TOTAL SUN ECLIPSE RECORDED BY RADIO

'Observations' in a Heavy Rain on Attu Yielded New Data, Astronomers Are Told

By CHARLES A. FEDERER Jr.
Of Harvard College Observatory
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HAVERFORD, Pa., Dec. 29—During a heavy rainstorm that passed over the island of Attu in the Aleutian Islands on Sept. 12, radio astronomers from the Naval Research Laboratory successfully "observed" a total eclipse of the sun.

A long-focus optical camera brought along to take direct photographs of the solar corona, the sun's outermost atmosphere best seen only during a total eclipse, proved useless. But "observations" by radio at wave lengths of sixty-five, ten, and three centimeters were complete. Only radio reception at a wave length of eight millimeters was impossible through the rain-filled atmosphere.

Dr. John P. Hagan, Grote Reber, Fred T. Haddock and other scientists of the Naval Research Laboratory described their radio telescopes to the meeting of the American Astronomical Society here today.

The astronomers on the Aleutian island could not actually see spots on the sun, nor the coronal distribution of light. But coronagraphs (photographic telescopes) at the Climax, Col., and Sacramento Peak, N. M., stations of the High Altitude Observatory of Harvard University and the University of Colorado provided the ne-

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cessary observations to compare visual and radio phenomena. Data procured for several days before and after the eclipse were used.

Measuring by Radio

In the project on Attu, the "collector" of radio waves of sixty-five centimeters in wave length was a mirror ten feet in diameter with a focal length of three feet. It was connected to a superheterodyne receiver used with two stages of amplification. Measurements of solar radio intensity were made from two to four times a minute and the sky at 90 degrees from the sun was used as a zero reference. Similar apparatus was used for the shorter wave lengths.

The ten-centimeter and three-centimeter receivers were kept covered with plastic raincoats during the storm. The loss of energy was estimated at about 15 per cent in the first instance and 50 per cent in the second, but in no way affected the validity of the observations.

The minimum value of the radio intensity at sixty-five centimeters occurred two minutes after optical totality, probably due to the presence of excitation in the sun's corona that was associated with a large group of spots near the east limb of the sun. Another large group of sunspots was near the center of the solar disk, and a marked fall and rise of the sun's radio energy was observed when the moon covered and uncovered this group.

The sun was not entirely eclipsed by the moon in radio waves, for the intensity at minimum was about one-fourth that of the normal unobscured sun. For certain wave lengths the sun's "radio diameter" is about 20 per cent greater than its visible diameter.

From its radio radiation, the temperature of the sun and its atmosphere can be inferred. Radio astronomers obtain solar temperatures that are not in all respects in agreement with those of previous workers using photographic and spectrographic means. Both optical and radio observations at future eclipses, such as that expected in February, 1952, in the Eastern Hemisphere, are needed to solve such problems as how the sun's corona attains a temperature of a million degrees or more.