METEOROLOGY

Eyes on Hurricane Eye

As hurricanes begin to form in tropical waters, they will be closely watched by unsleeping mechanical and human eyes from satellites, airplanes, ships and land stations.

See Front Cover

By BARBARA TUFTY

➤ THOUSANDS OF EYES will soon be watching one of nature's most dangerous eyes—that of the hurricane.

The unwinking eye of the hurricane, that calm center in the middle of wildly turbulent winds roaring from tropical waters, will be carefully surveyed during the next few months by mechanical and human eyes from satellites, airplanes, an ocean buoy, ships and land stations.

Night and day in the next six months, these eyes of the observed and the observers will not sleep. In the most closely inspected hurricane season in history, preparations are now underway to spot, record, analyze and study methods to control these mighty lashings of turbulent winds that strike the eastern United States every summer's end.

Vast Whirlwind of Fury

A hurricane is a vast whirlwind of fury blowing around a central calm core known as the "eye." In the Northern Hemisphere, hurricanes gyrate counterclockwise; south of the equator they turn clockwise. They are accompanied by violent destructive winds, heavy rains, high waves and tides.

Hurricanes originate in tropical ocean areas, where humidity, winds, atmospheric pressure and solar radiation all influence their birth and weaning. For some unknown reason, they do not form in the South Atlantic Ocean.

A hurricane can hover near the equator for days, even weeks, without starting to travel—although it is not officially called a hurricane until its internal winds reach 75 miles per hour. As wind, temperature and pressure change, the mass of hot humid air slowly spins and then moves from low to higher latitudes with increasing speed, size and intensity.

The hurricanes that develop in the Atlantic, Caribbean or the Gulf of Mexico drift in a westerly direction with the trade winds, then leave the tropics to surge across the land or up into the North Atlantic Ocean.

Some years they travel farther west before turning north, and have hit the mainland as far westward as Texas. Other years they may track harmlessly into the North Atlantic.

There are scientific theories why hurricanes form when and where they do. As the world tips on its axis, and the Northern Hemisphere basks in summer warmth, the sun reaches its northern position along the Tropic of Cancer about June 21. At this time the sun is pouring its maximum heat on the tropical areas of the Northern Hemisphere. In the humid tropics this hot energy is gradually converted into rotating winds and torrential rains.

Another cause for hurricanes, meteorologists believe, is the stormy intertropical front that exists where the trade winds of the north and those of the south come together near the equator. This front migrates toward the sun. During the summer months, the belt is about 10 or 20 degrees above the equator and becomes turbulent with thunderstorms.

No one yet knows why the circular motion starts, but the sun on its southward journey adds momentum to these revolving winds and storms that grow into fully developed hurricanes late in July, with the most intense storms forming in August, September and October.

As the storm starts, it may move forward very slowly, about 15 miles per hour, or sometimes it may even remain stationary for a while. As the hurricane of the North Atlantic gains momentum, it moves roughly parallel along the equator, then bends northwards in an arc. Now its speed increases and it travels as much as 50 or more miles an hour.

The entire circumference of the storm can expand to over hundreds of miles—sometimes as much as 600 miles.

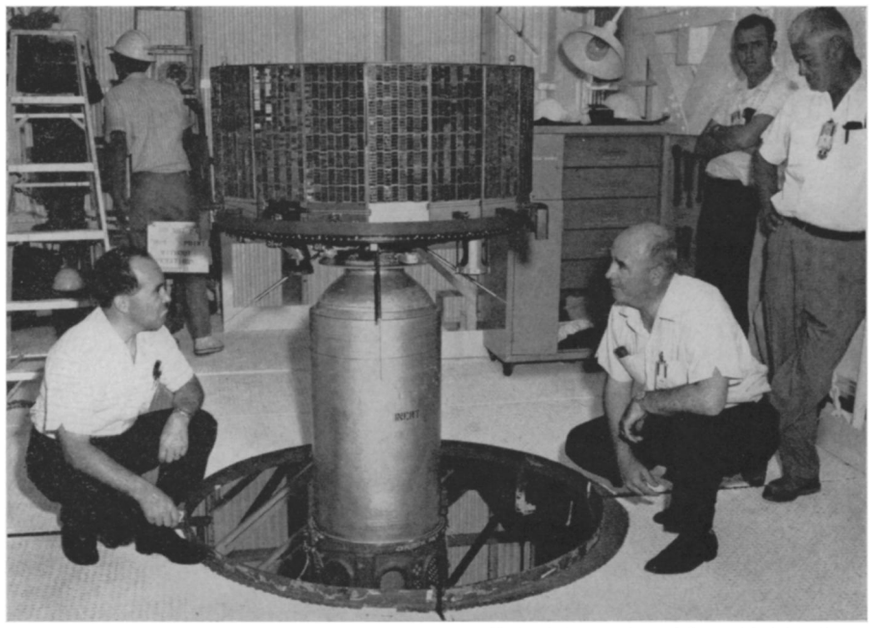
The highest wind speeds are found at the edge of the eye. Velocities here have been recorded as high as 150 miles per hour, and scientists estimate even greater speeds.

One of the most fascinating aspects of a hurricane is the eye—an enormous cloudless core as wide as five to 20 miles. Here in the center of the whirling screaming fury, the sky is unbelievably blue, the sun shines down with unconcerned serenity, and winds gently waft at speeds of 15 miles an hour or less. At night, the stars can be seen.

For the storm-tossed flora and fauna, this eye offers a breathing spell of from half an hour to several hours. But this is only a lull, and soon the other side of the storm moves in, this time with winds blowing violently in the opposite direction, as the lower rim of the storm's "doughnut" moves across the earth.

Torrential Rains

Most hurricanes are accompanied by torrential rains that cause extensive damage by drenching and destroying crops, washing out roads and bridges, and flooding



National Aeronautics and Space Administration

TIROS VII—The seventh Tiros weather satellite is shown as it was hooked up with the third stage of its Delta launch. The launch was timed so Tiros' two independent TV camera systems could take pictures over typhoon and hurricane-breeding areas.

low-lying areas. Along the coast, they can pile up huge waves that break with great force across the land, destroying buildings, ships and shorelines. The greatest loss of life during hurricanes comes not from the storm itself, but from drownings.

The word hurricane which is used in the Western Hemisphere comes from the Carib Indian word "huracan" or "hunraken" which means "big wind." This was the evil spirit who supposedly created the stormy weather that has ravaged Caribbean coasts for centuries each fall.

The same natural forces and elements create these storms in various parts of the world, only the storms are called by other names. In the western North Pacific Ocean, the storms that pour up from the tropics toward Japan are called typhoons. In the northern part of the Indian Ocean they are called cyclones, and the Australians call them willy-willies in their part of the world.

Forecasting and Warning

This year, with elaborate systems of forecastings and warnings in the United States areas, the loss of life can continue to be reduced, states Max Feinsilber, technical assistant in the U.S. Weather Bureau's emergency warning section in Washington, D. C.

From a vantage point some 425 miles high in the sky, the eyes of satellites Tiros VI and Tiros VII are already watching the seas for storm formations. Tiros stands for television infrared observation satellite. The satellites survey the world with two wide-angle lense cameras that can scan an area 750 miles across. Wide-awake mechanical guards take pictures in orbit, send them by radio to earth where the photos are reproduced and analyzed.

Satellites are particularly helpful over desolate areas in which no ships may pass for weeks.

Another mechanical eye is already on duty in the middle of the Gulf of Mexico. An orange and white aluminum platform called Nomad rides the waves while observing, coding and sending weather data to the shore, 300 miles away.

Soon U.S. Navy and Air Force airplanes will start their reconnaissance to watch over ocean expanses where storms begin. One of these hurricane hunters, an Air Force B-29, is shown on the front cover, as it drops from windy skies. From these planes come some of the most precise and valuable hurricane data, Mr. Feinsilber said. Flying right into the eye of the hurricane to pick up data on winds, directions, intensities and temperatures, these agile craft track each hurricane until it dies out or becomes harmless.

Land-based radar picks up the tracks as hurricanes approach the shores. The 3,000-mile stretch from Texas to Maine is covered with high-powered radar stations, each with a sight range of more than 200 miles.

Over, under and through all this network flies a fleet of the Weather Bureau's hurricane research planes to cover the tempestuous path with sensitive instruments designed to record and to carry out experiments.

No one can stop a hurricane, Robert Cecil Gentry, director of the National Hurricane Research Project, told SCIENCE SERVICE. But scientists are working on research to find out how to help diffuse the dynamic energy of the storms.

This year planes stand ready to seed turbulent clouds with silver iodide crystals, Mr. Gentry said. These crystals, used for the first time on Hurricane Esther in the 1961 season, crystallize supercooled water into ice. In the 1961 experiment, crystals were dropped in cannisters close to Esther's eye, and immediately a change in radar reflectivity of the clouds was noticed as supercooled water was changed to ice.

Careful evaluation indicated there was a diffusion of energy outward from the storm center that resulted in a momentary reduction of about 10% in the high winds of the hurricane at flight levels. Last year this particular experiment was not repeated because hurricane conditions were not right —as a matter of fact, no hurricanes plowed into America's shores.

Another method for trying to modify these winds, Mr. Gentry said, is still in the "active consideration" stage. This is to spray an ionized layer of very tiny plastic bubbles above the clouds. The theory is that this layer would filter the sun's energy as it flows down upon the congested area, and thus reduce the hurricane's energy source.

Why Girls' Names?

Why name hurricanes after girls? Well, state the weathermen officially, these names are short, simple, direct, and are not confusing when sent through the enormous number of communication channels needed. But then, others quietly say, you know, hurricanes are also erratic, unpredictable....

Names to be given this year to the yearly series of dangerous storms are Arlene, Beulah, Cindy, Debra, Edith, Flora, Ginny, Hannah, Irene, Janice, Kristy, Laura, Margo, Nona, Orchid, Portia, Rachel, Sandra, Terese, Verna and Wallis. The letters "Q, U, X, Y, and Z" are not included because few names begin with these letters.

Girls' names have been used by the U.S. Weather Bureau to identify tropical hurricanes in the Atlantic, Caribbean and Gulf of Mexico since 1953.

• Science News Letter, 84:26 July 13, 1963

Do You Know?

A *pebble* struck by the blade of a rotary lawn mower travels with the speed of a 22-caliber bullet.

An *oak tree* can send roots down 80 feet or more to underground water.

Young women are believed to be more prone to *motion sickness* than men; fat persons more susceptible than thin.

Jet engines are now being shipped from the factory enclosed in a block of hardened *foam.*

• Science News Letter, 84:27 July 13, 1963

AGRICULTURE

Breeding Cows Ups Milk Production for Farmers

➤ FARMERS looking for a way to increase a cow's milk production need search no more. All they have to do is make sure the cow has the right parents.

Research conducted by C. W. Arave and R. C. Laben of the University of California at Davis has shown that careful breeding can increase the milk output of a dairy herd, environmental factors remaining the same. After analyzing thousands of production records made during a period of 30 years, the researchers concluded that genetic changes were responsible for a consistent, one percent yearly improvement in production. Furthermore, they believe there is still considerable room for improvement.

• Science News Letter, 84:27 July 13, 1963

CONSERVATION

Chemical Bombs in Lakes Check Water Evaporation

➤ BOMBING LAKES and water reservoirs from the air with chemicals that check water evaporation wastage will help solve water shortages. The chemicals form "monolayers," C. Earl Israelsen and Vaughn E. Hansen of Utah State University told the American Society of Civil Engineers meeting in Milwaukee. They identified the chemicals as cetyl and stearyl alcohols, known as hexodecanol and octadecanol.

• Science News Letter, 84:27 July 13, 1963

TECHNOLOGY

Plastic, Rubber Suited to Withstand Ocean Floor

➤ MAN-MADE PLASTICS and rubber materials are best suited to withstand ocean life, seven-year tests to find the best material for submarine cables have shown.

More than 600 specimens of organic materials were exposed to marine life, including casting resins, rubbers, thermoplastic materials, and natural and synthetic fibers.

Evaluating the effects of marine life on different specimens, Bell Telephone Laboratories scientists found that polyethylene, polypropylene and most rubbers showed no signs of deterioration.

Natural jute fibers and cellulose acetates were affected by borers and other microorganisms.

The first transatlantic telephone cable, laid in 1956, was armored. It consisted of ten different layers of metals and organic materials and was covered by jute flooded with coal tar to prevent corrosion.

A new type of armorless cable is now being planned, using polyethylene as the outer protection against mechanical and corrosion damage.

The marine environment at the ocean floor is one of extreme cold and strong currents. Contributing to the decomposition of organic substances are bacteria, fungi and borers.

• Science News Letter, 84:27 July 13, 1963