



# noaa WEEK

National Climatic Center

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## International Study To Use German Habitat

On September 15, a two-month international scientific investigation of two problems besetting New England fisheries will begin off Rockport, Mass. Using the cold-water undersea laboratory "Helgoland" from the Federal Republic of Germany for on-site observation, German, Polish, and Russian scientists, technicians, and fisheries experts will participate with NOAA and university diver-scientists in efforts to:

- learn how environmental factors affect herring spawning;
- improve hydroacoustic (sonic) techniques for estimating the populations of major commercial pelagic fish species; and
- extend knowledge of underwater living and research from warm tropical seas to cold northern waters.

Dr. Donald Beaumariage, Director of NOAA's Manned Undersea Science and Technology office, is Program Coordinator. Dr. Robert Edwards, Director of the National Marine Fisheries Service Northeast Fisheries Center in Woods Hole, Mass., is NMFS Project Director; and Gunther Luther of the German firm GKSS (Gesellschaft für Kernenergie in Schiffbau und Schifffahrt), Hamburg-Geesthacht, FRG, is Helgoland project director.

(Continued on page 2)

## Hurricane Season Nearing, NWS Warns

### Buoys Deployed In Arctic Ice

Ten automatic data buoys are being deployed in the Arctic ice as part of the Arctic Ice Dynamics Joint Experiment (AIDJEX), a long-range scientific program of a consortium of United States and Canadian scientists funded by several agencies and managed by the National Science Foundation.

The buoys, which are an advanced version of buoys tested in the Arctic ice in 1972-74 to determine the feasibility of operating unmanned satellite-communicating, data-reporting buoys in the polar seas, will be stationed in the Beaufort Sea north of Alaska's North Slope, in a circle with a radius of about 185 miles, around the central AIDJEX manned camp. The precise position of each of the unmanned drifting buoys will be determined several times daily with the aid of the Navy satellite navigation system.

Three of the prototype buoys were developed by the NOAA Data Buoy Office in Bay St. Louis, Miss., as part of AIDJEX.

Other major participants in the program include the Arctic Research Laboratory of the Office of Naval Research, the Lamont-Doherty Geological Ob-

(Continued on page 2)

### ERL Scientists Report on Recent Ozone Trends

The ozone shield over the United States and Great Britain has thinned slightly during the last four years; nuclear explosions may not destroy ozone to the extent hitherto thought, but volcanic eruptions and solar flares may have some effect on ozone amount. These are among the conclusions of a study by two Environmental Research Laboratories researchers who have been scrutinizing ozone records from more than 60 stations around the globe. Instruments at these stations look upward through the atmosphere and derive the total ozone in the entire vertical column.

Dr. James K. Angell and Julius Korshover of ERL's Air Resources Laboratories used ozone data for the period from 1970 to 1974 to delineate recent trends, and long-term ozone data to compare ozone variations with the occurrence of nuclear explosions, volcanic eruptions, and solar events, all of which have been under suspicion as possible causes of ozone depletion.

They found that total ozone levels, which had been increasing throughout most of the northern hemisphere during the 1960's, have turned downward. From 1962 to 1970, most parts of the northern hemisphere, plus the south tropics, showed increases in ozone varying from one percent in Japan to eight percent in European Russia.

The ozone climb ceased by 1970, they say, and between 1970 and 1972, nearly all regions of the world underwent a decline of from one to two percent.

In the United States and Great Britain, where more recent records are available, the four years from 1970 to 1974 have brought a two percent reduction in total ozone. However, the researchers note, the annual rate of ozone decrease has been slowing.

Such long-term trends appear to be part of a confusing background of "normal" ozone varia-

(Continued on page 2)

The National Weather Service has launched its annual drive to educate U.S. coastal residents about the danger of hurricanes—the most destructive storms on earth.

"Each year our message to U.S. coastal populations along the Atlantic and Gulf of Mexico is becoming more urgent," says NWS Director Dr. George P. Cressman. "There are three main reasons. First, the number of people in hurricane-vulnerable areas is constantly increasing. Second, the proportion of people in those areas who have experienced even a moderate hurricane

#### HURRICANE NAMES FOR 1975

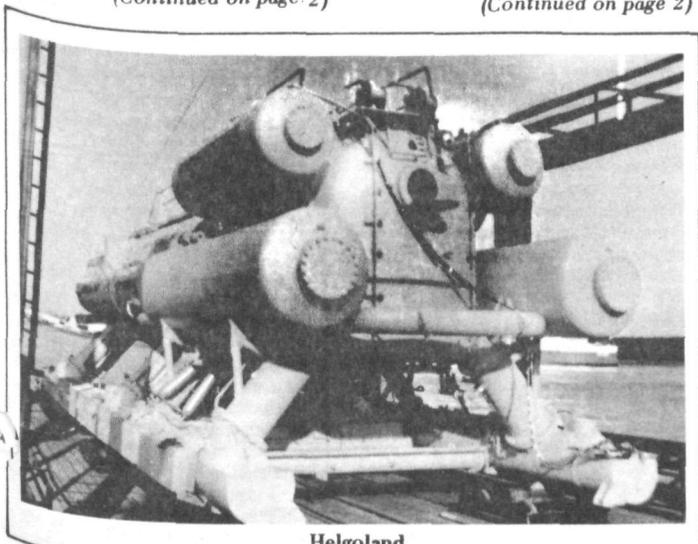
Amy	Kitty
Blanche	Lilly
Caroline	Mabel
Doris	Niki
Eloise	Opal
Faye	Peggy
Gladys	Ruby
Hallie	Sheila
Ingrid	Tilda
Julia	Vicky
	Winnie

is shrinking, because there have been fewer hurricanes there in recent years than in past decades. And third, our ability to predict the path and destructive power of individual hurricanes, while improving, is being overwhelmed by the growth of population along vulnerable coasts."

The NWS is responsible for coordinating the far-flung and complex network of hurricane detectors, trackers, and forecasters which issues hurricane advisories, watches and warnings. The hub of this effort is the National Hurricane Center in Miami, Fla., directed by Dr. Neil Frank.

An important part of the NWS' annual hurricane reminder campaign is a series of hurricane preparedness conferences with news media and community leaders in hurricane-prone areas. This year, Dr. Frank and Herbert S. Lieb, Chief of the NWS Community Preparedness Staff, are visiting Jacksonville and Tampa, Fla.; Savannah, Ga.; Charleston, S.C.; Norfolk, Va.; Boston, Mass.; New York City; Brownsville, Tex.; and Mobile, Ala.—where a joint Mobile-Pensacola,

(Continued on page 4)



Helgoland

# Scientists Report On Ozone Trends

(Continued from page 1)

tions. The amount of ozone measured at most regions undergoes a quasi-biennial oscillation, rising and falling again over a period of roughly two years. Dr. Angell and Mr. Korshover analyzed worldwide data for possible responses to three types of events that are thought by some researchers to affect ozone.

The fireball of a nuclear explosion produces nitric oxide, which catalyzes the destruction of ozone. Theoretically, then, nuclear explosions might affect the ozone shield. The scientists documented seasonal changes in total ozone for regions in the northern hemisphere before, during, and after the large Soviet thermonuclear explosions at Novaya Zemlya in the autumns of 1961 and 1962.

They found evidence both for and against a nuclear effect. On one hand, there was a total ozone minimum at west European stations nine months after the 1961 test, a time when the quasi-biennial maximum would normally be expected. On the other side of the register, the researchers found a large decrease in total ozone in Canada and West Europe between the springs of 1960 and 1961 that could not possibly be related to the Soviet nuclear tests. Furthermore, three months after the tests in the autumn of 1962, ozone levels were at a record high over Japan.

The eruption of a volcano in Indonesia gave the researchers an opportunity to search out any relationship between ozone levels and volcanic activity. They checked the seasonal values of total ozone at five stations north and south of Mt. Agung on Bali, which erupted violently in the spring of 1963, spewing tons of dust and ash into the stratosphere. The pronounced quasi-biennial oscillations in total ozone usually observed at two stations in Australia ceased at the time of the Agung eruption.

In general the ozone values following the eruption appear unusually high. But, the researchers caution, these changes may not be related to the eruption. Within a year or so of the eruption, the quasi-biennial oscillation changed from an approximately two-year period to a period of nearly three years, so the high ozone values may simply reflect circulation changes associated with this transition.

Solar activity is another potential ozone-alterer. To check on this possibility, Dr. Angell and Mr. Korshover compared sunspot number, a fairly reliable index of solar activity, with ozone records for North America and western Europe. The results were somewhat puzzling. The earliest



**PARTICIPANTS IN THE NATIONAL WEATHER SERVICE OPERATIONS CLASS 25** were (front row, from left) Joseph C. Fouts, WSO Fort Wayne, Ind.; Duane C. O'Malley, WSFO Minneapolis, Minn.; Francis B. Kehir, WSO Providence, R.I.; Walter L. Bartlett, WSO San Diego, Calif.; Seymour Zuckerman, WSO Tucson, Ariz.; Walter A. DeVoe, WSO Dubuque, Iowa; Leland R. Tracy, WSO Glasgow, Mont.; Clifford Haney, WSO Huntington, W.Va.; (standing, from left) Wilfred J. Sweet, Jr., WSO Burlington, Vt.; David R. Taylor, WSO McGrath, Alaska; Dale A. Clay, WSO Missoula, Mont.; Donald L. Corbett, WSO Charleston, S.C.; Jim Wantz, Instructor; Larry McEwen, Instructor; Wilfred J. Montagne, WSO Victoria, Tex.; Carl D. Bramble, WSO Beckley, W. Va.; Joseph Audsley, Instructor; Frank Dillenkoffer, Instructor; Ernest E. Sauve, Jr., WSO Pensacola, Fla.; and John L. Gilbert, WSFO Boise, Idaho.

## International Study To Use Helgoland Buoy Deployed

(Continued from page 1)

The 75-ton Helgoland will be transported to the United States by a Polish factory ship, and emplaced in about 110 feet of water at the site of a known herring spawning area 8.5 miles offshore, east of Rockport in late August.

Teams of four—three scientists and one habitat technician—will live in the two-room underwater laboratory for periods of nine to 22 days to carry out the research.

Among those expected to profit from the project results are the International Commission on Northwest Atlantic Fisheries (ICNAF), commercial fishermen, and fish processors.

NMFS scientists led by scientist-aquonaut Dr. Richard Cooper of the Northeast Fisheries Center hope to observe the herring during their spawning and for the critical period immediately thereafter. In general, they hope to obtain a complete description of the early life

European records, dating back to 1932, as well as scattered records at New York and Washington, D.C., show the ozone maximum appearing two to three years after the sunspot maximum. In more recent records in European Russia, west Europe, and North America the peaks in ozone and sunspot number nearly coincide. The latest sunspot maximum was in 1969. The researchers suggest that the decrease in ozone between 1970 and 1974 might be related to the decrease in sunspot number following that maximum, rather than any man-induced effects, such as the introduction of chlorine-bearing compounds (fluorocarbons) and nitric oxides.

The researchers also found some evidence for a seasonal decrease in total ozone following three intense solar flares in 1960, 1966, and 1972.

history of the herring and knowledge of the factors that can seriously reduce their numbers, obtaining scientific data that can be used as a basis for management decisions about the northwest Atlantic herring fishery and other fisheries that affect it.

Hydroacoustic techniques for measuring fish populations consist of echo sounders that transmit sound pulses and receive echoes from fish, and computers that convert the fish echo data into estimates of the abundance of the fish "targets".

Species of fish also may be identified by analyzing the sound "signature." When the estimates are accurate, hydroacoustics is a far more rapid method of measurement than conventional methods such as tagging or analysis of commercial catches. Joint hydroacoustical studies in 1974 by the Northeast Fisheries Center and the Russian and Polish fisheries communities showed present measurements of fish to be in error by a factor of two to four.

The Helgoland will therefore be used as a base to conduct experiments with live specimens of such species as herring, cod, pollock, and spiny dogfish shark, to calibrate the hydroacoustic techniques. Aquanaut-scientists will observe live specimens of fish—both singly and in schools—while hydroacoustic equipment in surface ships obtains the acoustic signatures of the fish. Direct communications between divers and the ship will make possible exact identification of the fish species and estimates of the numbers being "observed" hydroacoustically, providing "ground truth" for the sonic observations.

Operations Director of the project is Cdr. Laurence Bussey, USN, presently attached to MUS&T, NOAA headquarters; Deputy Operations Director is Lt. Thomas Ruzsala, NOAA Corps, presently attached to NEFC Woods Hole.

(Continued from page 1) servatory of Columbia University, U.S. Geological Survey, NASA, the University of Alaska, the Army Cold Regions Research and Engineering Laboratory and several Canadian groups.

The experiment is designed to reach, through coordinated field experiments and theoretical analysis, a fundamental understanding of the interaction between the Arctic sea ice and its environment. An understanding of sea ice dynamics could lead to safer navigation of the waters which flank the frozen north-land, now a center of attention in the search for new oil and gas deposits. In addition, buoys which operate successfully in the polar regions could play an important role in weather forecasting in those regions.

AIDJEX's planning and coordination office is located at the University of Washington in Seattle. Logistics and field support for the buoys are provided by AIDJEX through a National Science Foundation contract.

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## noaa week

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Catherine S. Cawley, Editor  
Anna V. Felter, Art Director

## Comments Invited On Proposed Salmon Policy

NOAA is inviting comments on a proposed policy related to the use of its financial assistance programs in the Washington, Oregon, and California salmon fishery.

The proposed policy, which has the general support of local and State agencies, would classify the fishery for salmon on the west coast as a "Conditional Fishery"—which Commerce Department regulations define as one where there are already more than enough vessels to harvest the available catch.

Robert W. Schoning, Director of the National Marine Fisheries Service, which administers the financial programs, said the NMFS is concerned that the salmon fishery on the west coast has reached this point.

If the proposed policy is adopted, it would mean that the NMFS financial assistance programs could not be used to add more salmon vessels to the existing fleet but would continue to be used to assist the vessel owners in the fishery to upgrade existing vessels, or to replace vessels lost or withdrawn from the fleet.

Under the Fishing Vessel Obligation Guarantee program, NMFS can guarantee up to 75 percent of the cost of constructing, reconstructing, or reconditioning commercial fishing vessels.

The Capital Construction Fund program may be used to obtain deferment of taxes on certain income derived from commercial fishing operations when such income is deposited in a special fund with the intention of using it for constructing, reconditioning, or (under certain circumstances) acquiring a commercial fishing vessel.

Comments should be sent to the NMFS Director by July 1, 1975.

## Edward F. Mitros Dies

Edward F. Mitros, Meteorological Technician at the Johnson Space Center Section of the National Weather Service Spaceflight Meteorology Group in Houston, Tex., died on May 10.

He was one of the initial group of employees in the Miami Section of the project Mercury Weather Support Group, the predecessor of the SMG. He joined the NWS for that assignment in 1960, after 20 years of meteorology service in the U.S. Marine Corps. He had been at the SMG office in Houston since 1964.

He is survived by his wife, Darlene, of 1017 Sunset Court, N., League City, Tex., 77573; two sons, Gary and Chris; and a daughter, Debbie Vanderlip.

## Miller Freeman Reactivated; Cdr. Petersen Named C.O.

Cdr. Sigmund R. Petersen has been appointed Commanding Officer of the NOAA Ship Miller Freeman, which is being reactivated in Seattle, Wash., and will sail soon for Alaska to participate in environmental impact studies in potentially oil-rich continental shelf waters. The



Cdr. Petersen

## LSC Sets Targets For Aerial Photos

The Lake Survey Center's Horizontal Control Section sent a team into the field recently to place targets along the southwest coast of Lake Erie for use in aerial photography. These targets, white plastic panels on wooden frames with three radians two feet by 12 feet long emanating from a seven-foot center panel positioned over the control point, establish the geographic locations of aerial photographs.

William Bergen (Chief) and Joel G. Gauthier from the Horizontal Control Section; Albin Barbusinski from LSC's Photogrammetry Unit; and Richard Kessling from the Atlantic Marine Center in Norfolk, Va., positioned 11 targets during the seven-day trip, providing controls for about 75 miles of photographs, between six miles west of Vermilion, Ohio, to about five miles east of Fairport, Ohio.

The National Ocean Survey's Aerotriangulation Section will establish the bridging control necessary and the Lake Survey's Photogrammetry Unit will perform the topographic planimetry.

ship was used in National Marine Fisheries Service fisheries research before budgetary problems forced her to be deactivated in 1970.

Lt. Cdr. John T. Atwell has been named the ship's Executive Officer, and Lt. Cdr. Warren G. Taguchi her Operations Officer.

Cdr. Petersen has served previously aboard the Pathfinder; as Executive Officer of the McArthur; as Acting Director and Operations Officer of the National Ocean Survey's Lake Survey Center in Detroit, Mich.; and for two years in Bracknell, England, with the International Scientific and Management Group for the Global Atmospheric Research Program.

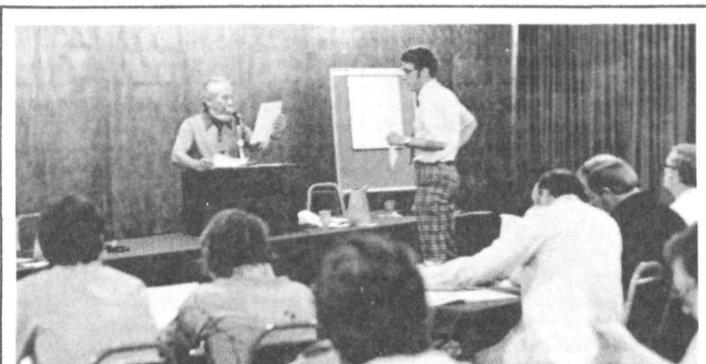
Lt. Cdr. Atwell, a submersible pilot as well as an oceanographer, served previously aboard the Pathfinder and Researcher.

Lt. Cdr. Taguchi previously served aboard the Davidson and with the NMFS laboratory in La Jolla, Calif.

## Fairweather Measures Undersea Mountain

The NOAA Ship Fairweather, while engaged in nautical charting surveys off southern California, determined that Lasuen Knoll, an undersea mountain about 12 miles off San Clemente, rises almost one-half mile to within approximately 336 feet of the surface. It is about 2,064 feet tall and lies in about 2,400 feet of water about half-way between San Clemente and Santa Catalina Island and equidistant between San Diego and Los Angeles.

The Fairweather, commanded by Commander Richard E. Alderman, used its electronic measuring devices to delineate the location and determine the dimensions of the knoll, which was discovered in the 1930's.



Sixty advisory personnel from 18 states attended a NOAA Marine Advisory Service workshop, held May 5-9 at St. Petersburg, Fla., for training in advisory techniques and to plan and evaluate the program. Above, at the workshop's opening session, Howard Eckles (left), NMAS Program Manager, and Daniel Panshin, Oregon State University, discuss the national program which, operating under the Office of Sea Grant, now provides services in 26 of the 30 coastal and Great Lakes states.

## Fish Landings Increase; Prices Decline

Commercial fishery landings at U.S. ports increased 4 percent in 1974 over 1973, according to preliminary figures released by the National Marine Fisheries Service. However, the value of the 4.9 billion pounds was \$898.5 million, about 1 percent less than that of the 1973 landings.

Larger landings of fish for industrial use was the major reason for the increase in volume, while a sharp decrease in the price fishermen received for higher valued shellfish and a decline in industrial fish prices contributed to the slight decrease in total value.

The NMFS data indicate the per capita consumption of fishery products dropped from a record high of 12.7 pounds in 1973 to 12 pounds in 1974, slightly higher than the past 5-year average of 11.9 pounds.

Total imports of fishery products reached a record high of \$1.69 billion, up 7 percent over the previous record high of \$1.58 billion set in 1973.

The value of fishery products processed in the United States from both domestic and imported raw materials was a record \$2.8 billion, up 2 percent from 1973.

Details of these and other preliminary data dealing with U.S. fisheries are included in Fisheries of the United States, 1974. Single copies may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for \$1.70.

## Buoy Data Now at NODC

NOAA's National Data Buoy Office has sent about 42,000 observations from 17 different buoys to the Environmental Data Service's National Oceanographic Data Center in compliance with a cooperative agreement signed in August 1971. The data now available to users from NODC are from three buoys off the Atlantic coast, three off the Alaska coast, and 11 in the Gulf of Mexico. The buoys are collecting meteorological data such as air temperature, dewpoint, wind speed and direction, barometric pressure, and precipitation, as well as global radiation in infrared and visual, oceanographic data such as wave height, wave period, pressure, temperature, current speed and direction, and conductivity.

NODC can select data from the file by buoy name and date of observation. The selected data can then be printed or copied onto magnetic tape for the requester. For additional information, write: NODC, 3300 Whitehaven St. N.W., Washington, D.C. 20235.

# notes about people

Capt. Robert E. Williams has been appointed Deputy Director of the National Ocean Survey's Pacific Marine Center in Seattle, Wash. He succeeds Capt. Gerald L. Short, who has retired.



Capt. Williams

Capt. Williams has served several previous tours of duty as operations officer at the marine center; aboard four NOAA ships; as Director of the NOS Lake Survey Center in Detroit, Mich., in 1971-72; and most recently was assigned to the Sea Grant Office at the University of Washington. He joined the commissioned corps in 1950 after graduation from the University of Wyoming. He was awarded a Commerce Silver Medal in 1969.

Capt. Short spent the last 32 months of his 35-year Federal career at PMC. A member of the commissioned corps since 1943,

he served aboard 15 ships, with various geodetic parties, and as Director of the Mid-Continent Field Office in Kansas City, Mo. He received a Commerce Bronze Medal in 1972.

Dr. David S. Crosby, a part-time mathematician with the Satellite Experiment Laboratory of the National Environmental Satellite Service, has been promoted to full professor and has also been selected as Chairman of the Department of Mathematics, Statistics and Computer Science of the American University for the 1975-1976 academic year.

Dr. Edwin Kessler, Director of the Environmental Research Laboratories' National Severe Storms Laboratory in Norman, Okla., and Dr. James D. McQuigg, Director of the Environmental Data Service's Center for Climatic and Environmental Assessment at Columbia, Mo., have been elected Fellows of the American Association for the Advancement of Science. A Fellow of the AAAS is defined

as one "who has produced a body of work on behalf of the advancement of science that is scientifically distinguished or socially highly significant, or both."

Dr. Kessler was cited for "original contributions that helped lead the atmospheric sciences into two critical and complex areas...cloud modeling and use of radar in meteorology..." and toward "...nation-wide operational use of radars in



Dr. McQuigg



Dr. Kessler

general weather forecasting and in severe storm monitoring."

Dr. McQuigg was cited for "his pioneering contributions in

the field of applied meteorology in particular, for innovative search in defining the economic impacts of weather in business and agricultural production; for developing analytical techniques and models for others to follow; and for signal contributions that have led to the establishment of a weather-impact research center."

Frederick M. Cramer has been named Meteorologist in Charge of the Apalachicola, Fla., office of the National Weather Service. He replaces Robert L. Smith, who has retired.



Mr. Cramer

Mr. Cramer joined the NWS at Houston, Tex., in 1955 after four years of weather work in the Air Force, and subsequently served at Amarillo, Tex., before transferring to Huron, S. Dak., where he has been Principal Assistant since 1972.

## Weather Service Warning Citizens That the 1975 Hurricane Season Is Approaching

(Continued from page 1)

Fla., group will meet. Representatives of NWS Regional Offices and local Meteorologists in Charge also participate in these programs. The primary objective of the conferences is to create a public awareness in the community of the hurricane threat and to enlist the help of the media in the delivery of the warnings and watches and also in

an educational effort during the season.

The hurricane season officially starts June 1 and ends November 30, but a few have occurred at other times of the year. Most of the giant tropical cyclones—with winds of 74 to 150 miles an hour or more—hit U.S. coastal areas in August, September, and October. They are a threat chiefly to states that border the

Gulf of Mexico and those on the Atlantic Seaboard. Hurricanes on the U.S. Pacific Coast are extremely rare, although tropical cyclones are a recurring threat to Hawaii, Guam, and other U.S. territories in the Pacific.

This year, as in the past, the nation's hurricane-surveillance system will consist of satellites, long-range aircraft, and coastal radars. With these, along with computer-assisted forecasts of hurricane path and strength, meteorologists will strive to give at least 12 daylight hours of warning before a coastal area is hit.

Significant additions include two Synchronous Meteorological Satellites launched by the National Aeronautics and Space Administration, operated by the National Environmental Satellite Service, and poised 22,300 miles high over the Equator. SMS-1 surveys the Atlantic, Caribbean and Gulf of Mexico; SMS-2 keeps watch over the eastern Pacific, Mexico, and Western U.S. Both provide photos of almost the entire disk of the globe every 30 minutes, and take pictures at night as well as by day, by means of infrared photography. Besides these, there also are NASA's older geostationary satellite, ATS-3, still available if needed for daylight photography, and NOAA's and the Defense Department's solar-orbiting satellites.

According to Dr. Frank, "This year we will not have the Navy hurricane hunters flying for us—

for the first time since the reconnaissance program began at the end of World War II—but we will have a fleet of WC-130 Hercules planes, manned by Air Force pilots, ready to be deployed from Keesler Air Force Base, Miss.

Our 'picket line' of 18 coastal radars will be on the job as usual, to pick up hurricanes when they are within about 250 miles or 400 kilometers of coastal areas. Radar gives us a precise track of hurricanes as they approach the coast and helps us predict the point of landfall. It also tells us whether a hurricane is expanding or contracting.

"Then, once we are quite sure where a hurricane will strike, we call into play a computerized prediction of the storm surge, the tide of wind-driven water that is responsible for an estimated 9 out of 10 hurricane deaths. These predictions have been available only during the past few years. They are based on numerical models developed by Dr. Chester Jelesnianski of the Techniques Development Laboratory.

"Finally, after the height of the expected tide has been added to the forecast, local public-safety officials in a growing number of localities can draw on storm-evacuation maps prepared by the National Ocean Survey to inform residents of best routes to move inland or to high ground."

**A HURRICANE WATCH MEANS A HURRICANE MAY THREATEN AN AREA WITHIN 24 HOURS. A HURRICANE WARNING MEANS A HURRICANE IS EXPECTED TO STRIKE AN AREA WITHIN 24 HOURS. Enter each hurricane season prepared.** Each spring, recheck your supply of boards, tools, batteries, nonperishable foods, and other equipment you will need if a hurricane strikes your town. When your area is covered by a hurricane watch, continue normal activities, but stay tuned to radio or television for National Weather Service advisories. Ignore rumors. When your area receives a hurricane warning:

Continuously monitor the storm's position through Weather Service advisories.

Check battery-powered equipment. A portable radio may become your only link with the outside world. Emergency cooking facilities and flashlights will be essential if utilities are interrupted.

Have your car fully fueled.

If you own a boat, secure it before the storm arrives or move it to a safe area. When the boat is moored, leave it. Don't return to it once the wind and waves are up.

Board up windows or protect them with storm shutters or tape.

Secure outdoor objects that might be blown away or damaged, or bring them inside.

Store drinking water—your town's water supply may be contaminated or diminished by hurricane floods.

Leave low-lying areas when advised to do so. If you live in a mobile home, leave it for more substantial shelter. Mobile homes are extremely vulnerable to high winds.

If your home is sturdy and at a safe elevation, remain indoors during the hurricane.

Because hurricanes often cause severe flooding, as they move inland, stay away from the banks of rivers and streams.

Tornadoes are often spawned by hurricanes and are among the storms' lethal effects. When a hurricane approaches, listen to radio and TV for tornado warnings.



# **National Oceanic and Atmospheric Administration**

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