Comments and Communications

Bursts of Solar Noise at 45 Mc Accompanying the Large Sunspots of 1947

The recent interest aroused during the present period of solar activity in the investigation of radiation of radio frequencies from the sun, for the most part of microwave dimensions, suggests that some results obtained with relatively simple apparatus at the Cosmic Terrestrial Research Laboratory in Needham in the region of 45 mc may be of interest.

The receiving antenna on the roof of the laboratory consisted of a single dipole tuned to the 40- to 50-mc band, erected at an angle to the horizontal of 45° atop a vertical mast. The longitudinal axis of the dipole was directed north and at this latitude (42°.4) was therefore approximately parallel to the earth's axis. Considering the broad loop pattern of the single dipole, it may be said that the antenna was thus broadside to the diurnal arc of the sun and thus required no mechanism for rotation. Since the extreme range of solar declination is from −23°.3 to +23°.3, little variation in reception could be expected from day to day or month to month on account of change in solar declination.

Furthermore, the mast supporting the dipole was arranged to be rotated through 180°, thus making it possible, for check purposes, to direct the axis of the dipole at any moment toward the sun for a determination of a null point of reception. The transmission line from the dipole consisted of a RG 59U shielded line. This was connected to a Hallicrafter S36 receiver tuned approximately to 45 mc, a band selected free from receivable broadcast reception at the laboratory. The recorder used was a Cambridge Instrument thread recorder, registering momentarily dot records of the position of the galvanometer pointer at intervals of 1 min. At the occasion of the very large sunspot of March 9, 1947, passing near the central meridian of the sun, a burst of solar noise occurred soon after sunrise, exceeding the limits of the scale of the recorder, which was slightly in excess of 2 microvolts. The burst lasted for somewhat over 1 hr and was followed by additional bursts with off-scale readings between 3:00 and 5:30 P.M., subsiding at sundown.

Again on the following day, March 10, 1947, shortly after sunrise, a fresh burst occurred, again sending the needle off scale between 10:00 and 11:00 A.M. This disturbance subsided near noon, but was followed between 3:00 and 5:00 P.M. by two additional bursts of approximately 2 microvolts equivalent CW reception at the receiver. During each of these bursts, the dipole was turned in azimuth 180° to obtain a null point, whereupon the recorder immediately fell to near zero, corresponding to the threshold value of residual extraneous noise. This gave assurance that the disturbances noted were definitely of solar origin and were undoubtedly associated with the large sunspot. Minor bursts of less significance occurred on March 11 and 13. A graphical representation for the interval March 2–March 12 is shown in Figs. 1 and 2.

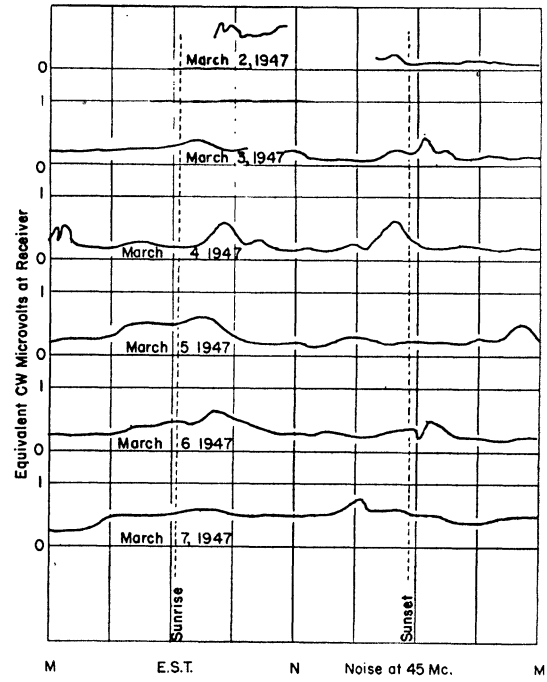

FIG. 1. M = midnight, N = noon.

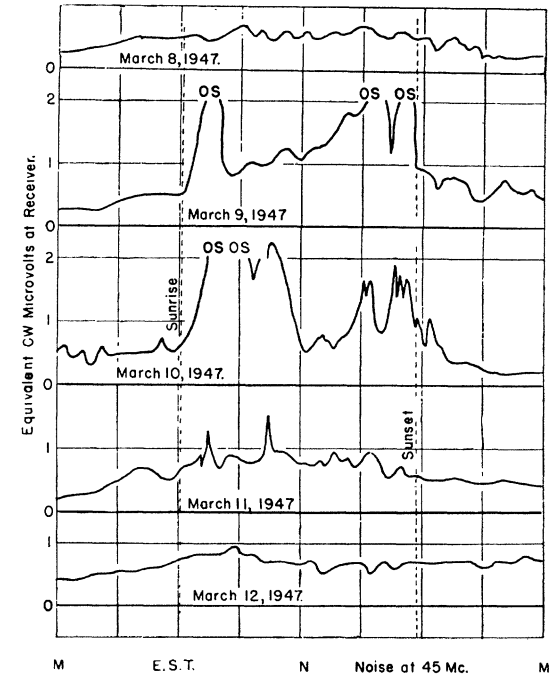

FIG. 2. M = midnight, N = noon, OS = off scale.

Tuning tests made during the occasion of the bursts indicated broad band emission.

The next occasion when conspicuous solar noise was recorded was on April 6, again with the appearance of a very large sunspot group. This was followed by a similar occurrence on April 15. In the interim, the sensitivity of the recording apparatus had been improved and at the same time the scale extended, thus avoiding any off-scale readings and making possible records of equivalent CW reception between 2 and 3 microvolts. A graphical exhibit of the burst of April 6, again at 45 mc, with the control records of April 5 and 7, is shown in Fig. 3.

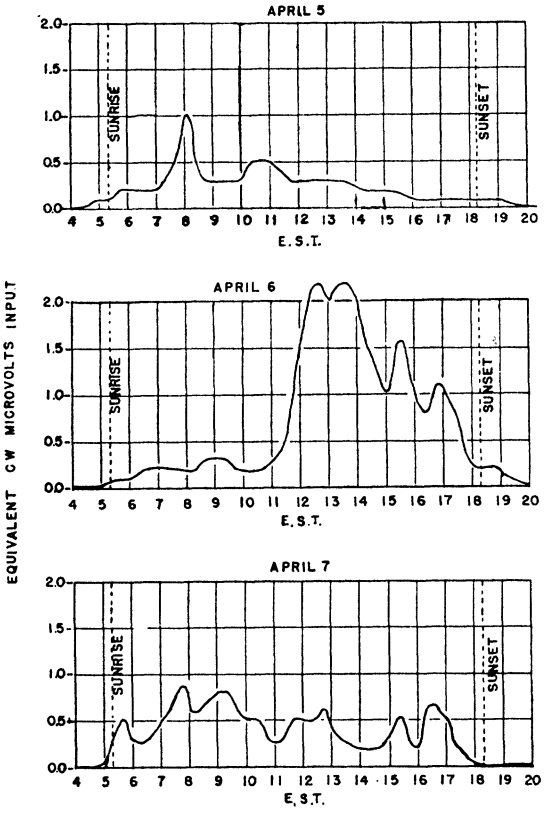

FIG. 3. Solar emission at 45 mc accompanying large sunspot of April 5–6–7, 1947.

With the return of the same active area on the sun early in May, noise bursts were again noted. On May 20, these were coincident with certain solar fade-outs on our recorders of WWV at 5-, 10-, and 15-mc frequencies.

It had been anticipated that, with the continuation of solar activity, other bursts of comparable magnitude would be recorded. However, although the dipole and the recorder have since been in continuous operation, no bursts of such magnitude as those accompanying the sunspot of March 8 and 9 and of April 6 have been recorded.

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Beta-Glucuronidase

In conjunction with studies on beta-glucuronidase activity, interesting data were obtained from newborn infants. Infant cord blood was found to possess less beta-glucuronidase activity than maternal venous blood, thus confirming an earlier report (Donald F. McDonald and Lester D. Odell. *J. clin. Endocrinol.*, 1947, 7, 535–542). However, within 10 days the activity of infant venous blood (jugular puncture) had increased several fold. In fact, these levels were in excess of those found in normal pregnant patients near term. There was no differentiation as to sex, nor was breast feeding responsible. This observation may relate to the susceptibility of newborn infants to the formation of edema. It is known, for example, that pregnant women who develop preeclampsia, a syndrome associated with edema and difficulty in excreting NaCl, likewise exhibit an increased activity of beta-glucuronidase in the blood serum (Lester D. Odell and Donald F. McDonald. *Amer. J. Obstet. Gynec.*, July 1948).

BETA-GLUCURONIDASE ACTIVITY

Infant and Maternal Blood Serum

Identification	Maternal	Cord	Infant 10 days
260680	372	159	734
397239	466	204	921
296090	429	101	501
352844	367	283	379
422196	619	269	845
426787	408	39	945
392237	562	174	920

Infant Urine
Day of life

0	1	2	3	4	5	6	7	8	9	10
8	111	555	155	670	157	232	136	74	525	845
28		520	1,000	182	84			93		703
9					577					298
2										
4										

(Single determinations on different infants.)

Amniotic Fluid

Identification	Maternal serum	Amniotic fluid	Infant urine*	Cord serum
392237	562	391	9	174
434537	530	157	2	

* Within 10 min of birth. Figures express gamma-phenolphthalein liberated/100 cc of serum or urine/hr. The method of analysis was that described by W. H. Fishman and B. Springer (to be published), which employs phenolphthalein glucuronide as substrate and which is an improvement over a previously reported method (P. Talahay, W. H. Fishman, and C. Huggins. *J. biol. Chem.*, 1946, **166**, 757–771).

The activity of beta-glucuronidase in infant urine was also of interest. At birth there was little activity, but this again increased during the first 10 days of life. There was no differentiation as to sex, nor was breast feeding responsible. The amniotic fluid was considerably higher in enzyme activity than the urine of newborns but less than maternal blood serum. Therefore, it is assumed that the beta-glucuronidase contained in amniotic fluid does not originate from fetal urine. Whether this