

A photograph taken from the International Space Station (ISS) showing a vibrant green aurora (Northern Lights) over the Earth's surface. The aurora is a bright, glowing band of light stretching across the horizon. The Earth's surface is visible below, showing dark landmasses and lighter ocean areas. The ISS structure, including solar panel arrays, is visible in the foreground on the left side of the frame.

DMSP and ISS Auroral Charging Events 17-18 March 2013 GEM-CEDAR Storm

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GEM Mini-Workshop
CEDAR-GEM Modeling Challenge Session
San Francisco, CA
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17-18 March 2013 Storm Period

- Equinox period is not conducive to strong DMSP auroral charging
 - Only a few weak auroral charging events during period
- Weak ISS charging, strongest events (few volts) in southern hemisphere

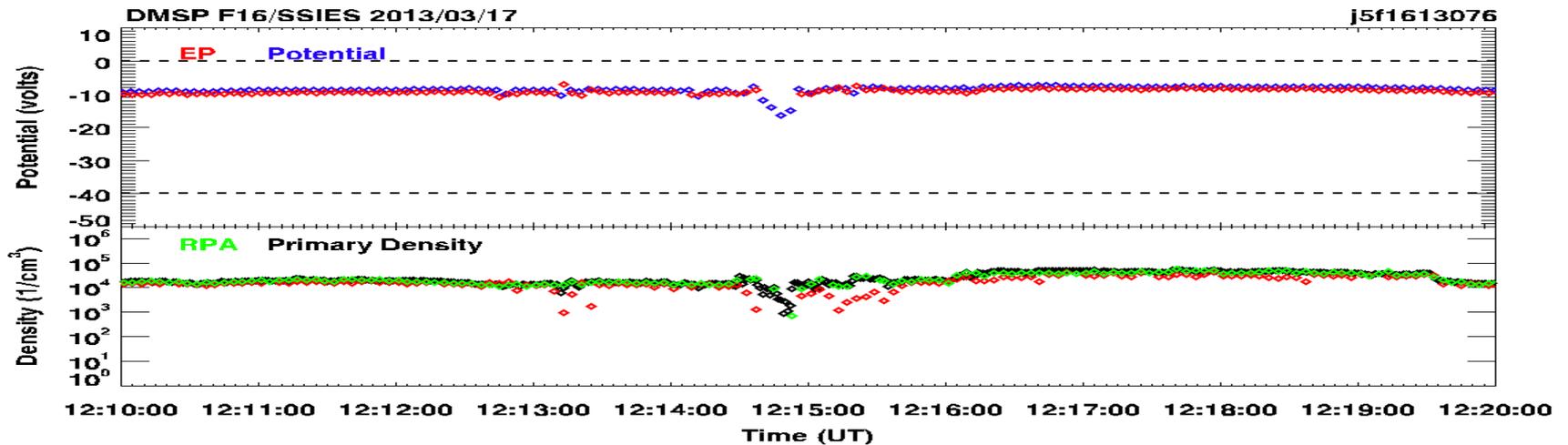
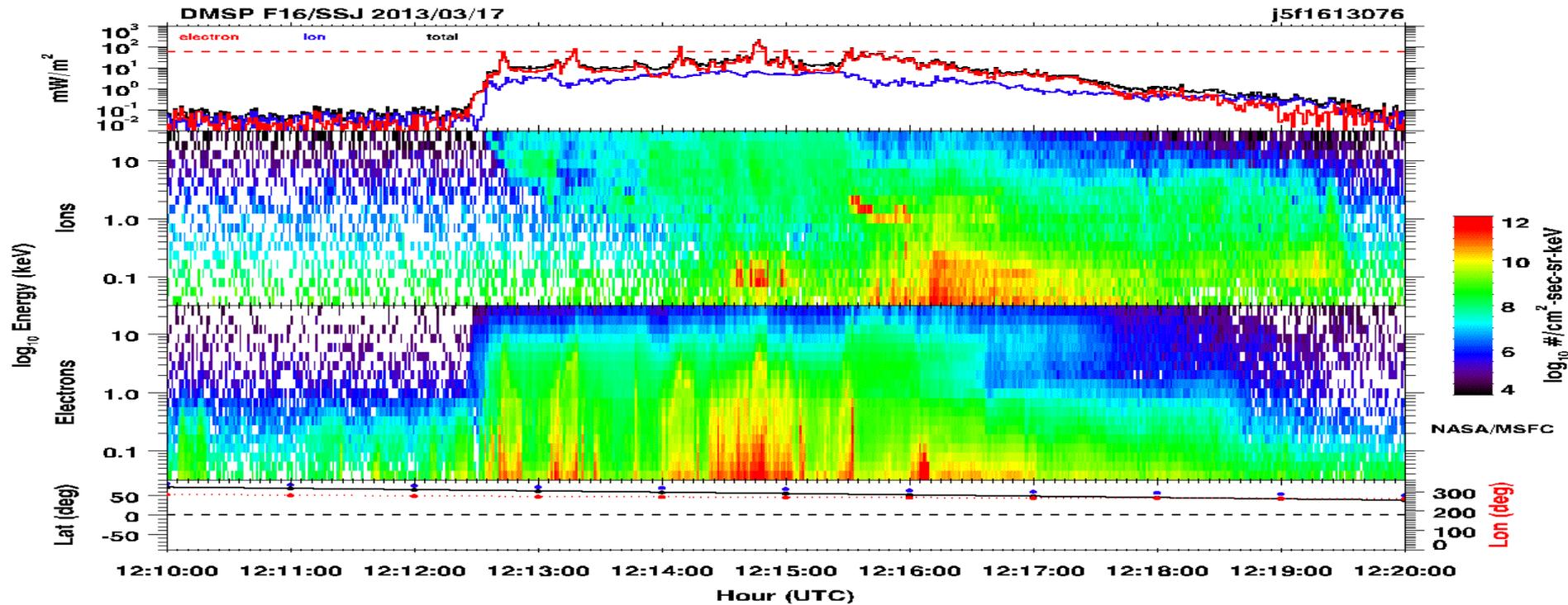
Date	Satellite	Charging Event Time	Potential	
			$\phi_{s/c}$ volt	$d\phi_{s/c}$ volt
17 March 2013	F16	12:15 UT	-18	8
	F16	16:14 UT	-26	14
	F18	19:49 UT	-28	10
	ISS	Multiple orbits ~11 – 19 UT		few volts

Acknowledgements:

DMSP SSJ, SSIES records are provided courtesy of the US Air Force and NOAA's National Geophysical Data Center.

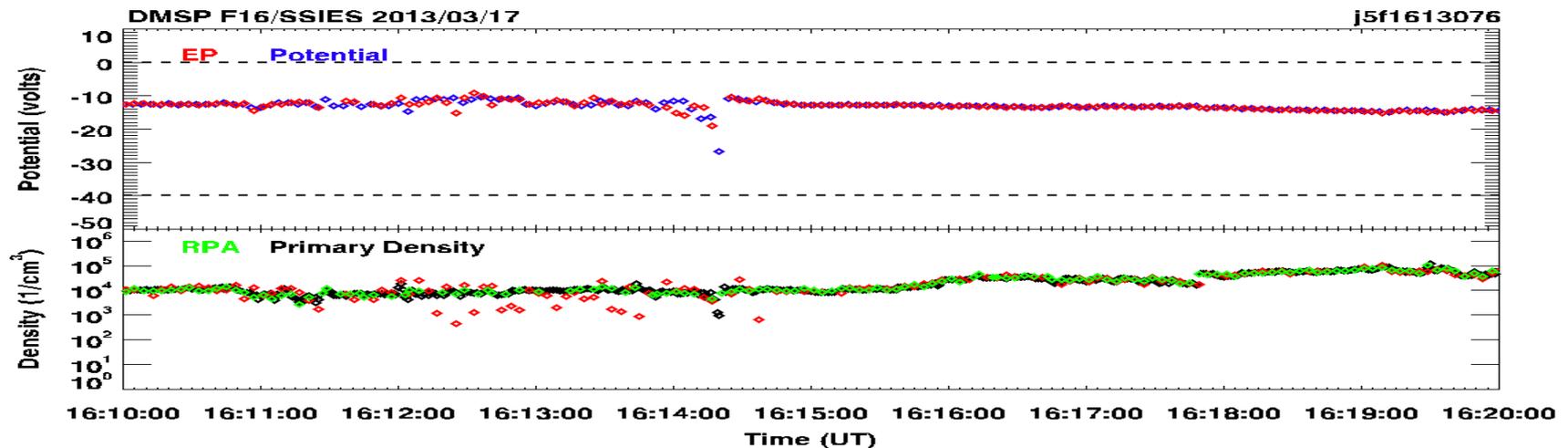
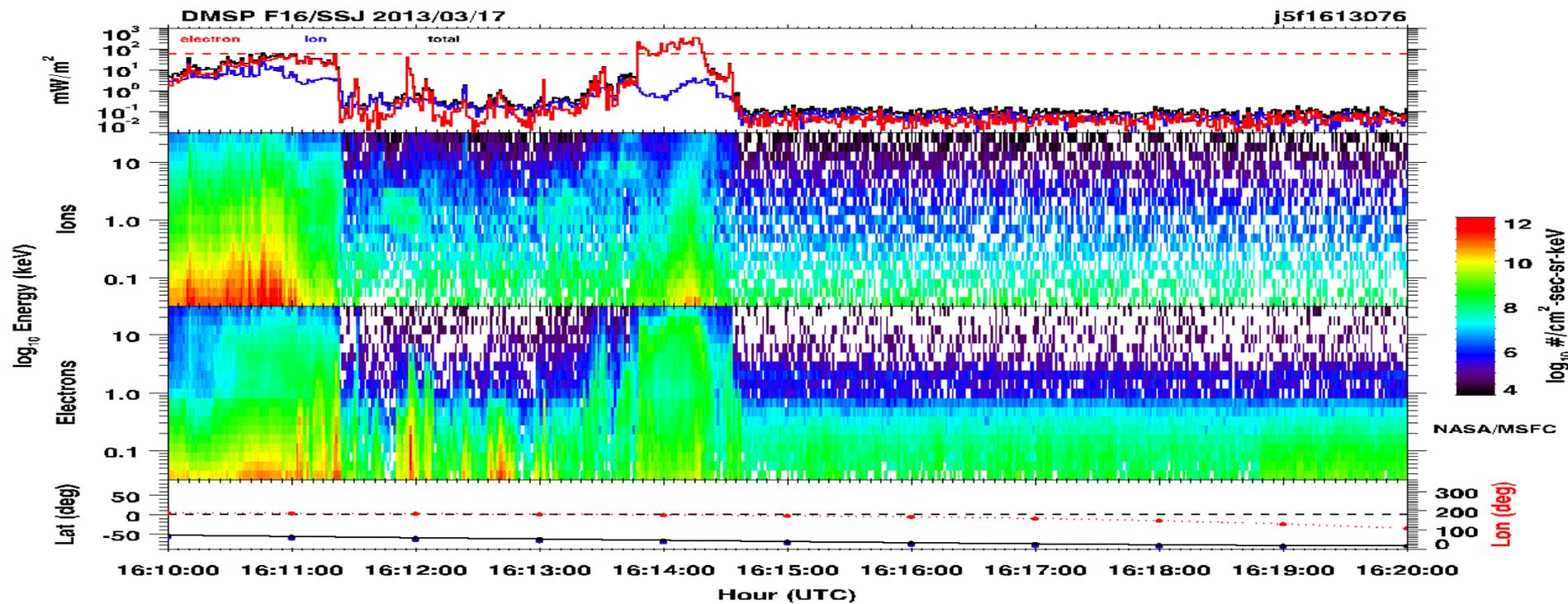


F16: 17 March 2013 ~12:15 UT event



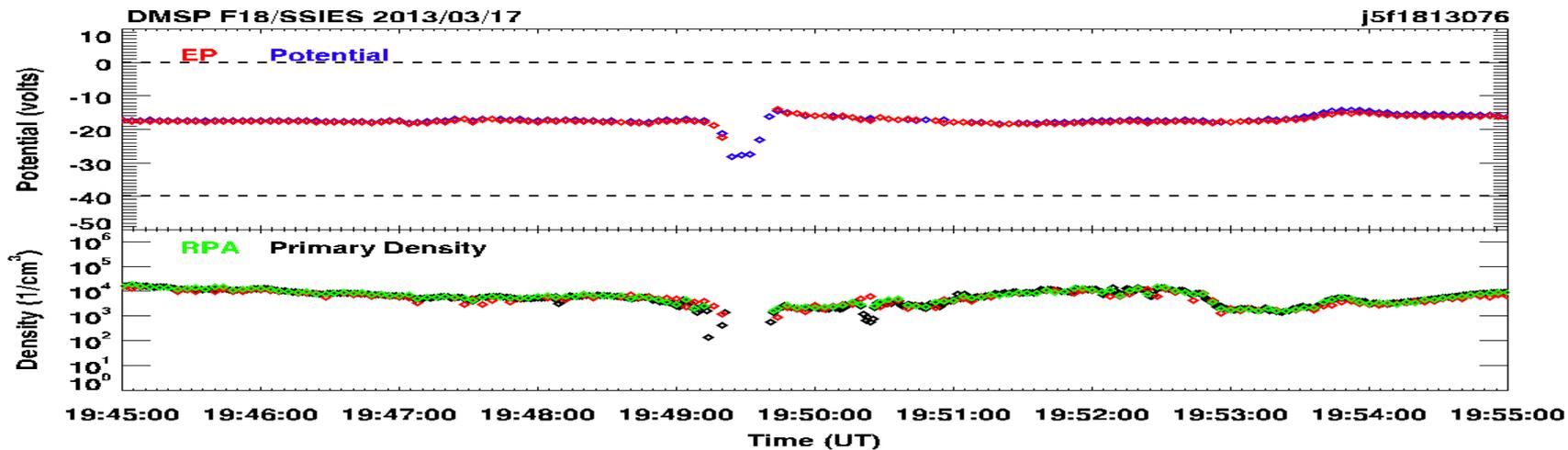
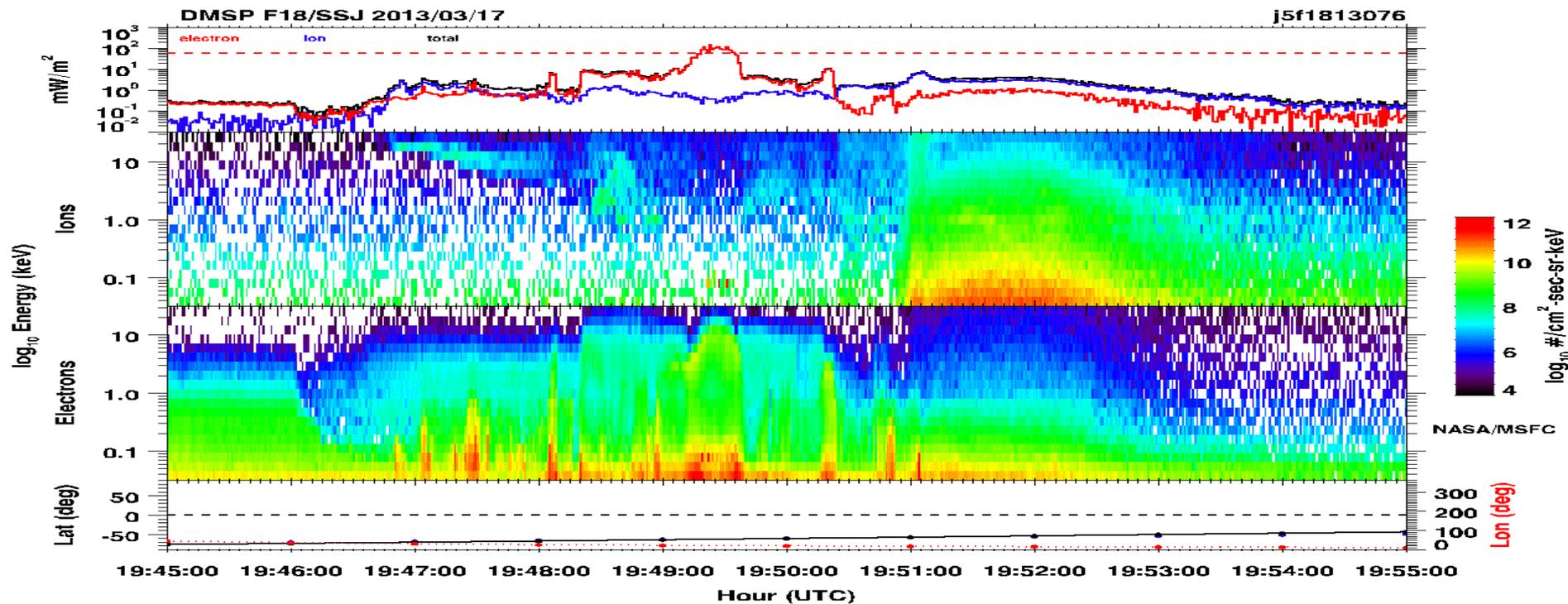


F16: 17 March 2013 ~16:14 UT event



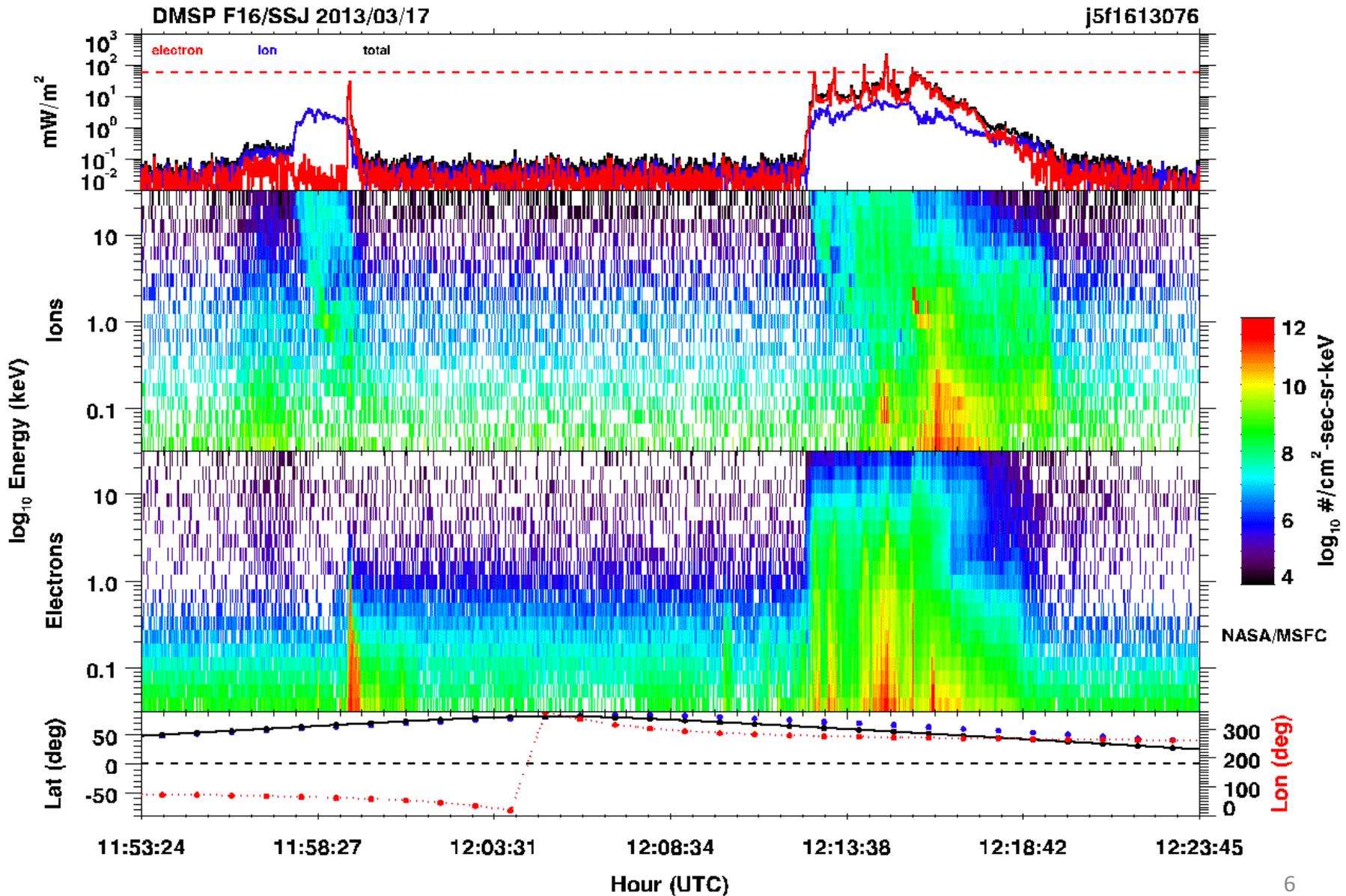


F18: 17 March 2013 ~19:49 UT event



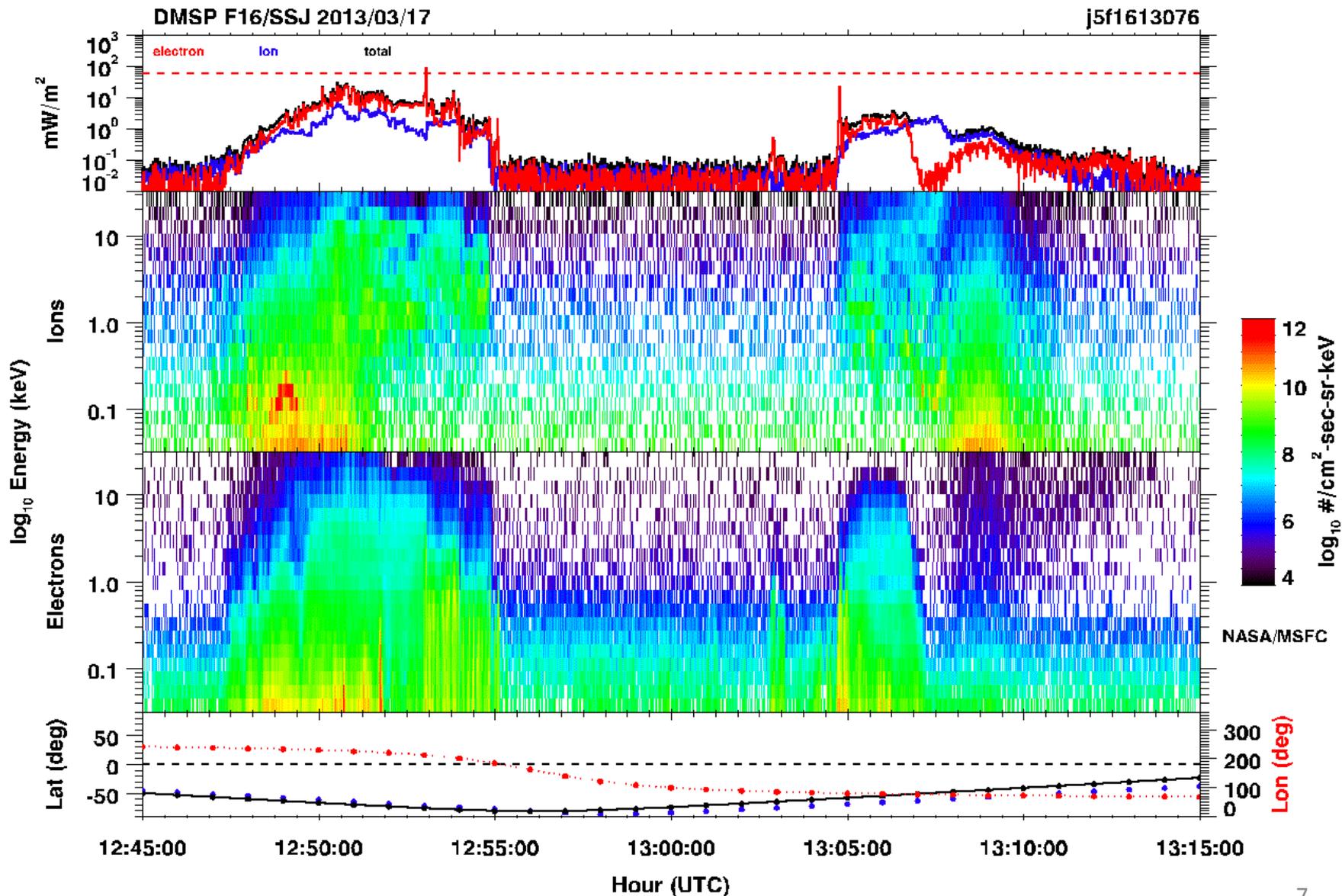


F16: 17 March 2013 N Hemisphere Oval



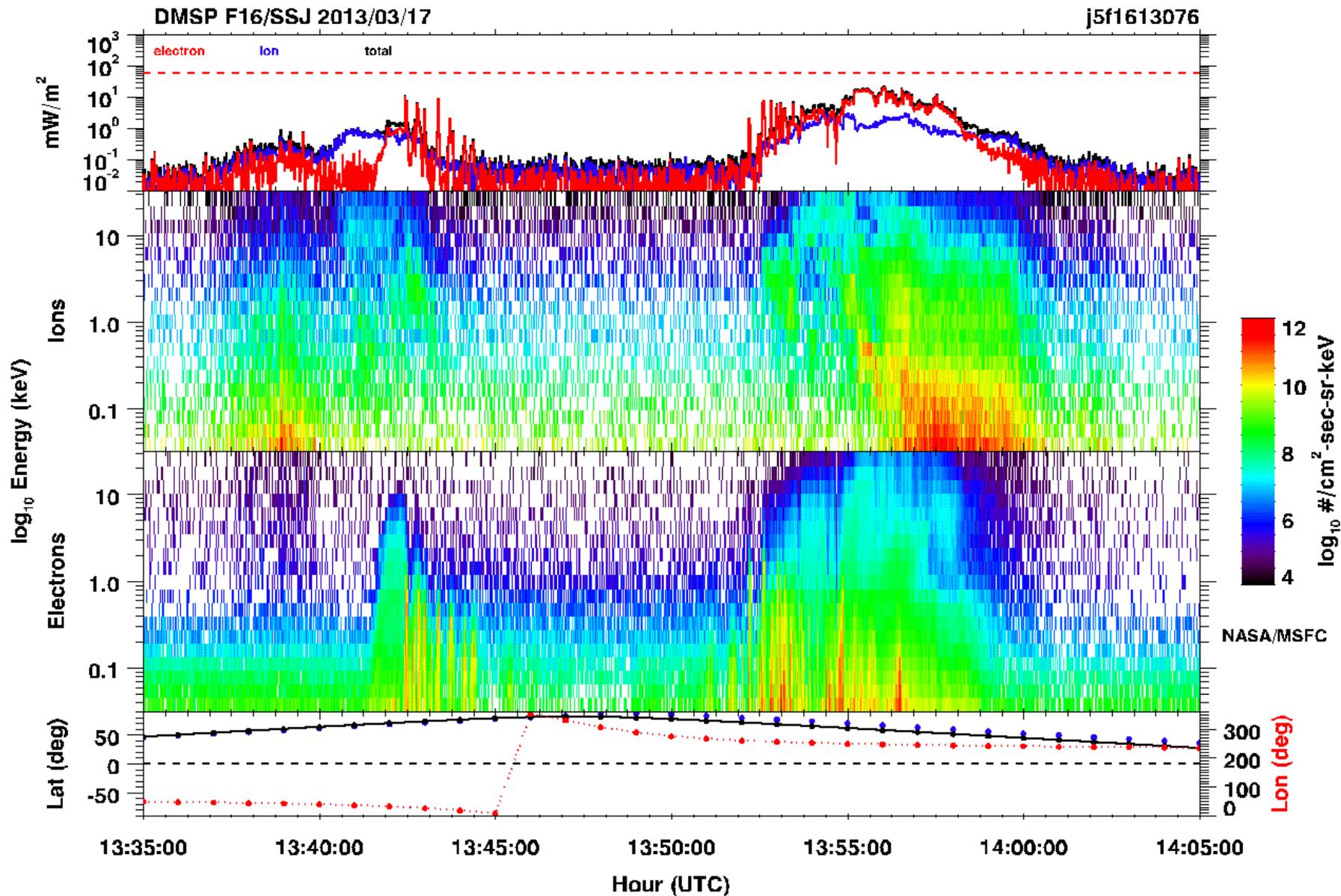


F16: 17 March 2013 S Hemisphere Oval



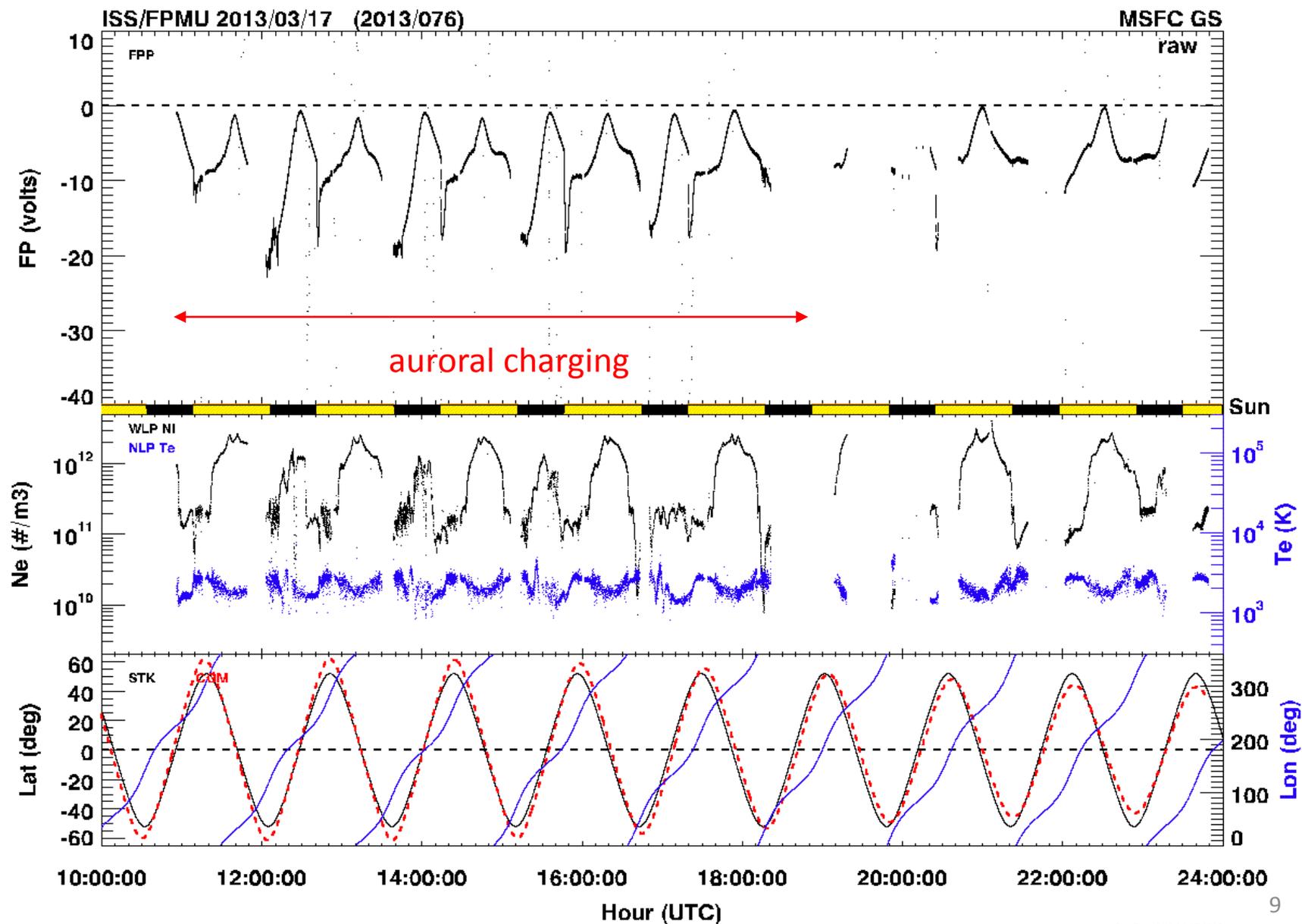


F16: 17 March 2013 N Hemisphere Oval



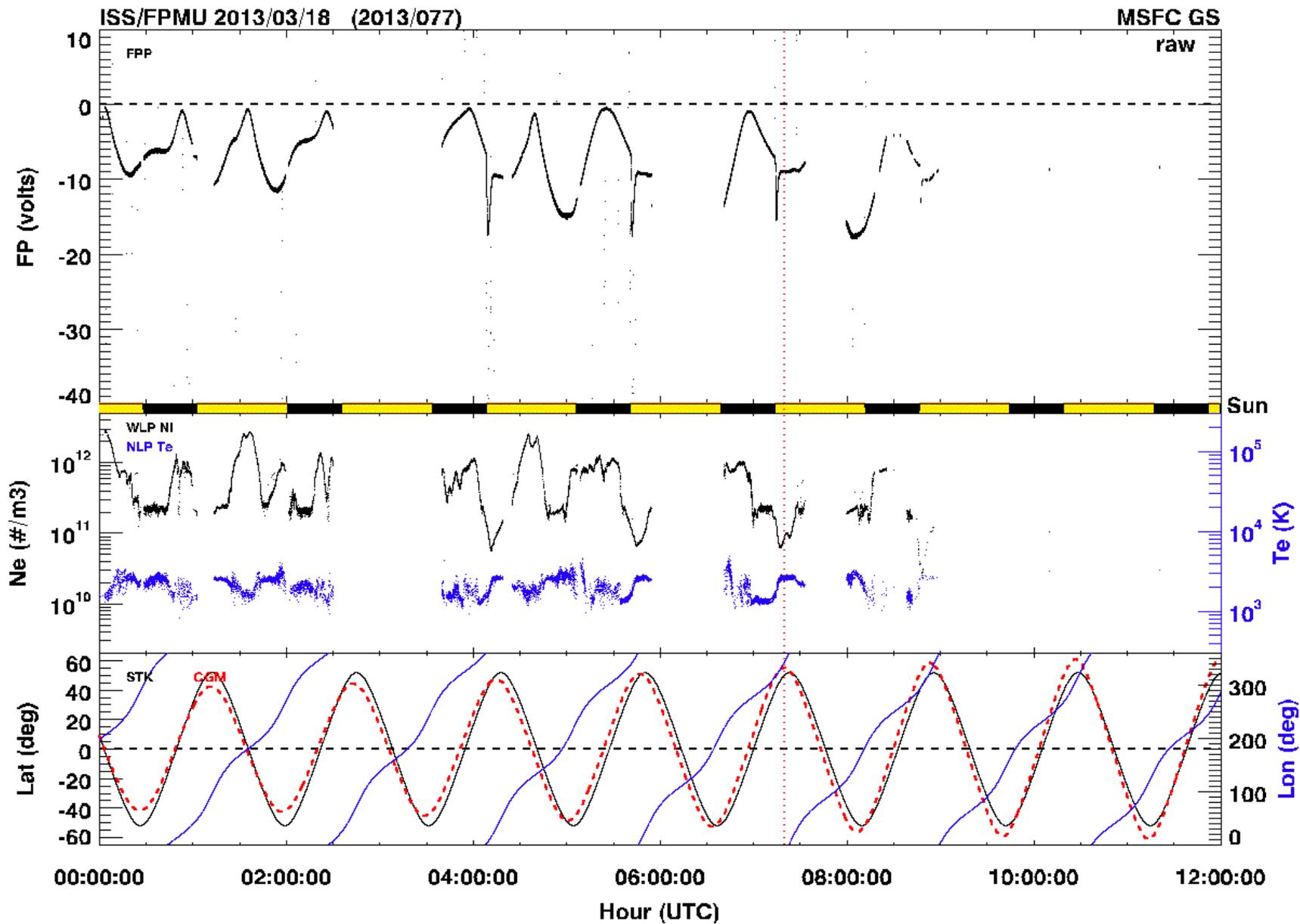


ISS: 17 March 2013 ~12 – 18 UT events



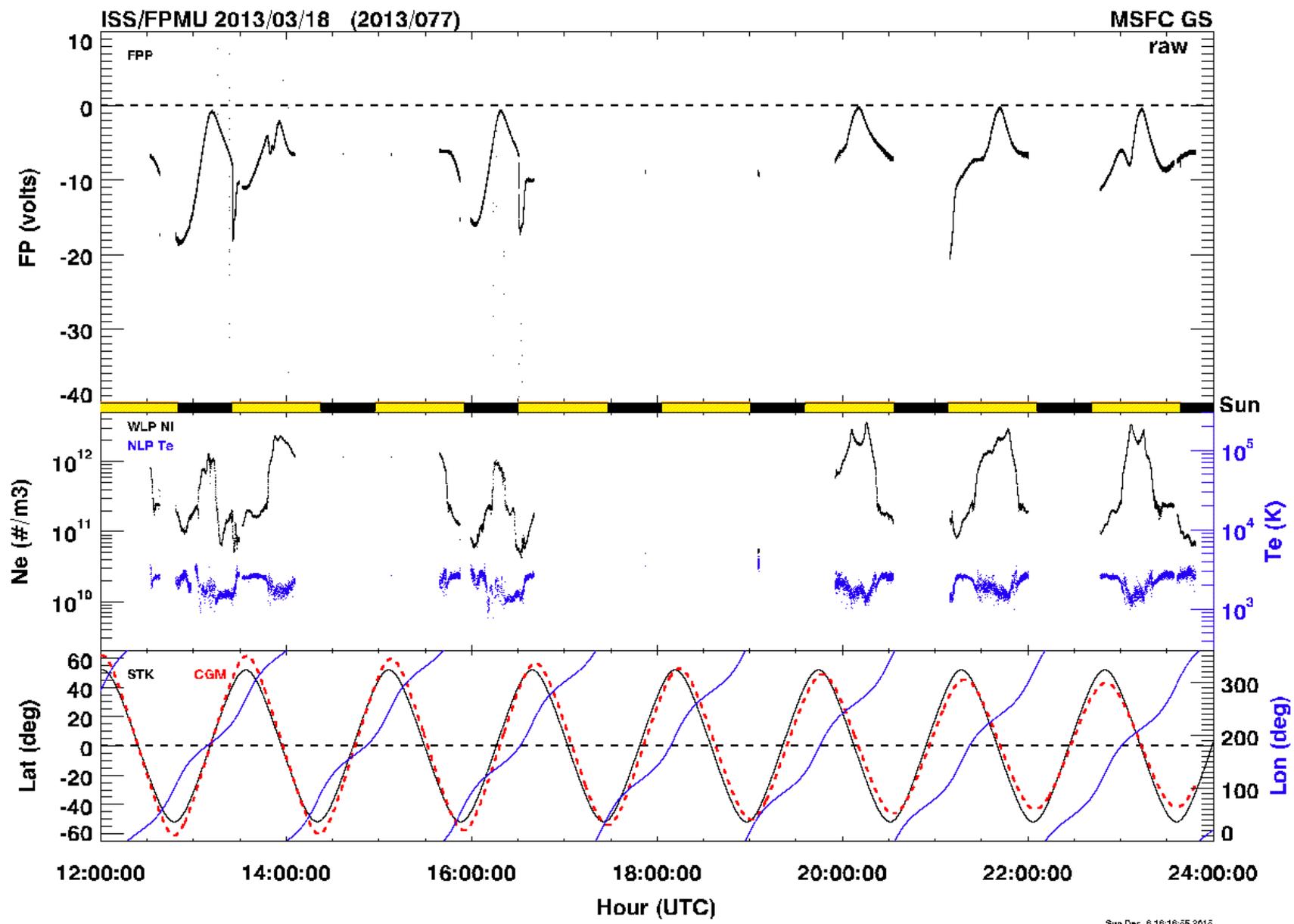


ISS: 18 March 2013





ISS: 18 March 2013



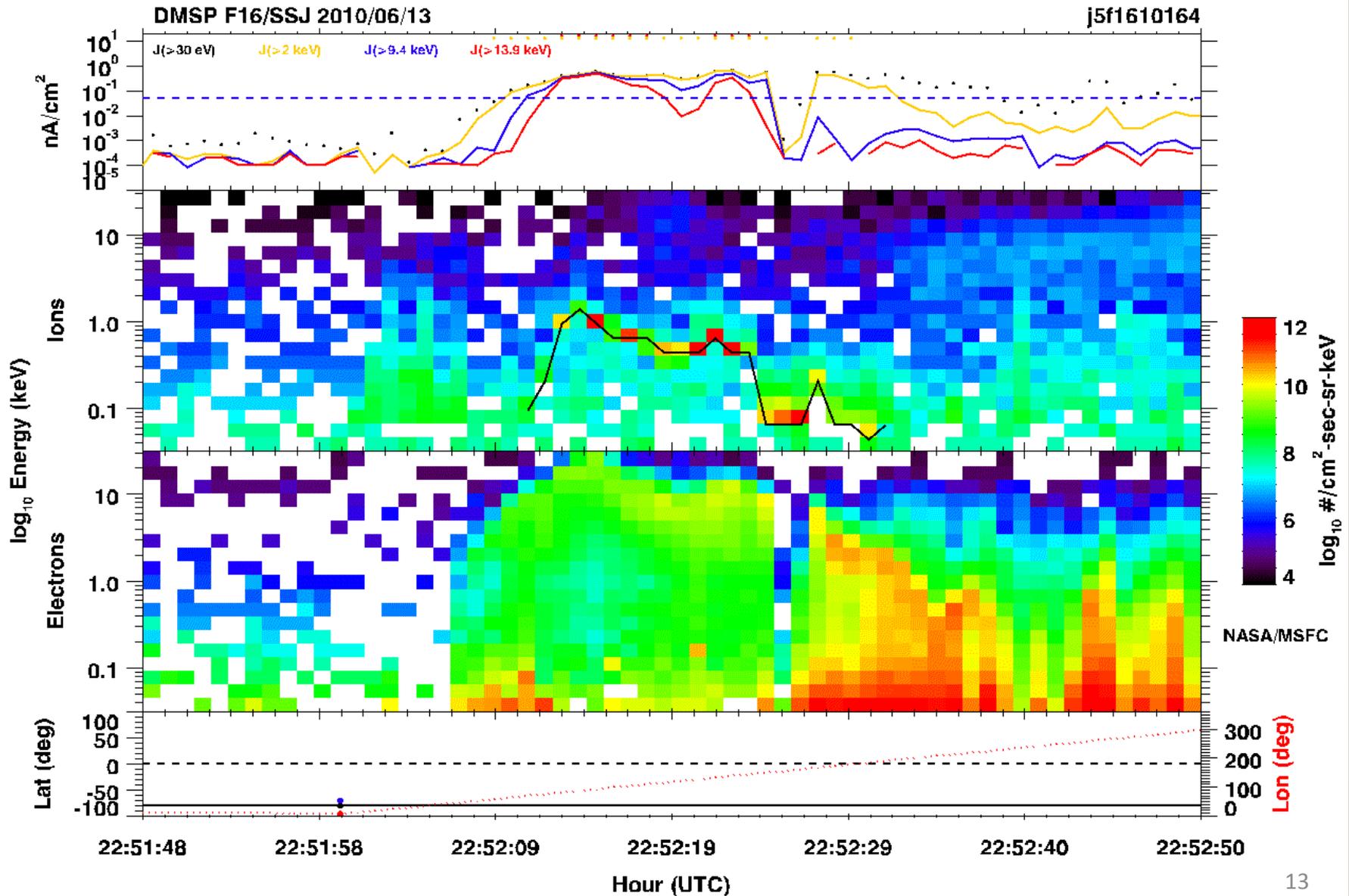


Backup

- Slides 13 – 14: Examples of kilovolt level DMSP charging
- Slides 15 – 20: DMSP 17-18 March 2015 summary plots
- Slide 21: Extreme DMSP charging levels as function of integral electron flux for three energy thresholds (>30 eV, >9.4 keV, >13.9 keV)

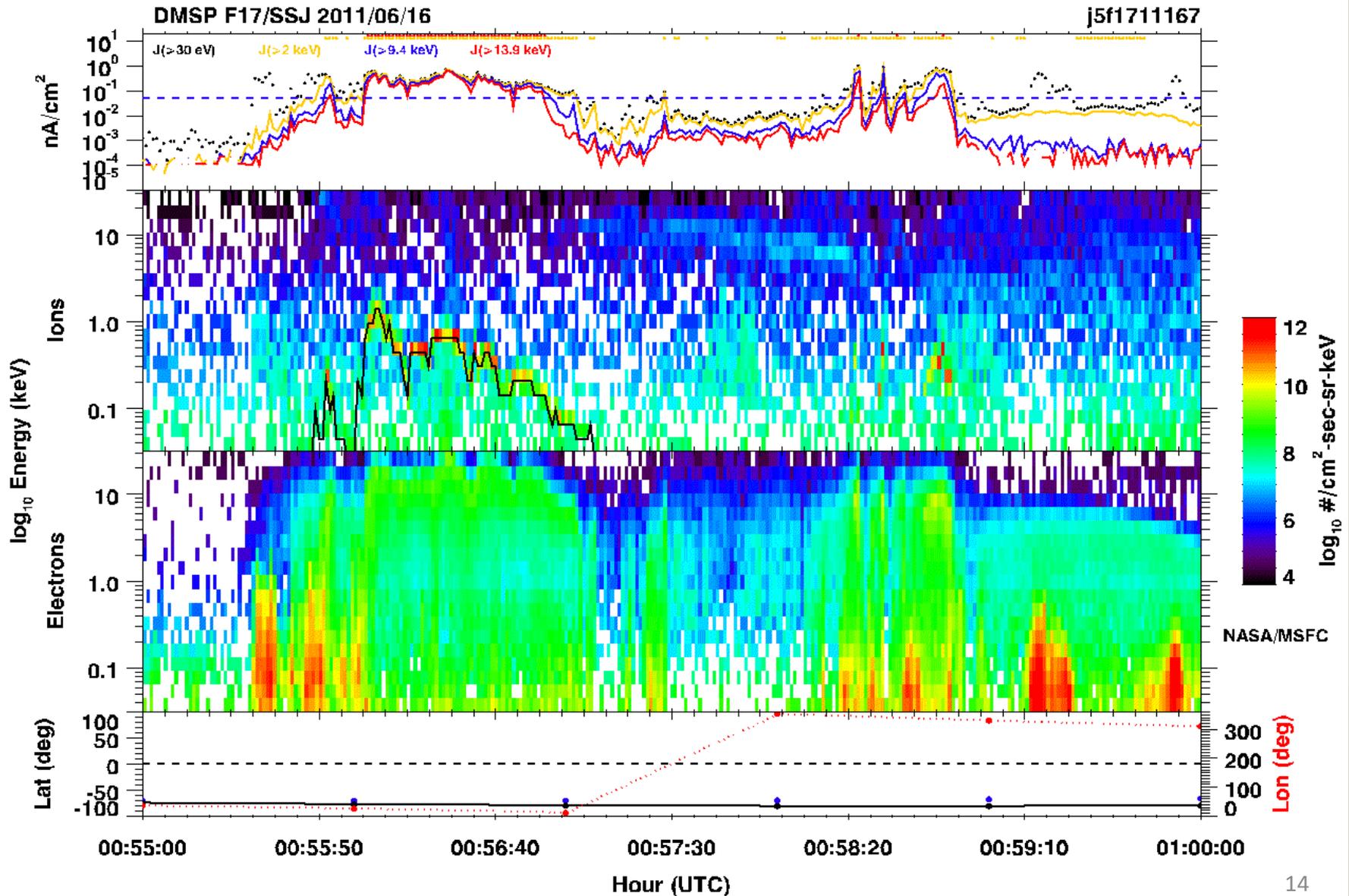


F16: 13 June 2010 ~1000 V charging



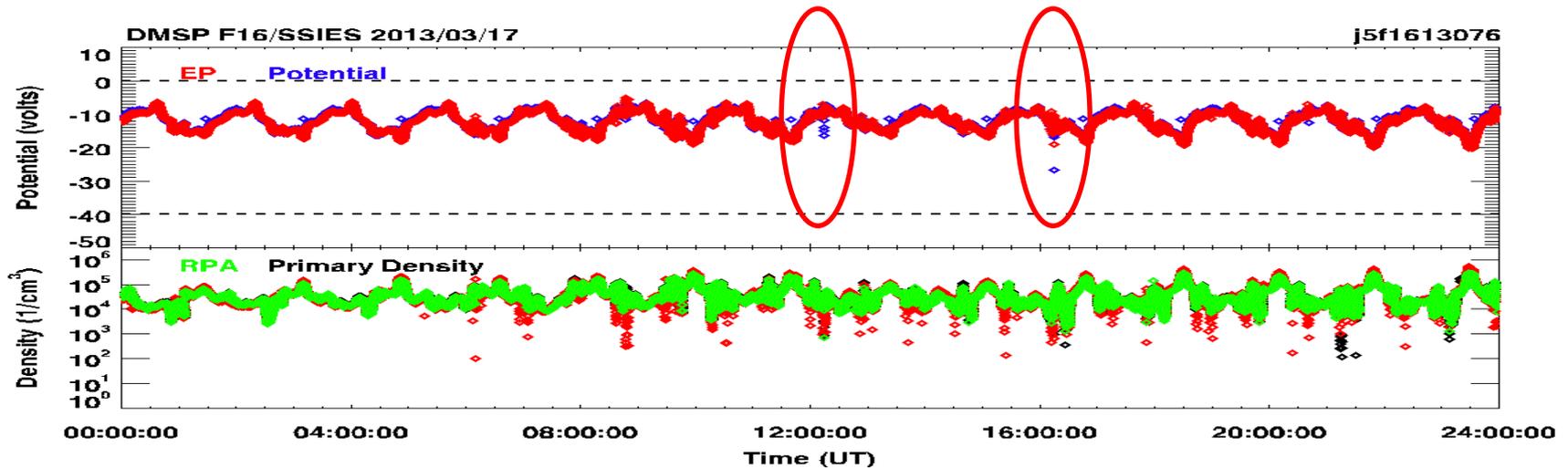
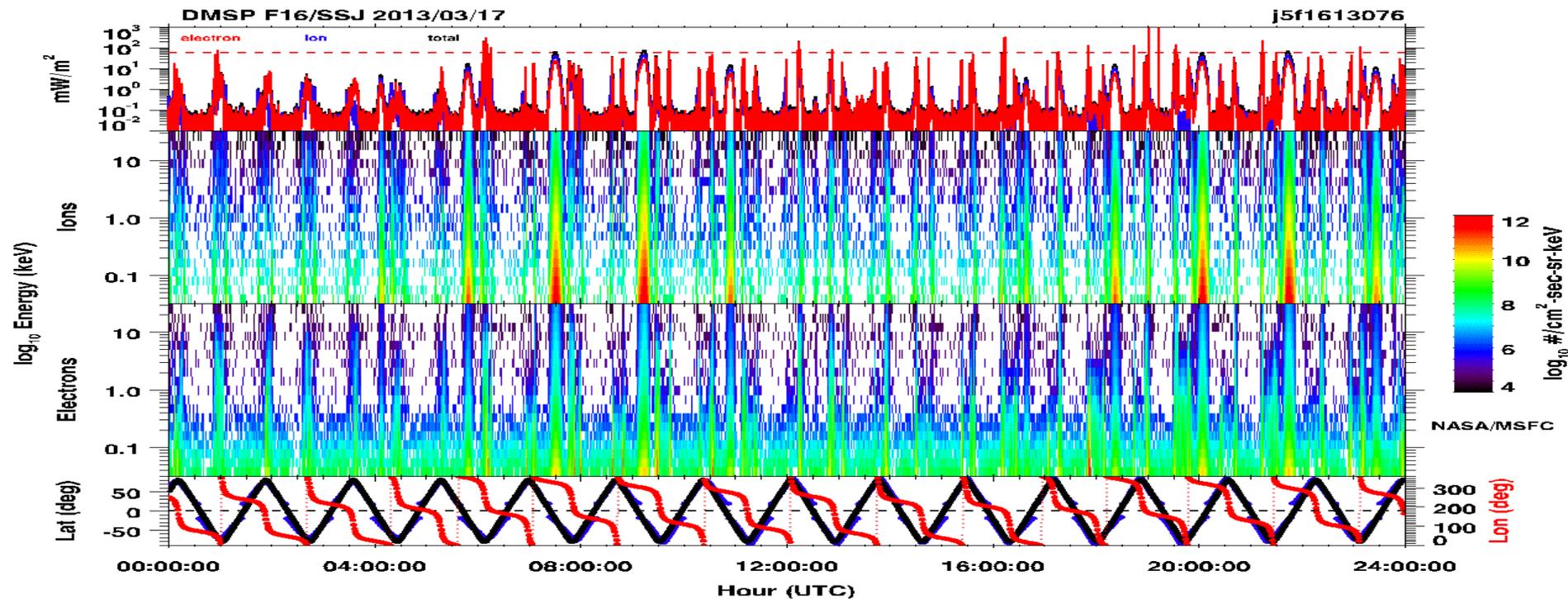


F17: 16 June 2011 ~1000 V charging



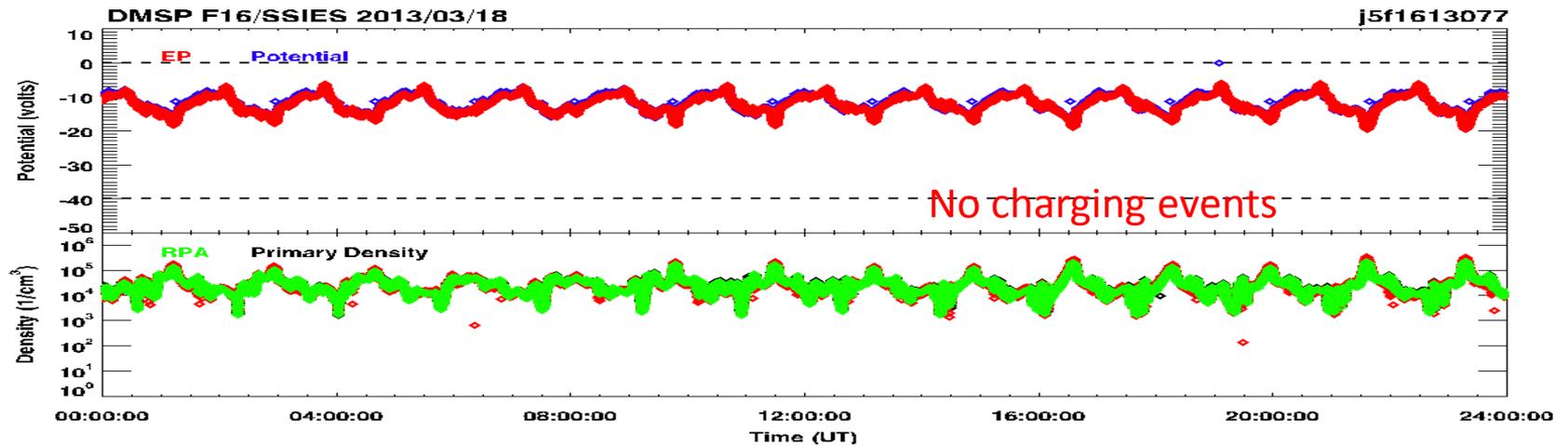
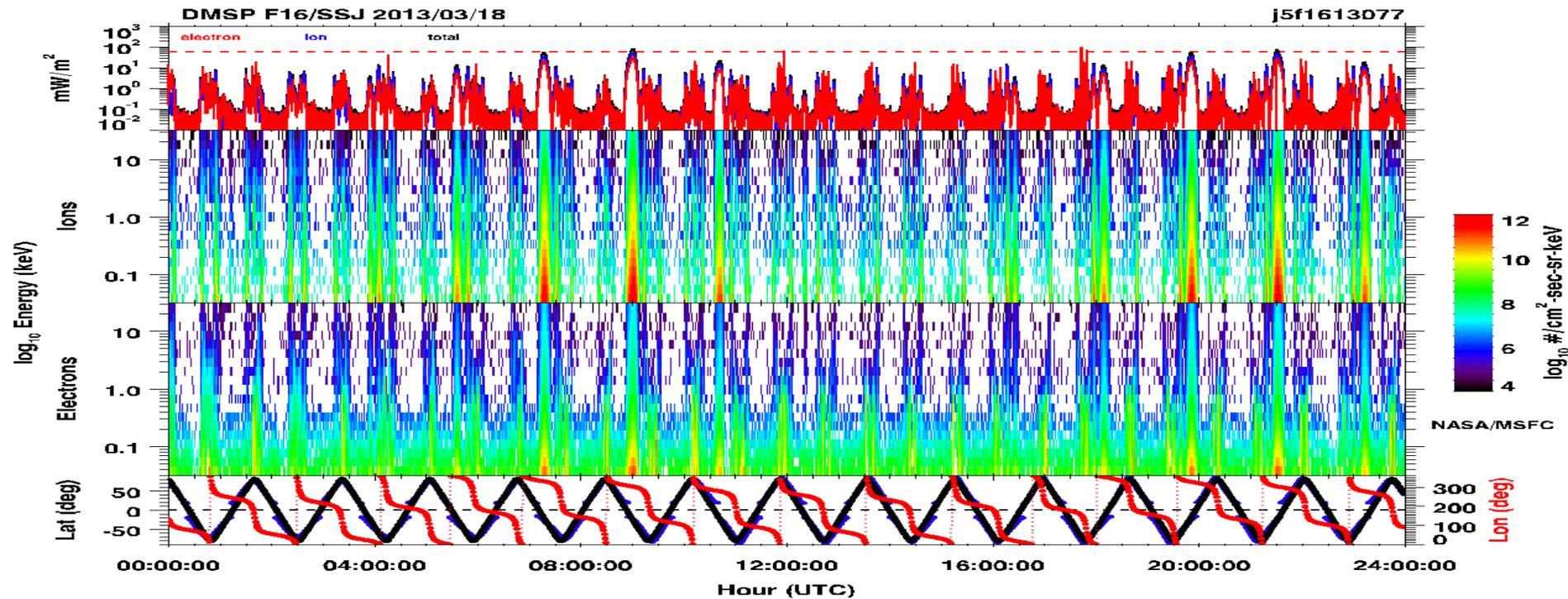


F16: 17 March 2013



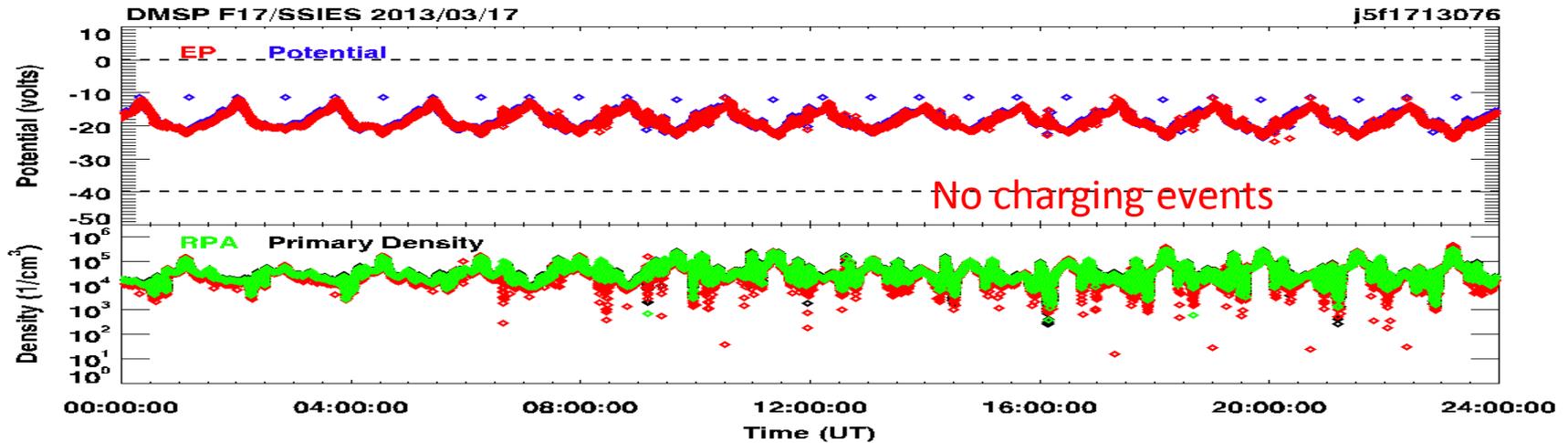
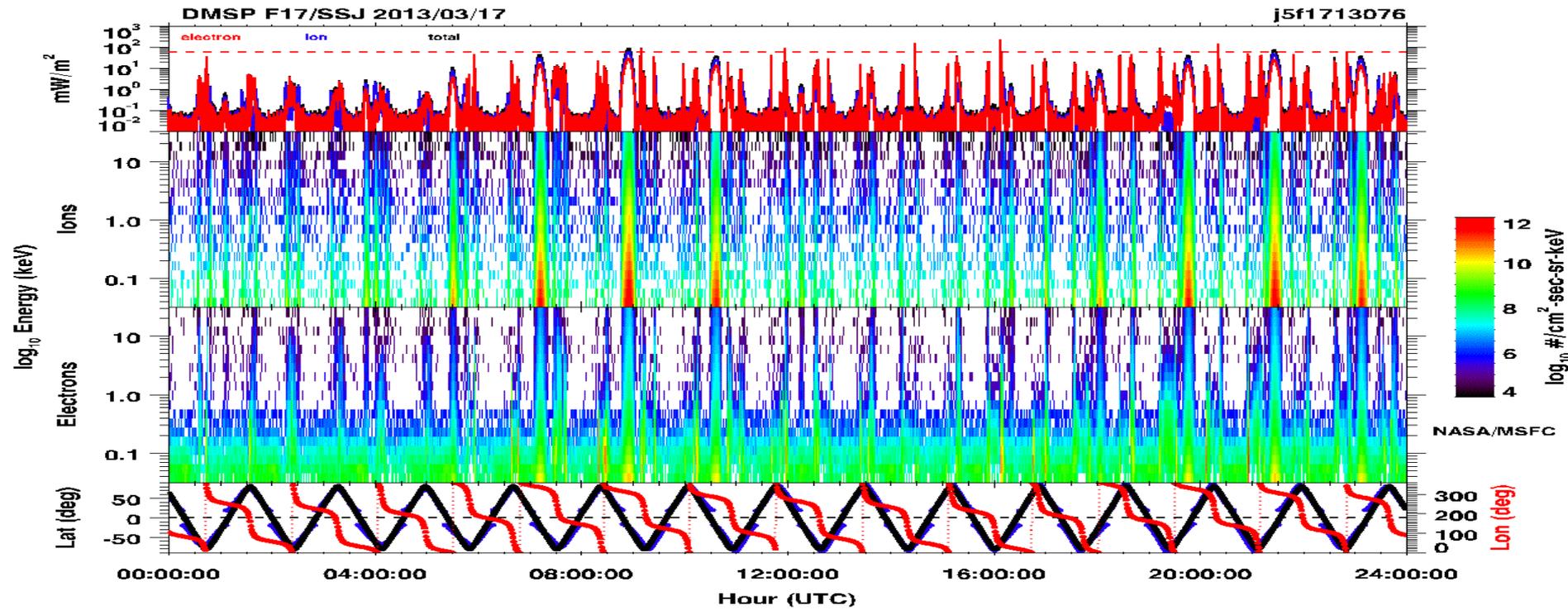


F16: 18 March 2013



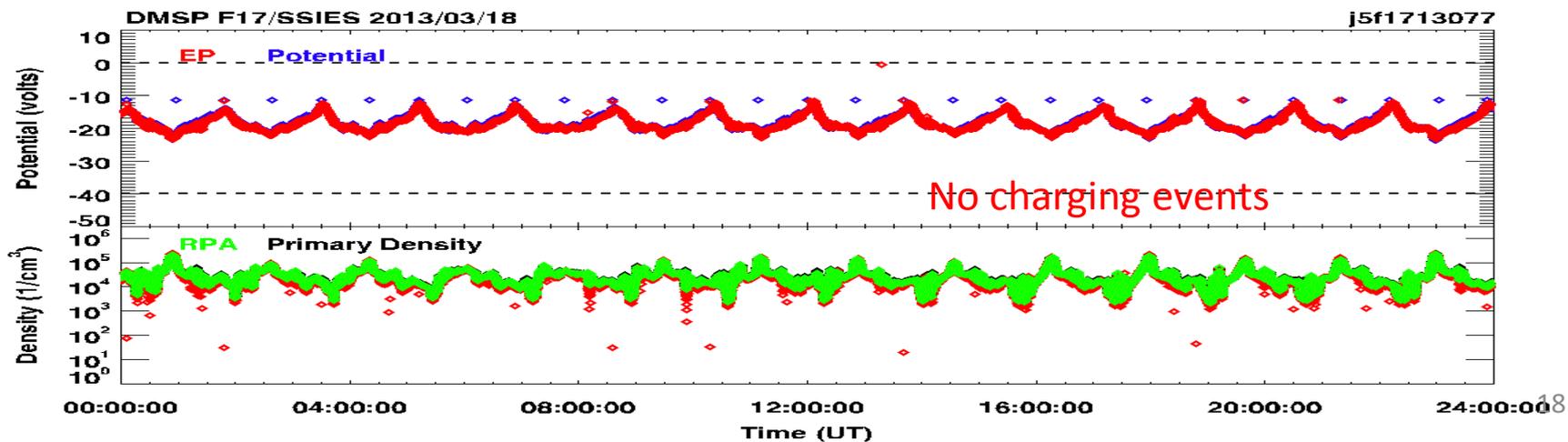
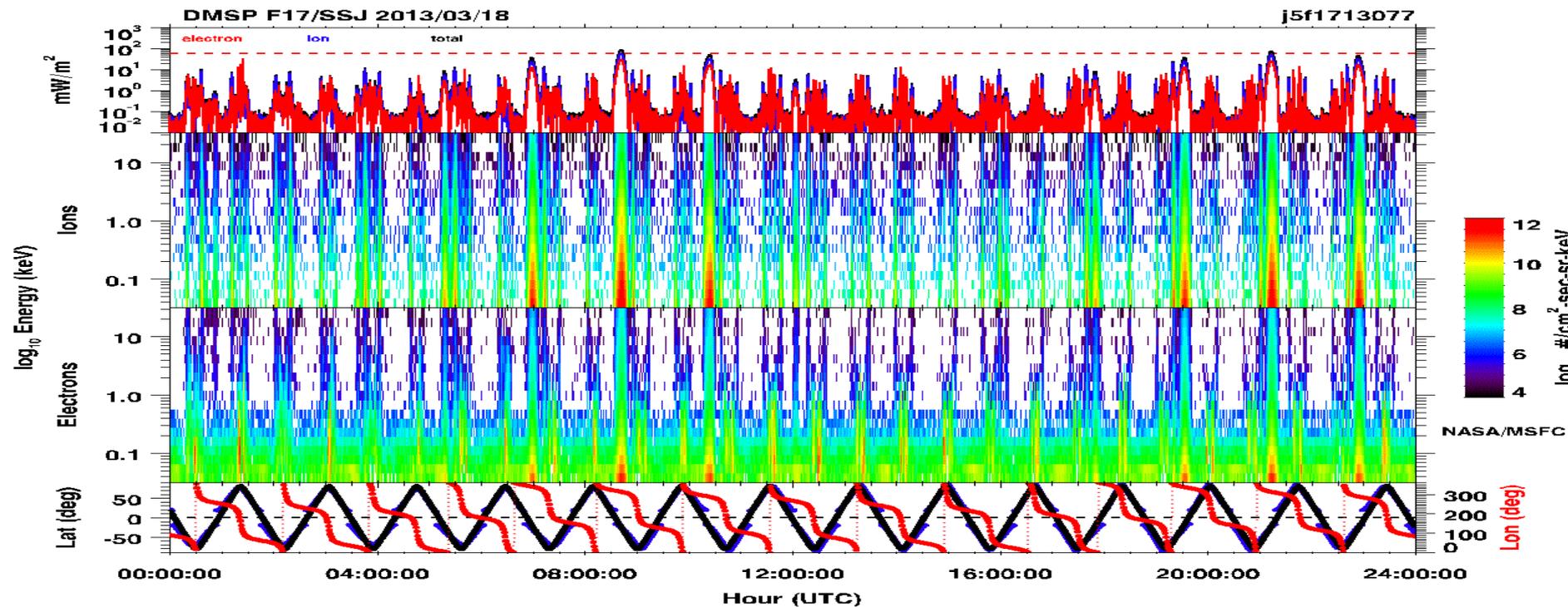


F17: 17 March 2013



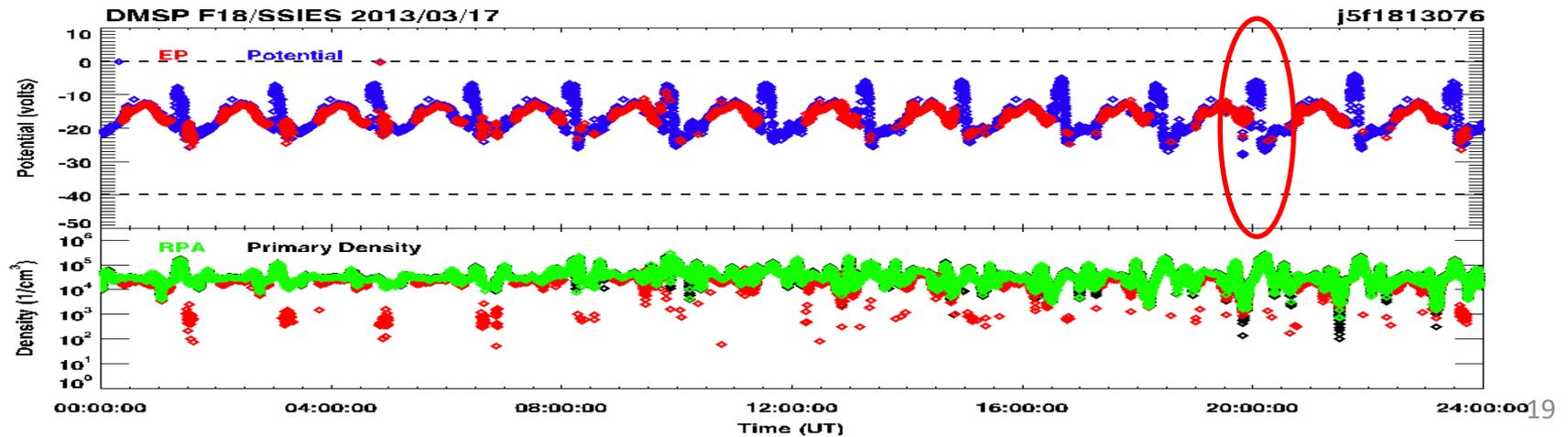
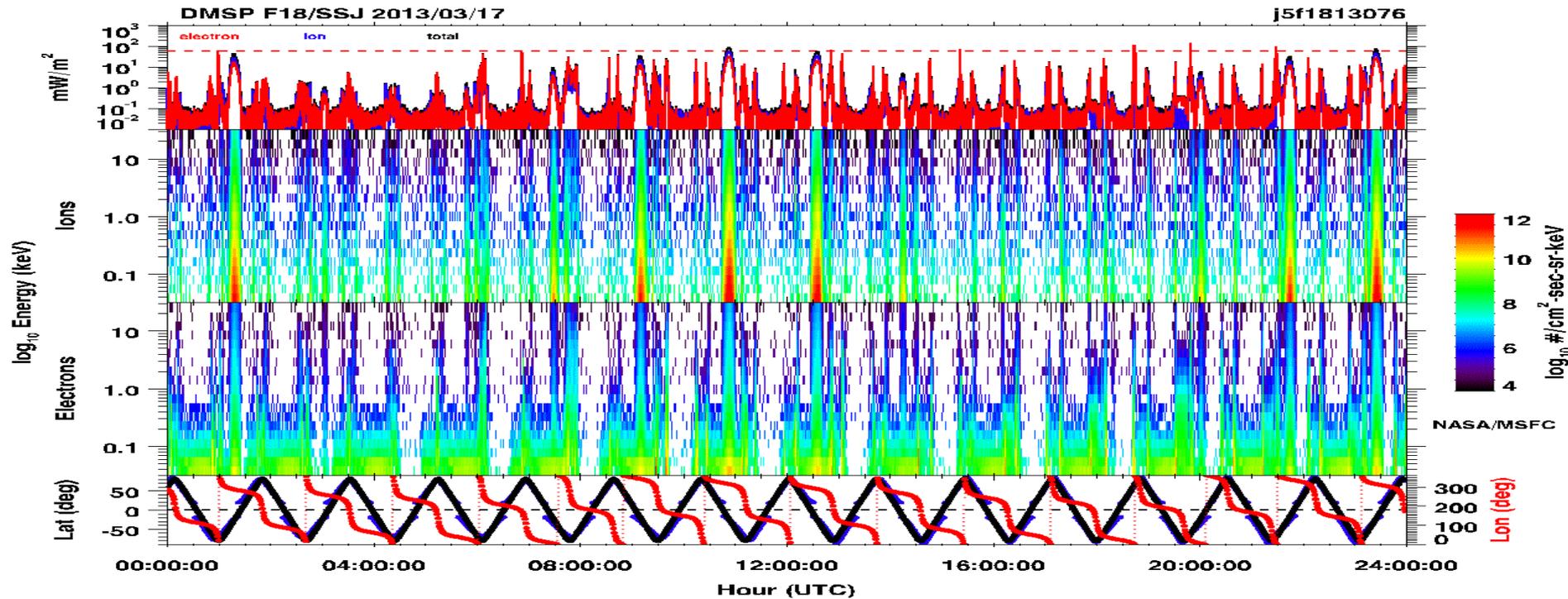


F17: 18 March 2013



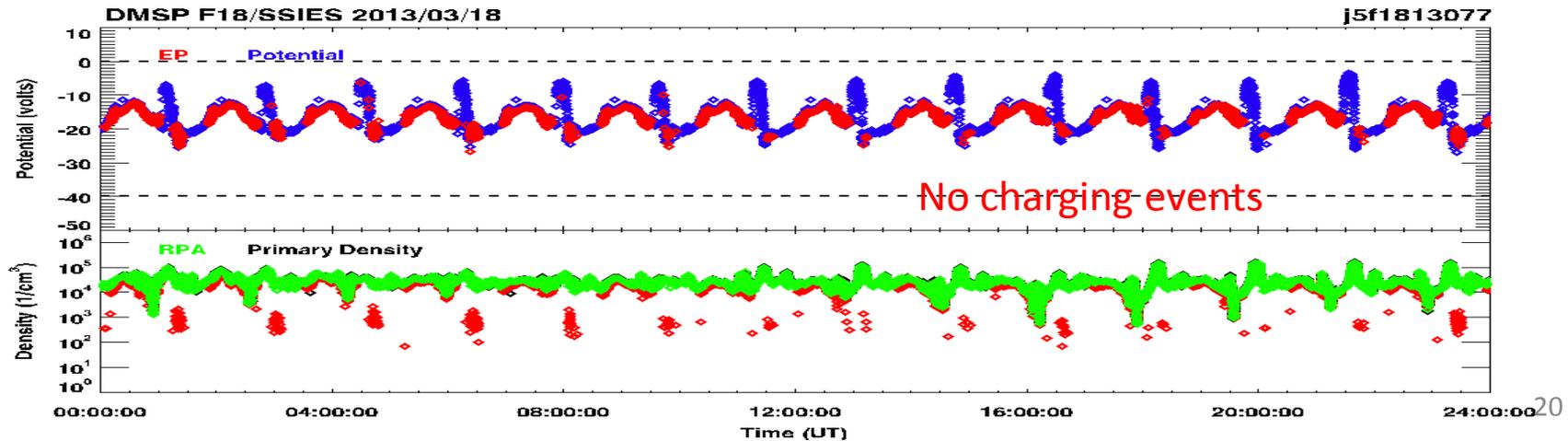
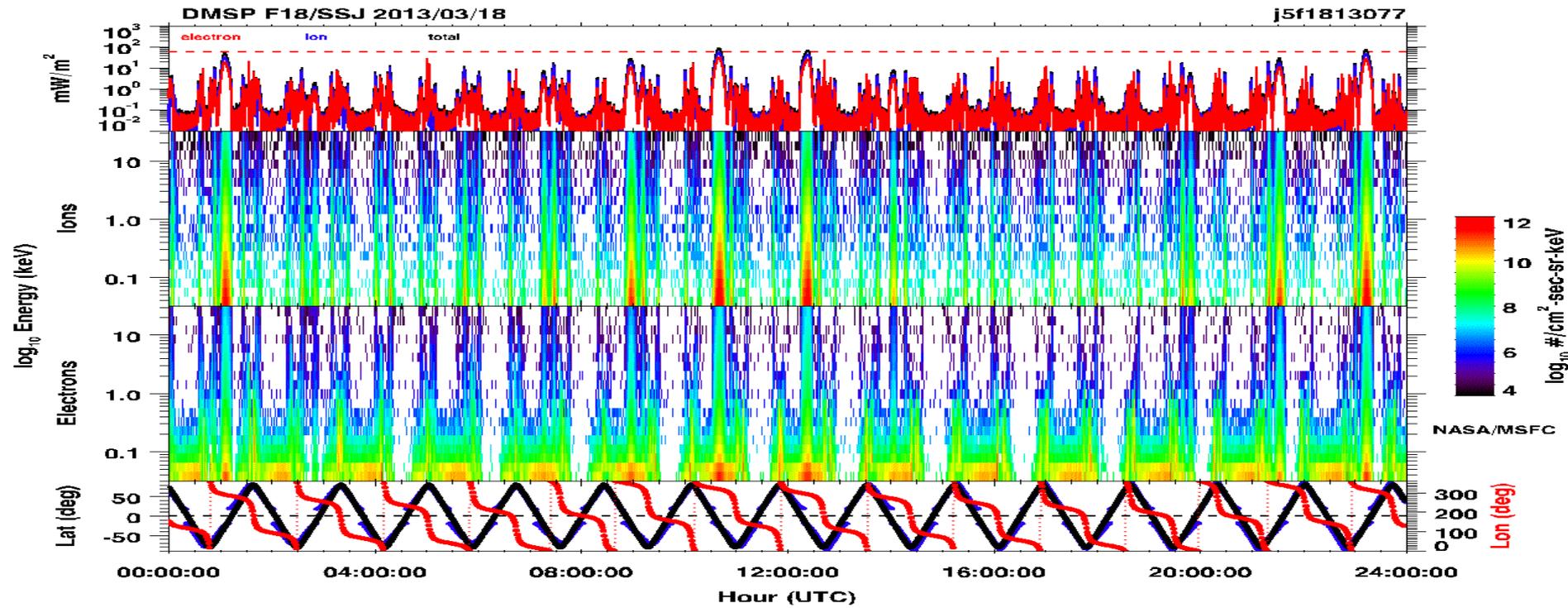


F18: 17 March 2013





F18: 18 March 2013





Correlation with Integral Number Flux

All potentials in event

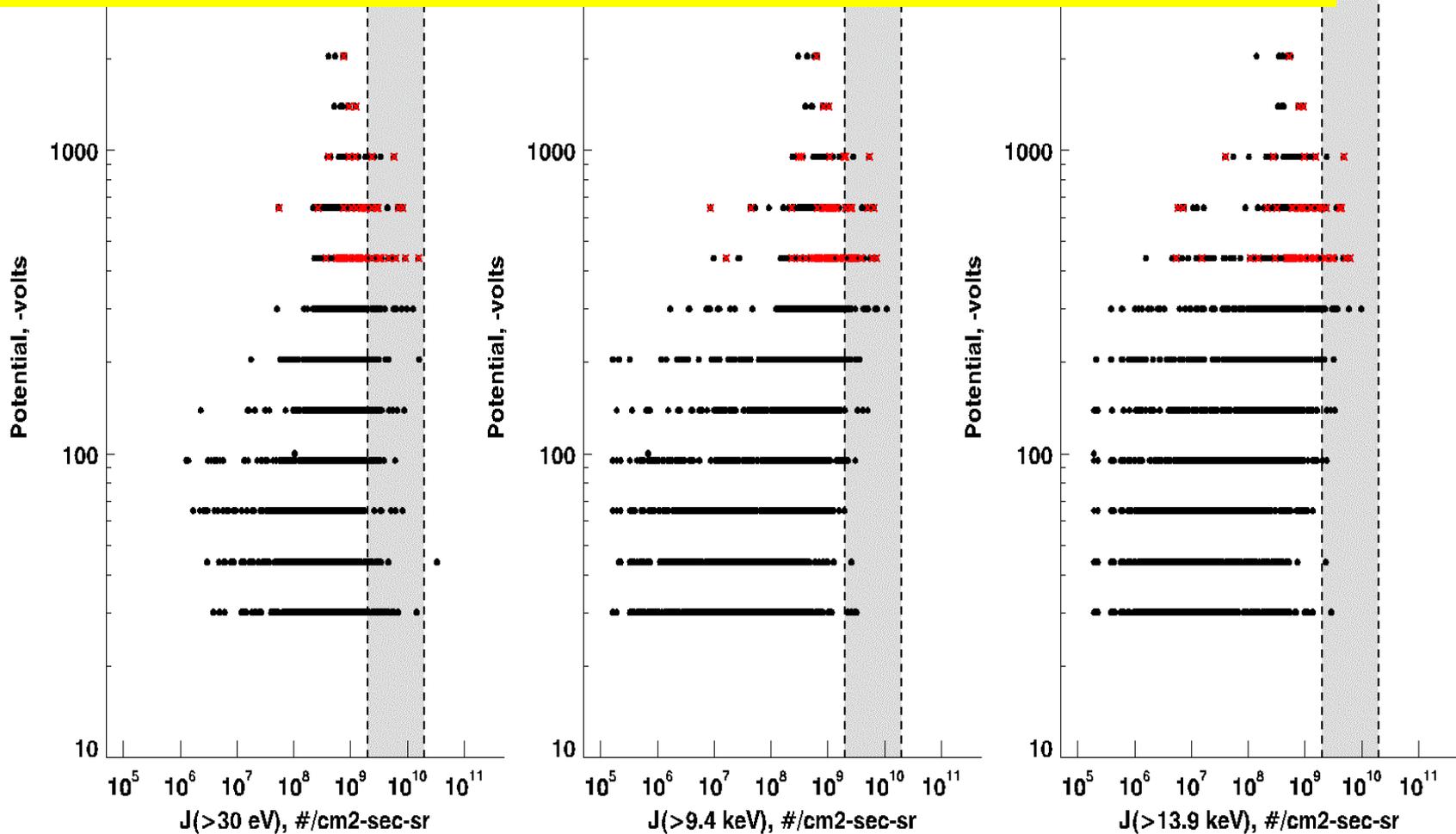
Maximum Potential

1-10 nA/cm²

Gussenhoven et al. 1985 criteria for auroral charging:

$E_{crit} \geq 14 \text{ keV}$ and $F_{crit} > 10^8 \text{ e-/cm}^2\text{-sec-sr}$

Critical energy is somewhat arbitrary and flux threshold is lower if a lower energy of 5 keV to 14 keV is used





Thank You