC research is focused on genesis, intensity, precipitation, and structure. He mentioned that 59% of their research is toward genesis and intensity change and 14% is towards obtaining observations for science and modeling. He noted that development of new observing technologies were not included as these technologies have broader application than just TC analysis and forecasting. Dr. Braun indicated that a great deal of past and future research work is related to field programs. Finally, he mentioned that there will be a significant field program beginning in 2010. During this field program, NASA expects to use the Global Hawk unmanned aerial system for the first time.
- Dr. Smull discussed NSF's current research emphasis and noted that it is partly but not entirely aligned with TC operational center priorities. However, he stated that TC intensity change, the TC forecast and warning centers' #1 priority is well supported by NSF. He noted that some contributions in ocean sciences and wind engineering were likely missing from this effort. He also mentioned that NSF-supported efforts are on high-risk, high-benefit research. Dr. Smull concluded that efforts by NSF's Social, Behavioral & Economic Sciences (SBE) Directorate don't readily map onto the current efforts of the WG/TCR, but the "human dimensions" research may still be

of key interest to emergency managers and first responders.

- Prior to reviewing NOAA’s TC research, Dr Rogers discussed NOAA’s Hurricane Forecast Improvement Project (HFIP), a unified approach to guide and accelerate improvements in TC forecasts with emphasis on rapid intensity change and reduction in uncertainty. HFIP measurements of success include: reduce track error by 50% at all lead times, reduce intensity error by 50% at all lead times, increase probability of detection and reduce false alarm ratio of rapid intensification events, and extend the lead time to 7 days. Dr .Rogers summarized that NOAA’s current research efforts are focused in the three main areas of intensity/structure, model development, and observations. He concluded that the four operational priorities receiving the highest man-years of work included intensity change (NHC/CPHC priority #1), observations (NHC/CPHC priority #2), wind analysis (NHC/CPHC priority #8), and TC size/structure (NHC/CPHC priority #9).
- Dr. Ferek discussed the Navy’s long-standing history of tropical meteorology research which emphasized naval requirements and knowledge gaps. Current Navy focus is on structure (wind field / sea height), genesis, intensity changes, physics coupled with the ocean, remote sensing vs. in-situ observing technologies, exploring the use of UUV’s and autonomous vehicles for ocean observing, and high-resolution coupled mesoscale model (COAMPS-TC) for structure and intensity prediction. He noted that the three operational priorities receiving the highest man-years of work included intensity change (JTWC priority #1), genesis (JTWC priority #3), and TC size/structure (JTWC priority #4).
- Capt Michael Angove closed by summarizing the combined TC research efforts of the agencies. He emphasized that this was a first-ever comprehensive, interagency linkage of TC research to tropical forecast and warning center’s operational priorities. He noted that the 2008 summary showed that the current research is roughly aligned with the operational centers’ priorities. The initial analysis did reveal that there was little emphasis on forecaster aids (guidance on guidance) and on research dealing with resolution vs. ensemble model output. He stated that the next step of the WG/TCR is to agree upon strategic objectives (e.g., track, intensity, genesis). He emphasized that the WG/TCR needs to accomplish a regular update of the research database to relate the research efforts toward achieving the strategic objectives. He concluded that the WG/TCR recommends that an executive oversight body be formalized to review and guide future efforts.

Questions and discussions following the presentations highlighted that there needs to be continued emphasis on global model improvement. Also, there was discussion that social science and associated decision-making issues related to TC research wasn’t included in the WG/TCR efforts to date. The WG/TCR members noted that the huge effort to gather and perform the atmospheric/oceanic-related TC research analysis didn’t allow them to include this very important piece. This issue is addressed in Section III.

- 63rd IHC Banquet and Richard H. Hagemeyer Award:
 - The significant events that occurred during the banquet are described below:
 - Banquet Address by Vice Admiral Roger T. Rufe, Jr., USCG (Ret.), Director, Operations Coordination & Planning, DHS: VADM Rufe expressed his gratitude to the IHC participants for their dedication in providing information and warnings on hurricanes and associated hazards that affect the lives and property in the United States and other areas of interest. Continuing to improve hurricane forecasts and warnings is vital to protecting Americans from these devastating natural disasters and greatly aids first responders, which directly supports the President’s Homeland Security Agenda. He also stressed how important accurate and timely weather information was for DHS in planning for response and recovery activities related to natural disasters and other emergencies. He noted that weather experts provide a comprehensive review of weather threats and their potential impacts at the daily briefing at the Homeland Security Operations Center. This information provides a vital basis for the decision and planning agendas of the assembled operations teams, which represents over 35 agencies ranging from state and local law enforcement to federal intelligence agencies.
 - For 2008, the Richard H. Hagemeyer Award—which is presented annually in honor of the longtime Director of the NWS Pacific Region and supporter of the IHC—was awarded to Dr. Mark DeMaria. Dr. DeMaria received a B.S. in Meteorology (1977) from Florida State University, and a Masters (1979) and PhD (1983) in Atmospheric Science from Colorado State University. After working at NCAR and North Carolina State University, he joined NOAA in 1987 and has worked as a research meteorologist at the Hurricane Research Division (1987-1995), as the Chief of the Technical Support Branch of the NCEP Tropical Prediction Center (1995-1998) and currently serves as the Chief of the NESDIS Regional and Mesoscale Meteorology Branch (1998-present). Some of his accomplishments include:
 - Led the development and continued improvement in the SHIPS (and now Decay-SHIPS) intensity scheme that for many years were the only skillful intensity guidance to TC forecasters.
 - Co-developer of the SHIPS rapid intensity forecast scheme.
 - Developed tropical cyclone genesis product.
 - Developed the probabilistic maximum intensity forecast program.
 - Designed and developed the wind speed probability software.
 - Founding member of the Joint Hurricane Testbed Steering Committee.

III. CONFERENCE ACTION ITEMS CONCLUSION

Conference Action Items:

- Support the next steps of the WG/TCR:
 - Develop set of interagency strategic objectives driven by requirements (intensity/structure, track, RI, genesis).
 - Relate research efforts toward achieving strategic objectives.
 - Document continued work of WG/TCR.
 - Formalize executive oversight (e.g., TC partnership alliance senior leaders).
 - Include and address social science and decision-making issues.
- To adequately address social science and decision-making issues:
 - Form a new OFCM-sponsored Joint Action Group under the WG/TCR.
 - Focus and build upon key areas in Section 5.3, Appendix P, and recommendation 2.a.2 of 2007 TC R&D Plan, “Social Science Research.”
 - Decision-making.
 - Warning process.
 - Behavioral response.
 - Societal impacts.
 - Activity should address the societal / public safety aspects and build upon major concerns / needs such as:
 - Risk mitigation.
 - Decision support.
 - Others.

Conclusion: The IHC was extremely successful in bringing the operational and research communities together to further improve the TC forecast and warning program. It was also successful in addressing the needs of the federal agencies and user communities that have a stake in the Nation’s TC program.