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National Hurricane Center



NOAA Aircraft Operations Center

Hurricane Research Division

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The STORMFURY era

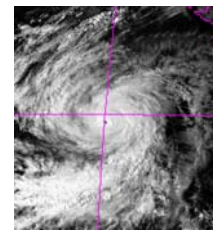


Also in 1961 the USN and USWB flew seeding experiments into Hurricane Esther. This led to the formal organization of [Project STORMFURY](#) in 1962, as a joint venture of the USN, USWB, and the National Science Foundation. This Project would continue for more than twenty years

and include **NHRP**, RFF and the USAF in its operations.

A good deal of **NHRP's** research during the early years of STORMFURY were in areas critical to weather modification, such as cloud physics and storm structure and dynamics. Ironically, studies into natural hurricane variability would eventually lead to questions of the effectiveness of STORMFURY.

Satellites had a dramatic impact on hurricane reconnaissance and research during the early 1960's. It was no longer necessary to send aircraft on long 'fishing expeditions', just looking for signs of tropical disturbances. Using the satellites forecasters could pinpoint where the Hurricane Hunters needed to fly. And researchers for the first time could watch the formation of a hurricane from the very start. New insights into storm genesis were also gained from this 'top-down' perspective. However, the high cirrus [Central Dense Overcast](#) of hurricanes still made it necessary to fly planes into these storms to collect information.



The DC6s and some **NHRP** scientist reached out to the international meteorological community in 1963 and 1964 by participating in the International Indian Ocean Expedition. This was the first in a long series of multi-national experiments to which the **Project** in its various forms was to contribute its expertise in tropical weather and in airborne meteorological observation.

In 1964 **NHRP** was redesignated the **National Hurricane Research Laboratory (NHRL)** to signify a more permanent status. The **Project** was initially supposed to run for only a few years; time enough, it was thought, to answer all the basic questions about hurricanes. As the complex nature of

tropical storms became apparent it was realized that hurricane research needed to be an on-going concern. It was already paying dividends in the development of statistical track forecast models and a storm surge forecast guide.



This year also saw both NHC and **NHRL** move to the Computer Center Building on the University of Miami campus in Coral Gables, Florida. This move brought the government researchers into closer contact with the academic community and also brought access to the University's computer systems. The greater computing power led to the development of a numerical storm

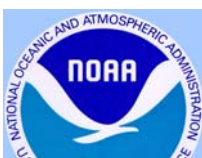
surge model and to NHC-67, a statistical hurricane track forecast model that outperformed all rivals in 1966. That year the U.S. Government reorganized its earth science agencies into the Environmental Science Services Administration (ESSA). This included the USWB, NHC, RFF, and **NHRL**. Work began on multi-layer primitive equation track forecast models and on SANBAR, a dynamic physics model. Gordon Dunn and the staff of NHC published a paper evaluating the positive impact of the previous eight years of computer forecast models on track prognostications. Hurricane computer models were also used to simulate hurricane modification experiments to try to validate the field work of STORMFURY.

In 1967 Dr. Gentry became Director of STORMFURY in addition to **NHRL** Director. This brought the Project under the direct management of **NHRL** and required a greater commitment of the **Laboratory's** personnel and resources. More restrictions were placed on where and when a hurricane could be a candidate for seeding and far fewer experiments were being flown. To increase the opportunity for candidate storms several attempts were made in the early 1970's to move Project STORMFURY's operations to the Pacific, but these plans were put aside each time.

Improvements were made to the cloud physics instrumentation on the DC6 in 1968. And for the next two years a series of experiments were carried out which released tracers into hurricanes in an attempt to study the air flow by airborne radar.

In the summer of 1969 the DC6s and several **NHRL** scientists participated in the Barbados Oceanographic and

Meteorological Experiment (**BOMEX**), a huge multi-national, multi-agency scientific study set east of Barbados. This was the second in a series of such large scale experiments to which the **Lab** contributed. BOMEX's purpose was to better define the the atmospheric and air/sea interaction processes in the tropics, and hence a better understanding of the energy source of hurricanes.

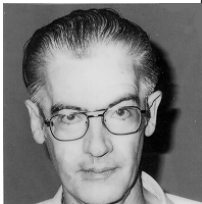


The Department of Commerce, in 1970, reorganized ESSA into the **National Oceanic and Atmospheric Administration (NOAA)**. This included renaming the USWB the **National Weather Service (NWS)**, and separating the **Environmental**

[Research Laboratories \(ERL\)](#) from the NWS. The National Hurricane Center was kept under NWS, the operational wing of NOAA, while the research laboratories, including **NHRL**, were put into ERL. The Experimental Meteorology Laboratory (EML) in collaboration with **NHRL** began the Florida Area Cumulus Experiment (FACE) in 1970. FACE, which was done in two segments, attempted to document the benefits of cloud seeding over the Florida peninsula. This, in turn, was supposed to prove the efficacy of seeding in modifying hurricanes. Instead the second segment, ending in 1983, proved inconclusive.



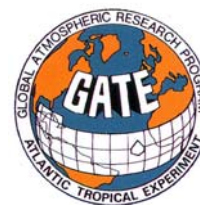
In 1971 STORMFURY experiments were flown into a late season Hurricane Ginger. Because of a dearth of candidate storms over the next few years and another hiatus as NOAA acquired new aircraft, this would be the last hurricane modification experiment flown under Project STORMFURY, although the Project would continue for another dozen years flying weather modification experiments into tropical cumulus as part of FACE.



In 1974 Dr. Gentry retired and Dr. Noel LaSeur took over the Directorship. A year later the Experimental Meteorology Laboratory was joined to **NHRL** to form the **National Hurricane and Experimental Meteorology Laboratory (NHEML)**. This brought the **Lab** to the largest staffing in its history, with nearly sixty scientist and support personnel.

Another period of high scientific productivity ensued with the development of a Moving Fine Mesh dynamical track model, and papers published on tropical wave dynamics, air-sea interactions in hurricanes, studies of the boundary layer in hurricanes, calculations of the rain drop spectra in tropical cyclones, and computer simulations of hurricane modification and of hurricanes at landfall.

The first experiment under the Global Atmospheric Research Project (GARP) was the GARP Atlantic Tropical Experiment ([GATE](#)) in the summer of 1974. A number of **NHEML** scientist as well as the RFF's DC6s and several NOAA ships were involved in this massive twenty nation effort to examine in detail the tropical waves that come off the west African coast each year, which spawn the Cape Verde hurricanes. The experiment's datasets are still being researched to this day for information on how the tropical Atlantic interacts with the global climate.



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