2008 APS March Meeting

New Orleans, Louisiana

http://www.aps.org/meetings/march/index.cfm

Tuesday, March 11, 2008 8:00AM - 10:24AM –

Session H6 FPS: Understanding Hurricanes and Severe Storms: Patterns, Prediction and Mitigation Morial Convention Center RO4

8:00AM H6.00001 Understanding Severe Hurricanes GREG J. HOLLAND, National Center for Atmospheric Research — Hurricanes are complex phenomena, whose understanding involves many facets, of which my presentation will provide an overall flavor and review. Understanding the physical hurricane involves a complex amalgam of fluid dynamics, thermodynamics and scale interactions. The basic structure is one of a fluid vortex, which dictates everything from the characteristic spiral shape to the clear eye region. Energetically, once formed a hurricane is a self sustaining heat engine, one that extracts energy from the enthalpy difference between the warm ocean surface and the cold upper atmosphere, and one that will continue its merry way until it is destroyed by some external influence (such as landfall). Hurricanes also are a response to the global climate in which they develop and can feed back to influence and perhaps even change that climate. For example a series of hurricanes moving into the higher latitudes in the Pacific can set off a train of events that are still affecting European weather a year later. From a societal perspective they are the most dangerous and deadly of all natural atmospheric systems, capable of causing widespread destruction and long-term disruptions to entire societies. The damage wreaked by Katrina in New Orleans provides a canonical example, but this was by no means the worse cyclone in history. Even lesser damage on a small island nation can be much more catastrophic and exceed their entire gross domestic product. This capacity for disruption arises from three main mechanisms: the high surface winds, the response of the ocean to these winds, and the intense rainfall. These have widely different contributions in different storms: the extended region of high winds and particularly the storm-surge response were dominant factors in Katrina; whereas the >10,000 deaths by Hurricane Mitch arose entirely from rainfall and the associated flooding and landslides. Societal response to this danger involves complex interplays of warning, communication culture, previous experiences and perceptions, interplays that are neither well understood nor adequately predictable.

8:36AM H6.00002 Tornadoes and Severe Thunderstorms: Physical Understanding and Climate Questions , HAROLD BROOKS, National Severe Storms Laboratory — Severe thunderstorms (those that produce large hail, high winds and/or tornadoes) are of importance because of the threat to life and property they pose. This talk will review our understanding of the physical processes that lead to them and their distribution in time and space. The basic approach follows that of weather forecasting, focusing on the atmospheric "ingredients" in the environment necessary to produce severe thunderstorms and tornadoes, particularly the thermodynamic state of the atmosphere and the organizing effects of vertical wind shear that leads to the most severe storms. We will look at the challenges of reconciling our limited reporting databases of events and our physical expectations derived from the distribution of those environmental conditions. Consistent (and inconsistent) aspects of the various databases around the world will be discussed with their implications for what we can and cannot say about the basic physical processes. Of particular interest is the record from the United States. Some simple efforts to deal with the spatial and temporal inhomogeneities in the observational record will be developed with the limits that are implied on our ability to detect past changes. Finally, the talk will close with a discussion of the possible effects of anthropogenic global warming on severe thunderstorms, particularly in the United States. Global climate model studies of this problem are very recent, with the first peer-reviewed results appearing in 2007. The limitations of the climate models and possible scenarios for the future will be discussed.

9:12AM H6.00003 Factors Influencing Hurricane Surges along the Louisiana-Mississippi Coast , DONALD T. RESIO, U.S. Army Engineer Research and Development Center — The effects of recent hurricanes along U.S. Coastlines, along with expected future sea level rise and the potential for increased storm activity all point to a critical need for improved methods for estimating coastal hazards and associated risks. Many of the models used today to assess hazards and risk incorporate considerable empiricism in their formulation. Unfortunately, most of the empirical evidence is drawn from small to moderate storm events and cannot be effectively extrapolated to extreme storms such as Hurricane Katrina. This presentation will critique the state of the art in hurricane surge prediction, including the adequacy of numerical models, coefficients within these models, and the wind fields utilized to force them. Once the predictive system and its physical basis are introduced and discussed, a methodology will be described for utilizing information from such a system to estimate risk for coastal areas, including the effect of uncertainties in both the modeling system and storm climate,. Using the methodology introduced here, maps of estimated storm surge levels for selected recurrence intervals in the New Orleans area will be presented along with a comparison to some previously derived values to provide perspective.

9:48AM H6.00004 Wetland Loss and Restoration Options in Southern Louisiana , ROBERT G. DEAN, University of Florida — Wetlands are productive landscape features of the broad Mississippi River Delta system. In addition to their ecological services of providing habitats for a variety of species including juvenile commercial and recreational fish, they provide a valuable wave reduction role during severe storm events characterized by elevated water levels and high waves. Currently, these wetlands are stressed by a combination of natural and human-related forces resulting in rapid loss rates. Although many factors contribute to wetland loss rates, the single greatest factor is the shunting of river borne sediments offshore into deep water. Navigational interests benefit greatly from the present fixed location of the main navigation channel at Southwest pass with its terminus at the edge of the continental shelf such that the sediment load is discharged into deep water. The Mississippi River Delta region is subsiding at up to more than 10 times the Eustatic rate of sea level rise and thus the wetland and barrier island systems require these sediments for maintenance and growth. With the increasing scarcity and costs of energy, it is highly desirable that wetland restoration be done using natural forces to the degree possible. Absent legal issues, a pragmatic approach could be to identify those areas where progress can be made with realistic investments of economic and energy resources and to accept that areas with less benefit per investment will continue to degrade. The paper will review various options and discuss obstacles and opportunities.

Thursday, March 13, 2008 11:15AM - 2:15PM –

Session V5 FPS FGSA: Panel Discussion: Lessons Learned from Katrina: How to Prepare a Department for Catastrophic Events Morial Convention Center RO1

11:15AM V5.00001 Lessons Learnt From Hurricane Katrina. , MURTY AKUNDI, Xavier University of Louisiana — Hurricane Katrina devastated New Orleans and its suburbs on Monday August 29^{th}, 2005. The previous Friday morning, August 26, the National Hurricane Center indicated that Katrina was a Category One Hurricane, which was expected to hit Florida. By Friday afternoon, it had changed its course, and neither the city nor Xavier University was prepared for this unexpected turn in the hurricane's path. The university had 6 to 7 ft of water in every building and Xavier was closed for four months. Students and university personnel that were unable to evacuate were trapped on campus and transportation out of the city became a logistical nightmare. Email and all electronic systems were unavailable for at least a month, and all cell phones with a 504 area code stopped working. For the Department, the most immediate problem was locating faculty and students. Xavier created a list of faculty and their new email addresses and began coordinating with faculty. Xavier created a web page with advice for students, and the chair of the department created a separate blog with contact information for students. The early lack of a clear method of communication made worse the confusion and dismay among the faculty on such issues as when the university would reopen, whether the faculty would be retained, whether they should seek temporary (or permanent) employment elsewhere, etc. With the vision and determination of President Dr. Francis, Xavier was able to reopen the university in January and ran a full academic year from January through August. Since Katrina, the university has asked every department and unit to prepare emergency preparedness plans. Each department has been asked to collect e-mail addresses (non-Xavier), cell phone numbers and out of town contact information. The University also established an emergency website to communicate. All faculty have been asked to prepare to teach classes electronically via Black board or the web. Questions remain about the longer term issues of the size and stability of the faculty.

11:30AM V5.00002 TBD , SHIRLEY LASKA, University of New Orleans — This abstract has not been submitted.

11:45AM V5.00003 Hurricane Katrina at Tulane. , JIM MCGUIRE, Tulane University — After hurricane Katrina struck New Orleans on August 29, 2005, Tulane University closed for the fall semester. Buildings on campus were closed and armed guards were hired to protect the campus. Faculty members were not allowed access to their offices and laboratories, except for exceptional cases when a Dean went with them. Many faculty members took their research groups to other universities accepting *much welcomed* invitations from colleagues. Undergraduates went to other colleges and universities, which accepted the without cost and a promise not to recruit them. The university email system went down for months. Collecting information on the welfare of faculty and students was difficult. The university was run from Houston by a small handful of senior administrators. Setting up the schedule of classes for the spring 2006 semester was done without records. Most faculty returned to New Orleans after several weeks. 80% of the city was flooded. Small trailers were provided. Some lived in the FEMA trailers for two years or more. When Tulane reopened, a wide reaching Renewal Plan, worked out by the upper administration, was implemented. A new *emergency preparedness plan* was also developed and put in place.

12:00PM V5.00004 , C. GREG SEAB, University of New Orleans — No abstract available.

12:15PM V5.00005 Academic environment and dynamics in response to extreme events: Theory and Practice (Katrina Lessons)[1] , NATALIA SIDOROVSKAIA, Department of Physics, University of Louisiana at Lafayette — The possibility of a catastrophic event requires the department as a unit and the university as an organization to devise a comprehensive emergency response plan to minimize the impact and shorten the recovery stage. Does the academic organizational structure and environment possess key features for the possibility of successful response to extreme events? The post Hurricane Katrina experience of Louisiana universities offers data to address this theoretical question. It also emphasizes that the mitigation plan should include two aspects: preparing/protecting a university for/during a catastrophic event and assisting other academic institutions experiencing an extreme event. Short-term and longer-term statistics and other data pertain to the interaction of the University of Louisiana at Lafayette (as an assistance unit) with the universities in New Orleans (units in distress), including the dynamics of student population, faculty influx, course adjustments, and response and recovery actions are presented. An attempt is made to categorize the losses and to assess the recovery quality and time. Faculty and institutional administration interviews are summarized to assist in developing future proactive response plans. UL Lafayette and UNO research capabilities and intellectual resources for developing complex models simulating the multi-variable effects of catastrophic events and providing adaptability in the decision-making process are investigated.

[1]This work was done in collaboration with George E. Ioup and Juliette W. Ioup (Department of Physics, University of New Orleans).

12:30PM V5.00006 Hosting a Katrina Evacuee. , DAVID HOAGLAND, Polymer Sci. and Eng. Dept., Univ. of Massachusetts Amherst — No individual or institution anticipated the impact on the academic research community of hurricane Katrina. When Tulane physicist Wayne Reed asked me to host his research group just a day or two after the disaster, with no authorization or understanding of the commitment, I agreed immediately and then pondered implications. Fortunately, colleagues helped in making the commitment real, only the bureaucracy of my public university posing small hindrances. Industry was remarkably generous in providing Reed with significant "loaner" equipment, and amazingly, a suite of custom Reed experiments was running within weeks. At the end, the most productive collaborations for Reed seemed not to have been with my group, with its similar research, but to other groups at my institution, particularly the synthetic chemists, who gained access to methods previously unique to Tulane while offering samples previously unique to UMass. Quickly designed projects exploiting this match turned out remarkably productive. Although begun with trepidation, hosting of Reed had huge positive benefits to me and UMass, and I believe, also to Reed and Tulane. Some key lessons for the future: (i) industry has capacity and willingness to help academic research during disruption (ii) commitment of a host institution must be immediate, without a wait for formal approvals or arrangement of special funding – delay leads only to discouragement, (iii) continuing academic progress of displaced students must come first, and (iv) intellectual synergy rather than overlap should be the basis for seeking a host. Lastly, NSF or other funding agency should consider a program directly addressing the research needs of unexpectedly disrupted academic scientists, and most particularly, graduate students who face greatly extended studies.

12:45PM V5.00007 Panel Discussion —