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PICTURE OF THE MONTH
Late Summer Hazards to Coastal Southern California

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The advent of satellite surveillance has helped in the identification and forecasting of oceanic disturbances that generate destructive sea swells which assault southern California's harbors, beaches, and shore installations from the south. Meteorological satellites have shown the major cause of these erosion-producing waves to be tropical cyclones that form off the west coasts of Mexico and Central America and move out into the cooler waters of the northeast Pacific Ocean. During the summer hurricane season, storms in this area form with such regularity that the northeast Pacific is now recognized as the world's second most active oceanic area in the production of tropical cyclones (Gray 1968).

Meteorological satellites occasionally detect several of these tropical cyclones simultaneously in various stages of development. On Aug. 23, 1972, for example, ESSA 8 automatic picture transmission (APT) pictures received at the U.S. Navy's Pacific Missile Range, Point Mugu,

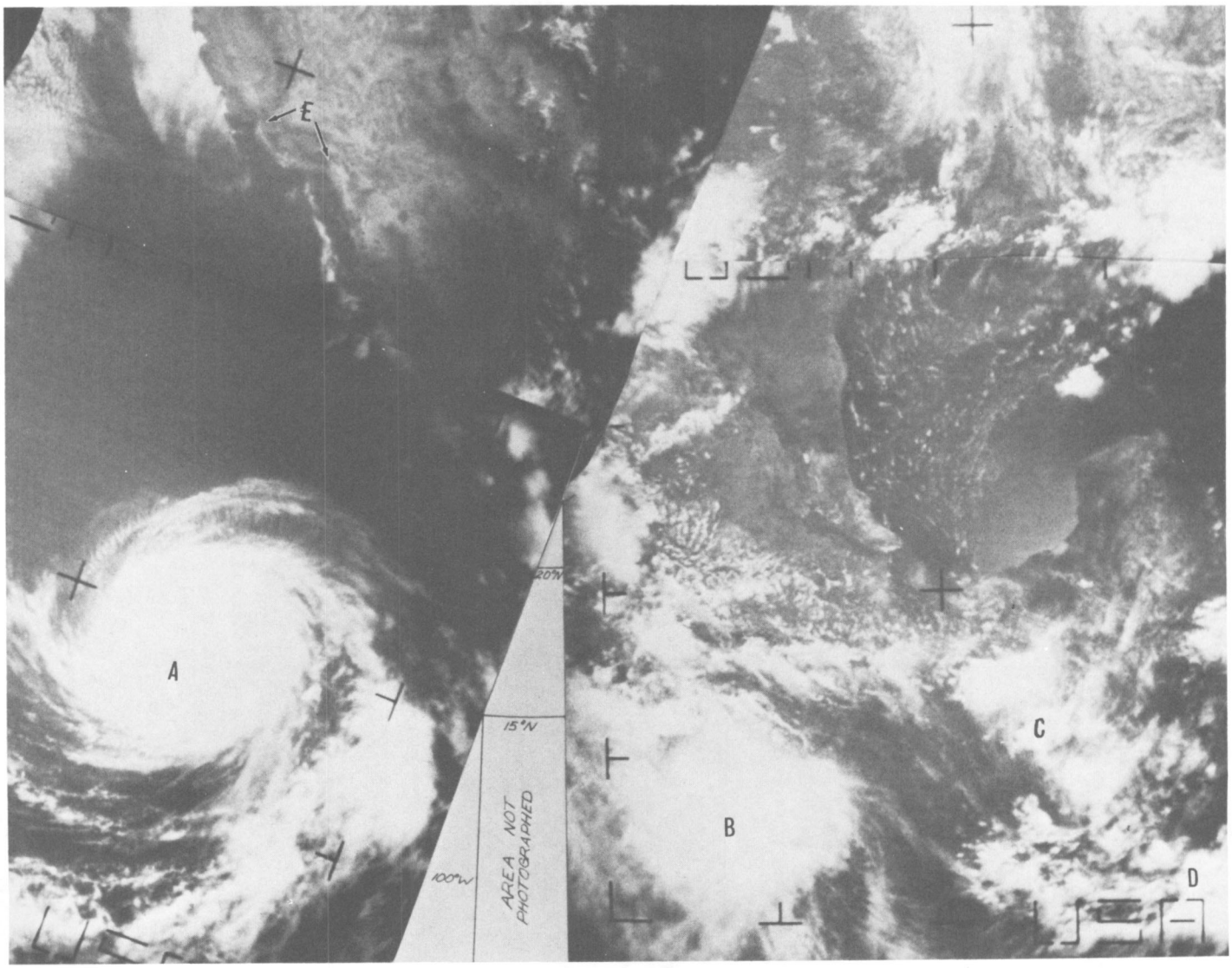

FIGURE 1.—Mosaic of ESSA 8 APT pictures of Aug. 23, 1972, showing mature hurricane Fernanda (A), developing tropical storm Gwen (B), possible harbingers of not-yet formed hurricane Hyacinth (C, D), and smoke plume from a major brush fire (E) in Los Padres National Forest of southern California.

Calif., (fig. 1), revealed three mature and incipient disturbances out of a total of six hurricanes that formed during the brief period August 7 through August 30. An Advanced Technology Satellite (ATS 1) picture showing some of the early storms in this sequence of hurricanes was recently presented in the *Mariners Weather Log* (U.S. Department of Commerce 1972). As these storms moved westward and northward, their above-average intensities and the closer proximity of some to the U.S. coast made the 1972 season a memorable one for southern Californians subject to high surf conditions.

In figure 1, large hurricane Fernanda (point A) is centered at about 17.6°N, 120.4°W with maximum sustained winds estimated at about 90 kt and peak gusts to 110 kt. She was moving toward the west and was estimated to have intensified by the following morning to 100-kt maximum sustained wind with peak gusts to 125 kt. While Fernanda continued to move in a westerly direction, posing no direct threat to inhabited areas, she generated large waves that reached the southern California coast as southerly swells up to 18- to 20-ft high (as estimated by lifeguard officials at some beaches on August 24).

Farther to the east and south in figure 1, tropical storm Gwen (point B) is shown in its developing stage centered near 13.0°N, 105.2°W with maximum sustained winds esimated at 45 kt and gusts to 70 kt. Her position at this time was a few hundred n.mi. southwest of Acapulco, Mexico, a typical region for the spawning and rapid intensification of tropical storms (Sadler 1964). Gwen was the fifth storm to form during this August 7–30 period, reaching hurricane intensity during the morning of the 24th. On the 29th and 30th, it appeared that she would become the first tropical storm to score a direct hit on Los Angeles and coastal southern California since the September storm of 1939 (Kalstrom 1952, Tubbs 1972) as she moved to within 300 n.mi. of Los Angeles. However, this proved to be her point of closest approach, and she again drifted on a more westerly course and dissipated offshore. Like Fernanda, she produced breakers up to 20 ft high at some beaches with a southerly exposure.

Points C and D in figure 1 are cloud clusters south of the Yucatan Peninsula that may be the initial harbingers of Hyacinth, the last hurricane in the string of six.[1] Such bright cloud clusters commonly precede hurricane formation in this area and are associated with disturbances that appear to originate in the Atlantic (Garstang 1972). After an initial westerly movement, Hyacinth also veered northward coming even closer than her predecessor Gwen to hitting the southern California coastal area. Just prior to her apparent demise some 80 n.mi. south of Los Angeles, she brought San Diego 0.41 in. of unseasonal rain and spread clouds and rain into much of the desert Southwest. Once again, storm-generated swells pounded some California beaches with 20-ft breakers.

The short time span between successive storms in this August series averaged only about 4 days, thereby helping to maintain an almost constant southerly swell at south-exposed beaches during this period. [Dickson (1972) has proposed that the frequent formation of storms in 1972 is attributable to anomalously warm sea-surface temperatures to the southeast of the spawning area.]

Also faintly visible in figure 1 is a plume of smoke (point E) from the season's first major brush fire burning out of control in the Los Padres National Forest of Ventura County in southern California. These brush fires serve as additional late summer hazards to California's coastal and mountain areas.

[1] We now know that these cloud clusters were probably not directly associated with Hyacinth. Post-season analyses indicate that the seedling that eventually became hurricane Hyacinth formed in the Caribbean as a disturbance on the intertropical convergence zone and did not move out of the Caribbean until August 25, two days after this photograph (Frank 1973).—Editor

REFERENCES

Dickson, Robert R., "Weather and Circulation of August 1972—Five Hurricanes in the East Pacific," *Monthly Weather Review*, Vol. 100, No. 11, Nov. **1972**, pp. 819–824.

Frank, Neil L., "Atlantic Tropical Systems of 1972," *Monthly Weather Review*, Vol. 101, No. 4, Apr. **1973**, pp. 334–338.

Garstang, M., "A Review of Hurricane and Tropical Meteorology," *Bulletin of the American Meteorological Society*, Vol. 53, No. 7, July **1972**, pp. 612–630.

Gray, William M., "Global View of the Origin of Tropical Disturbances and Storms," *Monthly Weather Review*, Vol. 96, No. 10, Oct. **1968**, pp. 669–700.

Kalstrom, George W., "El Cordonazo — The Lash of Saint Francis," *Weatherwise*, Vol. 5, No. 5, Oct. **1952**, pp. 99–103, 110.

Sadler, James C., "Tropical Cyclones of the Eastern North Pacific as Revealed by TIROS Observations," *Journal of Applied Meteorology*, Vol. 3, No. 4, Aug. **1964**, pp. 347–366.

Tubbs, Anthony M., "Summer Thunderstorms Over Southern California," *Monthly Weather Review*, Vol. 100, No. 11, Nov. **1972**, pp. 799–807.

U.S. Department of Commerce, NOAA, "Rough Log, North Pacific Weather—August and September 1972," *Mariners Weather Log*, Vol. 16, No. 6, Nov. **1972**, pp. 403–414.

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