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Atlantic Basin Tropical Cyclone Database Reanalysis and Impact of Incomplete Sampling

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Abstract: Hurricanes are arguably the single largest extreme weather event that impacts human society today as the over 1,500 lives lost during Hurricane Katrina in Louisiana and Mississippi and the economic cost of over \$10 billion annually in the continental United States will attest. A high quality database of historical hurricane activity is crucial for studies of importance to the general public, the business community, governmental groups, and emergency managers. In addition to applications for the above users, the North Atlantic basin tropical storm and hurricane database (or HURDAT) has been extensively utilized for meteorological applications as well as climate variability and change studies ranging from intraseasonal, interannual, decadal, and multidecadal timescales.

HURDAT currently extends back from present to 1851. However, this cornerstone database contains many systematic and random errors that need to be corrected. Additionally, as our understanding of tropical cyclones has advanced, analysis techniques have evolved over the years at NOAA's National Hurricane Center, leading to biases in the historical database that have not been addressed. Another difficulty in applying HURDAT to studies concerned with tropical cyclone events is the lack of exact location, time and intensity information for landfalling systems. Finally, due to incomplete observations in past hurricane seasons, tropical storms and hurricanes that existed over the open Atlantic may not have been included in the database. The comprehensive collection and analysis of historical observations that is proposed in this work will result in the addition of many of these "missing" storms to HURDAT. By spring of 2011, work will be completed on the re-analysis for the years from 1851 to 1960. This proposal details research that will focus on storms occurring during the satellite and aircraft reconnaissance era in the latter third of the 20th Century. Products to be provided include: the revised HURDAT; metadata files providing details about the individual changes to the database; a complete database of all raw observations of gale force winds or stronger; the Best Track Change Committee's comments and our team's responses; track maps for individual years; and specific detailed listing of U.S. tropical storms and hurricanes. All of these data would continue to be made available from the Atlantic hurricane database reanalysis project website - <http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html> as well as the National Climate Data Center's International Best Track Archive for Climate Stewardship website - <<http://www.ncdc.noaa.gov/oa/ibtracs/>>.

Additionally, work will be conducted that quantifies the amount of subsampling that likely occurs in the intensity analyses of historic tropical cyclones because of limited observations of a primarily oceanic, mesoscale feature (i.e, the maximum 1 min winds and the central pressure). This continues efforts that have been published addressing incomplete monitoring upon tropical cyclone frequency efforts and the lifetime maximum intensity.