

# Solar Proton Fluxes for 1989

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The current solar maximum has become a concern to the IUE project because of the effect of solar protons on its radiation environment, cameras and solar panels. Consequently, we are monitoring the available solar data. We have plotted here the FPM voltages and the solar proton fluxes for the year of 1989.

Solar proton data was provided by the Space Environment Laboratory Data Acquisition and Display System (SELDADS) of the National Oceanic and Atmospheric Administration. The data we use comes from the GOES-7 satellite, which is in geosynchronous orbit at 107 degrees West. The IUE satellite is in geosynchronous orbit at roughly 45 degrees West, so the solar proton fluxes will be similar to those at the GOES-7 station.

The solar protons are binned in three energy groups: greater than 1 MeV, 10 MeV and 100 MeV, expressed in units of particles per centimeter squared per second per steradian. There is one data point per hour for each of these bins. We have plotted the  $\log_{10}$  of these, and for comparison the daily peak radiation as measured by the Flux Particle Monitor (FPM) on board the IUE (from Loomis and Arquilla, this issue).

Figure 1 shows the radiation for the entire year of 1989. Only the daily maximum solar proton fluxes are shown here. Immediately obvious are the high-energy proton events in January, August, September and October. It appears that the increased solar proton fluxes have a weak but noticeable correlation with higher FPM readings. These events are actually quite rare: in 1989, the year with the maximum solar activity so far, there were only 10 events with over 10 particles  $> 100$  MeV (four of them in just a few days of October). These took up only 216 of the 8704 hours for which we have data, or 2.5% of the time.

It should be noted that although the  $> 100$  MeV proton events seem to provoke a period of high FPM values, the camera response to this high radiation is even greater than would be expected from these high readings (see Imhoff, this issue).

Figures 2 through 13 show the daily peak FPM and the hourly proton data for each month. In contrast to the increased FPM readings associated with the  $> 100$  MeV events, it seems that large numbers of low-energy protons may induce a subsequent decline in the peak FPM (see for example April 12 and May 6). This may be due to compression of the upper Van Allen belts by the solar wind to below the level of IUE's orbit.

Figure 1

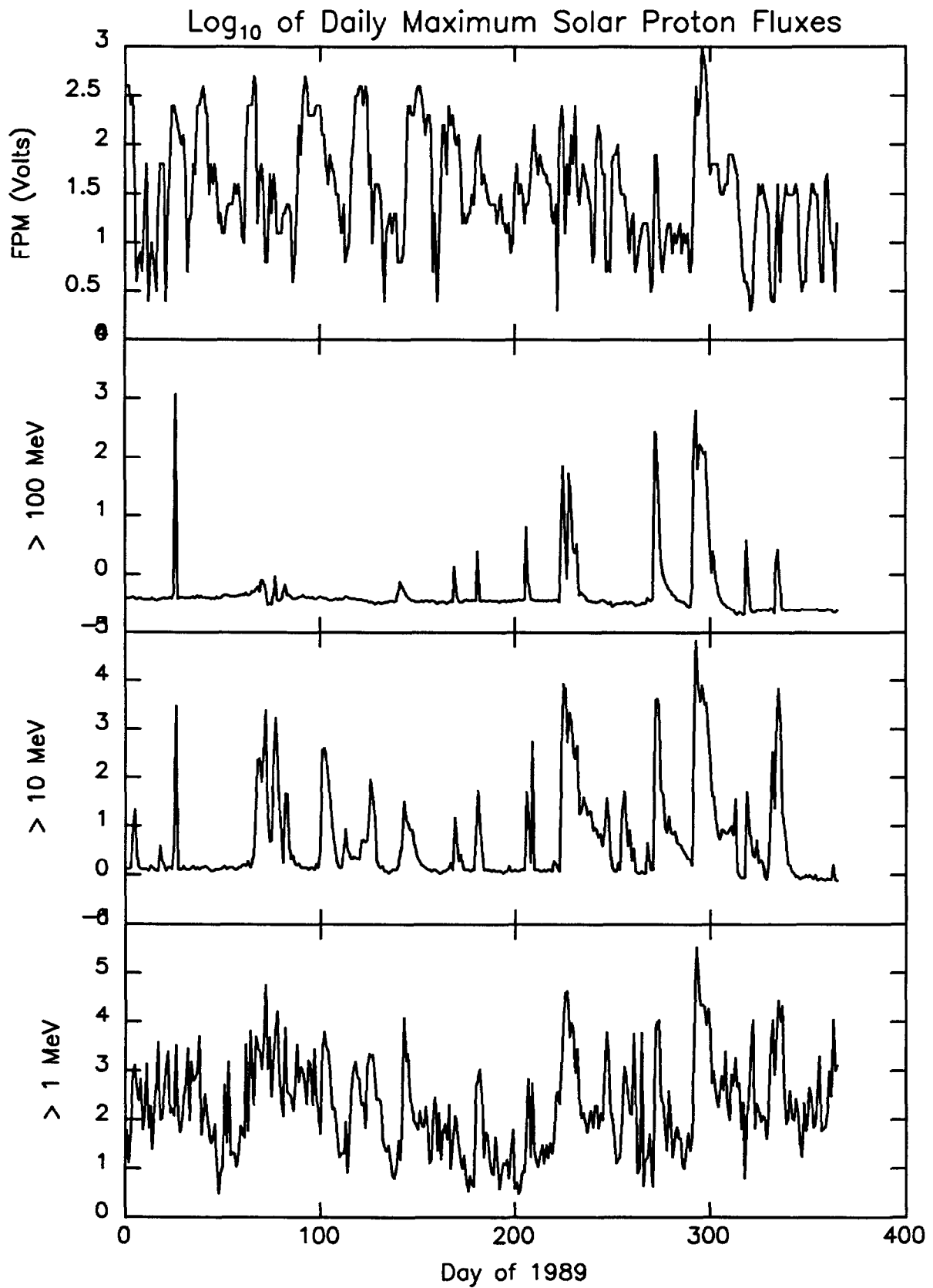


Figure 2

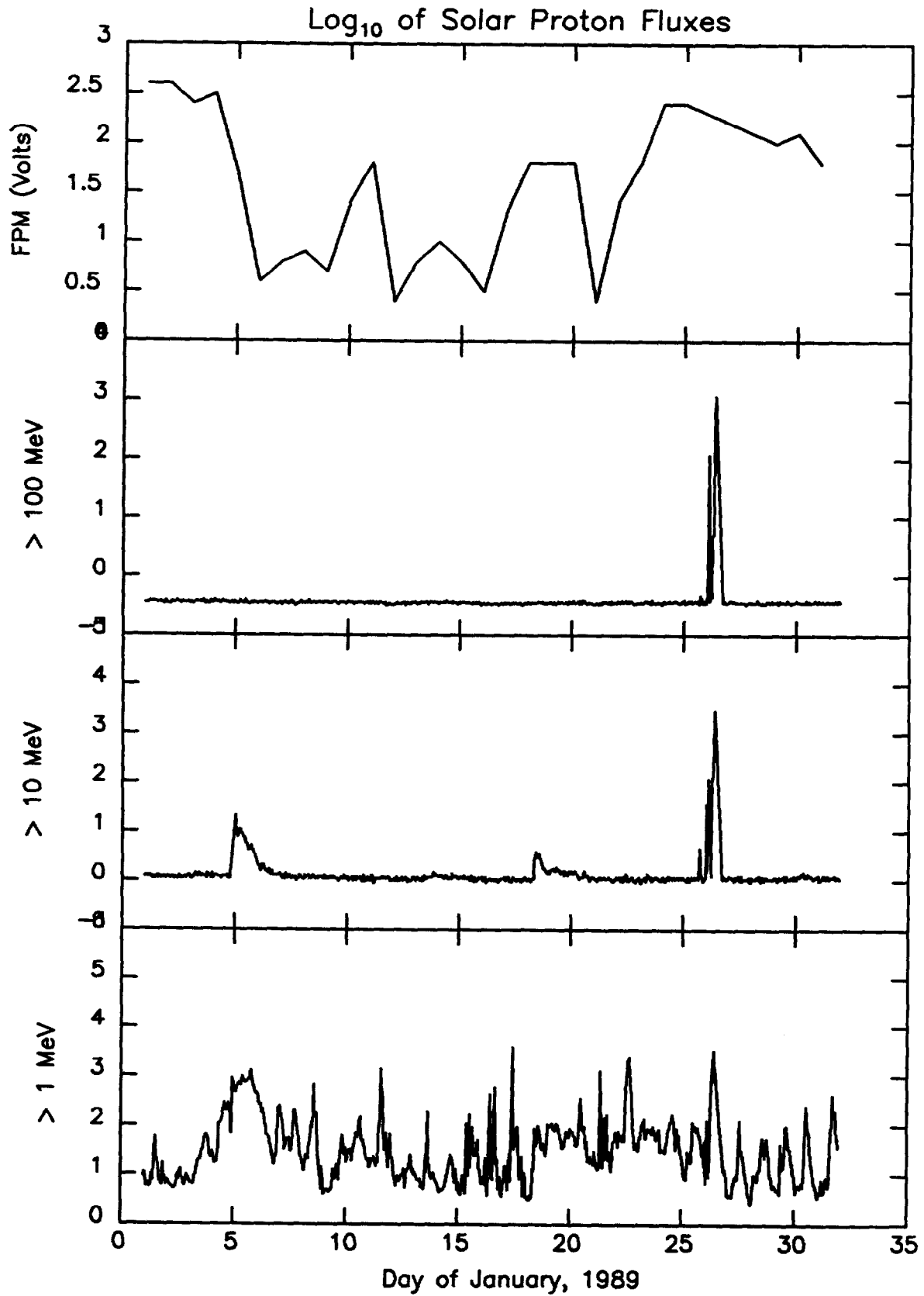


Figure 3

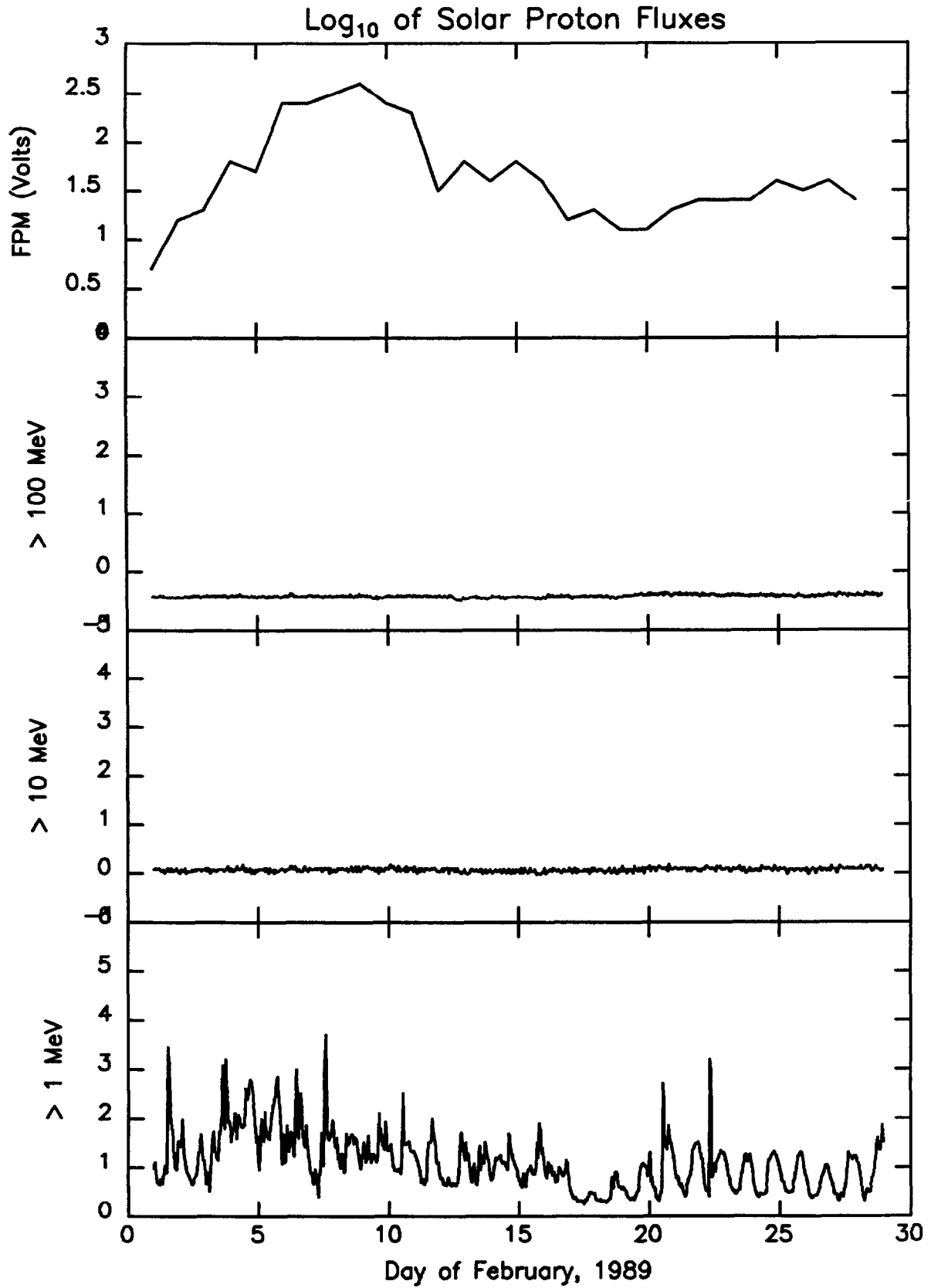


Figure 4

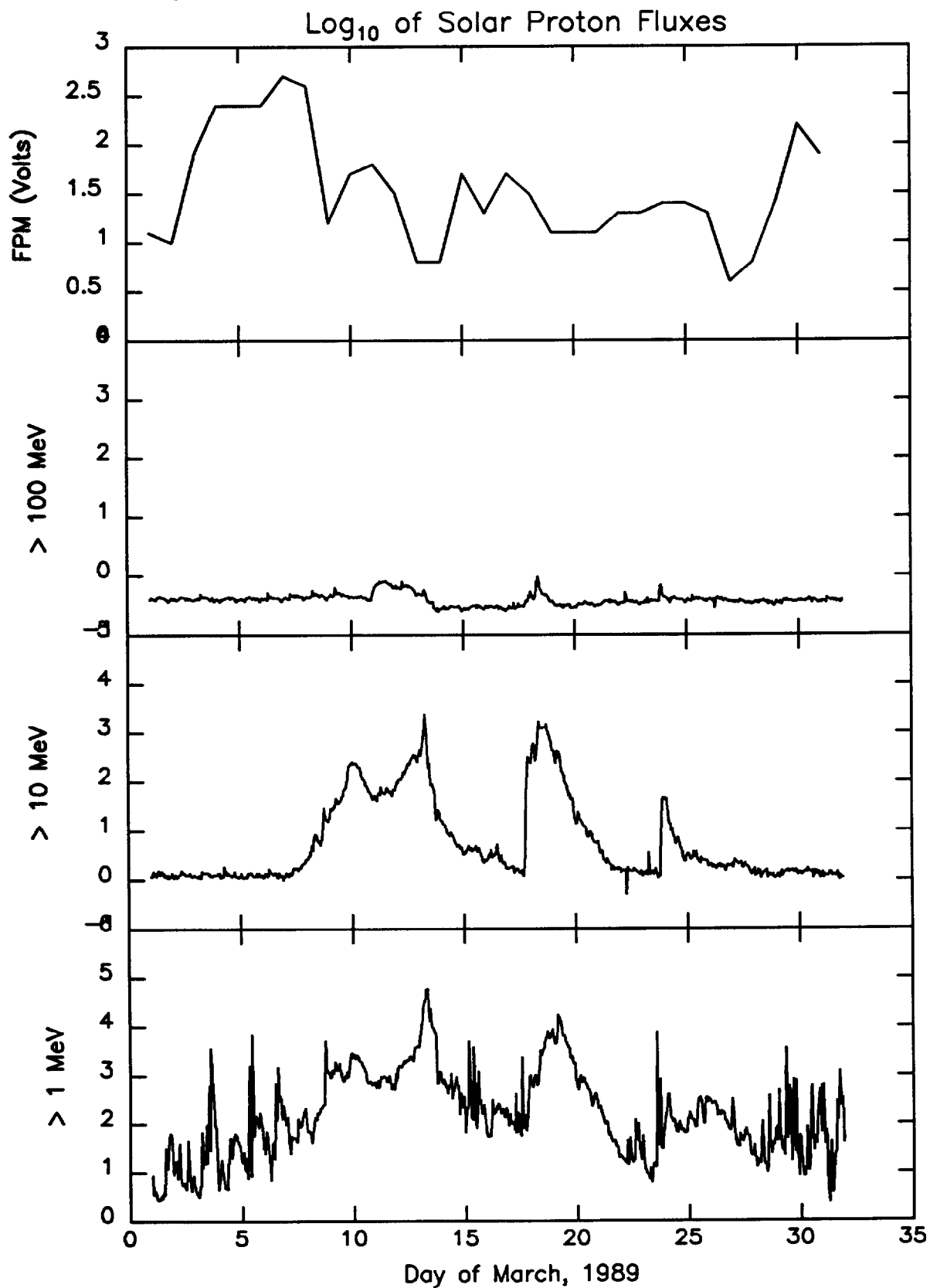


Figure 5

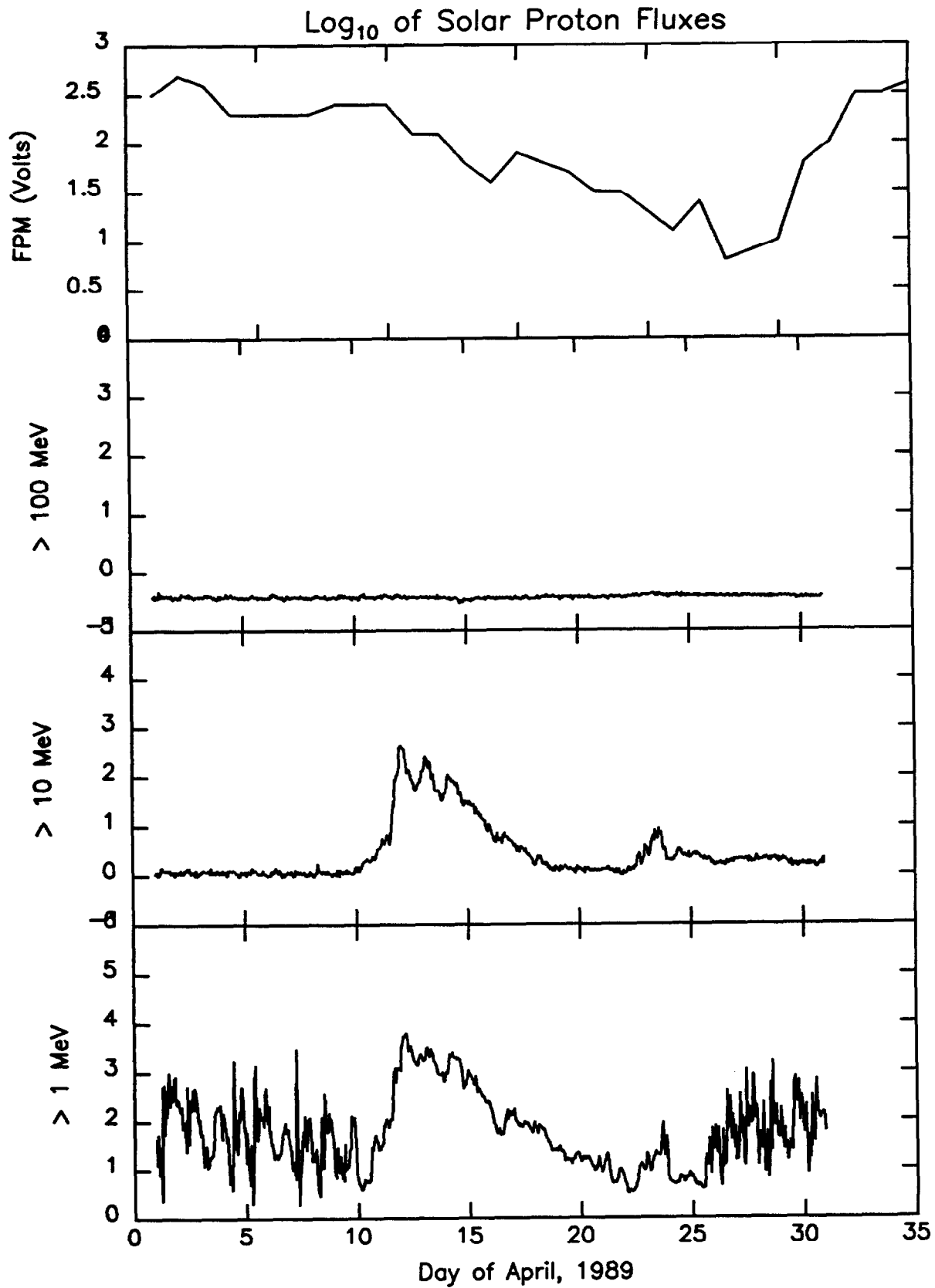


Figure 6

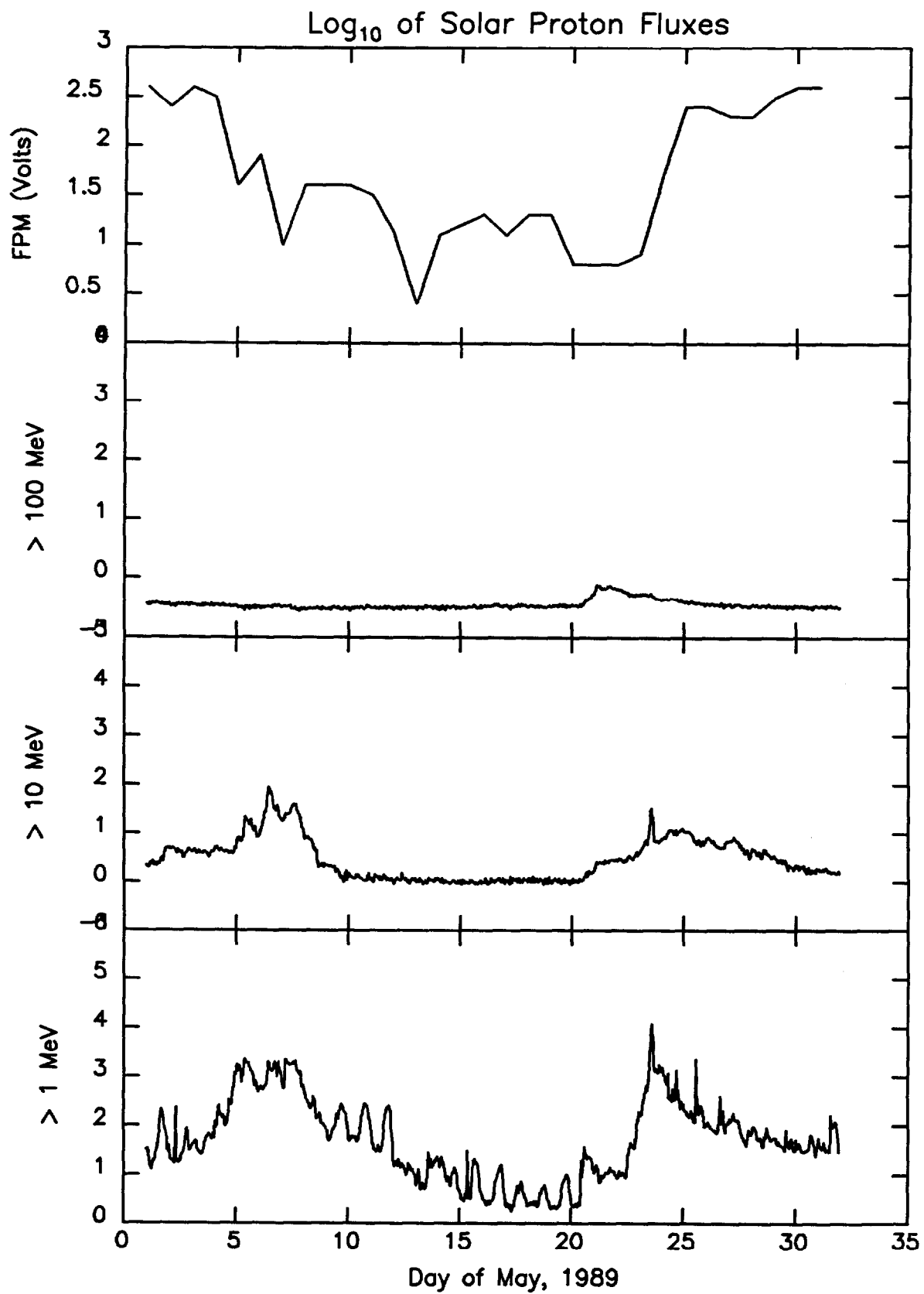


Figure 7

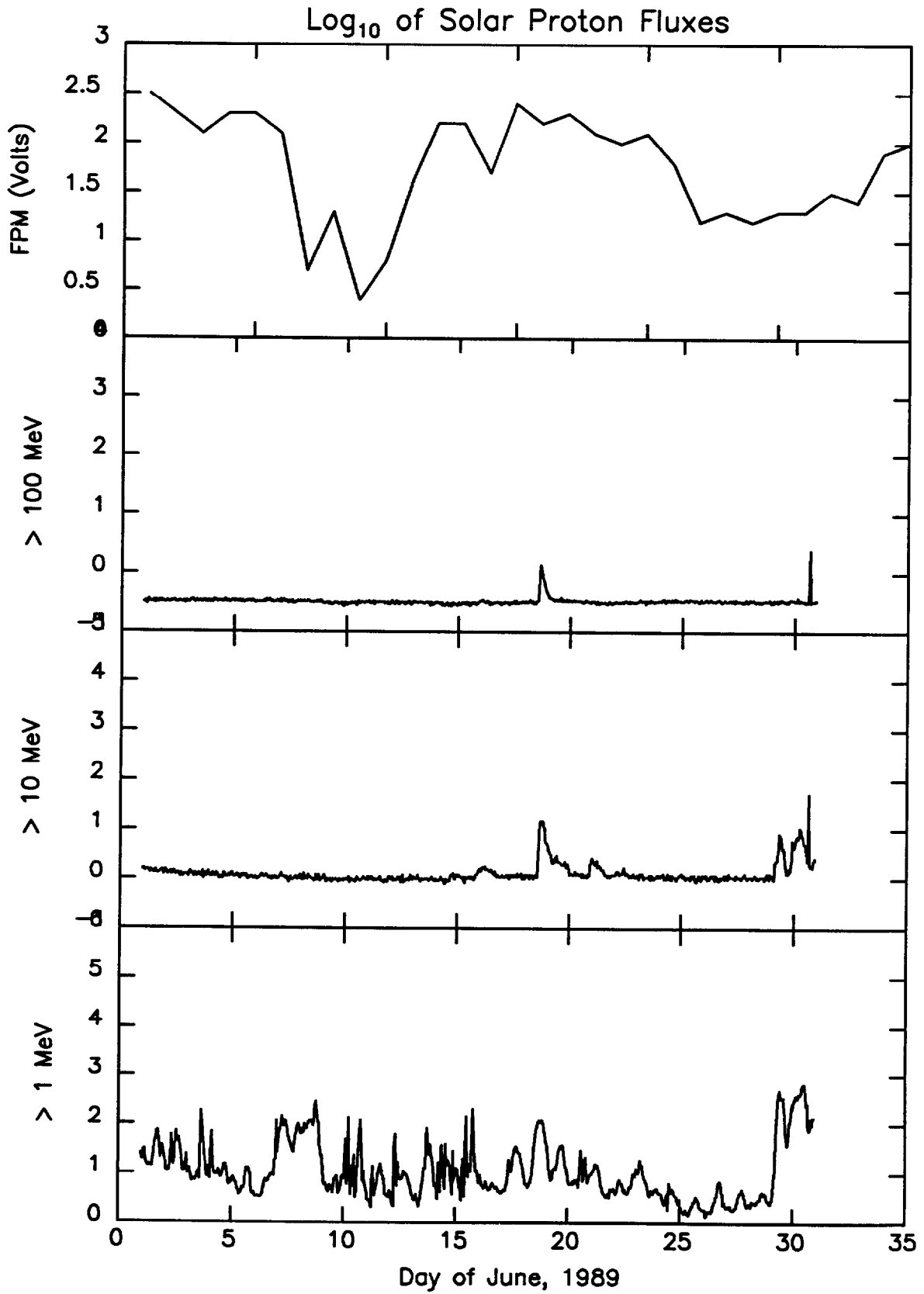




Figure 8

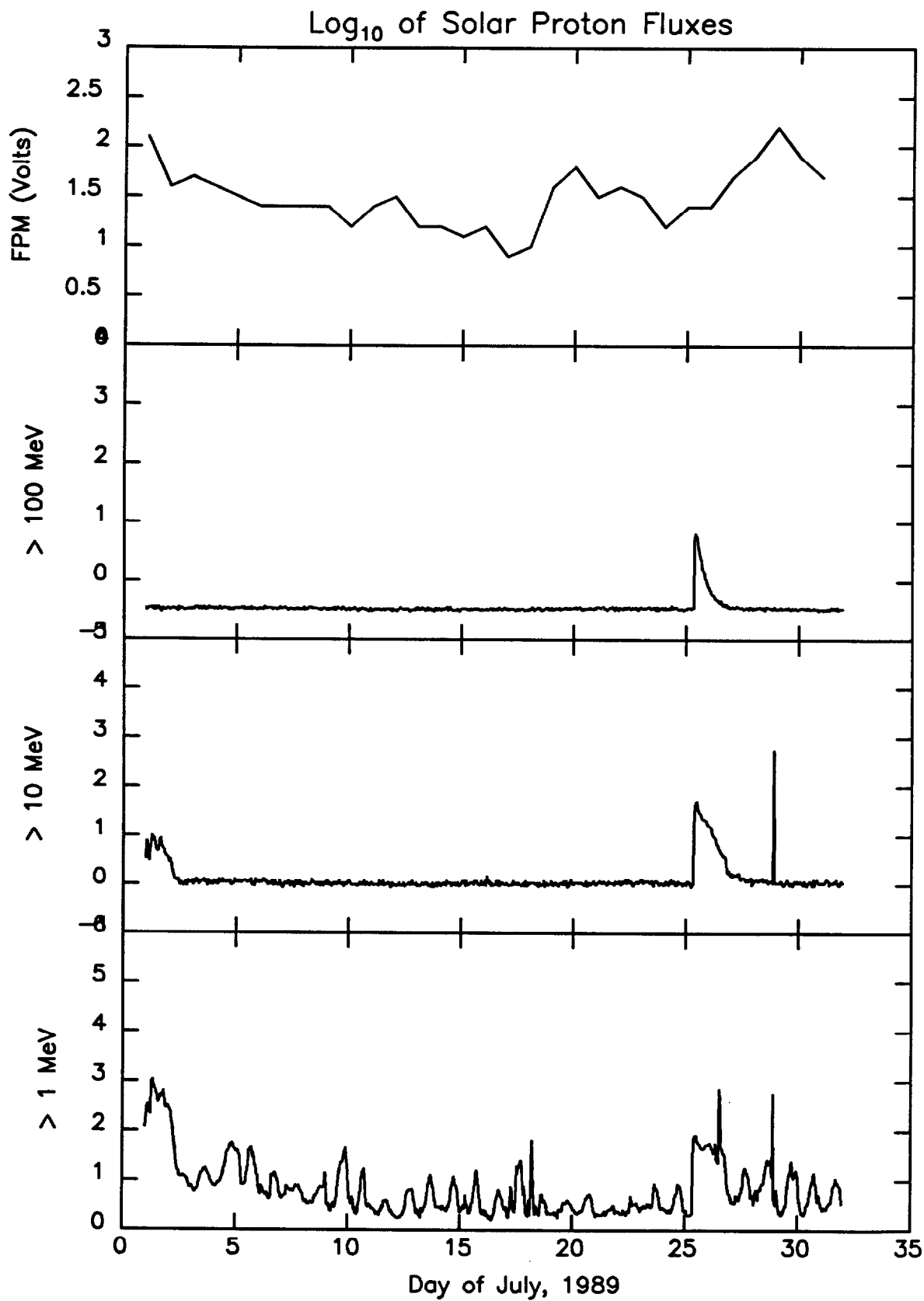


Figure 9

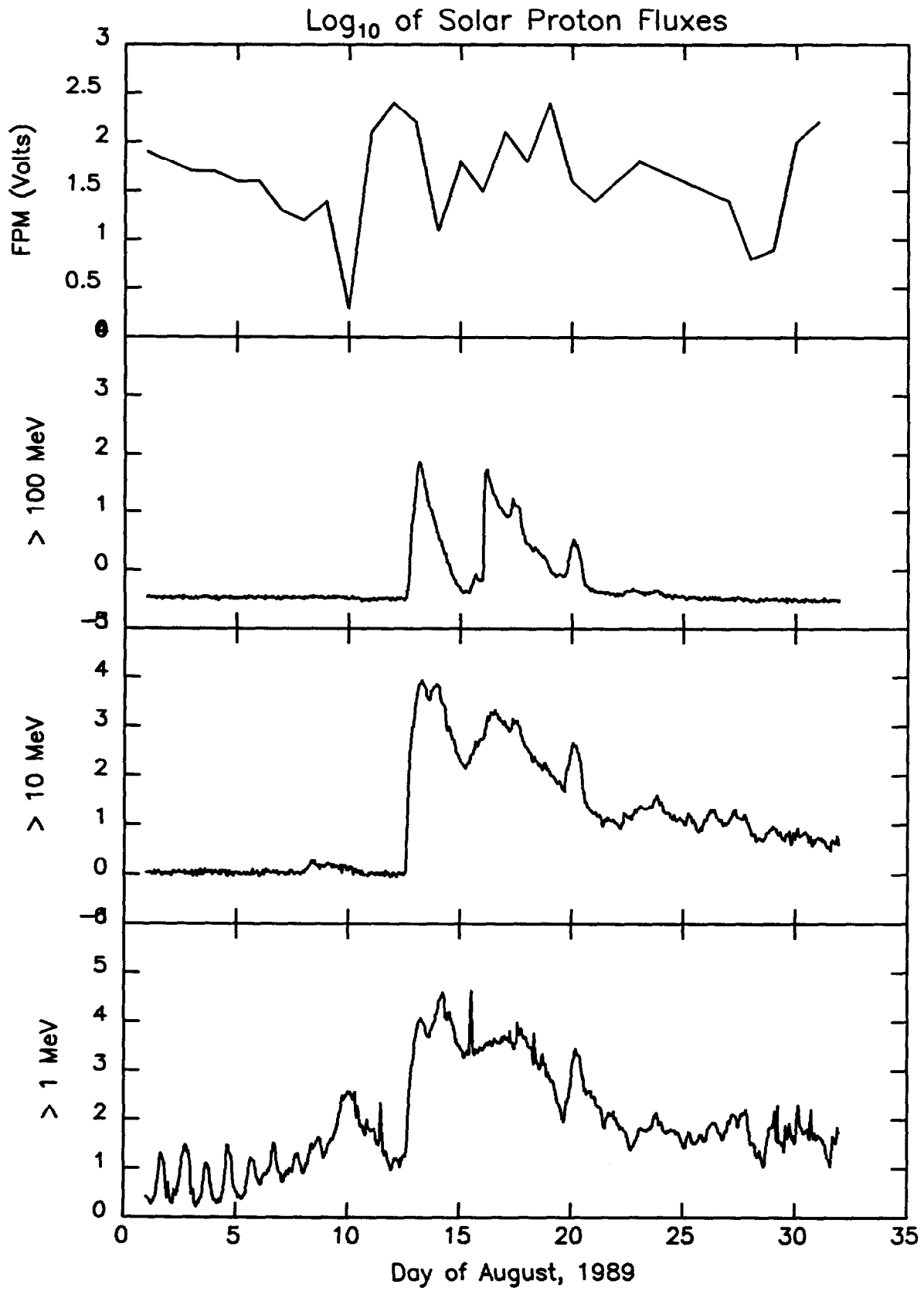


Figure 10

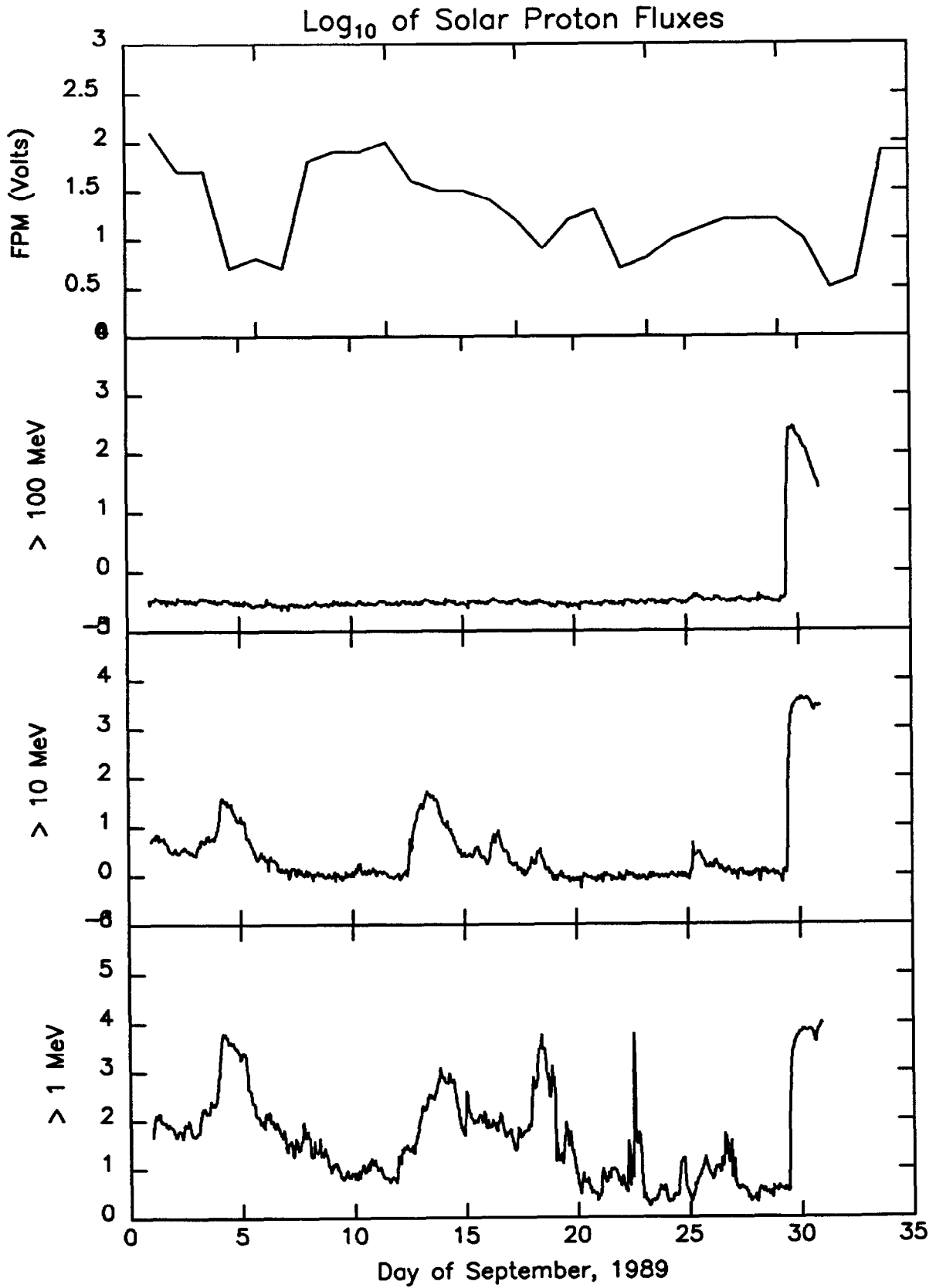


Figure 11

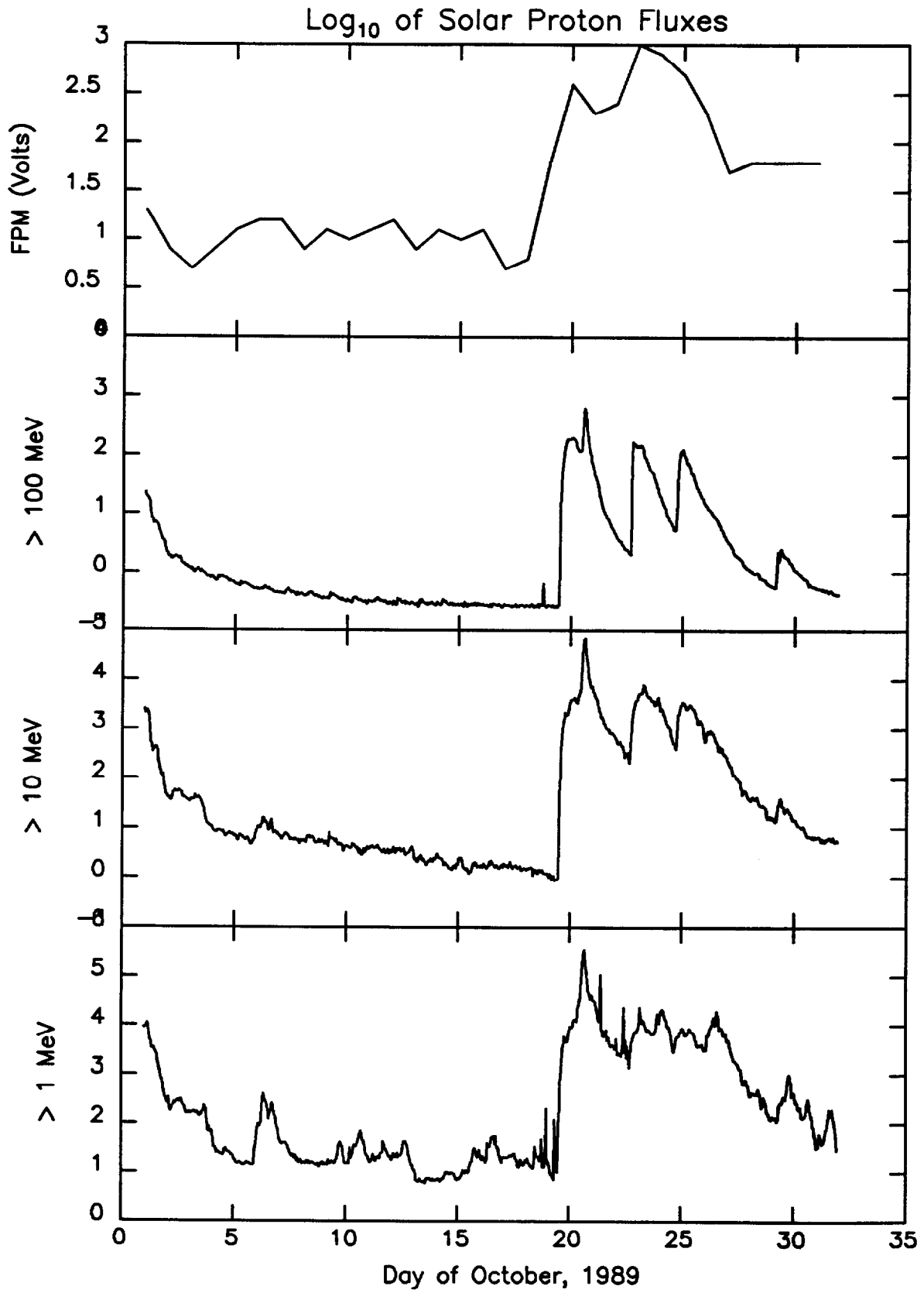


Figure 12

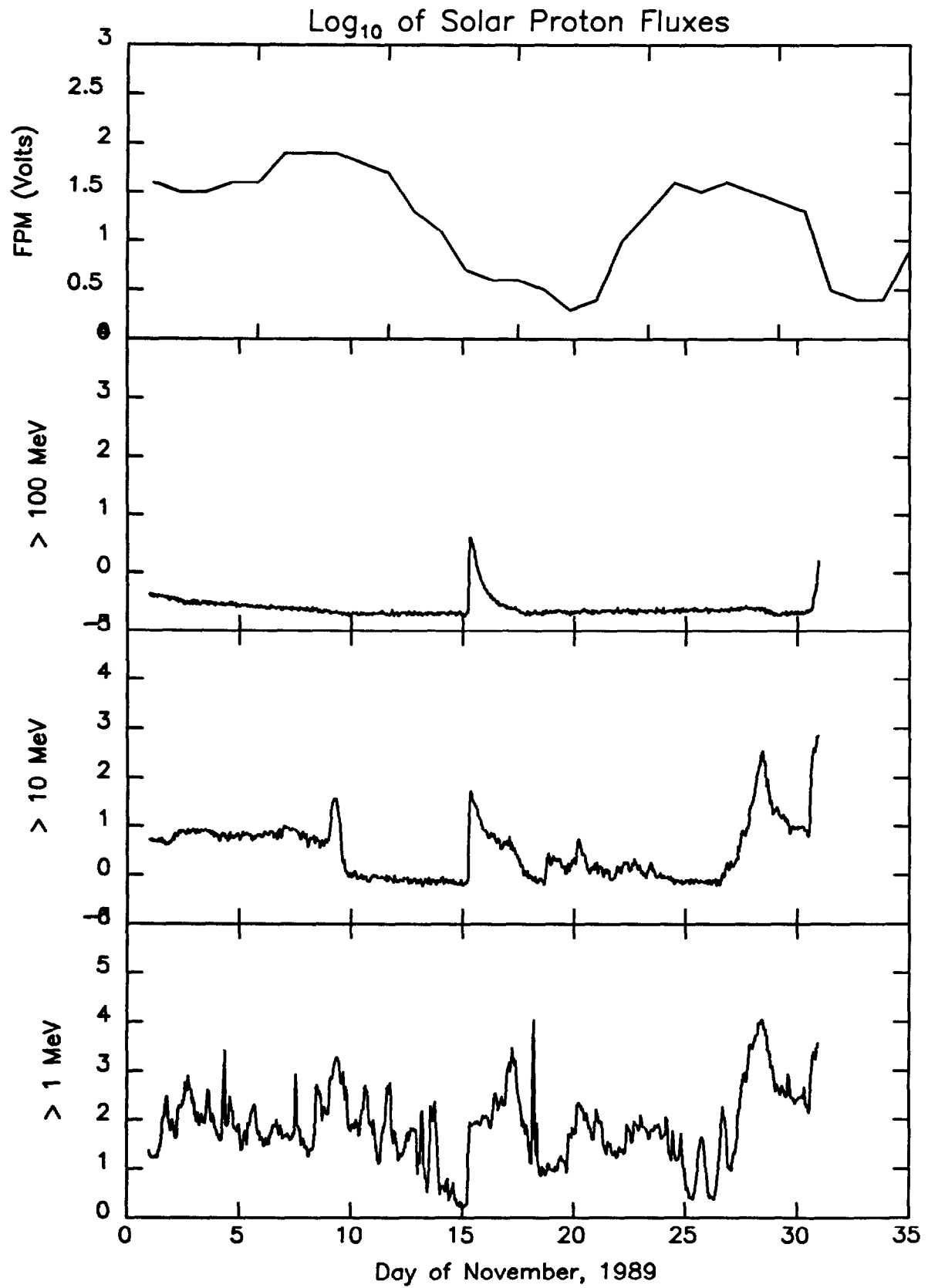


Figure 13

