

Warning!

The View From Above

1 The GOES system of stationary satellites, EROS 7, right, provides continuous images and sensor readings.

2 The Earth image, right, shows Hurricane Andrew in the Gulf of Mexico.

Growing coastal populations depend upon a robust program of hurricane research.

EDITOR'S NOTE: Five former directors of the National Hurricane Center — Robert W. Burpee, Robert J. Simpson, Neil L. Frank, Robert C. Sheets and Jerry D. Jarrell — co-authored this commentary.

Millions of residents along the Atlantic and Gulf of Mexico coasts expect state-of-the-art warnings whenever a hurricane threatens. As record numbers of American families and homes are at risk, meteorologists are increasingly challenged to provide sufficient time for warned populations to prepare for a storm. Although forecasts have been improving, we are concerned that basic and applied hurricane research is not adequately funded to advance forecasting skill fast enough to keep pace with the growing population in harm's way.

The cornerstone of cutting-edge hurricane science is the Hurricane Research Division in Miami, part of the Atlantic Oceanographic and Meteorological Laboratory of the National Oceanic and Atmospheric Administration. In 1956, after six devastating hurricanes pounded the Eastern Seaboard, Congress created the National Hurricane Research Project, the former name of HRD. The purpose of the NHRP — to advance scientific understanding and improve forecasts of hurricanes — remains the primary mission of HRD.

Recent research by HRD scientists and collaborators, published in the July 20 issue of *Science*, indicates that the Atlantic hurricane basin has returned to an increased level of hurricane activity much like that of the 1950s. Such hurricane activity may greatly increase the threat to the Atlantic and Gulf of Mexico seaboards. A strong commitment to a robust program of hurricane research is needed to meet this potential threat to the coastal population.

HRD has an impressive record of accomplishments that have improved forecasts and the warning system. It is the only organization in the world able to design and conduct scientific aircraft missions into hurricanes on a regular basis. For nearly 20 years, HRD scientists have conducted uniquely designed flights to gather observations in the environment around hurricanes, the area with the most crucial information for determining the future track of a storm.

The Hurricane Research Division, together with government and university colleagues, has been responsible for the development and deployment of new aircraft instruments that are able to measure surface wind speeds and rainfall. This information helps improve predictions of locations of highest winds and flooding. Other important innovations that HRD is involved in are airborne Doppler

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Hurricane activity increasing.



Team Emblems



Storm Tracking

3 Color-enhanced radar images, above, provide detailed anatomy of storms.

Flying Into The Eye

4 The Hurricane Hunters fly out of MacDill Airforce Base in Tampa, home to NOAA's Aircraft Operations Center. When a storm forms, crews of specialists climb aboard planes like this one built in 1975, above right. Equipped with scientific instruments, they venture inside to measure its intensity.

Faster Modeling

5 Faster computers can make better models that aid in earlier predictions. NOAA has upgraded to a supercomputer to develop more realistic models of climate variability, image right.

Tribune graphic by VAUGHN HUGHES; Source: National Oceanic and Atmospheric Administration

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radars and low-cost, expendable probes that provide high-resolution measurements of wind, pressure, temperature and humidity.

The scientific and technical staff of HRD has worked with NOAA and university colleagues to pioneer computer models for hurricane forecasting. These efforts and other innovations have helped to improve dramatically both hurricane intensity and track forecasts. Some of the current work at HRD includes analyses for ship, buoy, aircraft and satellite data to support hurricane wind forecasting at the National Hurricane Center. These analyses and airborne observations from research and operational flights staffed by HRD personnel provide real-time information to NHC forecasters. This information is especially critical when hurricanes are approaching land.

Despite these achievements, base funding for HRD has not increased for the last two decades, and its purchasing power has been severely eroded by inflation and increased overhead costs. Because of the lack of funding, the scientific staff has decreased from 40 to 26 federal employees and will continue to decline without new financial support.

Another consequence of inadequate funding is that HRD has not been able to upgrade crucial computer equipment that is necessary to expedite its research. Furthermore, key investigations of hurricane motion, rainfall distribution and rapid intensification are slow to be transitioned to operations at NHC.

A few years ago it was hoped that hurricane research could derive adequate support from the U.S. Weather Research Program, a multi-agency federal effort to study high-impact weather. Although research of hurricanes at landfall is a high priority of the USWRP, the NOAA portion of the program has been funded at less than 10 percent of the required level. HRD has sought and continues to seek grants funded through the USWRP of

fice that will allow HRD staff to perform specific operational tasks. The USWRP, however, does not solve the staffing problem at HRD, nor does it enable the institution to conduct much of the critical research that would advance the science of hurricane forecasting.

Hurricanes impose an average cost of \$5 billion to the United States per year. Hurricane Andrew in 1992 caused more than \$30 billion in damage in South Florida alone. Although loss of life from hurricanes in the United States has decreased substantially, the 10,000 Central Americans drowned during Hurricane Mitch in 1998 illustrate the sobering possibility of a human catastrophe in the United States.

The last six years have seen an unprecedented increase in hurricane activity in the Atlantic basin, and as HRD research indicates, this high level of activity is expected to continue for a decade or more. Therefore, this is not the time to allow funding for this vital organization to continue decreasing. It is simply a good return on investment for the United States to support a vigorous program of world-class hurricane research.

We urge Congress to safeguard American lives and help reduce property loss by adequately funding the Hurricane Research Division and its scientific collaborators.