

A composite image showing the International Space Station (ISS) in the upper left corner, with its complex structure and solar panel arrays visible. The background is a view of Earth from space, featuring a vibrant display of green aurora borealis (Northern Lights) stretching across the horizon. The aurora appears as bright, vertical streaks of green light against the dark sky and the Earth's surface. The text "ISS FPMU and DMSP SSIES Ne, Te Data" is overlaid in white, sans-serif font in the center-right area of the image.

ISS FPMU and DMSP SSIES Ne, Te Data

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NASA/MSFC

CEDAR-GEM Joint Modeling Challenge

2013 GEM Mini-Workshop, San Francisco, CA

8 December 2013



ISS FPMU, DMSP SSIES, and AFRL HASDM Data

ISS /Floating Potential Measurement Unit (FPMU)

~400 km altitude circular, 51.6 deg inclination

Ne, Te, Vfloat: 1 second Vfloat: 1/128 second

- ISS Program operates the FPMU suite of plasma instruments with a primary goal of supporting engineering activities
- FPMU electron density (Ne) and temperature (Te) can also be used for scientific studies of the F2-region ionosphere

DMSP/Special Sensor for Ions, Electrons, and Scintillation (SSIES)

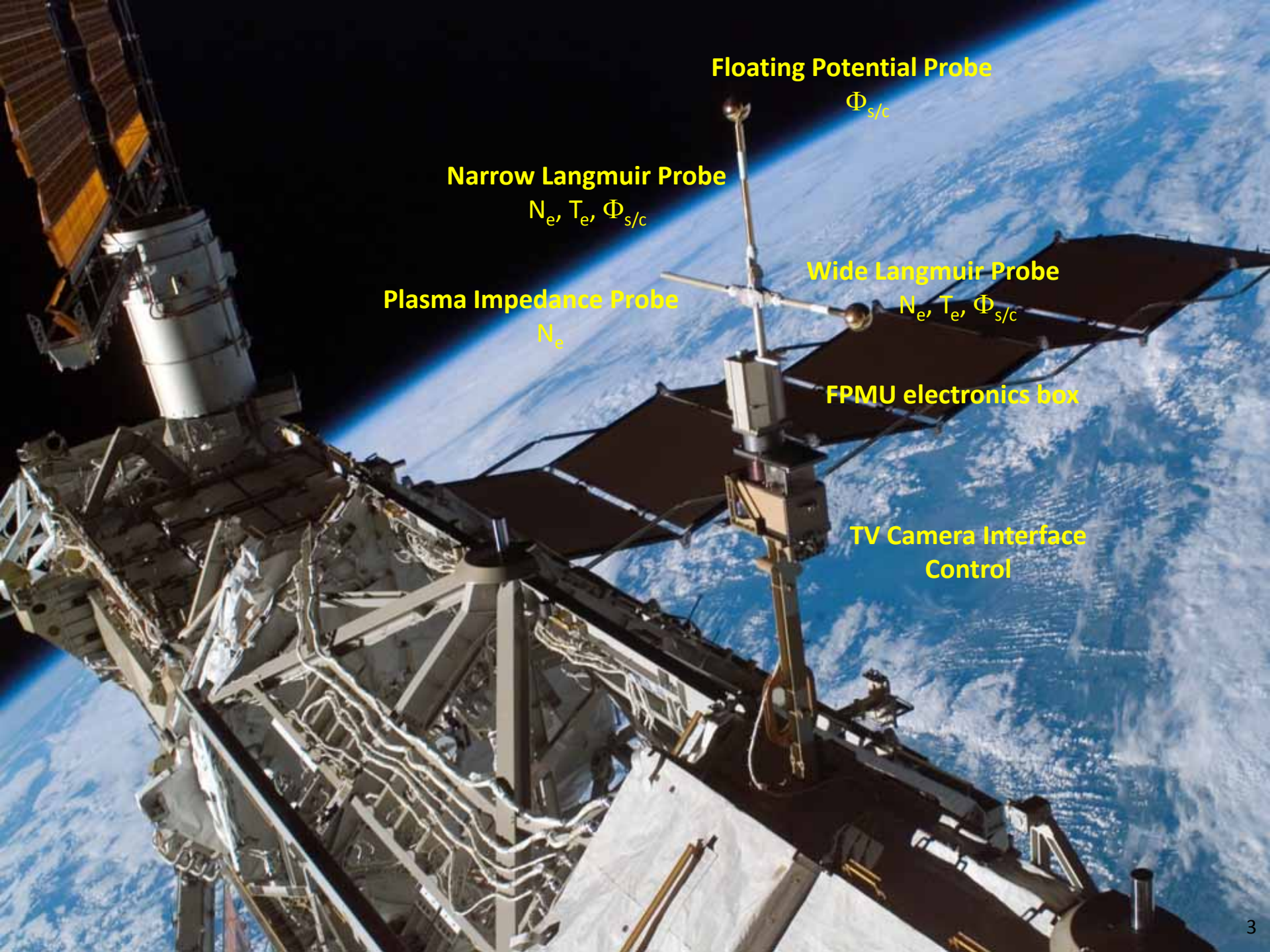
~850 km altitude circular, 98 deg inclination

Ne, Te, Vfloat: 4 second

- DMSP SSIES data from topside ionosphere is distributed by NOAA National Geophysical Data Center.
- MSFC maintains a full set of this data and can provide DMSP Ne, Te records corresponding to periods with ISS FPMU data

AFRL HASDM neutral mass density

- AFRL can provide High Accuracy Satellite Drag Model neutral mass density along both ISS and DMSP orbits for periods where Ne, Te data is available



Floating Potential Probe

$\Phi_{s/c}$

Narrow Langmuir Probe

$N_e, T_e, \Phi_{s/c}$

Wide Langmuir Probe

$N_e, T_e, \Phi_{s/c}$

Plasma Impedance Probe

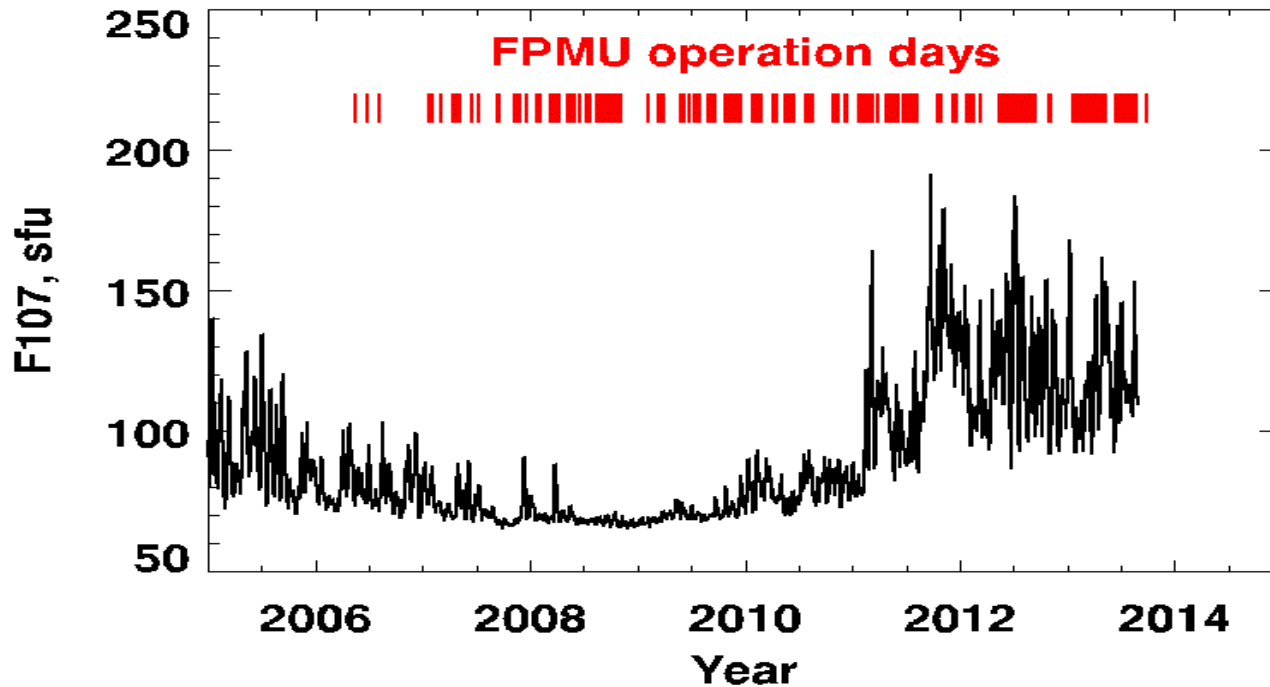
N_e

FPMU electronics box

TV Camera Interface
Control



FPMU Operations Summary



YEAR	Operation Days
2006	8
2007	39
2008	105
2009	102
2010	95
2011	136
2012	94
2013	130*
Total	709*

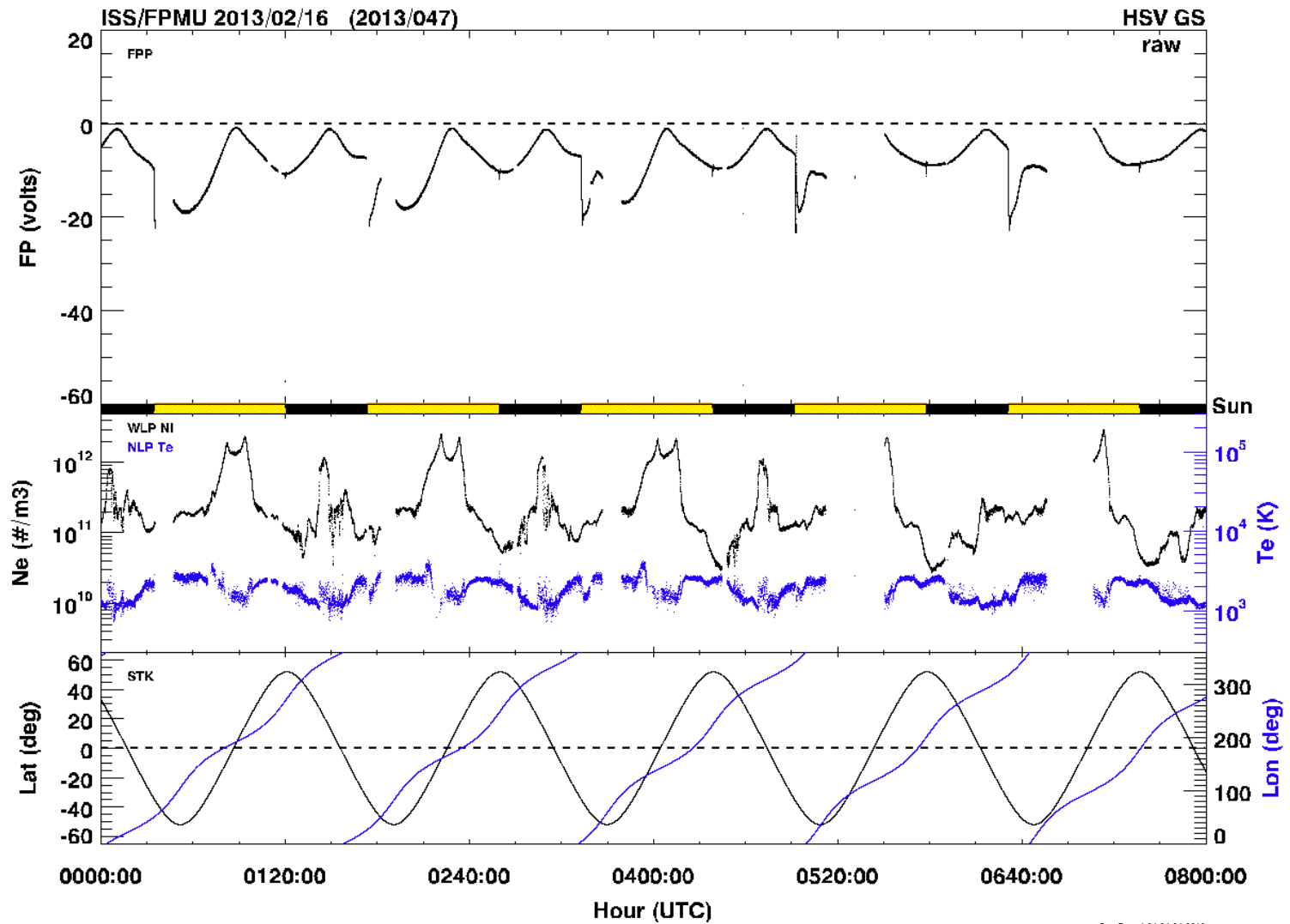
*3 Aug 2006 to 1 Nov 2013

YEAR	Max Kp	Min Dst	Max F107
2006	5.7	-48	81.2
2007	5.3	-59	88.8
2008	6.3	-86	88.2
2009	5.7	-83	80.4
2010	7.7	-81	93.1
2011	7.7	-132	166.3
2012	8.0	-143	171.4
2013	6.7	-132	153.5



FPMU

16 Feb 2013



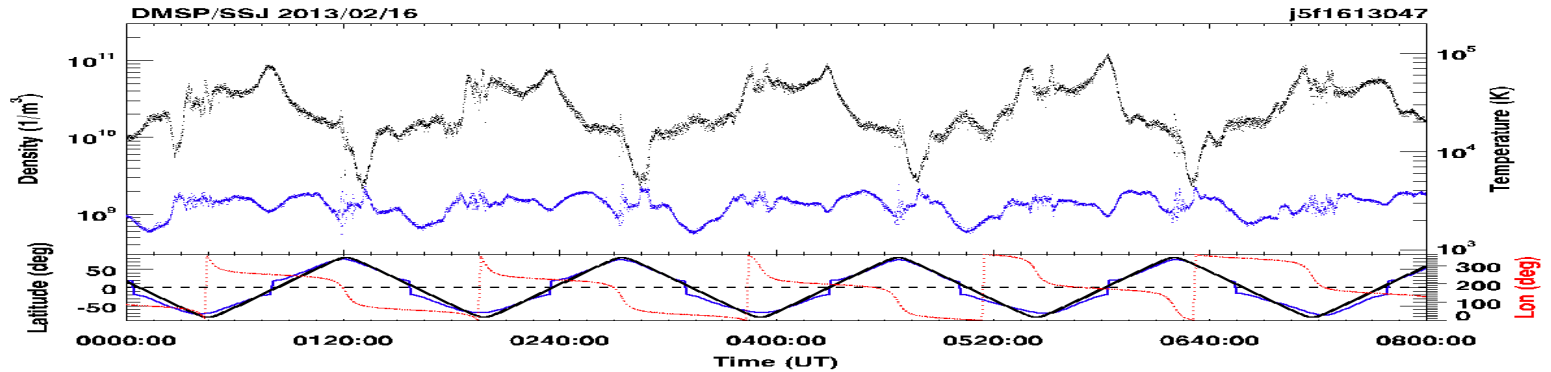
San Dec 1 21:21:24 2013



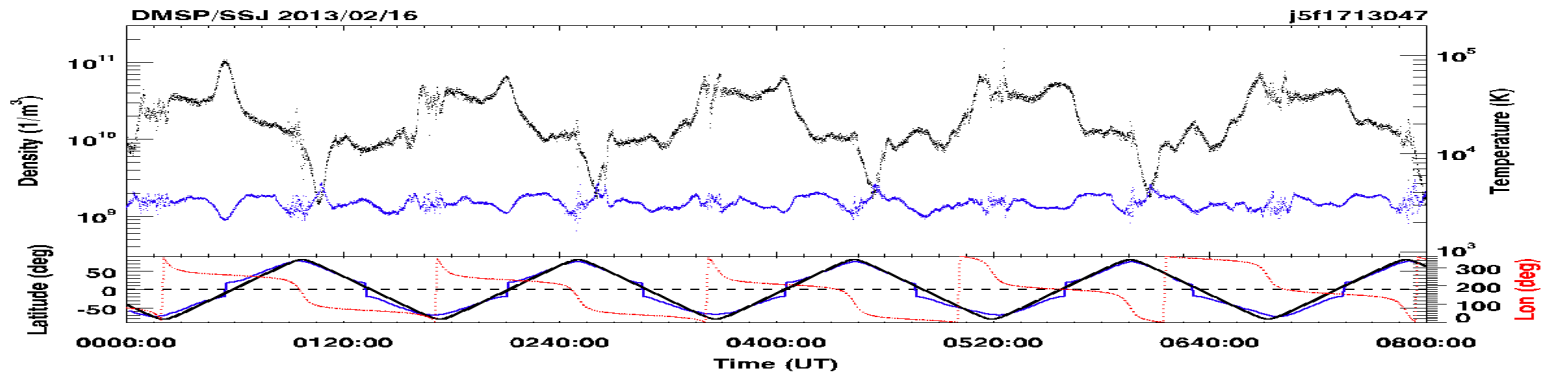
DMSP F16, F17, F18

16 Feb 2013

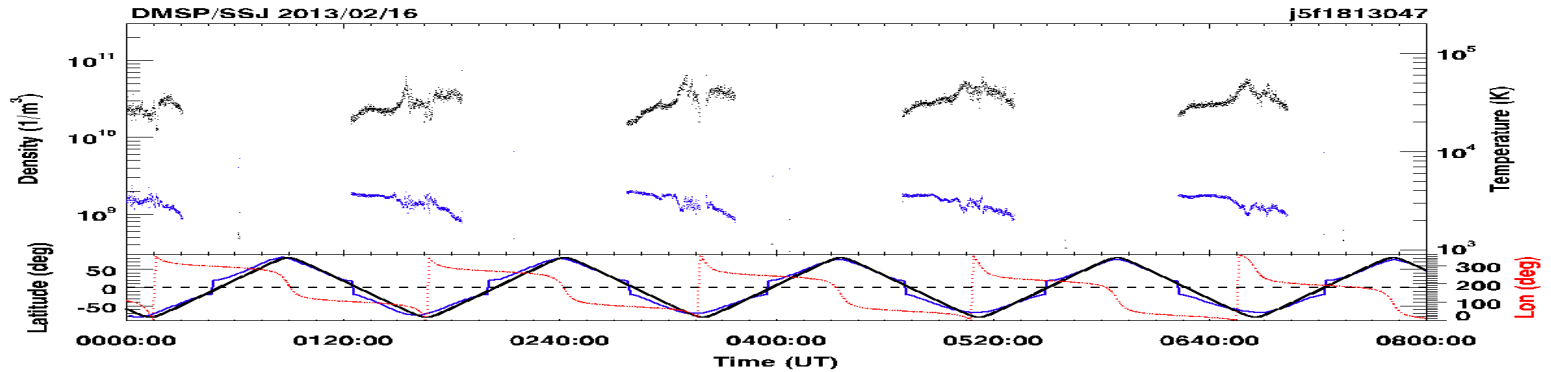
F16
~5-17 LT



F17
~5-17 LT

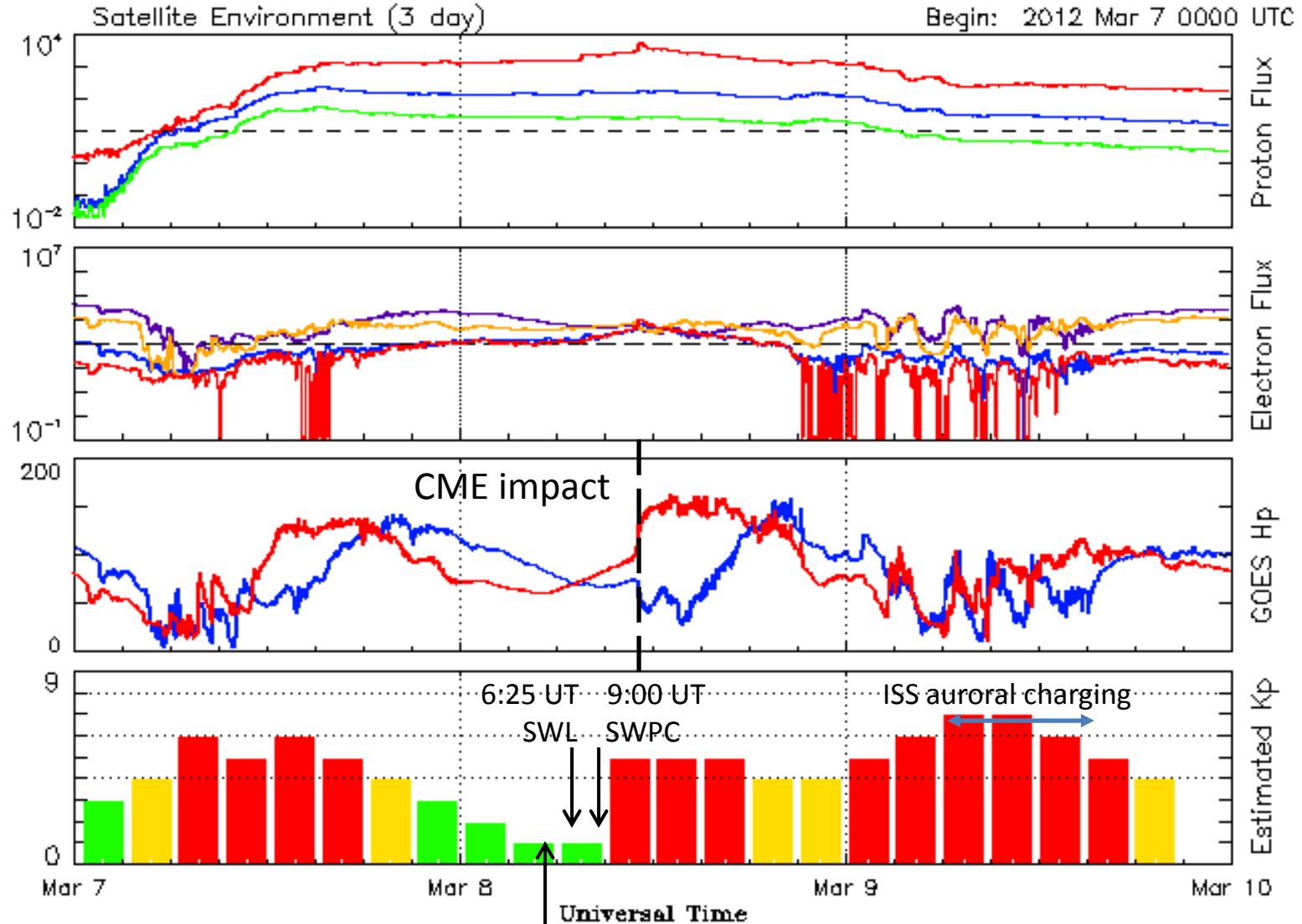


F18
~9-16 LT





March 2012 Geomagnetic Storm



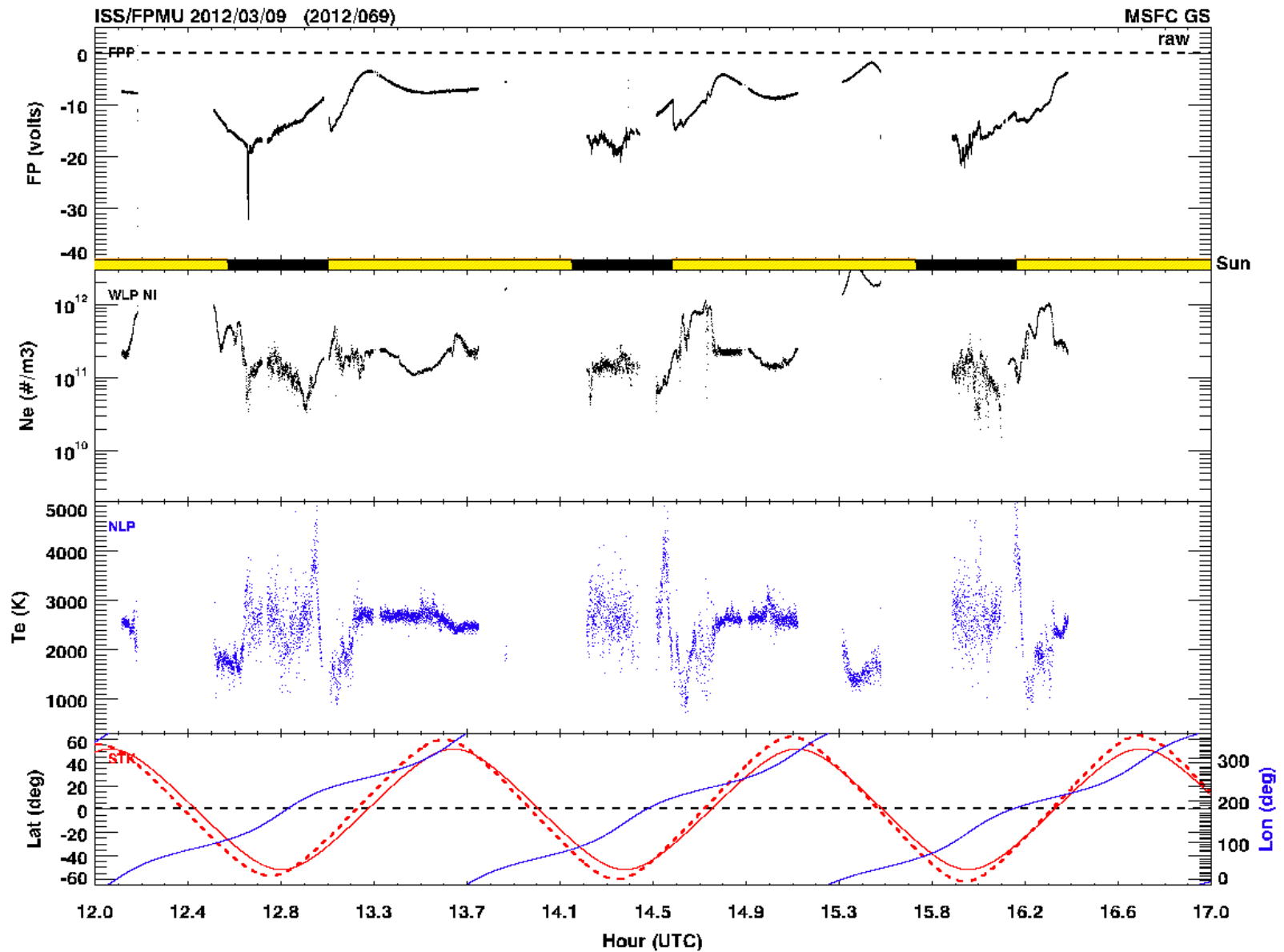
Updated 2012 Mar 9 23:56:06 UTC

NOAA/SWPC Boulder, CO USA

FPMU activated based on CME alerts



9 March 2012

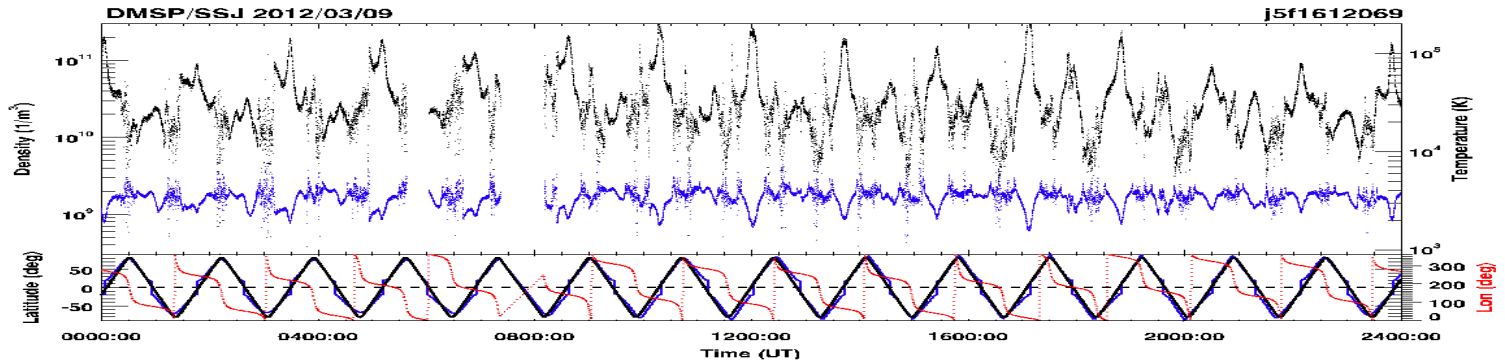




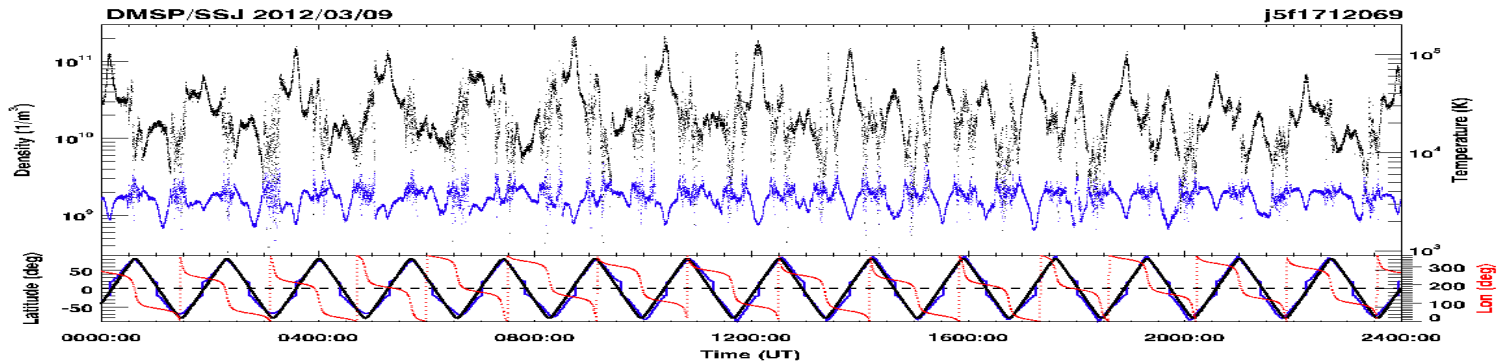
DMSP F16, F17, F18

9 Mar 2012

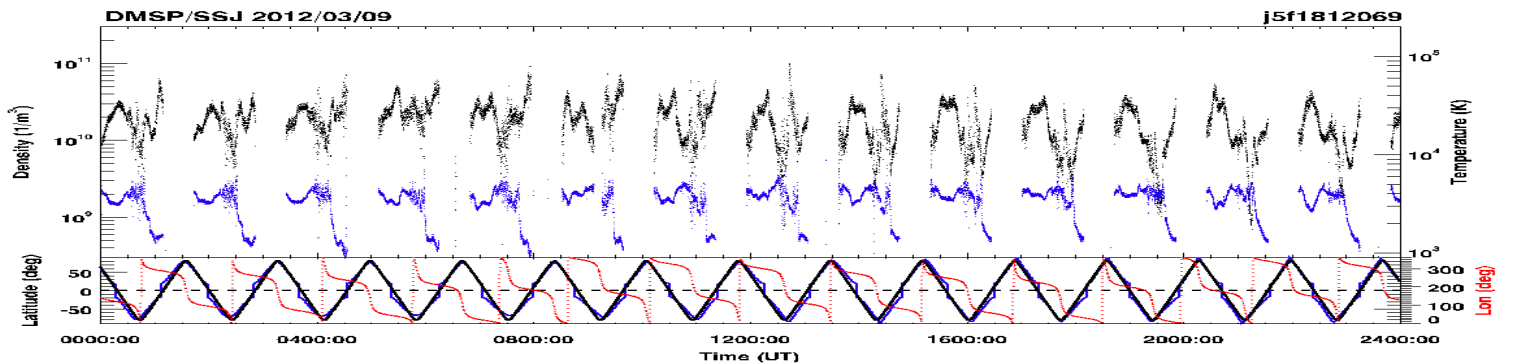
F16
~5-17 LT



F17
~5-17 LT



F18
~9-16 LT





Periods with ISS Auroral Charging

ISS Auroral Charging Observations

FPMU Operations

26 March 2008 (GMT 086)

STS-123/ESA ATV-001 docking

5-6 April 2010 (GMT 095-096)

STS-131/19A

22,23,25 January 2012 (GMT 025)

SWx: M8.7 flare, CME ~2211 km/s

9-11 March 2012 (GMT 069-071)

SWx: X5.4 flare, CME ~2200 km/s

X1.3 flare, CME ~1800 km/s

23 May 2012 (GMT 144)

SpaceX Dragon berth/unberth

15-16 July 2012 (GMT 197-198)

SWx: X1.4 flare, CME ~1400 km/s

3 September 2012 (GMT 247)

US EVA 19

20 January 2013 (GMT 020)

Solar Cycle 24 Solar Maximum Conditions

17 March 2013 (GMT 076)

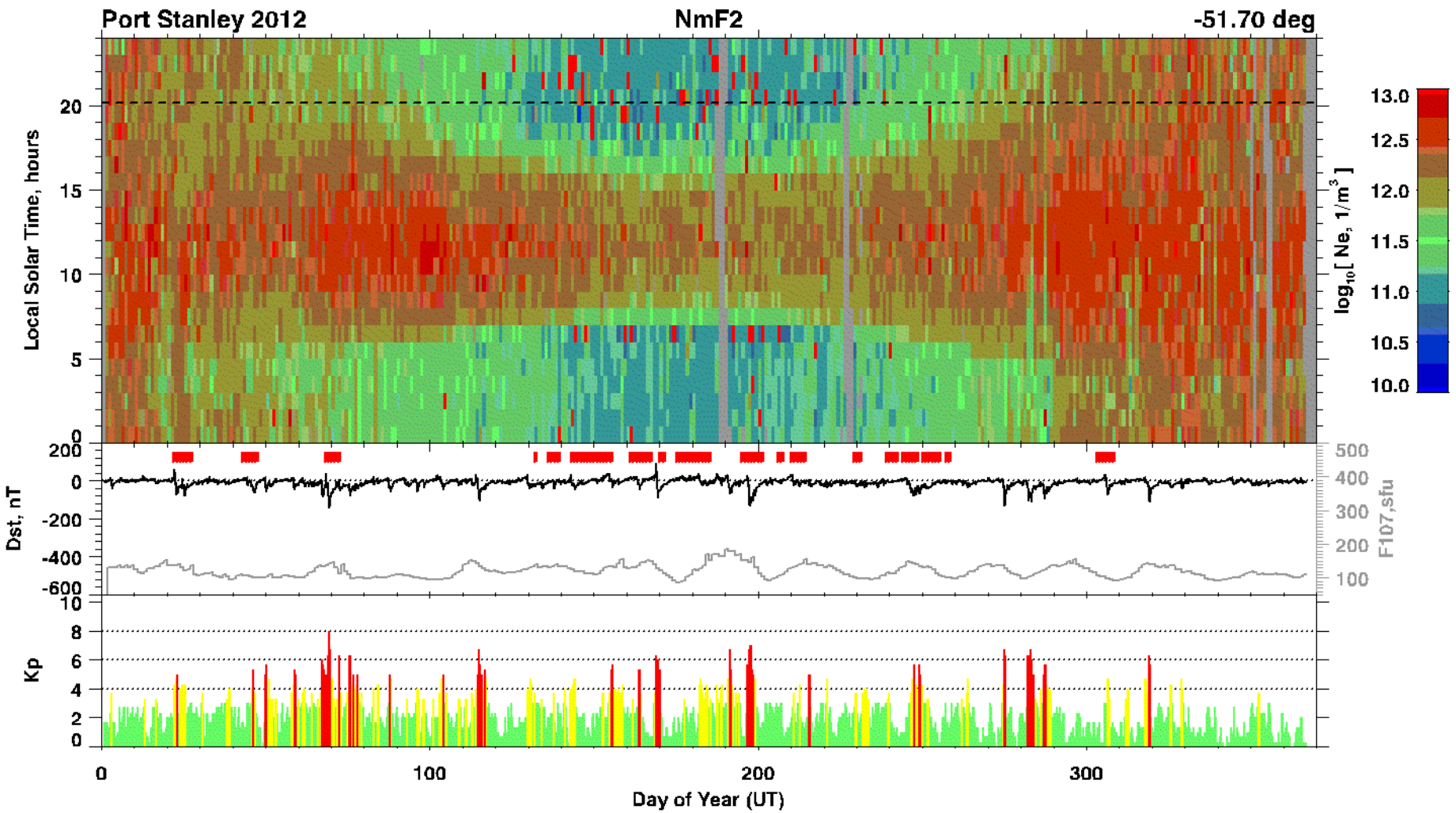
SWx: M1.1 flare, CME ~1400 km/s

28,29 June 2013 (GMT 179,180)

US EVA 22,23



2012

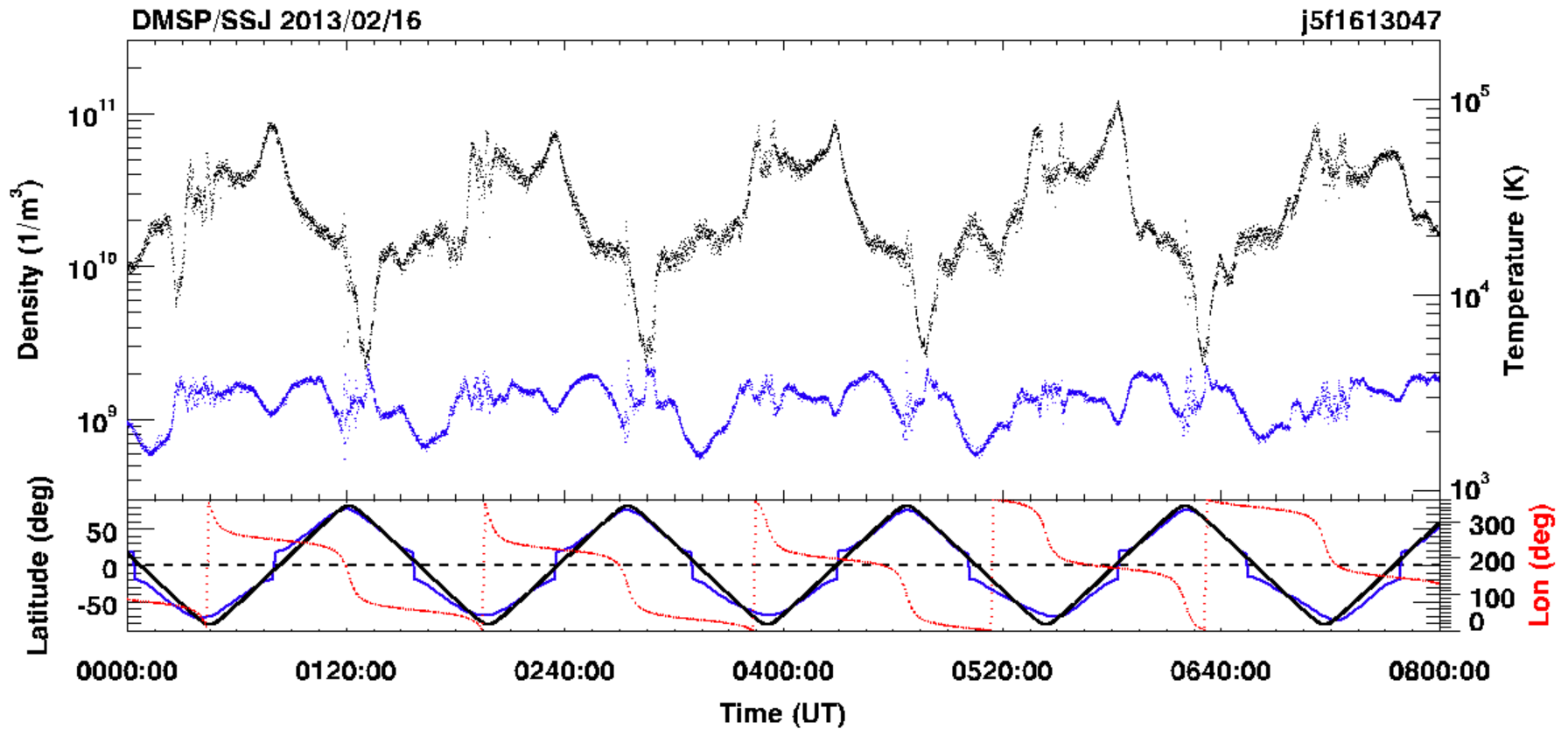




Backup



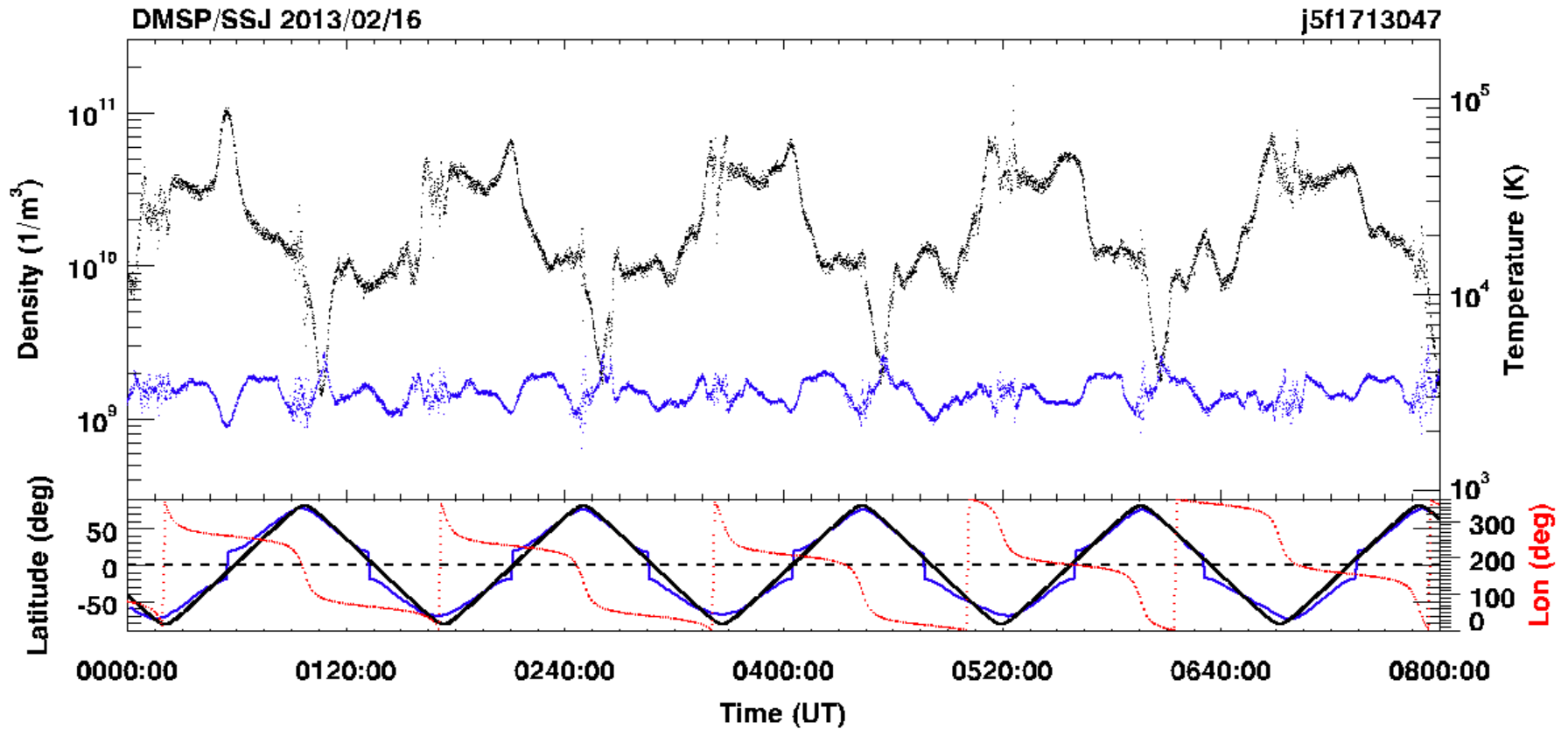
DMSP F16 16 Feb 2013



~5-17 LT



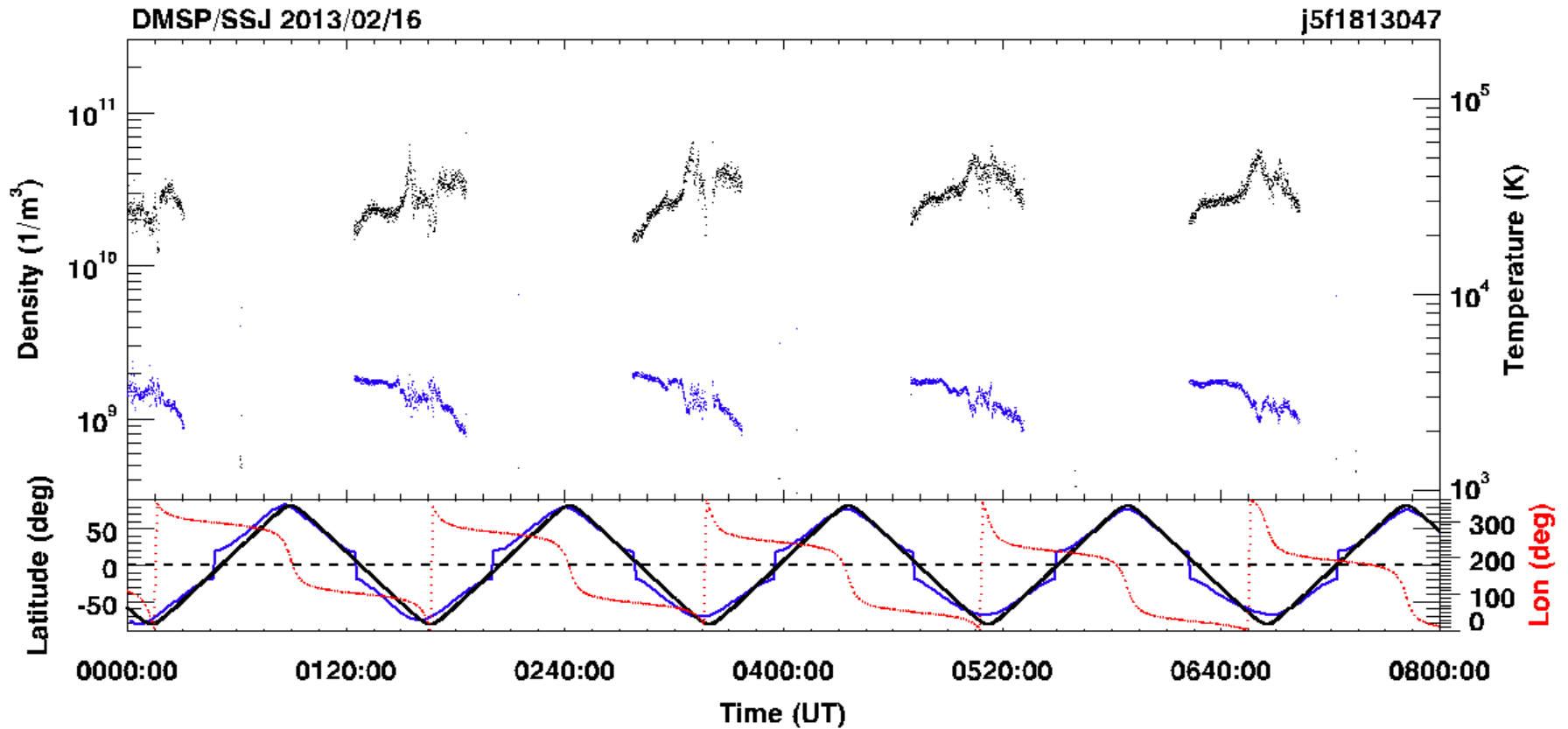
DMSP F17 16 Feb 2013



~5-17 LT



DMSP F18 16 Feb 2013

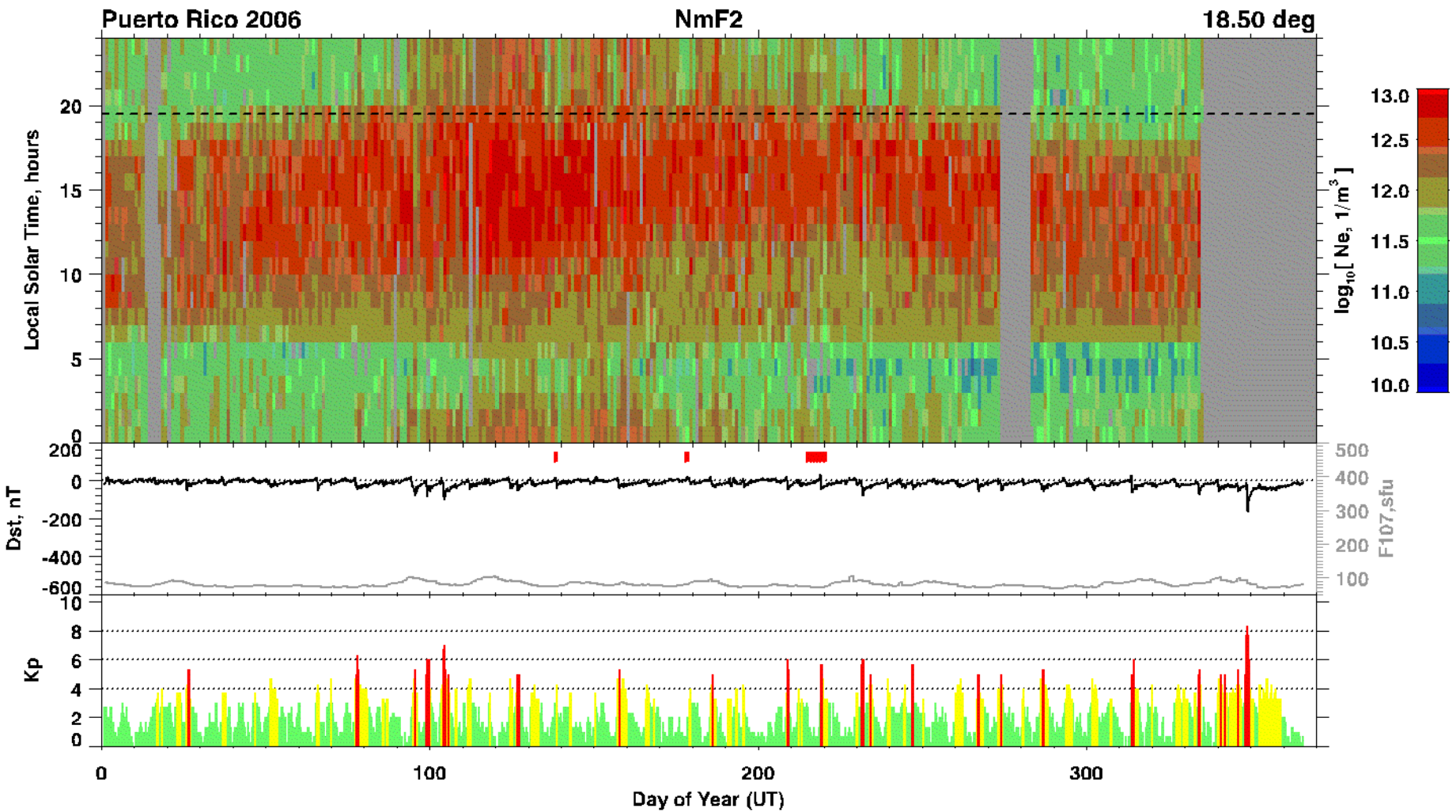


~9-21 LT



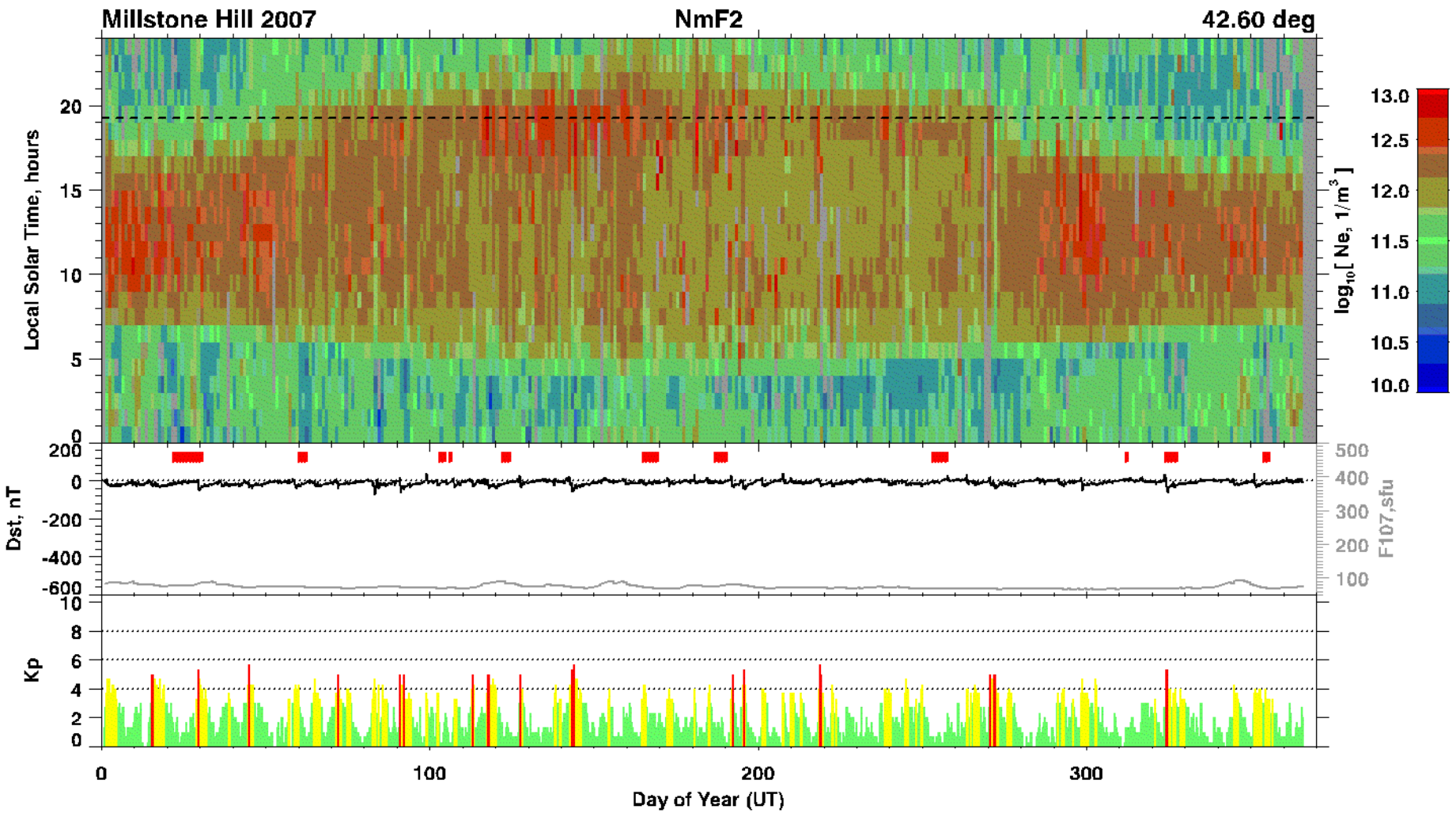
2006

FPMU operation periods marked with red bars above Dst



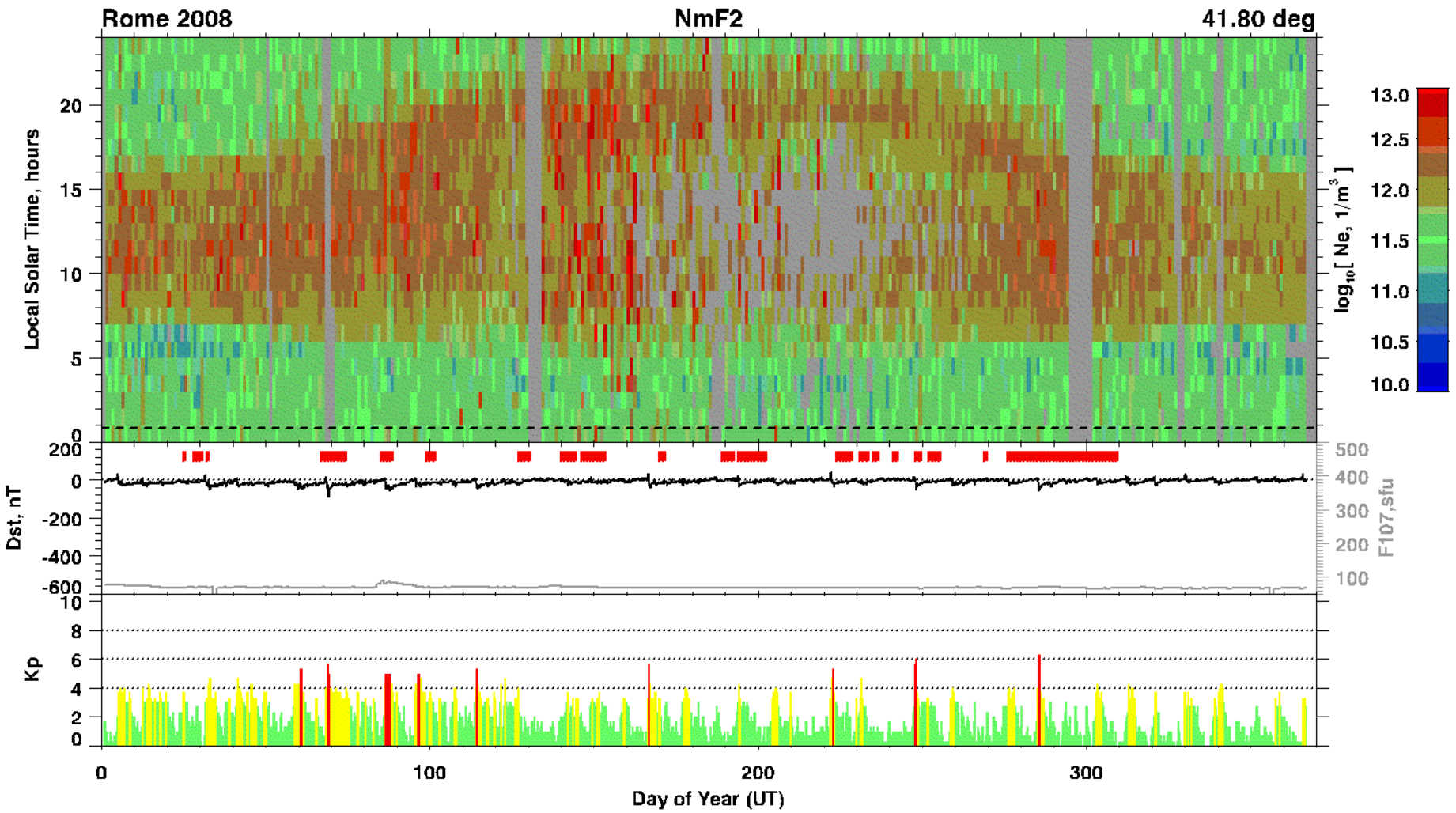


2007



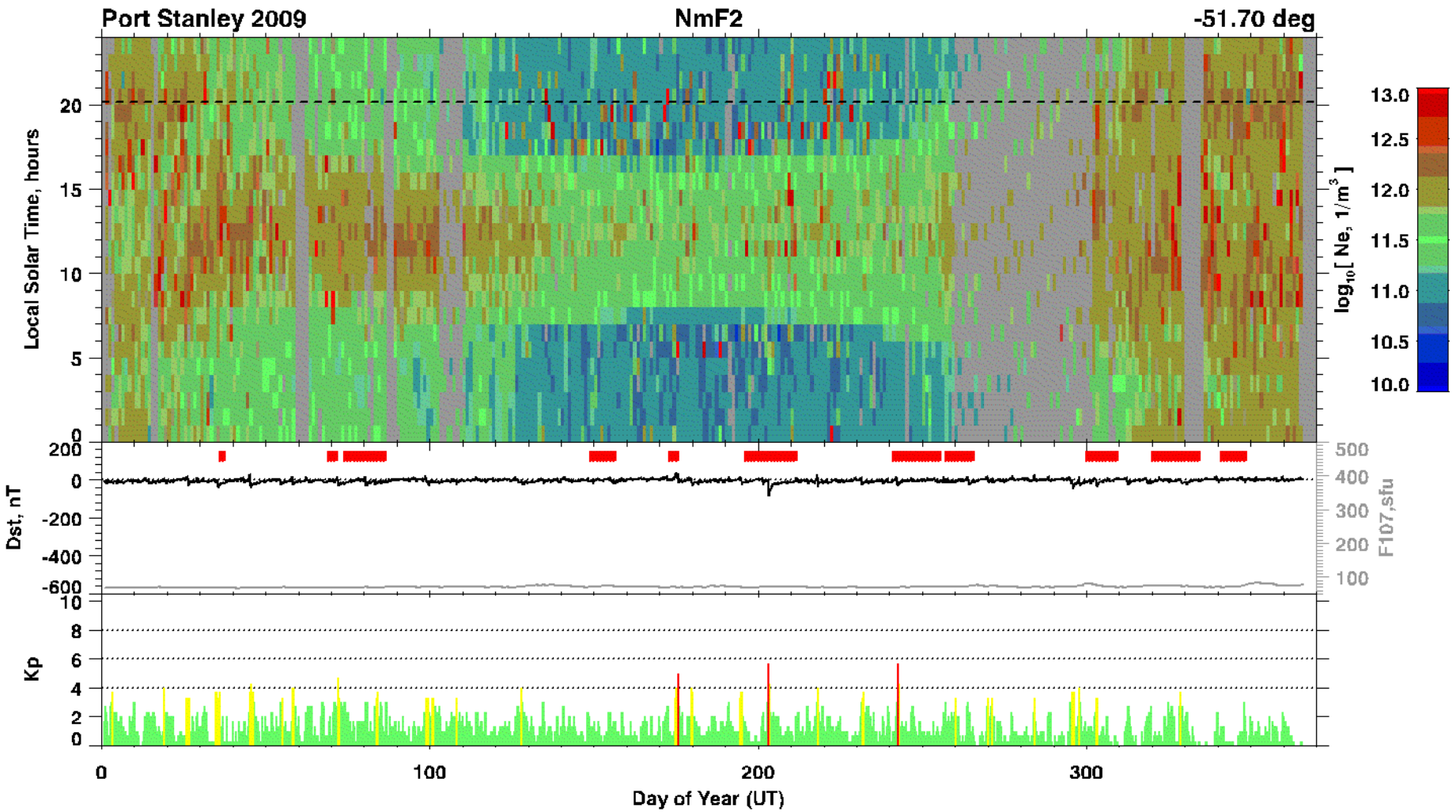


2008



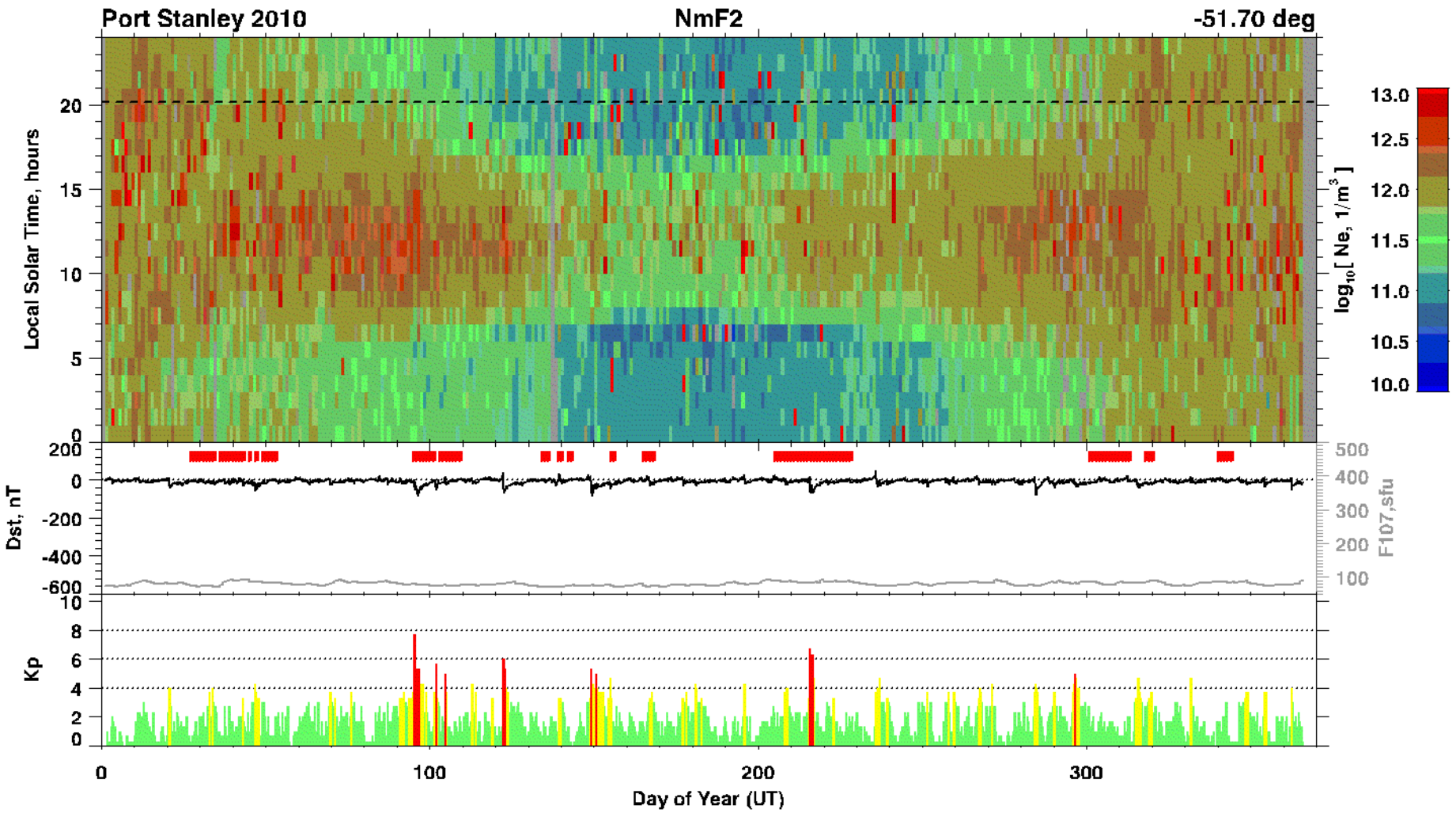


2009



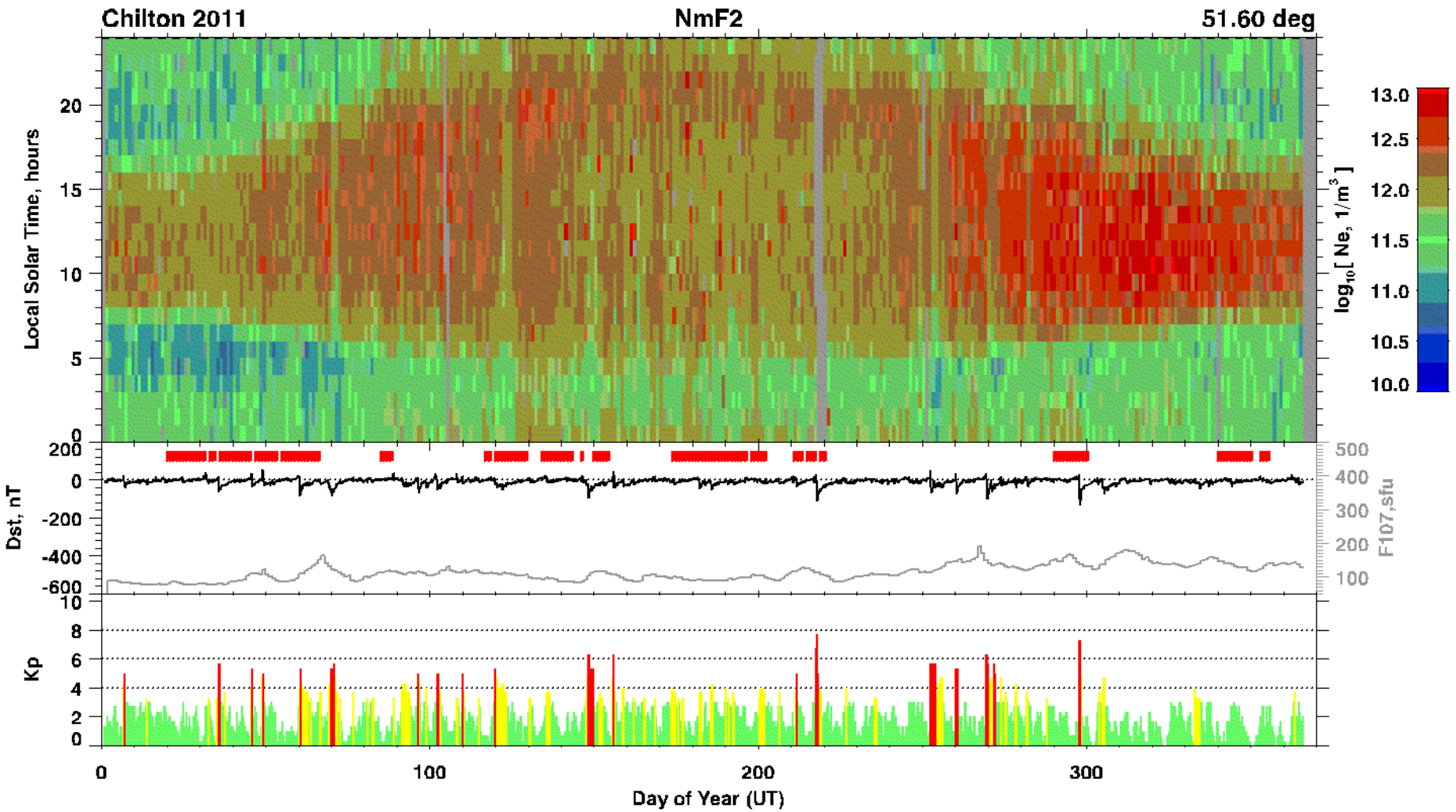


2010



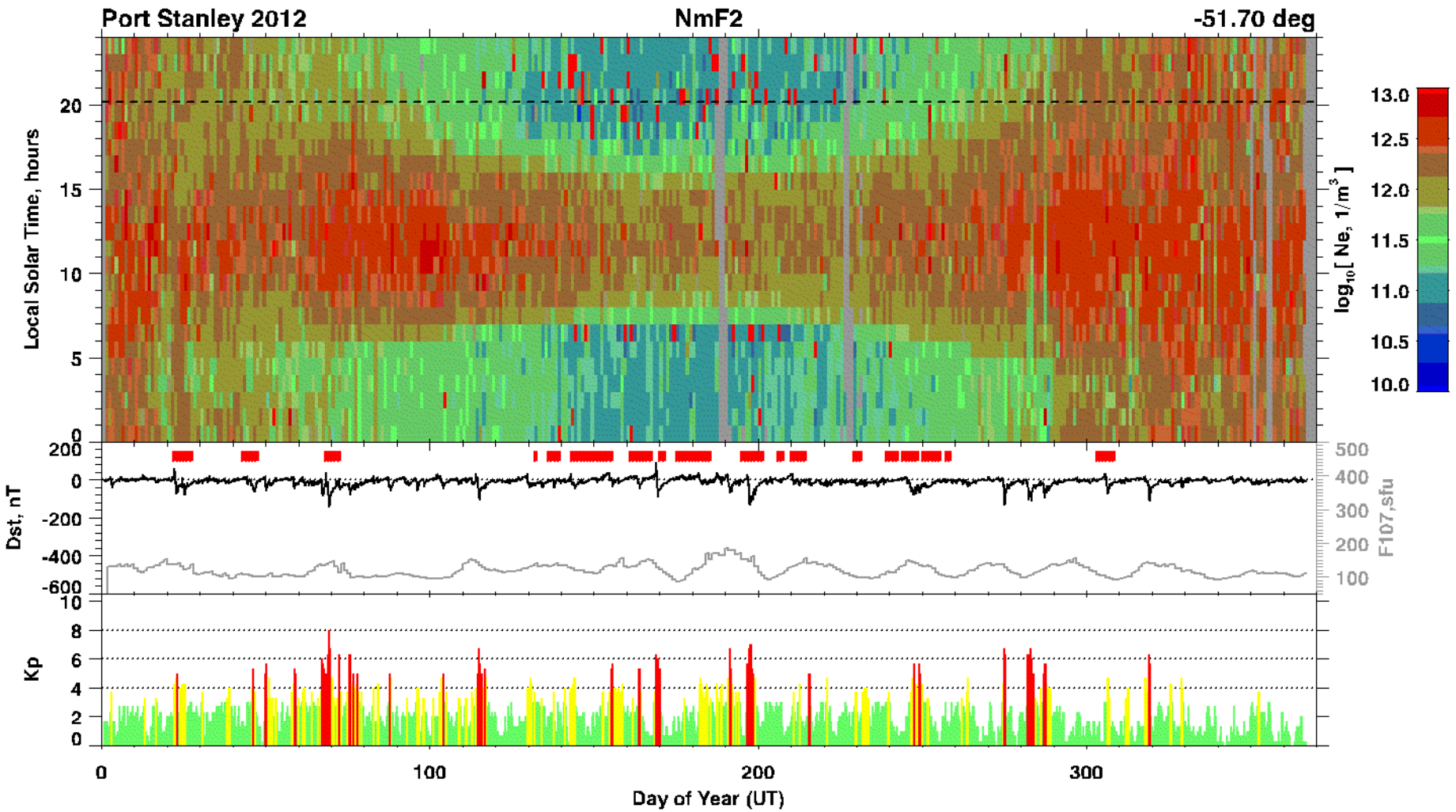


2011



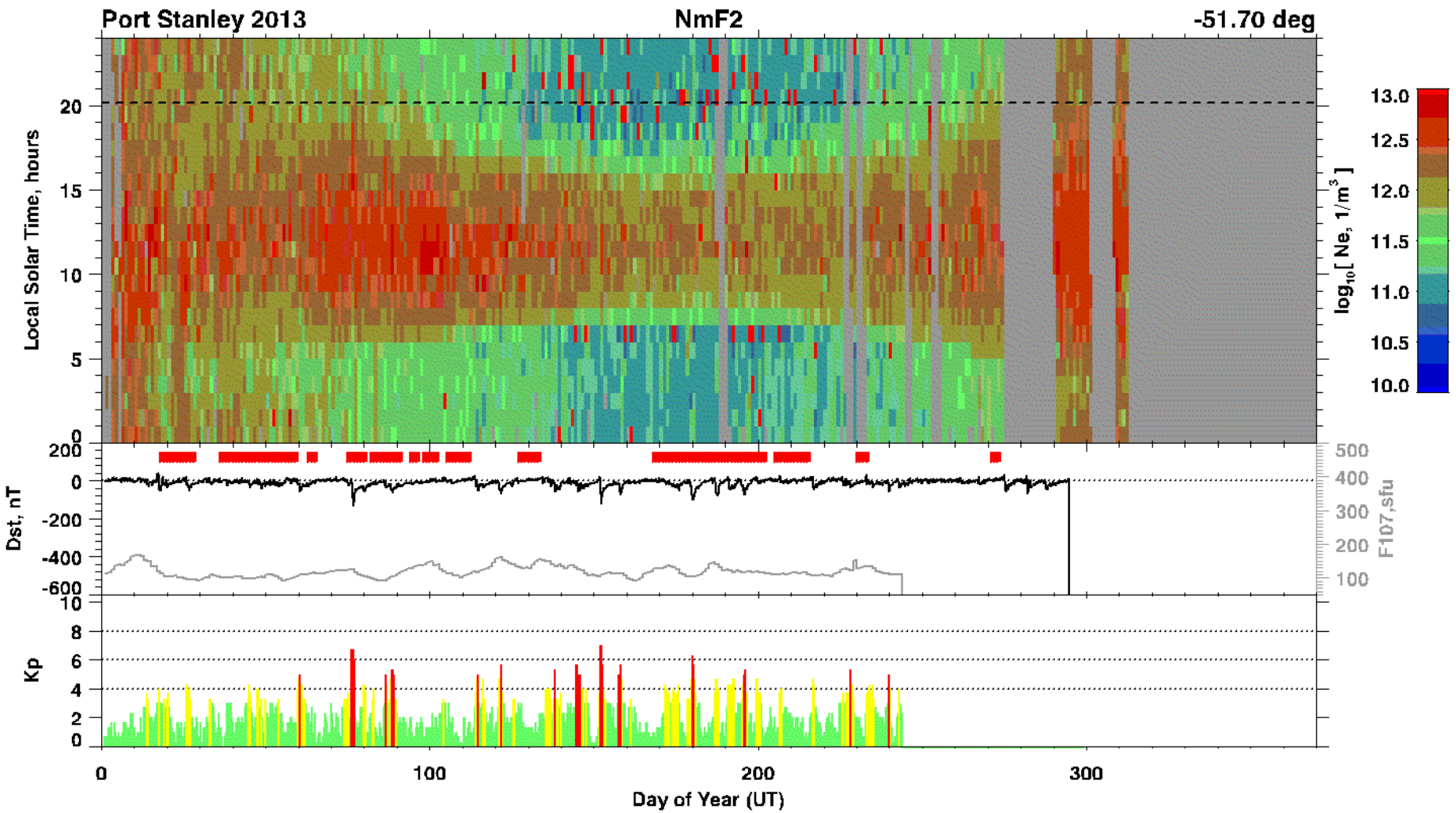


2012



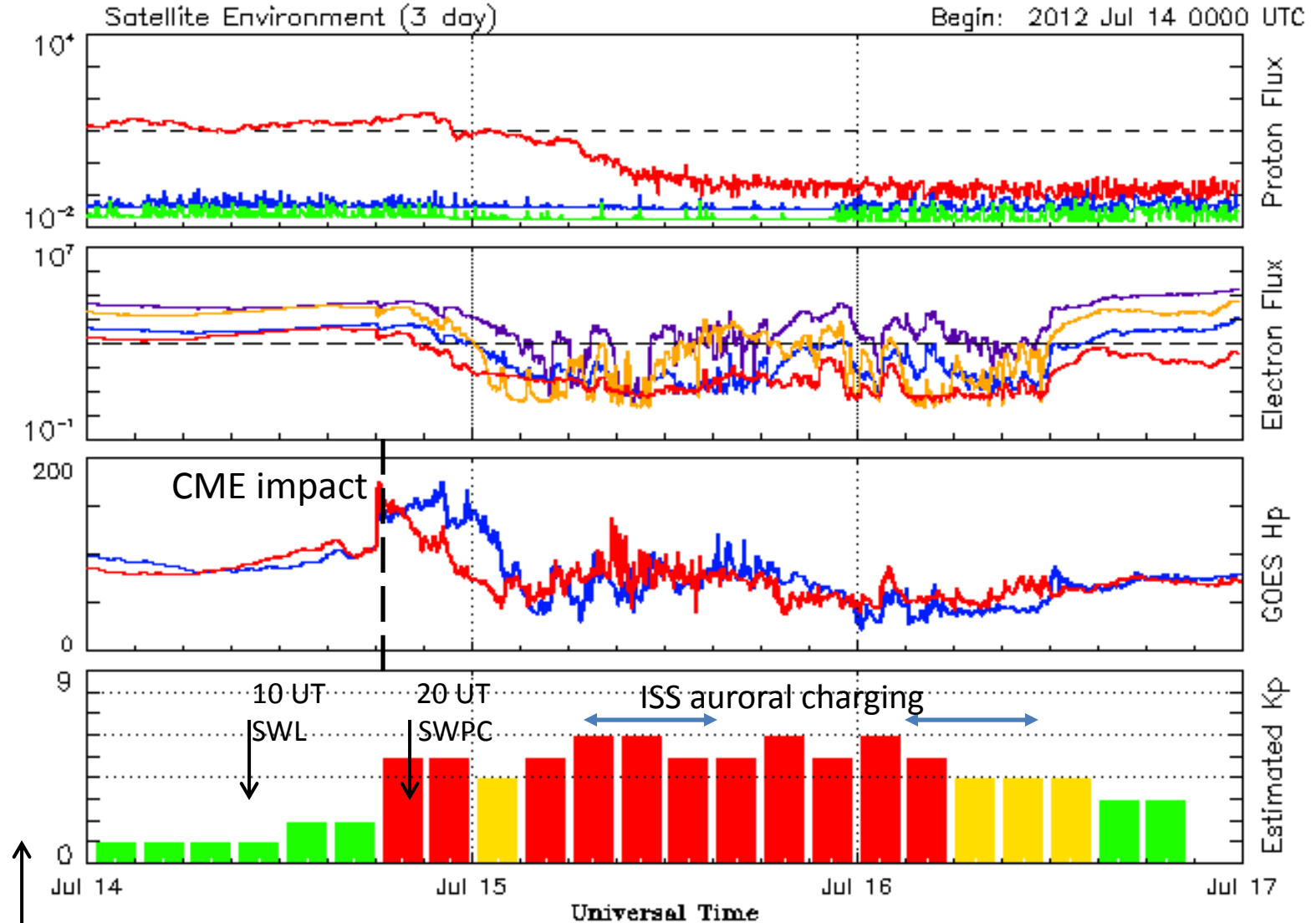


2013





July 2012 Geomagnetic Storm



Updated 2012 Jul 16 23:56:05 UTC

NOAA/SWPC Boulder, CO USA

FPMU activated 13 July based on CME alerts



15 July 2012

