from the earth and its atmosphere, the moon, and a rainstorm as well as the enhanced emission of active regions on the sun are taken into account. On the day of the eclipse the sun was relatively quiet. Only three spot groups were visible; one near the eastern limb, one near the center of the disk, and one small group. The eclipse curves show the effect of immersion and emersion of the spot groups. Comparison is then made between the measured radio eclipse curves and those based upon various hypothetical radio brightness distributions across the solar disk, such as discussed by Hagen in the next abstract.

The 10 cm wave length curve was affected adversely by a heavy rainstorm. It is estimated that the rain reduced the sun readings 15 to 30 per cent. It is also estimated that the enhanced emission over and above the quiescent radiation was less than 50 per cent of the "quiet" emission. This is a relatively low value for 10 cm radiation and is consistent with the small amount of solar activity noted on the day of the eclipse.

It is possible to distribute the amount of enhanced emission among the various regions of solar activity so as to obtain as close a fit as possible to the hypothetical eclipse curves for the quiet sun after the effect of these enhanced sources is subtracted from the measured eclipse curve.

If we assume that the 10 cm wave length emission remaining after this correction is of thermal origin, then the analysis appears to favor the model based on temperatures below $30,000^{\circ}\text{K}$ in the lower chromosphere. It can also be concluded that if the area of the source of the enhanced radiation is the same as the associated sunspot area then the intensity of the source is equivalent to that of a black body radiator at about 4×10^7 $^{\circ}\text{K}$, which is the same order as that obtained by Covington¹ during the partial eclipse of November 23, 1946.

The 3 cm data were more seriously affected by the rainstorm. It is estimated that the sun reading was reduced 35 to 50 per cent by the rain. After the corrections were made for the effect of the rain and the shape of antenna beam across the disk, background emission, the thermal radiation from the moon, and the enhanced emission (only about 6.5 per cent) the magnitude and shape of the corrected curve around totality agreed quite well with the thermal emission hypothesis. The corrected curve fell between the two curves derived from limb brightening models and therefore does not favor either. Although

little weight can be given this 3 cm observation because of the effect of rain and loss of data, it is believed that during the five-minute period around totality, which is the sensitive zone for discriminating between various models, that the effect of rain remained fairly constant. The sharp dip in the eclipse curve at totality occurs at the correct time and has the right form as that expected from a bright limb distribution of radio emission expected on the "quiet" sun theory of thermal emission rather than a uniform or a limb-darkened sun. It was also concluded that if the area of the radiating source of enhanced emission is the size of the spot, then the intensity is equivalent to a black body radiator at about 2×10^6 $^{\circ}\text{K}$, which is lower than that for the 10 cm data, as would seem reasonable.

In conclusion then the results at 10 cm appear to give evidence in favor of a relatively cool lower chromosphere and at 3 cm there is some evidence in favor of "limb brightening."

1. *Nature* **159**, 405, 1947.

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**Hagen, John P. Naval Research Laboratory
eclipse expedition to Attu, Alaska, September
12, 1950.**

During the last decade radio-frequency measurements of the intensity of the radiation of the sun were made over that part of the radio-frequency spectrum where our atmosphere is transparent. From these measurements temperature gradients in the sun's atmosphere have been deduced.^{1,2} Observations of the variation of this radio emission from the sun at centimeter wave lengths during a total eclipse offer a good means of confirming the deduction concerning the temperature gradients in the sun's atmosphere as well as a means of evaluating the effect of disturbed areas such as those associated with sun spots.³

This eclipse was observed on the island of Attu, Alaska, and results were obtained at 64, 10 and 3 cm wave lengths. A storm which passed over the island on the day of the eclipse contained high winds and rain. This did not seriously affect the work at the longer wave lengths just mentioned but excluded measurements at 8 mm wave length due to the high and variable attenuation in the rain-filled atmosphere.

Four radiometers designed to operate at 65 cm, 10 cm, 3 cm, and 8.5 mm wave lengths were installed. Each consisted of a parabolic reflector,