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Solar Radio Bursts at Night

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The records shown in Figure 1 represent the level of 18-Mc/s galactic noise received on four simple vertically beamed antennas distributed around the world. In Hawaii and Boulder, local time at 22 hours UT on May 25, 1965, was noon and 3 P.M., respectively. Exceedingly strong solar bursts appear throughout the observing period from 2000 to 2300 UT; an especially intense burst appears at 2242 UT. The flux density of this burst exceeds the level that we can measure reliably, but we crudely estimated its value as 10^{-18} watt m^{-2} cps^{-1}.

The great burst appears clearly on both the Manila record, at about 7 A.M., and on the Rome record, at about midnight local time. Earlier bursts, beginning at 2004, 2200, and 2209 UT, also appear in the Rome record, corresponding to 9 and 11 P.M. We estimate the flux density in Rome as 3×10^{-21} watt m^{-2} cps^{-1}, on the assumption that the antenna collecting area is 225 m^2.

All of these bursts appeared on the Boulder radio spectrograph where they were classified (CRPL F-Series, Part B, June 1965) as type III (fast-drift) bursts. On that equipment, the bursts drove the receiver more strongly toward saturation than any solar emission ever before recorded. Observers at the station examined the radio spectrum during the bursts. They concluded that the equipment had malfunctioned as a result of a rain storm, and labeled the Boulder record accordingly (see Figure 1).

Night bursts have been previously reported in the literature [*Smith et al.*, 1959; *Warwick*, 1963]. However, these were isolated single events. The present example is, to our knowledge, the first case established where a succession of bursts propagated into the night hemisphere. Since moonrise on May 25, 1965, at Rome occurred at about 2 A.M., we conclude that the radiation was not reflected from the moon into the night hemisphere. On the other hand, trapping of this very strong burst in the sunlit hemisphere, followed by its normal propagation around the world, seems a plausible explanation. Because the bursts were observed over a two and one-half hour period, it seems unlikely that antipodal propagation [*Wells*, 1958] is involved.

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