

Figure 3. EMA 1 and EMA 2 data (10-minute averages). ("V/m" denotes volts per minute.)

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References

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Coordinated satellite and antarctic ground-based measurements of precipitating electrons

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An electron precipitation event occurred near 2300 universal time (UT) on 27 June 1982 in the vicinity of South Pole Station; we investigated it using bremsstrahlung X-ray mapping data taken from two satellites and using ground-based riometer and magnetometer data. This collaborative effort involved scientists from several laboratories, and the results have been submitted for publication in the *Journal of Geophysical Research* (Imhof et al. in preparation). The feature of greatest interest was an intense spike of approximately 10-seconds duration and limited spatial

extent. In the figure, the X-ray intensity vs. time profiles for the spike are compared with the cosmic-noise absorption measured at South Pole Station. The ratio of X-ray counts in channel 2 to those recorded in channel 1 are plotted in the bottom section of the figure to provide a measure of the spectral changes with time. After approximately 2301 UT the riometer absorption decreased rapidly while the X-ray fluxes emitted from a large area at the south polar region remained relatively constant. This behavior indicates that after occurrence of the spike, the region of precipitation moved away from the South Pole Station.

In cooperation with T. Rosenberg at the University of Maryland, we are now in the process of comparing ground-based riometer and satellite bremsstrahlung X-ray measurements for several events in 1982 and 1983. Additional coordinated data are being acquired in 1984 for eventual analysis. Some of the most promising times of coordination are listed in table 1.

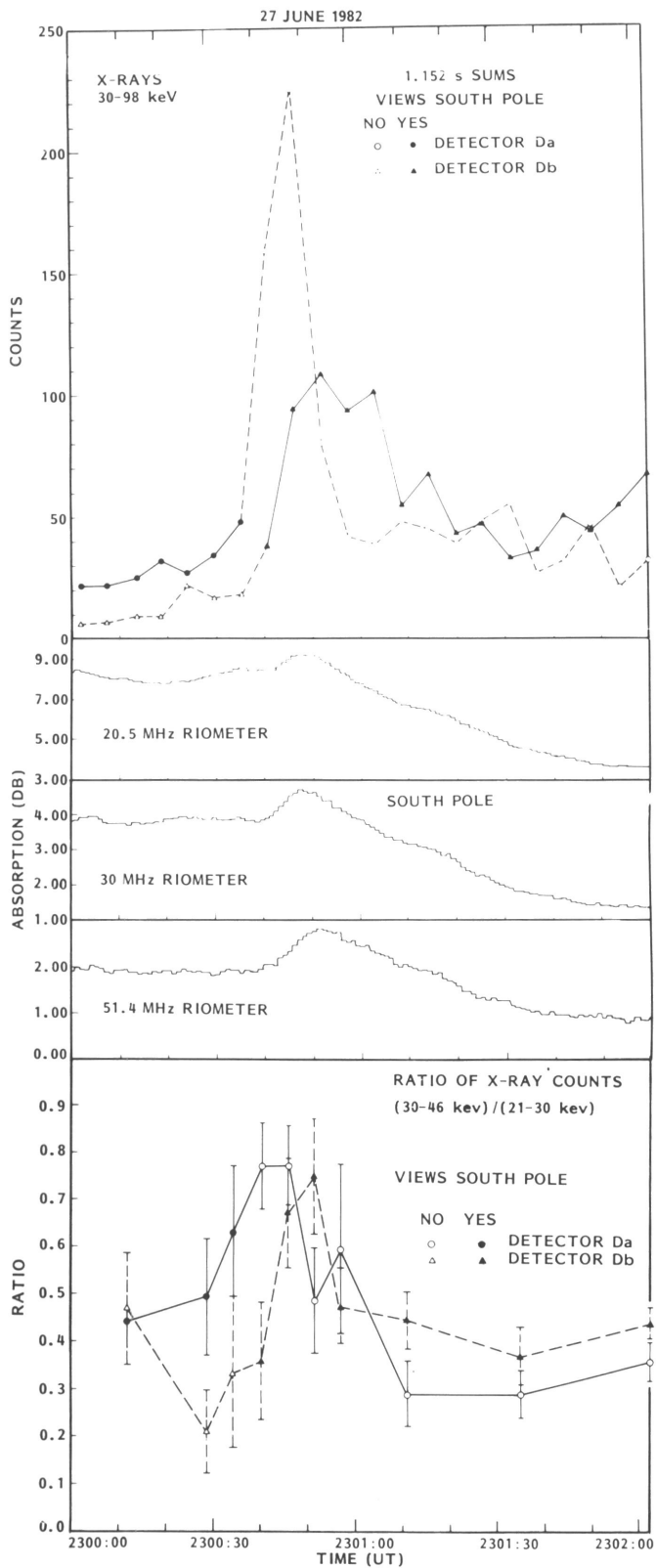
Comparisons are being made between the bremsstrahlung X-ray intensities and energy spectra measured from balloons launched at Siple Station and the precipitating electrons observed from the P78-1 satellite during the 1980-1981 campaigns. The satellite data were taken with fine angular (approximately 3°) resolution and cover electron energies from 68 kiloelectronvolts to approximately 1 megaelectronvolts. From the measured pitch-angle distribution near the edge of the loss cone, calculations are being made of the expected bremsstrahlung X-ray production and these are compared with the X-rays observed from the balloons. Some of the events being studied are listed in table 2.

Table 1. List of time intervals for which coordinated riometer and X-ray measurements are being analyzed

Date	Time interval of interest (in universal time)
3 March 1982	1041-1047
18 July 1982	1247-1251
18 January 1983	1303-1308
18 January 1983	1438-1443
7 February 1983	1709-1716
13 February 1983	0757-0803
15 February 1983	0430-0436
20 February 1983	0039-0043
20 March 1983	0445-0450
31 March 1983	1422-1427

Table 2. List of coordinated electron X-ray events being studied

Date	Coordination time (in universal time)	Satellite longitude at 75°S latitude
30 December 1980	1923	86° W
5 January 1981	1921	88° W
6 January 1981	0313	80° W
13 January 1981	1917	85° W



The X-ray counts recorded per 1.152 seconds in each of the detectors Da and Db are plotted in the top section. The ratios of counts in channel 2 (30-46 kiloelectronvolts) to those recorded in channel 1 (21-30 kiloelectronvolts) in each of the spectrometers Da and Db are plotted in the bottom section. The riometer absorptions recorded at the South Pole at three different riometer frequencies are plotted in the three middle sections.



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Reference

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