

DAILY RADIATION STATISTICS FOR 1990

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Every day, the IUE satellite passes nearby or through the outer Van Allen radiation belts. The particles trapped in the belts effect normal operations by fogging the cameras on board IUE. The Flux Particle Monitor (FPM) is able to detect the level of radiation present as a voltage, which can then be used to determine the rate at which the cameras will fog. It is important to note, however, that the FPM can only detect electrons with a threshold energy of 960 KeV and protons with a threshold of about 15 MeV; particles of other energies can also effect the cameras. The fogging rate of the cameras is given by

$$DNs/hour = constant \times 10^{FPM},$$

where FPM is in volts, and the constant depends on the camera and the dispersion. For high dispersion, the values are: 0.7 for the LWR, 1.0 for the SWP and 1.3 for the LWP.

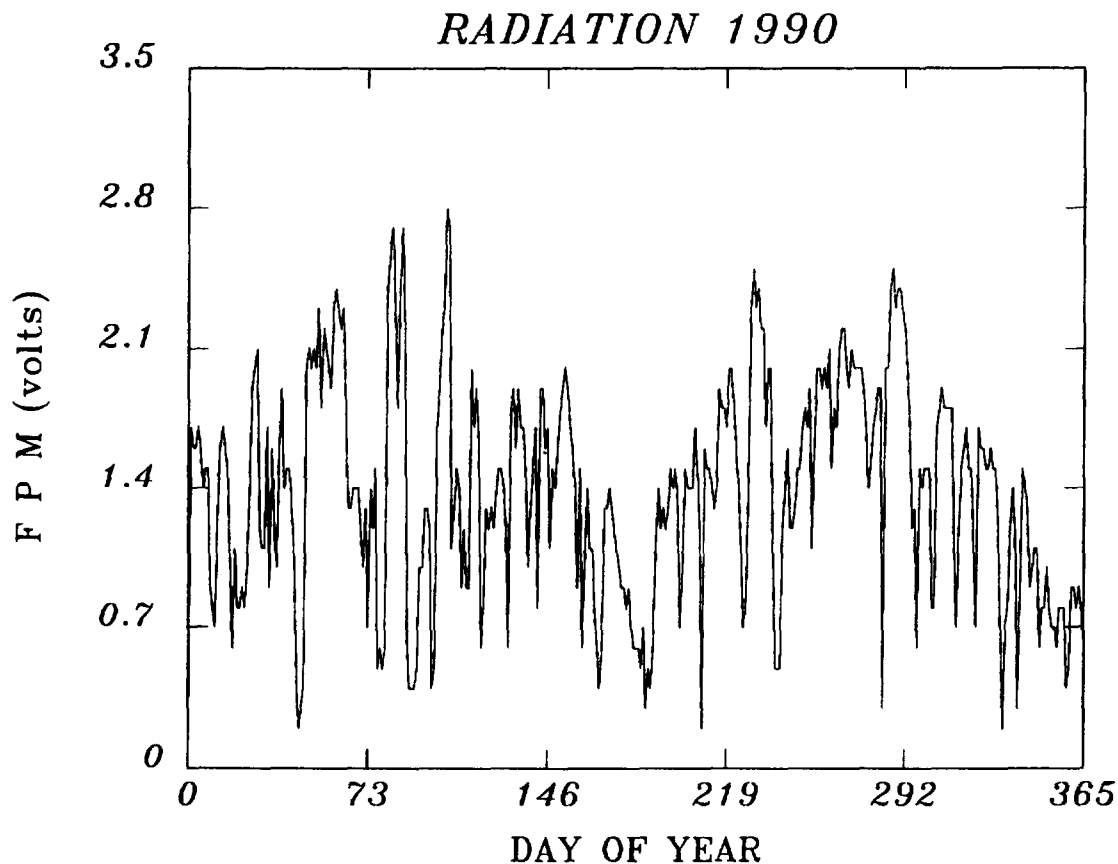


Figure 1

Daily peak values for the FPM

1990 daily peak values for the FPM (see Figure 1) were in general lower than in previous years. This is most likely explained by the increased solar activity seen in the last few years. The effect of solar activity on the peak FPM can be demonstrated by comparing data throughout the solar cycle:

Percentage of Days Affected

Year	Daily Peak FPM	
	FPM < 1.7 V	FPM ≥ 2.4 V
1981	58.4%	6.1%
1982	31.5	22.4
1983	21.1	36.6
1984	28.7	39.1
1985	26.0	37.5
1986	37.5	30.7
1987	49.9	19.7
1988	34.4	12.6
1989	61.1	12.1
1990	66.8	3.9

For days when the peak FPM reading is less than 1.7 volts, the fogging rate of the cameras is 50 DNs per hour or less. For high radiation days (peak FPM ≥ 2.4 volts) the fogging rate is 250 DNs per hour or higher at the time of the peak radiation. In general, the maximum FPM readings come during the US2 shift for a duration of about half the shift.

A trend started in mid-November 1990, and continued through early March 1991. The daily peak value of the FPM did not surpass the value of 1.7 volts during this period. Many guest observers were thus able to make longer exposures during the US2 shift. However, the daily peak cannot reliably be predicted far in advance. Radiation trends can change on a daily basis, and guest observers should be able to accommodate high radiation shifts on short notice.