THE HURRICANE INTENSITY FORECAST IMPROVEMENT AND IMPACTS PROJECTIONS (HiFi) PROGRAM

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Executive Summary

The devastating 2005 hurricane season in the Gulf of Mexico and the previous record four hurricanes striking Florida during 2004 have strongly underscored the need for improved prediction of hurricane risk and assessment of the longer-term risk level. This has been emphasized by expert reports commissioned by NOAA, the National Science Board and the AGU, which have noted the lack of progress with improving hurricane intensity forecasts and impacts projection and strongly recommended a substantial increase in funding to accelerate such improvements. Max Mayfield, Director of the National Hurricane Center, described the problem concisely in response to queries about the lack of intensification of Tropical Storm Ernesto: "It's not an operational problem….. It's a research problem." (Miami Herald 08-3-06)

In response to this need, leading scientists have proposed a major program for Hurricane Intensity Forecast improvement and Impacts projection (**HiFi**).

HiFi is a balanced program of observations and modeling development and theoretical research accompanied by structured transition of the results to improved techniques for hurricane predictions (out to 5 days) and for hurricane impacts projections on longer time scales (seasonal to decadal). Specifically HiFi will focus on:

1. Improving forecasts of hurricane intensity, wind structure and rainfall out to 5 days, with an emphasis on reducing the error in 48-hour intensity forecasts for hurricane-strength storms by at least 10 kt (approximately one half of a Saffir-Simpson category) within the next five years. The emphasis here will be on better forecasting of rapid intensification and decay, and related cycles;
2. Developing improved methods of indicating the potential impact of hurricanes on vulnerable communities and industries; and,
3. Improving the techniques used to assess projections of hurricane activity over seasonal to decadal time scales in support of planning, engineering design and infrastructure development requirements.

The program will investigate, test and develop strategies for all aspects of hurricane forecasting and impacts projection, including:

1. New observing systems, especially those that are able to improve our observations, understanding and prediction of the near-surface winds and their effect on the ocean and structures. Special areas that will be investigated include: instrumentation of oil rigs and other offshore structures, use of

remote and unmanned systems (both airborne and oceanic); and improved use of the current mix of aircraft, radar, and satellite observations;

2. Novel theoretical concepts aimed at providing critical information in areas such as air-sea interactions and longer-term hurricane variability and trends, for improving our forecast and longer term impacts projection capabilities.

The National Center for Atmospheric Research will be the lead organization for the **HiFi** program, working with university, government and industry scientists and engineers. A Regional Project Office will be established at Nova Southeastern University Oceanographic Center (NSU OC) to support the NCAR program leadership by providing local coordination and project support. Dr. Alexander Soloviev of NSU OC will serve on the **HiFi** Steering Committee to help coordinate with local communities and particularly the Coastal Ocean Observing System community.

A Science Steering Committee of leading scientists and engineers has been established to coordinate development of a **HiFi** Science Strategy Plan that will provide an outline of the overall research and operational implementation strategies and specific milestones. This will be finalized at a meeting of experts in Houston on 11-13 October and it is envisaged that its implementation will be reviewed by the National Research Council. While it is expected that forecast improvements will be made early in the program, the research and observational and modeling testing agenda will take place primarily during the first five years, and the transition to operational applications will be completed during the subsequent five years.

HiFi is thus a major undertaking aimed at reducing the impacts of one of the greatest threats against the nation: the economic and social disruption and widespread damage resulting from annual hurricane developments. It has already been given a high priority by the Gulf of Mexico Coastal Ocean Observing System Regional Association (GCOOS-RA) and by leading industry and civil groups. A sustained and stable level of funding of $10 million per year over ten years (for a total of $100 million) is required to enable this program to undertake the research and develop the observing, advanced computer modeling and techniques to address this critical national challenge. The resulting reduction in economic and social disruption and improvements in capacity to properly plan coastal developments and engineer major structures is expected to result in savings that are many times the initial investment.