# GOES DATA CAVEATS

[1.] As reported in the online “SWPC GOES readme file” (2007), [ http://www.swpc.noaa.gov/ftpdir/lists/pchan/README ], and on the “SPIDR GOES Data webpage”, [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], the cutoff energy at geo-stationary orbit is typically of the order of several MeV, and therefore the P1 proton channel response is primarily due to trapped protons of the outer zone of the magnetosphere (Fig. 1 shows this effect for GOES08/SEM (raw data)). When using the SEPEM “cleaned data” this Channel is removed (see Fig. 2).

[2.] As reported in the online “SWPC GOES readme file” (2007), [ http://www.swpc.noaa.gov/ftpdir/lists/pchan/README ], and on the “SPIDR GOES Data webpage”, [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], during moderate compressions of the magnetosphere, the P2 proton channel may also ‘see’ magnetospherically trapped protons, while during extreme compressions (magnetopause crossings), GOES will find itself in the magnetosheath.

[3.] As reported in the online “SWPC GOES readme file” (2007), [ http://www.swpc.noaa.gov/ftpdir/lists/pchan/README ], the GOES10 energetic proton detectors show intermittent, high noise levels in the higher energy proton channels (greater than about 80 MeV). This problem was first noticed in data taken April 26, 2003. Further analysis revealed that the noise spikes were occurring on the P6 and P7 proton channels and a similar spike was observed around the same time for several days (see Fig. 3). When using the SEPEM “cleaned data” the noise in the data is removed (see Fig. 4).

[4.] As reported in the online “SWPC GOES readme file” (2007), [ http://www.swpc.noaa.gov/ftpdir/lists/pchan/README ], the pattern reported in the above Caveat [3.] is similar to problems experienced on the GOES12 EPS Dome detector prior its P6 and P7 channel failures in early 2003.

[5.] As reported on the “SPIDR Data NOAA Goes Satellite Mission” webpage, [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], significant secondary responses may exist in the particle data, i.e. responses from other particles and energies and from directions outside the nominal detector entrance aperture. For example the electron detector responds significantly to protons above 32 MeV; therefore, electron data are contaminated when a proton event is in progress. A description of the algorithm that partially corrects for these effects is described on the “SPIDR Data NOAA Goes Satellite Mission” webpage.

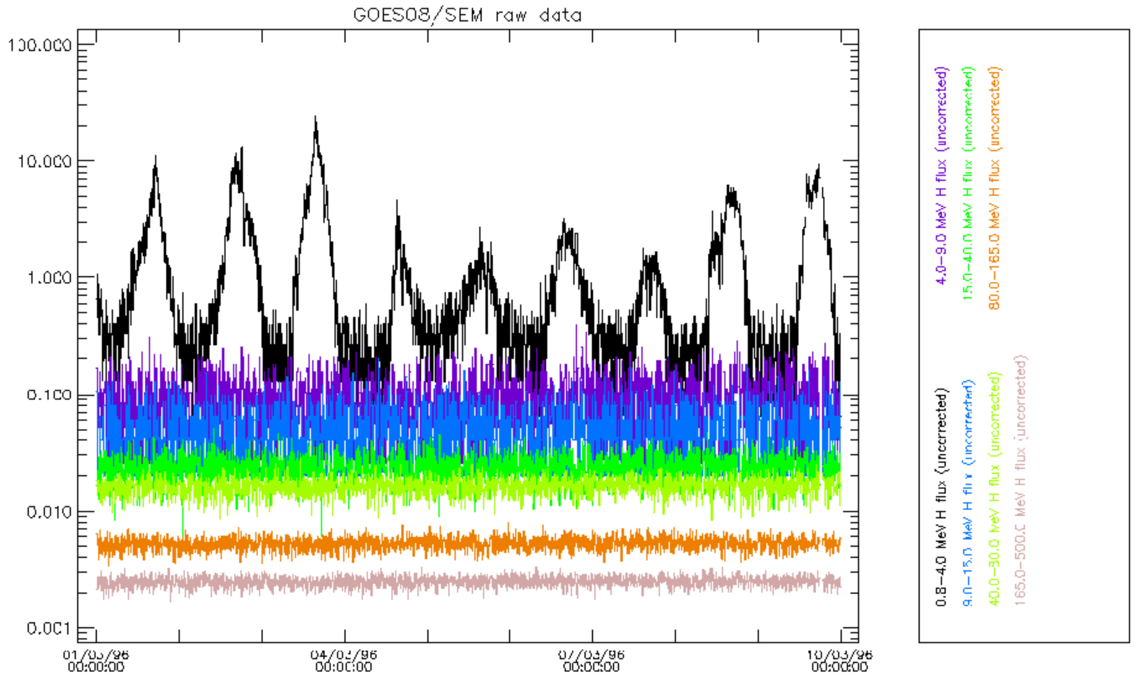


Figure 1. Proton flux observations recorded by GOES8/SEM from 1 to 9 March 1996 in seven energy channels (raw data). The response of the lowest energy P1 proton flux channel (black curve) is primarily due to trapped protons of the outer zone of the magnetosphere. Courtesy of SEPEM.

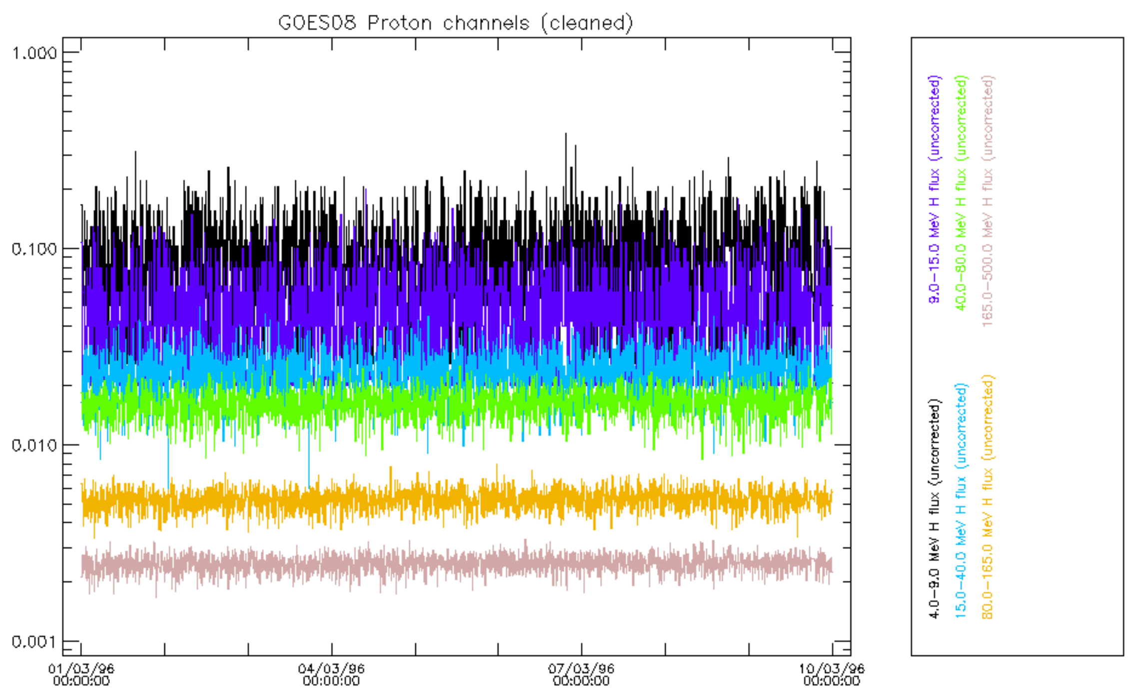


Figure. 2. GOES08/SEM proton flux observations from 1 to 9 March 1996 in six energy channels (cleaned data). Note that Channel 1 (P1) in Fig. 1 is removed in the “cleaned data”. Courtesy of SEPEM.

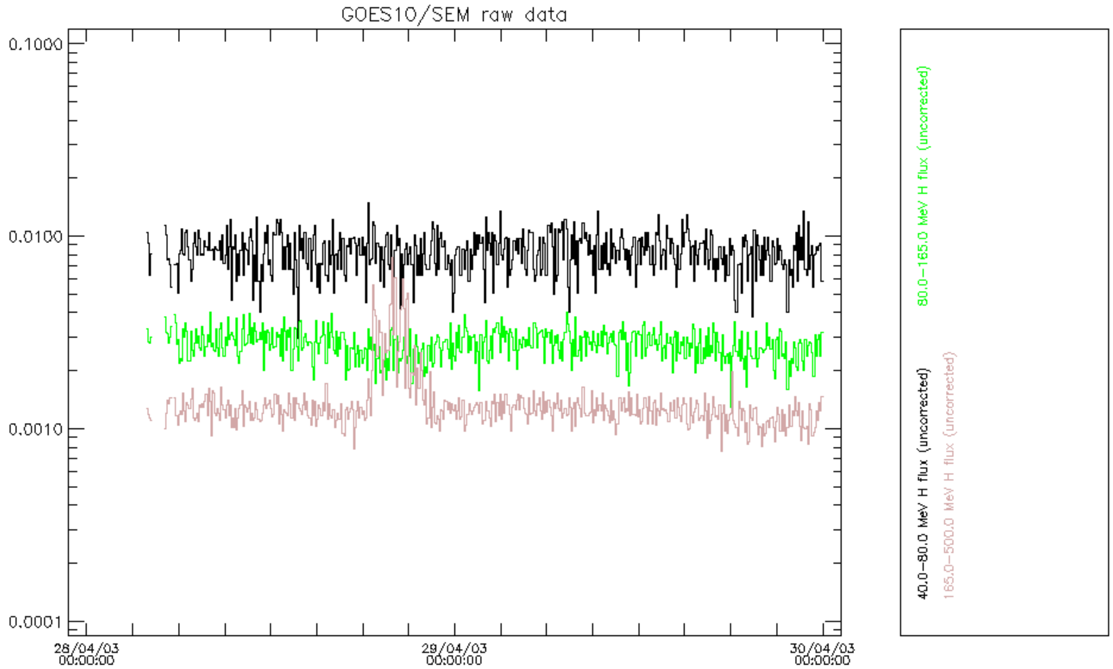


Figure 3. Proton flux observations recorded by GOES10/SEM for the three high-energy channels (raw data) from 28 to 30 April 2003. High noise levels observed in the P7 channel at the end of the first day. Courtesy of SEPEM.

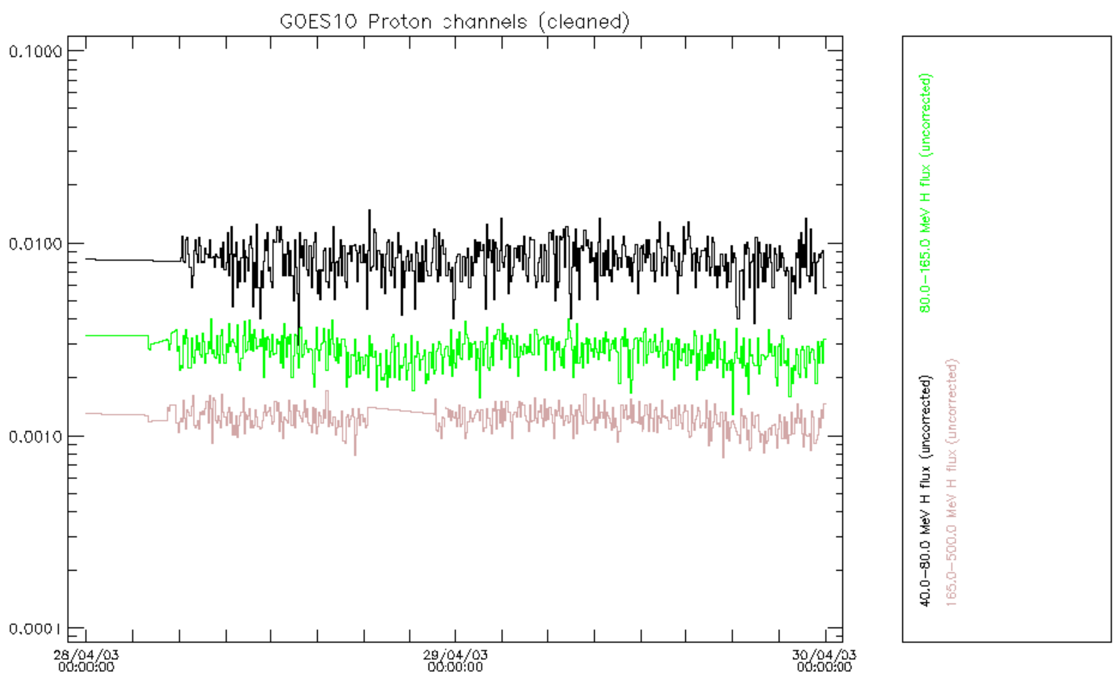


Figure 4. GOES10/SEM proton flux levels from 28 to 30 April 2003 for the three high-energy channels (cleaned data). The high noise level in the P7 Channel on Fig. 3 has been removed and filled in by using SEPEM cleaning tool. Courtesy of SEPEM.

[6.] As reported on the "SPIDR Data NOAA Goes Satellite Mission webpage", [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], the GOES05 electron channel is noisy from 1986 onwards and readings are a possible factor of 2 high.

[7.] As reported on the "SPIDR Data NOAA Goes Satellite Mission webpage", [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], one component of the GOES06 particle detector system has had radiation damage since 1986 that reduced its counting efficiency progressively. The E1 and P4 channels derived from this component recorded at only a few percent of their proper rates.

[8.] As reported on the "SPIDR Data NOAA Goes Satellite Mission webpage", [ http://spidr2.ips.gov.au/spidr/help.do?group=GOES ], In 1991 the telescope component of the GOES07 energetic particle detector system experienced episodes of malfunction (noise). The first period began at 0330 UT, October 18, 1991 and extended to November 5, 1991. The detector was commanded off for 12 hours. At turn-on the detector appeared to have recovered, but failed again on November 11, with a rerecovery on November 12 after a second turn-off of three hours. The detector has since operated normally. The noise periods may be identified by unusually high rates being shown by the P1 channel and the derived > 1 MeV integral channel. The GOES-7 Energetic Particle Sensor was left turned off for 4 hours after eclipse to minimize bad data."

[9.] As reported in the "Geosynchronous Environment for Identification of Satellite Hit Anomalies (GEISHA) report, ESA contract 16956/02/NL/LvH" the GOES06 P4 (15.0-44.0 MeV proton channel  response is sometimes incoherent compared to Channel P3 and P5 and GOES07 P4 channel. Often this occurs after a data gap (see two examples in Fig. 5 recorded on 20 March 1990 and 21 March 1990) where GOES06/SEM P4 levels are ten times higher than they should be after the data gap (compare with GOES07 P4 levels on Fig. 6 (raw data) and Fig. 7 (cleaned data)).

[10.] As reported in the "Geosynchronous Environment for Identification of Satellite Hit Anomalies (GEISHA) report, ESA contract 16956/02/NL/LvH" the GOES7 P2 4.2-8.7 MeV channel looks like the P3 8.7-14.5 MeV channel (see Fig. 8 (raw data) and Fig. 9 (cleaned data)) and is incoherent with the GOES06 P2 channel whereas the GOES07 P3 channel is coherent with the GOES06 P3 channel (see Fig. 10 - raw data) during the time interval 28/10/1991 10:30:00 to 16/11/1991 24:00:00. Probably, related to the above Caveat [8.].

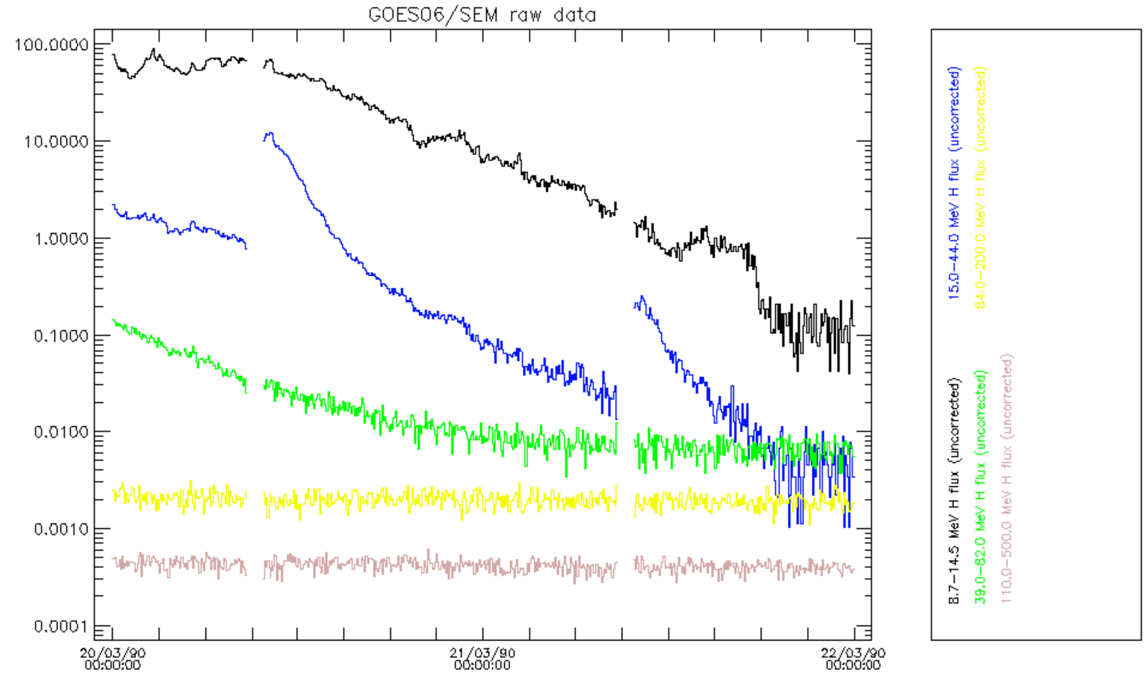


Figure 5. GOES06 P4 proton flux (raw data) level (blue curve) is ten times higher than it should be following the data gaps on 20 March 1990 and 21 March 1990 (compare with GOES7/SEM P4 levels on Fig. 6). Courtesy of SEPEM

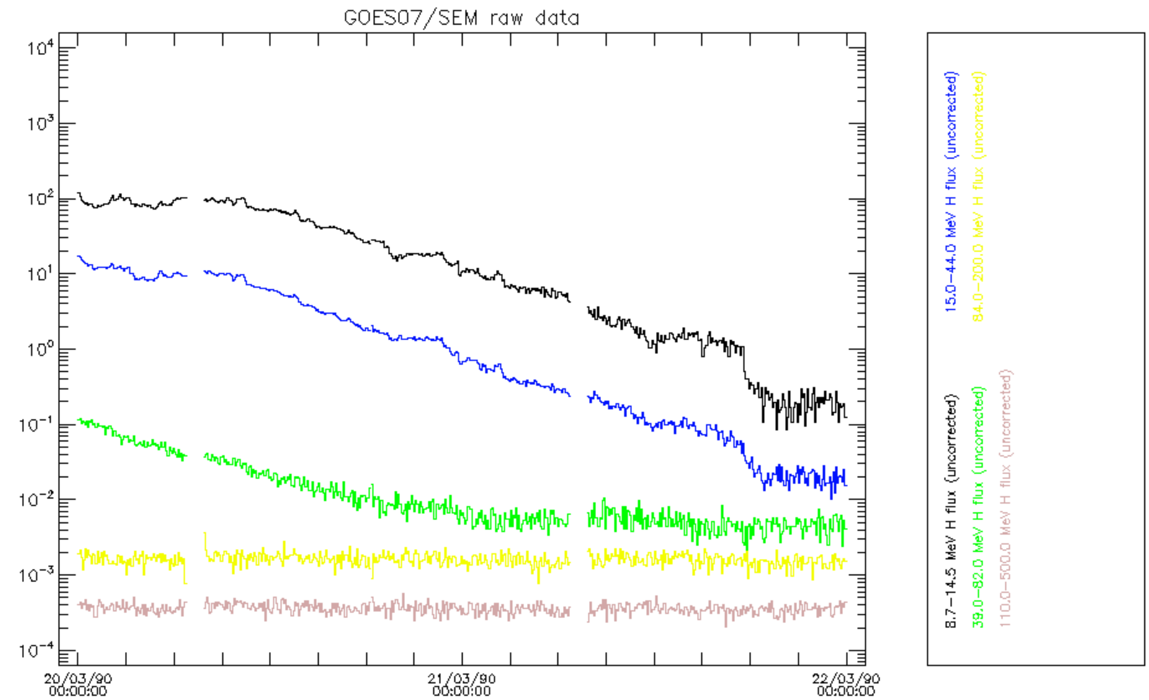


Figure 6. GOES07 P4 proton flux (raw data) level (blue curve) shows data gaps on 20 March 1990 and 21 March 1990. Courtesy of SEPEM.

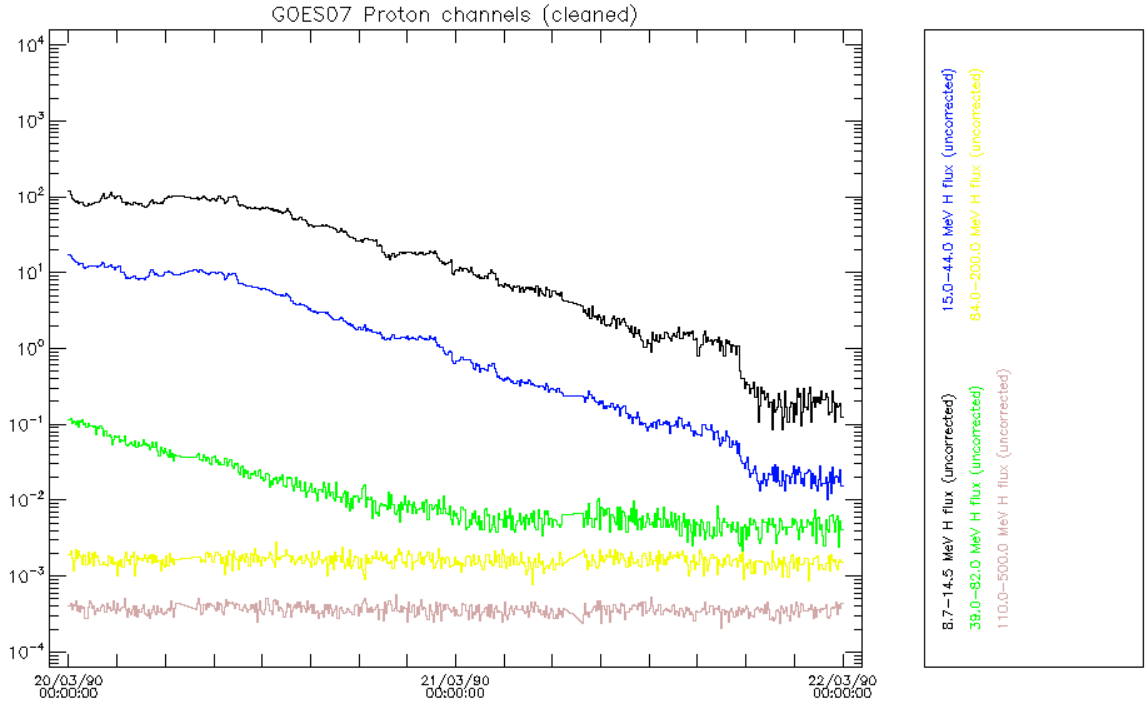


Figure 7. GOES07 P4 proton flux (cleaned data) level (blue curve) for 20 March 1990 and 21 March 1990. Note that the data gaps on Fig. 5 and Fig. 6 for this time period have been filled in by using SEPEM cleaning tool. Courtesy of SEPEM.

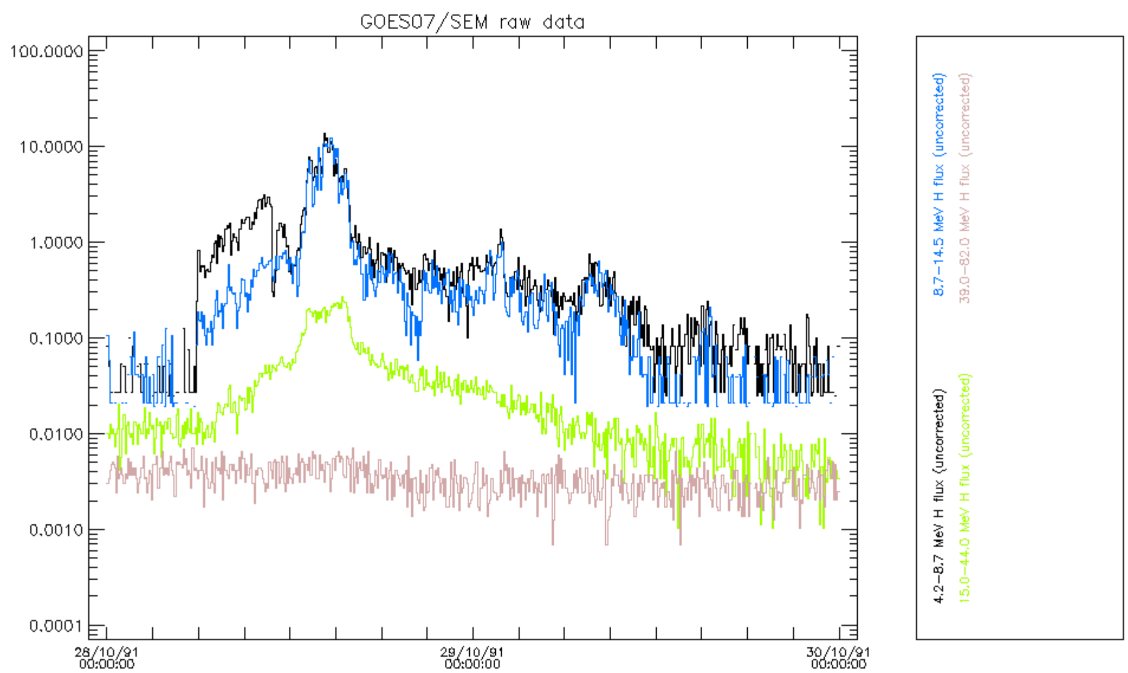


Figure 8. GOES07 P2 proton flux (raw data) level (black curve) has a similar time profile as GOES07 P3 proton flux (blue curve) from 28 to 30 October 1991. Compare with GOES06 P2 and P3 proton flux levels on Fig. 10. Courtesy of SEPEM.

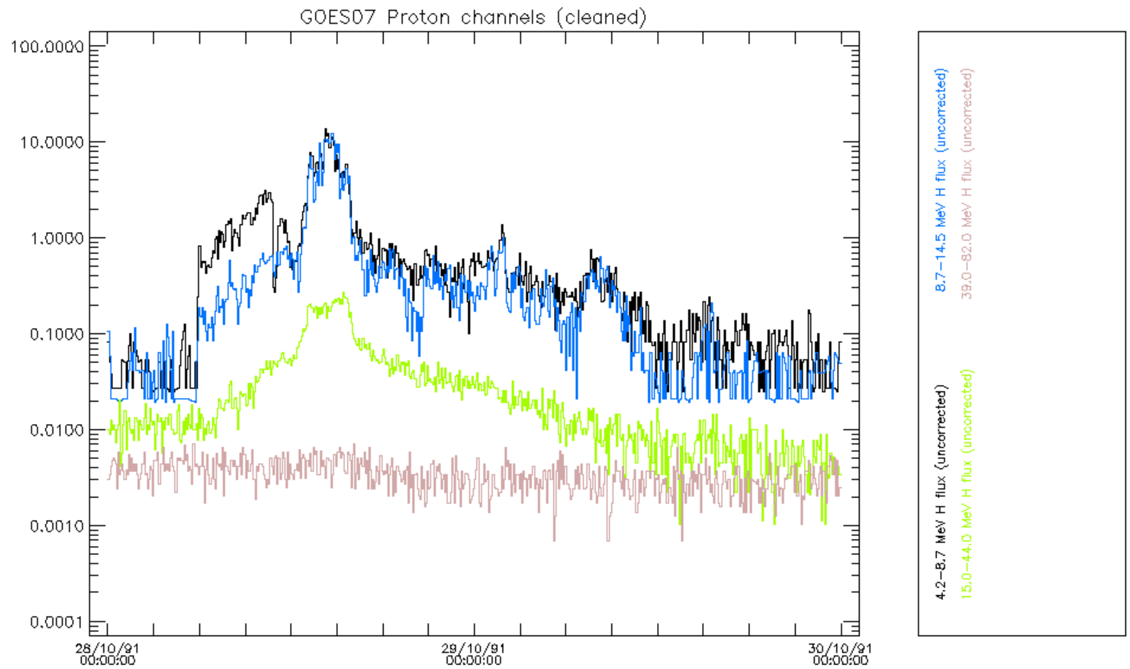


Figure 9. GOES07 P2 proton flux (cleaned data) level (black curve) has a similar time profile as GOES07 P3 proton flux (blue curve) from 28 to 30 October 1991. Courtesy of SEPEM.

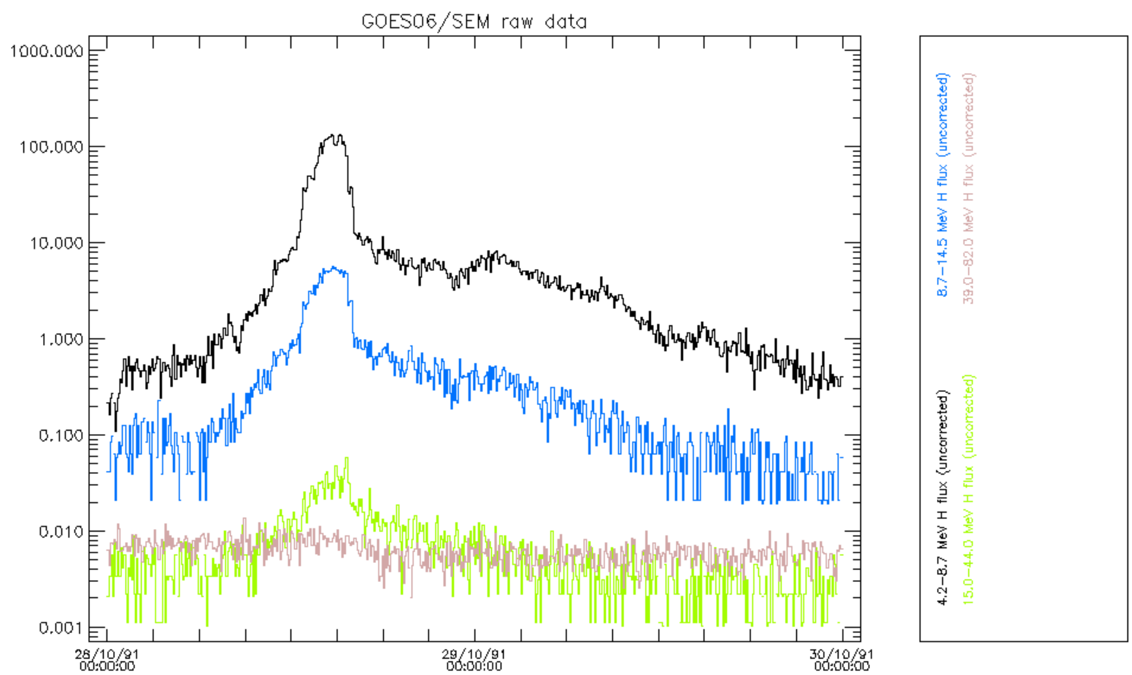


Figure 10. GOES06 P2 proton flux (raw data) level (black curve) and GOES07 P3 proton flux (raw data) level (blue curve) time profiles as from 28 to 30 October 1991. Courtesy of SEPEM.