SA33B-01

SOLAR FLARE EFFECTS ON THE IONOSPHERE OBSERVED NEAR THE SOUTH MAGNETIC ANOMALY CENTER

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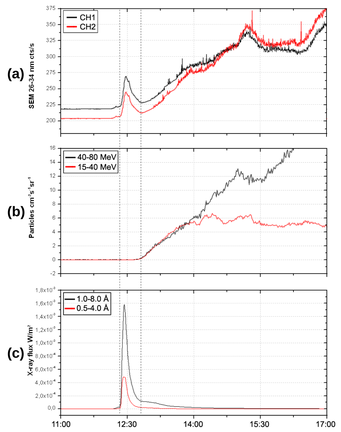
Introduction

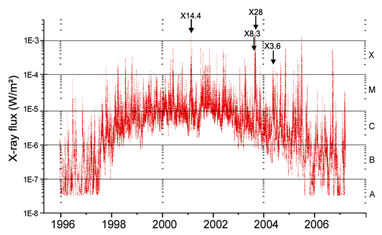
This work present an analyze of the solar flare effects in the ionosphere making use of dedicated instruments located at the Southern Space Observatory (SSO/CRS/CCR/INPE – MCT), (29.4°S, 53.8°W, 480m a.s.l), São Martinho da Serra, RS, Brazil. With the SSO's Riometer data it was identified the Sudden Cosmic Noise Absorption phenomena. The magnetometers were used to measure the Magnetic Crochet effects and with the SAVNET it was identified the Sudden Phase Anomaly.

Solar data



(a) The SOHO/SEM EUV count rate, (b) The GOES Particle flux and (c) GOES X-ray flux.

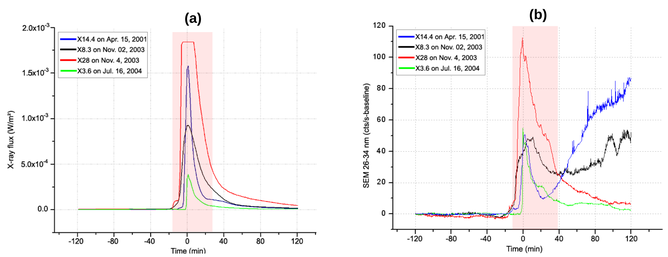
Selected events



The Solar X-ray flux for the solar cycle 23 and the selected flares

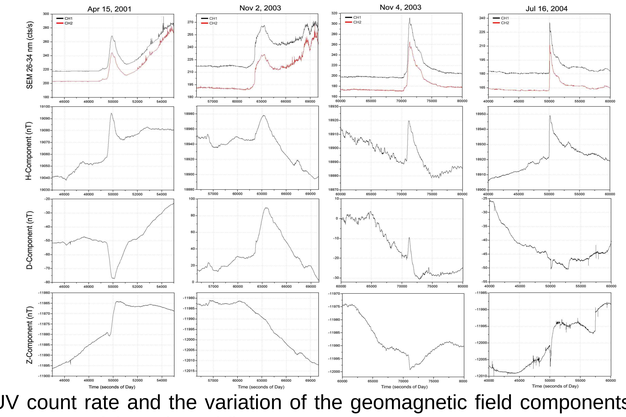
The selected Solar Events

Date	Time (UT)	GOES Class.	SEM (cts/s)
2001/04/15	13:50	X14.4	50.67
2003/11/02	17:25	X8.3	48.50
2003/11/04	19:50	X28	114.30
2004/07/16	13:55	X3.6	50.80

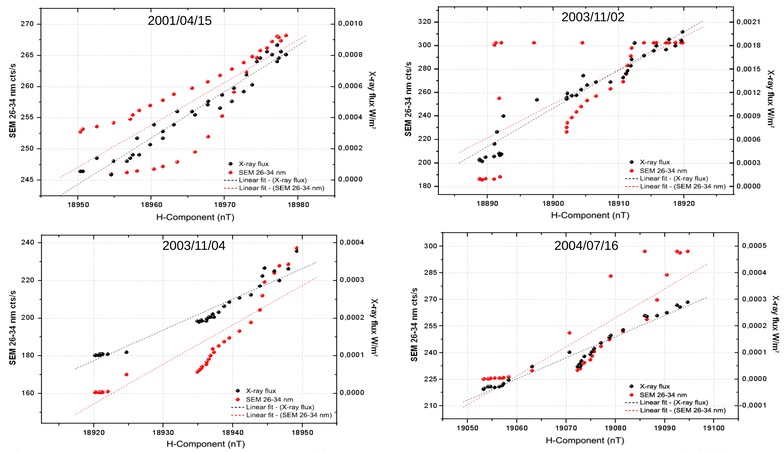


(a) The four selected flares in X-ray flux (0.1-0.8nm) and (b) the EUV count rate in 26.0–34.0nm. The full disc solar background has been removed from each event.

Magnetic Crochet or SFE - Magnetometers



The EUV count rate and the variation of the geomagnetic field components (H, D, Z) during events of the selected flares.

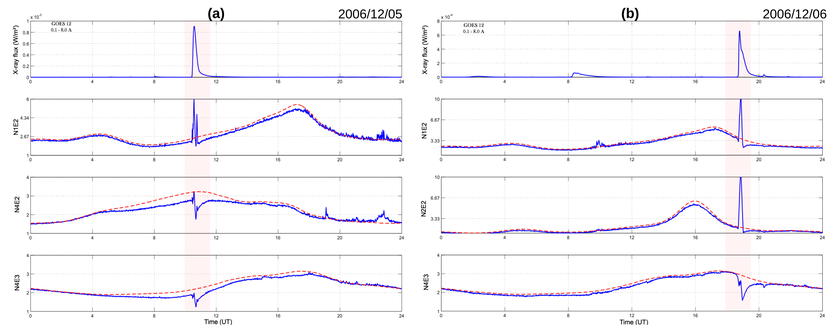


The events correlations between H-component and each radiation range (EUV and X-ray). The Correlation Coefficient (R) were determined by the linear fits curves.

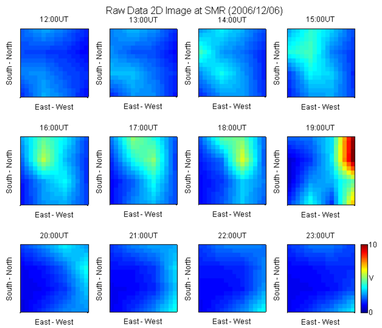
Comparative values for the four different SFE events.

Date	Time (UT)	GOES Class.	SEM (cts/s)	ΔH (nT)	ΔD (nT)	ΔZ (nT)	*R* (EUV)	*R* (X-Ray)
2001/04/15	13:50	X14.4	50.67	41.37	-26.72	-2.5	0.9782	0.8640
2003/11/02	17:25	X8.3	48.50	33.40	59.67	-	0.9786	0.8146
2003/11/04	19:50	X28	114.30	31.00	10.37	-5.67	0.9713	0.6868
2004/07/16	13:55	X3.6	50.80	27.70	-3.65	-6.4	0.9738	0.9084

Sudden Cosmic Noise Absorption (SCNA) - Riometer

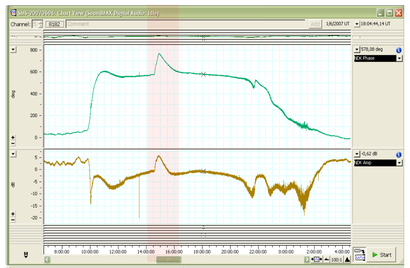


The Sudden Ionospheric Disturbance (SID) phenomena were detected by the SSO Riometer antennas (a) N4E2, N4E3 and (b) N4E3. The solar radio bursts were observed by the antennas (a) N1E2 and (b) N1E2, N2E2.



The SID detected with the SSO's Imaging Riometer, the saturated data is due to the Solar Radio Burst.

Sudden Phase Anomaly (SPA) - VLF with SAVNET



The Sudden Phase Anomalies detected, in 2007/06/01, by the SSO SAVNET station during a M2.8 flare.

Summary

- The H-component variation was always positive during the flares
- The largest crochet in the H component during the studied period was on April 15, 2001 at 13:50 UT (10:50 LT) with X-ray flux intensity equivalent to a X14.4 flare. The geomagnetic H-components variation was about 41.37nT.
- The EUV Correlation coefficient is ~ 0.975
- The X-ray Correlation coefficient is ~ 0.862 (excluding the saturated data)
- In the SSO Riometer data it was difficult to obtain clear-cut results for the SID magnitudes, since the solar radio bursts are superimposed on the ionospheric absorption during the solar flare explosive phase.