



noaa week

Volume 7

Number 23

June 4, 1976

Search-Rescue Missions Aided By Satellites

Environmental information observed from outer space by satellites operated by NOAA is becoming an increasingly vital tool in search and rescue missions conducted off the nation's shores by the U.S. Coast Guard.

In a number of instances, data provided by the GOES and polar-orbiting satellites have helped the Coast Guard find lost or disabled ships and aircraft quicker and with reduced search costs.

On some occasions, it is believed, the satellite-provided information may have meant the difference between life and death

(Continued on page 3)

First Global Heat Flow Map Issued by EDS

A map showing the amount of heat flowing outward from the earth's interior—the first map of its kind ever produced—has been issued by the Environmental Data Service.

Representing research carried out by scientists from many nations during the past several decades, the map is a product of the World Data Center A for Solid Earth Geophysics, operated by the National Geophysical and

(Continued on page 2)

NWS Names Dr. Glahn To Direct Techniques Development Lab.

Dr. Harry R. Glahn has been named Director of the Techniques Development Laboratory in the National Weather Service's Systems Development Office in Silver Spring, Md. He succeeds Dr. William H. Klein, who is now the Director of SDO.

Dr. Glahn formerly served as Dep-



Dr. Glahn

NOAA To Support Operation Sail Vessels



THE REPUTATION AS THE MOST HOSPITABLE BERTHING on the East Coast for tall ships, gained when hosting the Christian Radich last year, made the National Ocean Survey's Atlantic Marine Center the first choice for a Norfolk port stop for the Bluenose II, an exact replica of Canada's most famous sailing schooner, Bluenose. The 143-foot sailing schooner, homeported in Halifax, Nova Scotia, will visit New Orleans, La., and go back up the coast, stopping at various ports, including AMC again, to New York City, where she will take part in "Operation Sail," on July 4.

NOAA will play an important role in one of the most colorful and international of the country's bicentennial celebrations—"Operation Sail 1976," an Independence Day parade up New York Harbor of some 200-plus sailing ships from around the world—the preliminary activities of the ships, and their subsequent voyages to make port calls along the Atlantic, Gulf and Pacific Coasts and Great Lakes before returning to their homes.

The National Environmental Satellite Service, the National

Weather Service, the Environmental Research Laboratories, and the National Ocean Survey will provide "Operation Sail"

(Continued on page 2)

U. of Alaska Awarded \$4,784,035 To Make Environmental Studies

Secretary of Commerce Elliot L. Richardson announced this week that NOAA has awarded to the University of Alaska at Fairbanks contracts totaling nearly five million dollars to assess possible effects of ice movement and volcanic activity on petroleum exploration and development off Alaska, and to study the life forms and ecosystems of the Gulf of Alaska, and the Bering and Beaufort Seas.

The contracts, which continue work begun in the spring of 1975, are part of a major marine environmental study conducted by the Environmental Research Laboratories for the Interior Department's Bureau of Land Management as a portion of the Department's Outer Continental Shelf Environmental Assessment Program. These studies seek to determine the probable ecological impacts of oil exploration and development activities on Alaska's outer continental shelf.

Hurricane Season Here, NWS Reminds

Hurricane season begins this week, and once again the NWS is advising U.S. coastal residents from Texas to Maine to start getting ready.

Months of peak frequency for the giant pinwheel-shaped storms are August, September and October. The season lasts through November 30.

The last major loss of life from a hurricane on the U.S. coastline was in August 1969, when Hurricane Camille roared into Mississippi and Louisiana, causing 144 deaths.

National Weather Service forecasters are growing increasingly apprehensive about public apathy. Their concern is magnified by mushrooming population in coastal areas around the Gulf of Mexico and along the Atlantic Seaboard, and further increased by the very low level of hurricane experience in that population.

Dr. Neil Frank, Director of

(Continued on page 4)

Primary objectives of the university research are to determine the amount of stress which mov-

(Continued on page 4)

Gregory S. Richter Is New Appointee To High Level Post

Gregory S. Richter recently has taken a position as Physical Scientist in the Oceanographic Services Office of the Office of the Associate Administrator for Environmental Monitoring and Prediction, and has been designated the Executive Secretary to the Interagen-



Mr. Richter

(Continued on page 4)

ty Director of TDL, as well as the Chief of its Objective Forecast Branch. In 1975 he received the NOAA Award for Engineering and Applications Development and the Department of Commerce Gold Medal for his pioneering work in applying computer models to weather forecasting. He received the Department's Silver Medal in 1968 for a series of important papers in statistical meteorology.

Dr. Glahn's many contributions include development of a method for combining numerical

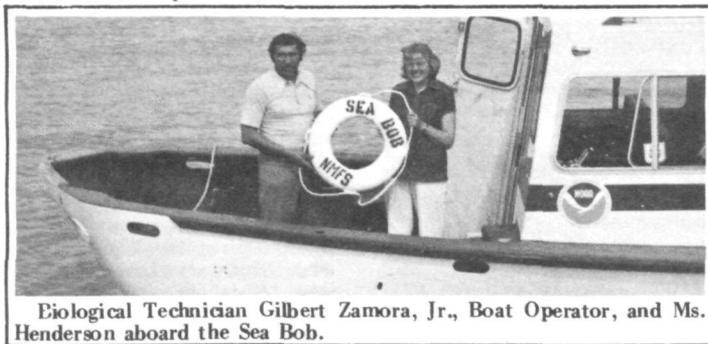
(Continued on page 3)

New Research Vessel To Be Used In Environmental Impact Studies

The National Marine Fisheries Service Gulf Fisheries Center in Galveston, Tex., recently acquired a new 27-foot research vessel for extensive offshore and inshore environmental impact studies. Initially, the Sea Bob will be used in an EPA-supported energy-related study involving marine scientists from Texas A & M University (TAMU), Rice University, the University of Houston, the University of Texas, and NMFS. The subject of the study will be the Buccaneer Oil Field about 20 miles south of Galveston. Using scuba gear, trawls, grabs, and specially designed fish traps, the scientists will identify the marine plants and fishes associated with oil rigs that have been producing oil or

gas over a number of years.

Sea Bob was the winning entry in the name-the-boat contest sponsored by the NMFS Employee's Recreation Association at the Center. It was submitted by Emma Henderson, Operations Research Analyst in the Division of Fishery Analysis. Honorable mention was given for NOAA's Ark, entered by Peter M. Villarreal, Maintenance Mechanic Leader in the Support Office, and Sea NMFS, the entry of Frank Patella, Fishery Biologist in the Division of Fishery Analysis. The judges were Dr. Sammy M. Ray, Head of the Department of Marine Sciences at TAMU, and Joel Kirkpatrick, Marine Reporter for the *Galveston Daily News*.



Biological Technician Gilbert Zamora, Jr., Boat Operator, and Ms. Henderson aboard the Sea Bob.

NOAA Will Provide Support for Vessels Participating in Operation Sail 1976

vessels with satellite-assisted weather forecasts, Gulf Stream information, nautical charts and tide and currents information.

More than a dozen square rigger training ships already are en route from Plymouth, England, to Bermuda via the Canary Islands, and later this month will race to Newport, R.I., where they will be joined by other vessels.

NOAA's assistance to the sailing vessels, coordinated by Robert E. Beck, Deputy Associate Administrator of Environmental Monitoring and Prediction, begins at 35° W. longitude (approximately mid-Atlantic). The NWS Forecast Offices in Miami, Fla., Washington, D.C., and Garden City, N.Y., will provide meteorological forecasts to the ships through the ensuing parade up N.Y. Harbor on Independence Day.

The U.S. Navy Weather Detachment at Bermuda will give a meteorological briefing, with the assistance of representatives from NOAA's weather and satellite services.

NOAA will provide the ships with specialized environmental forecasts by radio during the time they are in U.S. waters, according to William McKee, Executive Officer at NWS Eastern Region Headquarters.

Dr. John Apel, Director of ERL's Pacific Marine Environmental Laboratory in Seattle, Wash., will conduct a seminar for

skippers in Bermuda prior to the start of the Bermuda-to-Newport leg of the race on June 20. The seminar topics will include Gulf Stream meanders and eddies and how to use or avoid them.

Two NWS meteorologists will be aboard the Coast Guard Cutter Morganthau as she accompanies the ships from Bermuda to Newport, and will take weather observations every three hours. These will be transmitted to NWS Forecast Office in Washington, D.C., and incorporated into marine briefings including Gulf Stream and eddy locations based on satellite infrared (heat) observations. The weather and oceanographic messages will be transmitted from Washington back to the Morganthau, which has a high-grade communications capability, for dissemination to the fleet. Once the fleet is in coastal waters, continuous broadcasts of weather and oceanographic information will go to the fleet via NOAA's regular VHF/FM broadcasts. These broadcasts will also serve the U.S. private boats accompanying the sailing fleet. Warnings of hazardous weather will also be on NOAA's weather radio.

The Satellite Field Service Station in Washington, D.C., will monitor areas through which the ships are sailing, using imagery from NOAA's GOES-1 and NOAA-4 satellites. This facility will make available information on existing detailed weather

First Global Heat Flow Map

Solar-Terrestrial Data Center in Boulder, Colo.

The map also shows two other types of data closely related to heat flow—the locations of active volcanoes and earthquake epicenters. The epicenters delineate lithospheric plate boundaries which mark places where two plates interact with each other, such as mid-ocean ridges, fracture zones, trenches, and areas of mountain building.

Volcanoes for the most part occur at places where one plate underthrusts another close to oceanic trenches such as the Aleutians or South America, where new crust is being formed, as at mid-ocean ridges, and some intra plate islands such as Hawaii.

The map, which is expected to have wide appeal to scientists and teachers, indicates where heat flow measurements have been taken and the approximate heat flow value at each of about 5,500 measurement sites. It also

(Continued from page 1) shows a general correlation between high heat flow and locations where geothermal energy is being produced, or is likely to be produced.

Measuring approximately 50 by 35 inches, the map has a scale of about 1 to 30 million. It uses the Mercator projection and its upper and lower latitude limits are 75 N and 70 S, respectively. Heat flow values are indicated by various colors.

Copies of the map may be ordered, either rolled for folding or flat, from the Distribution Division (Code C44), National Ocean Survey, Riverdale, Md. 20840, for \$2.50 each.

The heat flow data also are available in digital format on magnetic tape or punched cards from World Data Center A. The following parameters are included for each measurement: identification code, latitude, longitude, temperature gradient, thermal conductivity, and heat flow value. In addition, each heat flow measurement is referenced to the publication in which it first appeared. The reference list is also available on magnetic tape and on cards. For further information contact World Data Center A for Solar Earth Geophysics, Environmental Data Service/NOAA, Boulder, Colo. 80302.

DO YOU KNOW THAT—
Dividends of 6% have been paid each quarter this year.
DEPARTMENT OF COMMERCE
FEDERAL CREDIT UNION
Room 7056 — Main Commerce,
Washington, D.C. 20230
202-967-4134
Branch offices elsewhere.

systems within the sailing area, the present position of the Gulf Stream, and an expectant 24-hour forecast to be incorporated into the daily marine briefings to be disseminated to the fleet.

In addition, meteorological observations will be taken by the training ships Bay State from Massachusetts Maritime Academy and the State of Maine from Maine Maritime Academy.

Dr. Apel and Dr. Athelstan Spilhaus, Special Assistant to the Administrator of NOAA, will be aboard the Sea Education Association research vessel Westward, which will be stationed along the Gulf Stream. The Westward will transmit Gulf Stream information to Washington to assist in the preparation of the forecast to the fleet.

The ships will leave Newport on July 1, and will be joined on their way to New York by an anticipated 200 barques, brigantines, schooners, yawls, ketches and sloops, 60 naval vessels from a score of nations, and in excess of 5,000 private boats, Operation Sail organizers estimate.

Vessels too tall to pass beneath the Brooklyn Bridge en route to New York Harbor will head westward off the southern shore of Long Island and anchor at Sandy Hook, N.J. The others will proceed through Long Island Sound to later anchor at Gravesend Bay. On July 4, the entire fleet will sail up New York Harbor.

(Continued from page 1)

Weather Service Offices in Boston, New York, Washington, Philadelphia, Providence, Hartford, Chatham, Bridgeport, and Atlantic City will maintain continuous surveillance of marine weather conditions during the mass cruise. The WSFO in New York will serve as focal point.

The Independence Day parade will begin mid-morning and take about four hours from the time the fleet's leader, the United States Coast Guard Cutter Eagle, gets underway until the last ship passes up the Hudson River. At the end of the procession route.

noaa week

Published weekly at Rockville, Md., by the Office of Public Affairs for the Department of the Interior, Office of Oceanic and Atmospheric Administration.

Articles to be considered for publication should be submitted at least a week in advance to NOAA Week, Room 221, West 5, Office of Public Affairs, National Oceanic and Atmospheric Administration, Rockville, Md. 20852.

NOAA Week reserves the right to make corrections, changes or deletions in any submitted copy in conformity with the policies of the paper or the Administration.

Catherine S. Cawley, Editor
Warren W. Buck, Jr., Art Director

Georgia Receives \$67,000 CZM Grant

The Georgia Office of Planning and Budget has received a \$67,000 grant to determine and prepare for the social, economic, and environmental effects which could impact the Georgia coast by offshore oil and gas production.

Under the grant, awarded by the office of Coastal Zone Management, State and local officials will conduct a series of studies to assist in making decisions on reducing any adverse impacts of Outer Continental Shelf energy production, and to ensure the State maximum benefits.

Study results will let officials determine, for example, what types of energy facilities might be located along the coast, the most suitable areas for placing them, what effects they might have on critical natural areas, and what auxiliary facilities—schools, homes, hospitals, businesses—would be needed along the coast in the event of offshore drilling.

The information also will be incorporated into the ongoing development of Georgia's coastal management program. This is a cooperative, Federal-State effort to minimize destruction of valuable ecosystems and to guide coastal development, for a variety of competing socio-economic purposes, in a rational and balanced manner.

To assist Georgia in developing its program, OCZM has awarded the State more than \$600,000, including the current grant, which supplements an earlier award. Under law, Georgia has contributed an additional \$340,145 in matching funds.



THE UTAH PILOTS ASSOCIATION AWARD for Outstanding Service to Aviation During 1975 was presented recently to William T. Chapman, Meteorologist in Charge of the National Weather Service Forecast Office in Salt Lake City. This is the first time the award has been presented to an NWS employee.

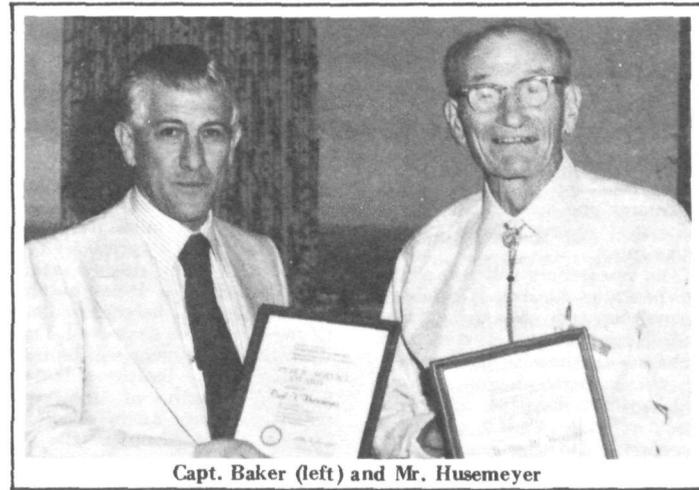
First NOS Public Service Award Presented to Retired Surveyors

The National Ocean Survey's first Public Service Award has been presented to two retired brothers who worked a total of more than 58 years for the NOS National Geodetic Survey's predecessor, the Coast and Geodetic Survey.

The award, established to honor private citizens and organizations making significant contributions to the national geodetic program, was presented to William Husemeyer by Capt. Leonard S. Baker, NGS Director, during a recent meeting of the California Association of Land Surveyors in Los Angeles. Mr. Husemeyer's brother, Carl, was unable to attend the ceremony. Both live in Pismo Beach, Calif.

Capt. Baker said the Husemeyers have devoted numerous hours since their retirement in 1962 to the relocation and preservation of difficult to reach survey monuments. "Often," said Capt. Baker, "this meant packing to the top of mountains, or long, hard

drives which required a four-wheel-drive vehicle."



Capt. Baker (left) and Mr. Husemeyer

Satellites Aiding Coast Guard in Search-Rescue Missions

For occupants of the lost craft. NOAA's involvement in the dramatic business of search and rescue at sea began about a year ago when it became apparent the satellites could provide informa-

tion previously denied the Coast Guard in such detail—information that gave searchers a more precise idea of where to concentrate their search activities.

Many rescue missions begin when a vessel radios it is in distress and needs assistance. Usually operations of this sort are relatively cut and dried. The Coast Guard knows where the disabled vessel is and can respond with ships, planes, or helicopters.

But frequently, the first indication a craft is missing comes when the vessel fails to arrive in port when expected. The ship, as far as those on land are concerned, has vanished. Where should search activities be concentrated? Where in an area perhaps as large as several thousand square miles, might the lost ship be found?

A number of factors need to be considered: What have been the general weather and sea conditions since the vessel's last known position? In what direction and how far may the ship—if disabled—have drifted because of winds and ocean currents? How urgent is the situation? If the craft sank, are sea surface temperatures conducive to survival in the water, and if so, for how long a time?

Satellite imagery is invaluable in helping determine the answers to these questions. Not only can the pictures from space disclose conditions at sea when the lost

(Continued from page 1)

ship was last heard from, they can update that information every half hour thereafter.

When a vessel or plane is lost at sea, the Coast Guard Rescue Coordination Center charged with conducting search and rescue operations can turn for assistance to the field stations of the National Environmental Satellite Service in Washington, Miami, San Francisco, Honolulu, and Anchorage.

There, oceanographers and meteorologists, specially trained in satellite imagery interpretation and analysis, pull together past and current information on appropriate ocean and atmosphere phenomena for the general search area. Carefully they evaluate wind velocities and directions, activities of major ocean currents such as the Gulf Stream, low level cloud cover and fog data, sea surface temperatures, and other information.

From analysis of this mass of material, NESS personnel are able to suggest to the Coast Guard where search efforts might be concentrated with the greatest potential for successful completion of the mission.

No one really knows how many lives have been saved by this added input, but the growing number of Coast Guard requests for NESS assistance strongly indicate that NOAA's eyes in space are helping save lives at sea.

drives which required a four-wheel-drive vehicle."

The brothers have recovered about 65 markers from Point Sal to Big Sur, Calif. In what turned out to be a most unusual recovery—at the famous Hearst estate, San Simeon—they found about six buried geodetic markers, all of which were champagne bottles dating back to 1872.

The award, a plaque engraved with two geodetic symbols—a triangulation mark and a bench mark—is the first of its kind presented since the surveying agency was established 167 years ago under President Jefferson.

Cooperative Charting Open House Is Held

The National Ocean Survey's Lake Survey Center hosted its annual U.S. Power Squadron-NOS Cooperative Charting Open House last month at the LSC Marine Base in Monroe, Mich.

About 30 USPS cooperative charters heard LSC's Frank Blust, Chief, Charting Operations Division; Casey Zaranek, Verification Section Chief; Ted Kuchciak, Revisory Survey Team Chief; and Bob Goodnough, Water Levels Gauging Section Chief, discuss various aspects of the subject.

This voluntary USPS program has become a significant ingredient in the processes and procedures necessary for the construction of nautical charts.

Dr. Glahn (Continued from page 1)

computer predictions with surface observations of weather to arrive at automated forecasts of the probability of precipitation, its type and amount, maximum and minimum temperatures, surface windspeed and direction, cloud amount, ceiling and visibility, and the probability of thunderstorms. The method, known to forecasters as Model Output Statistics (MOS), is one of the major advances in weather forecasting during the past decade.

He has also developed a computer program which produces automatically worded weather forecasts for issuance by telephone recordings, radios and newspapers. This is an important part of the National Weather Service's continuing effort to automate its field operations and services.

Dr. Glahn holds a B.S. from Northeast Missouri State Teachers' College, an M.S. from Massachusetts Institute of Technology, and Ph.D. from Pennsylvania State University. He has been with the NWS since 1958 and recently was elected a Fellow of the American Meteorological Society.



PARTICIPANTS IN A RECENT MARMAP TRAINING COURSE on Identification of Fish Eggs and Larvae taught by Dr. Elbert H. Ahlstrom at the National Marine Fisheries Service Southwest Fisheries Center's La Jolla, Calif., Laboratory were (from left) Susan Roberts, NMFS, Highlands, N.J.; William Karp, University of Washington, Seattle; John Butler, NMFS, La Jolla; Marty Stevenson, Moss Landing (Calif.) Marine Laboratory; Angeles Alvarino, NMFS, La Jolla; Beverly Vinter, NMFS, Seattle, Wash.; David Authur, NMFS, La Jolla; (back) Anthony Wilson, Nigeria; (front) Araceli Martinez, Mexico; Enrique Gonzalez, Mexico; Gloria Calderon, El Salvador; Leon Tissot,

Mexico; Elizabeth Stevens, NMFS, La Jolla; Chossi Sinque, Brazil; Vijayalakshmi Nair, India; Olayinka Babalola, Nigeria; Howard Powles, Marine Resources Research Inst., Charleston, S.C.; Elaine Sandknop, NMFS, La Jolla; Susan D'Vincent, NMFS, La Jolla; Dr. Fahay, NMFS, Highlands, N.J.; Barbara Sumida, NMFS, La Jolla; Dr. Ahlstrom; Darrel Snyder, Colorado State University, Fort Collins; Elzbieta Klis, Poland; Geoffrey Moser, NMFS, La Jolla; Dennis Gruber, Scripps Inst. of Oceanography, La Jolla; Maria Mackus, Poland; and Alan Collins, NMFS, Panama Cty, Fla.

University of Alaska Receives \$4,784,035 in Contracts for Environmental Study *(Continued from page 1)*

ing ice could exert on offshore structures, and the effects of crude oil and other petroleum-associated chemicals on marine organisms.

The researchers will also study the potential hazards of offshore permafrost and volcanic activity on oil exploration activities, and make comprehensive assessments of the marine microorganisms and bottom dwelling fishes in the Gulf of Alaska, and the Beaufort and Bering Seas.

To evaluate the fracture strength of moving ice sheets against offshore grounded struc-

tures, the scientists will implant pressure gauges on an ice sheet adjacent to a grounded ice floeberg about 100 miles northwest of Pt. Barrow.

As the ice pack crushes against the floeberg, ice stress buildup and motion will be recorded until the gauges are destroyed. Data from the experiment will be used to place lower limits on the required strength of manmade structures such as offshore oil riggings to be placed in the ice-bound waters.

The research team also will study the activity state and po-

tential environmental hazard of two Cook Inlet volcanoes, Redoubt and Augustine. Both could pose a considerable hazard to oil development in the Gulf of Alaska area.

Part of the contract award will go toward adding 11 short-period seismic stations to an existing network to lower the present detection threshold of earthquakes to Richter magnitudes of two or three.

Results from the improved seismic network will be combined with hypocenter maps produced by the Environmental Da-

ta Service. The Alaska researchers also will monitor the micro-earthquake activity of the two active volcanoes and determine the type of fracturing along the region's active faults.

The university is applying part of the contract award to developing methods of estimating the possible impact of petroleum-related offshore activities on marine organisms.

Weather Service Reminding People Hurricane Season Is Here *(Continued from page 1)*

the National Hurricane Center at Miami, Fla., is spearheading an effort to arouse public awareness of the danger. "Our greatest concern," he says "is that people will underestimate the lethal effects of hurricanes, either out of ignorance or because they once went through a mild storm, or saw only the fringe effects of a major one."

It is for this reason that forecasters constantly remind us that it was a hurricane which, in 1900, produced the worst natural disaster ever to strike the North American continent—a 15-foot tide of wind-driven water that totally devastated Galveston Island, cutting off escape to the Texas mainland, and drowning 6,000 people.

With this and other grim reminders, forecasters hope to avert another such disaster. They believe that, if they don't speak out, growing population pressures in hurricane-prone areas may cancel out the benefits of satellites, reconnaissance aircraft, radar, and constantly improving forecast techniques which have made the U.S. hurricane-warning

service the best in the world.

This year the hurricane detection and surveillance network will include the new GOES-1 satellite launched last October 16, and now poised in a seemingly stationary, earth-synchronous orbit, 22,250 miles (35,600 kilometers) high over equatorial Brazil. It will be used to detect hurricanes forming in the Atlantic, the Caribbean, and Gulf of Mexico.

The SMS-2 earth-synchronous satellite, poised in equatorial orbit over the Pacific, will look for hurricanes and typhoons there. These Geostationary Operational Environmental Satellites are operated by the National Environmental Satellite Service. Both provide photos of almost the entire disk of the globe every 30 minutes, taking pictures by visible light by day and by infrared radiation by night. In addition, NOAA's and the Defense Department's polar-orbiting satellites provide photos of a given location twice a day from much lower altitudes.

Aircraft reconnaissance this year will be provided by 10 WC-130 Hercules planes operating from Keesler Air Force Base, near Biloxi, Miss. Seventy percent of the missions will be flown by Air Force reservists, the remaining 30 percent by active-duty crews. "So we'll have doctors, lawyers, merchants, and

perhaps even some chiefs out there scouting hurricanes for us this summer," says Dr. Frank. "I expect they'll show a lot of enthusiasm for the job."

A picket line of coastal radars will be on duty as usual to pick up hurricanes when they approach within 250 miles (400 kilometers) of the coast.

In the forecasting process, an experimental numerical model developed specifically for hurricanes by Dr. John Hovemale of the National Meteorological Center will be tested routinely on 1976 hurricanes, using NOAA's giant computers. Says NWS Director Dr. George P. Cressman: "At present the Hovemale model shows promise for improving forecasts of hurricane motion. We will be most interested in seeing how it performs."

When a hurricane is within striking distance, a computerized prediction of the height of the storm surge will be called into play, using numerical models developed by Dr. Chester Jelesnianski of the NWS Techniques Development Laboratory.

Finally, after the height of storm surge has been forecast, local public safety officials in many communities will be able to draw on storm-evacuation maps prepared by the National Ocean Survey, to advise residents and vacationers of the best routes to move inland or to high ground.

Richter *(Continued from page 1)*
 cy Committee for Marine Environmental Prediction. Since 1975 he has served as the Deputy Chief of the Programs Division of the Office of Programs and Budget.

Mr. Richter will be responsible for developing and evaluating NOAA's marine environmental service program elements with respect to their relevance to marine environmental monitoring, assessment and prediction, and for the interagency coordination for preparation of the annual Federal Plan for Marine Environmental Prediction (MAREP).

With NOAA since 1967, Mr. Richter served first as Meteorologist in Charge and Station Scientific Leader at Byrd Station in the Antarctic and subsequently the Antarctic and subsequently was MIC at Nome, Alaska. From 1970-1975 he was a Staff Meteorologist at National Weather Service Headquarters in Silver Spring, Md. In 1970-1971 he served as U.S. Delegate to the World Meteorological Organization Congress.

Mr. Richter received his B.S. in Chemistry from California State College in California, Pasadena; did graduate work in meteorology at St. Louis University; received his Master's Degree in marine affairs from the University of Rhode Island on an NWS Fellowship; and is a June 1977 doctoral candidate in environmental system management in Washington, D.C.

HURRICANE NAMES FOR 1976

Anna	Holly	Orpha
Belle	Inga	Pamela
Candice	Jill	Ruth
Dottie	Kay	Shirley
Emmy	Lilias	Trixie
Frances	Maria	Vilda
Gloria	Nola	Wynne

National Oceanic and Atmospheric Administration

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages

Faded or light ink

Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov

HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
July 23, 2010