

Variability observed in the topside ionosphere of Mars during a multi-instrument campaign in March and April 2010

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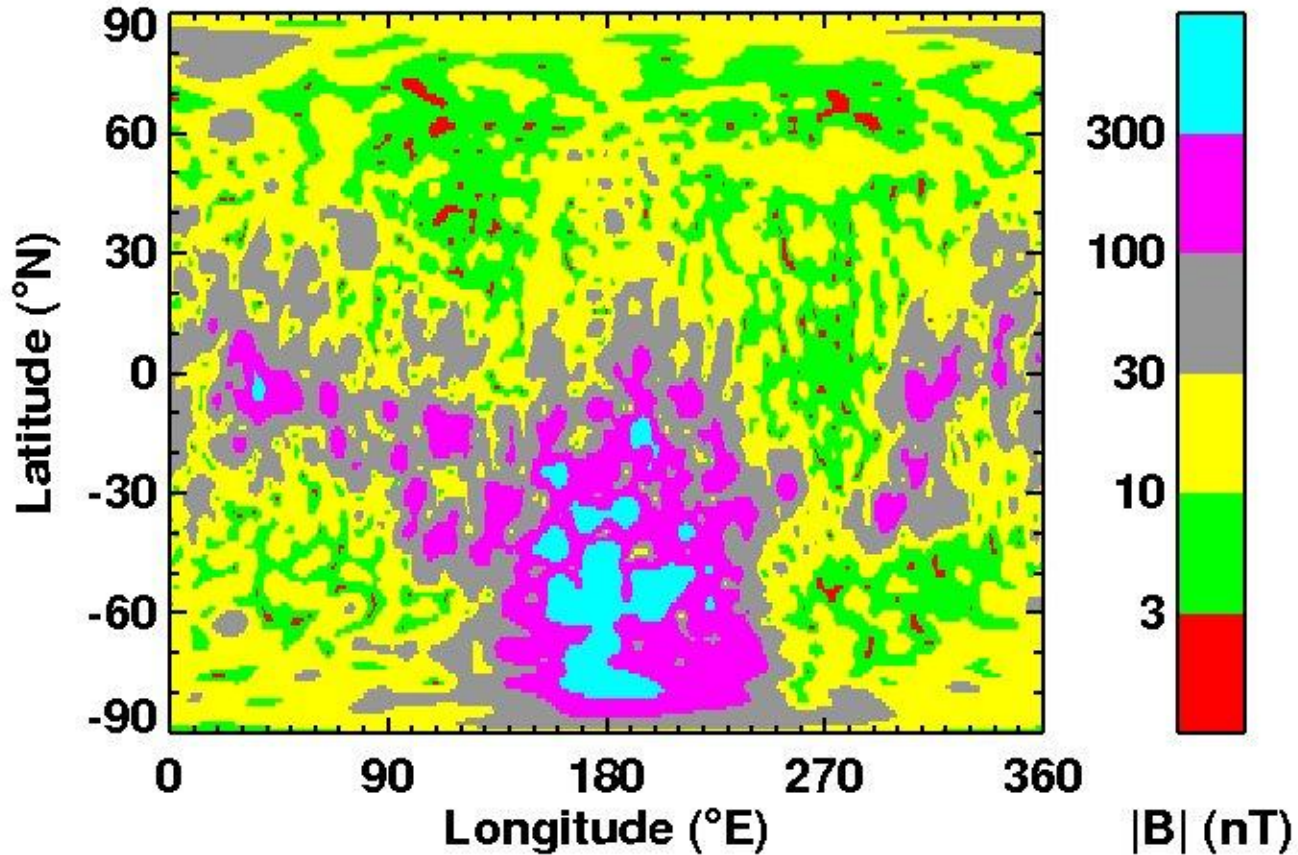
EGU 2013-11798 R97

Several Mars Express instruments have collaborated on two observing campaigns dedicated to the effects of the solar wind on the induced magnetosphere and ionosphere of Mars. These campaigns occurred in March/April 2010 and March/April 2012, during periods where Earth and Mars were radially aligned, and also in the vicinity of the same arm of the solar wind's Parker spiral, both of which permit Earth-directed solar data to be extrapolated to Mars with relatively high accuracy. Here we focus on a comparison of radio occultation observations, which provide vertical profiles of ionospheric electron density, with near-simultaneous MARSIS and ASPERA measurements, which reveal the state of the magnetosphere and solar wind. Due to orbital and other restrictions, only 20 radio occultation profiles are available from the 2010 campaign and none are available from the 2012 campaign. We use observations of ionospheric electron densities, inferred solar wind density and speed, ion and electron energy spectra, local magnetic field strength, and local plasma density to view the effects of the solar wind throughout the space environment that surrounds Mars. Two ionospheric profiles are of particular interest: they were acquired 13 days apart at almost exactly the same latitude, longitude, and solar zenith angle, yet they have very different topside structures.

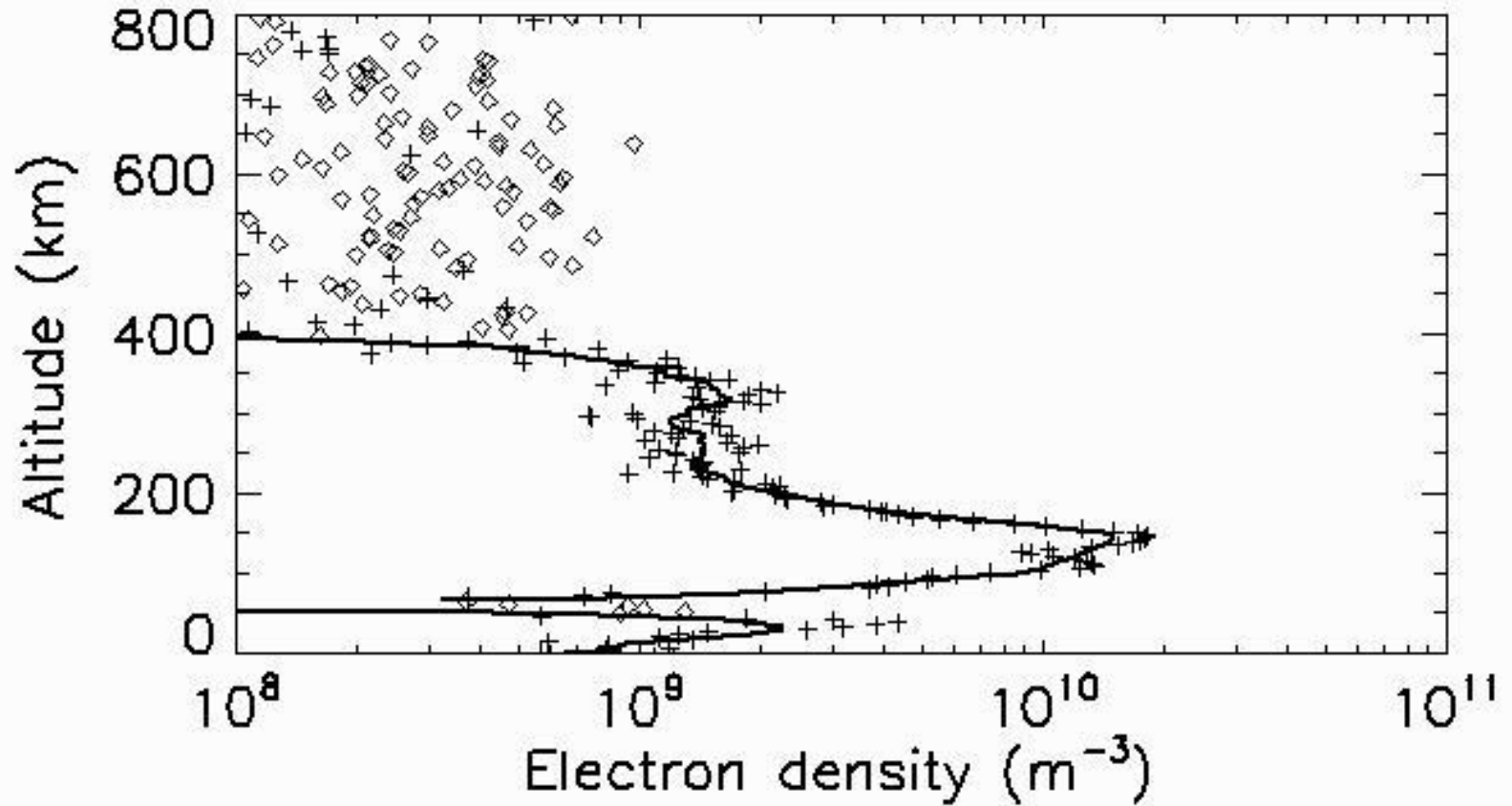
Here we focus on conditions observed on orbits 7919 and 7920 from 8 March 2010.

We present MaRS radio occultation profiles from each orbit alongside ASPERA electron spectrometer and ion analyzer data. In future work, these ASPERA observations of conditions in the solar wind and magnetosphere will be used to interpret the MaRS observations of the topside ionosphere.

Magnetic field strength at 150 km

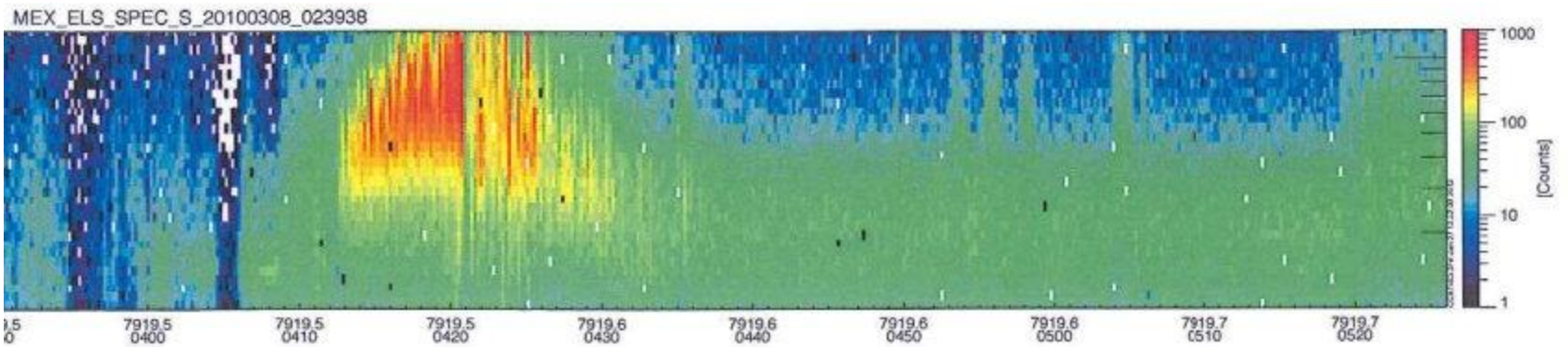
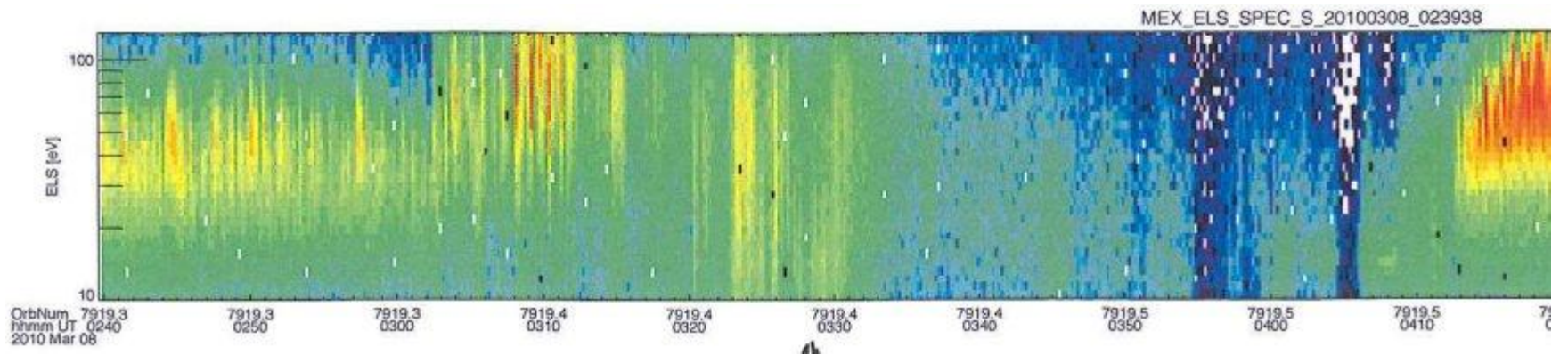


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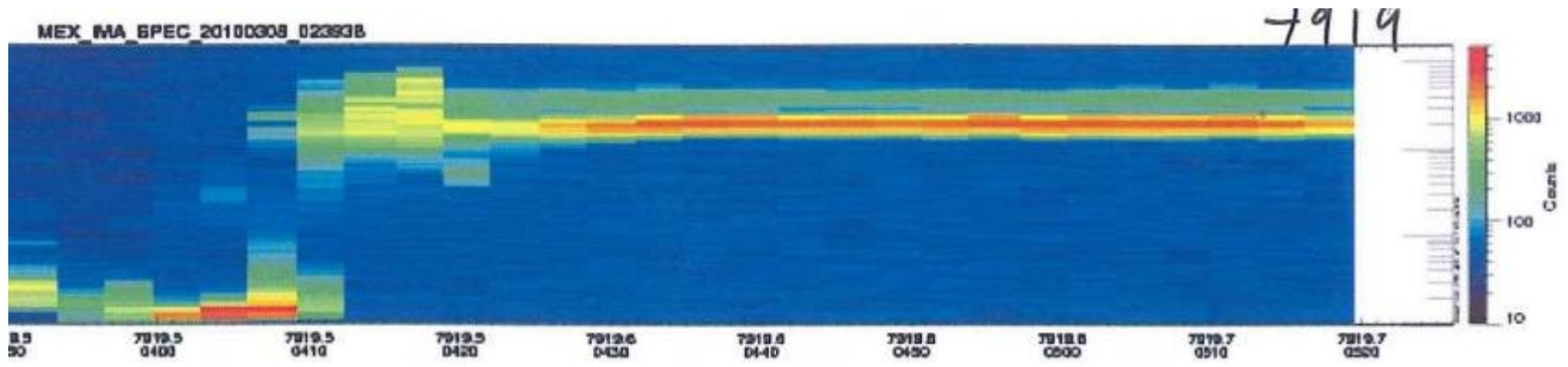
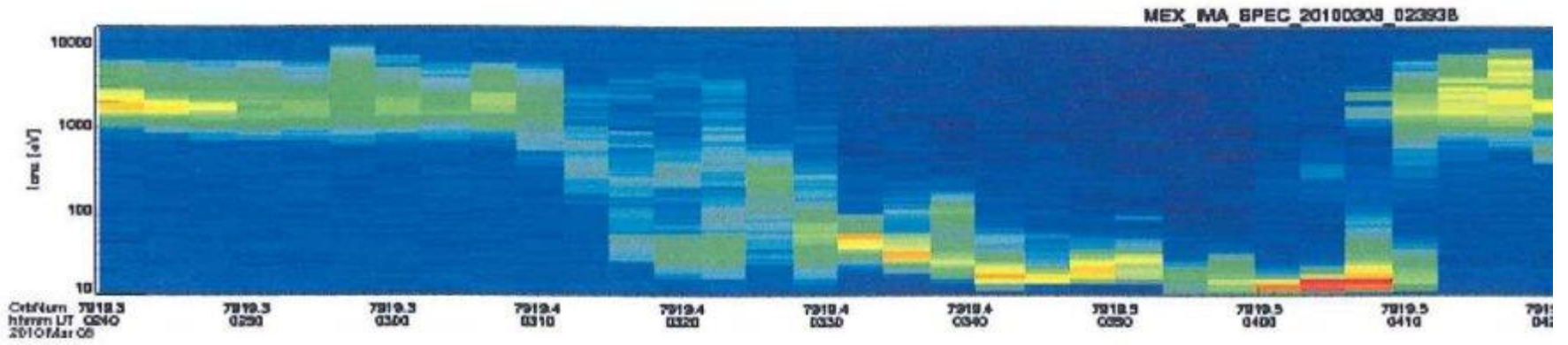


Orbit 7919

68.85S, 293.12E, SZA=93.41 degrees

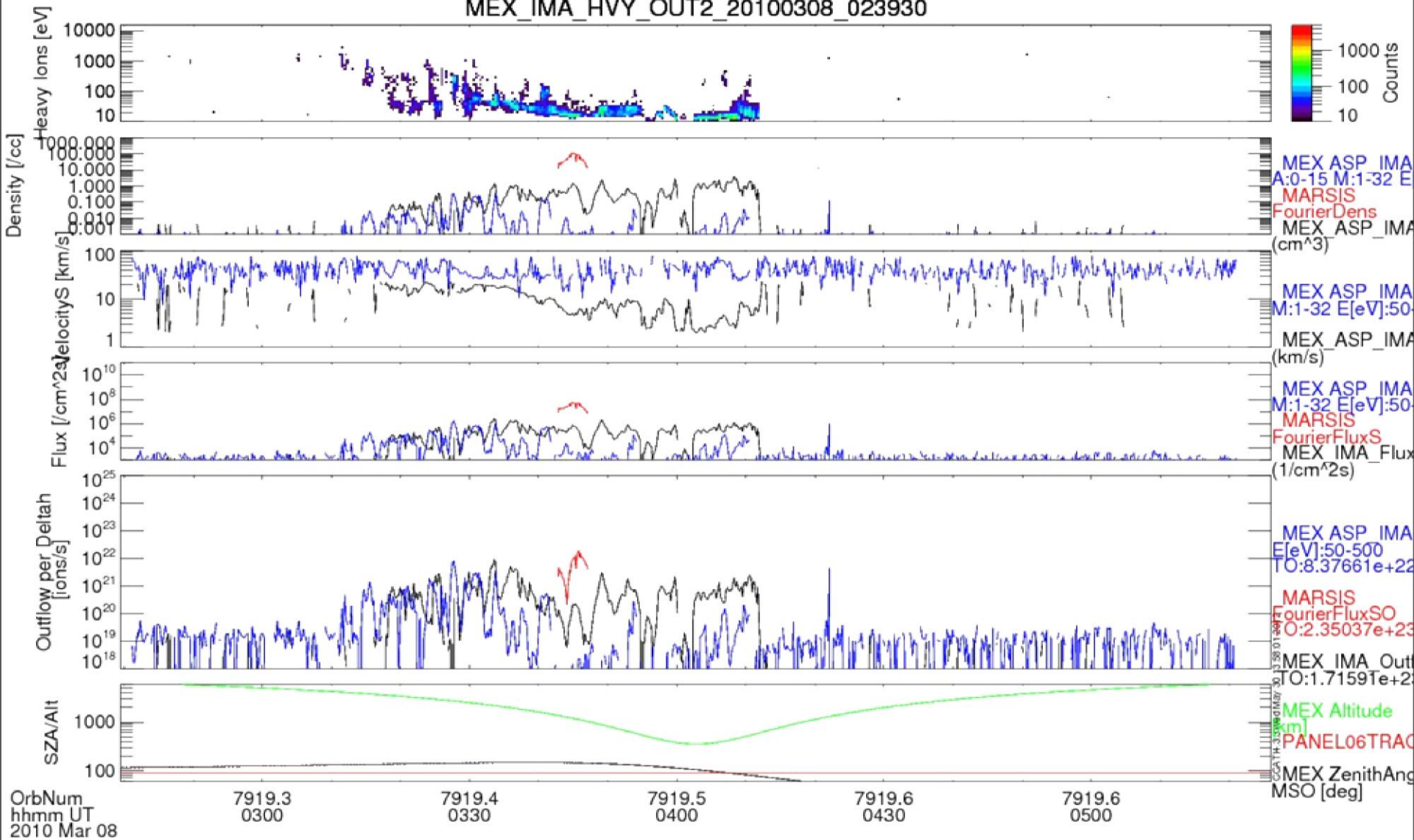


Orbit 7919
ASPERA ELS data



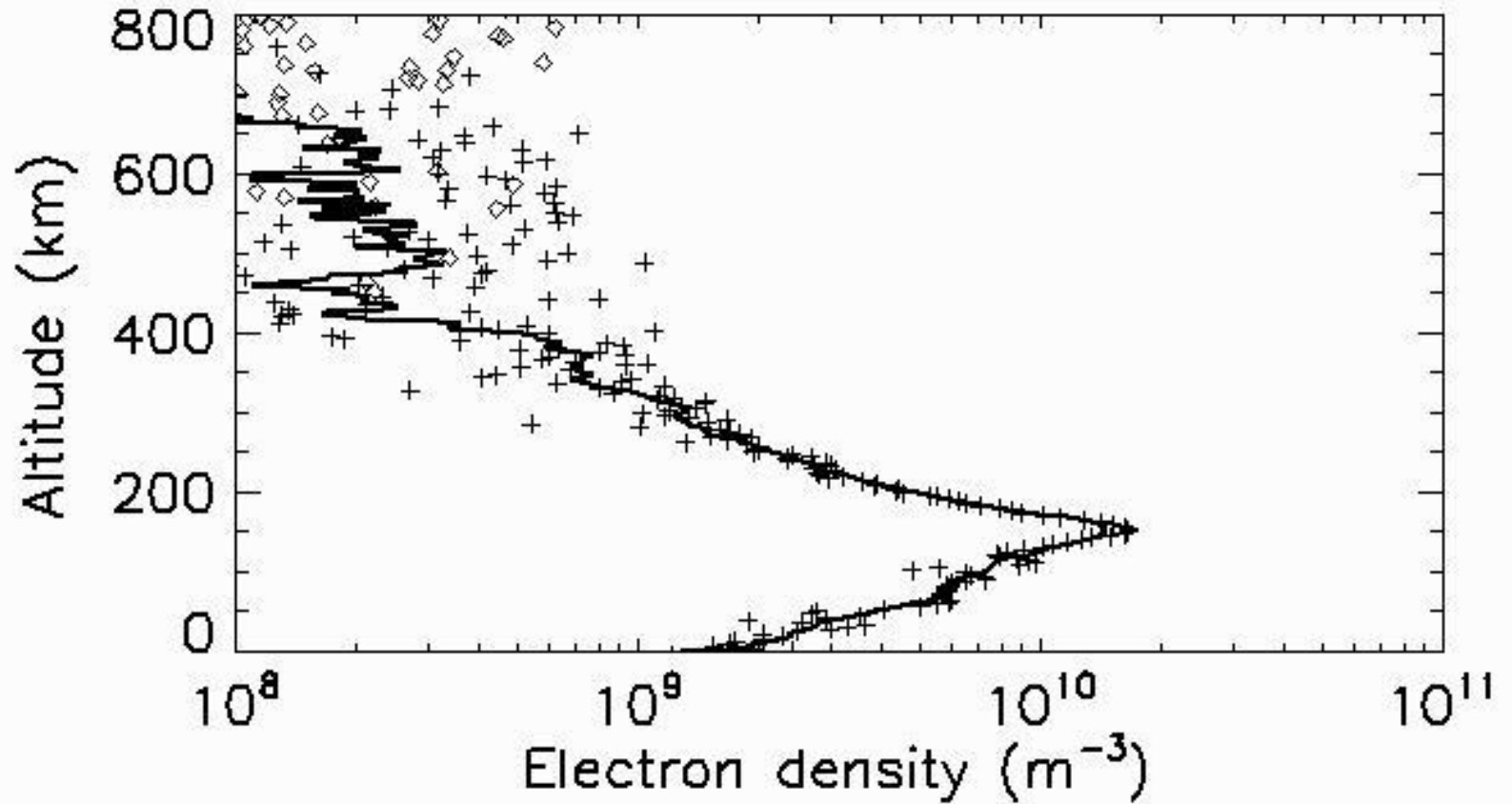
Orbit 7919
ASPERA IMA data

MEX_IMA_HVY_OUT2_20100308_023930



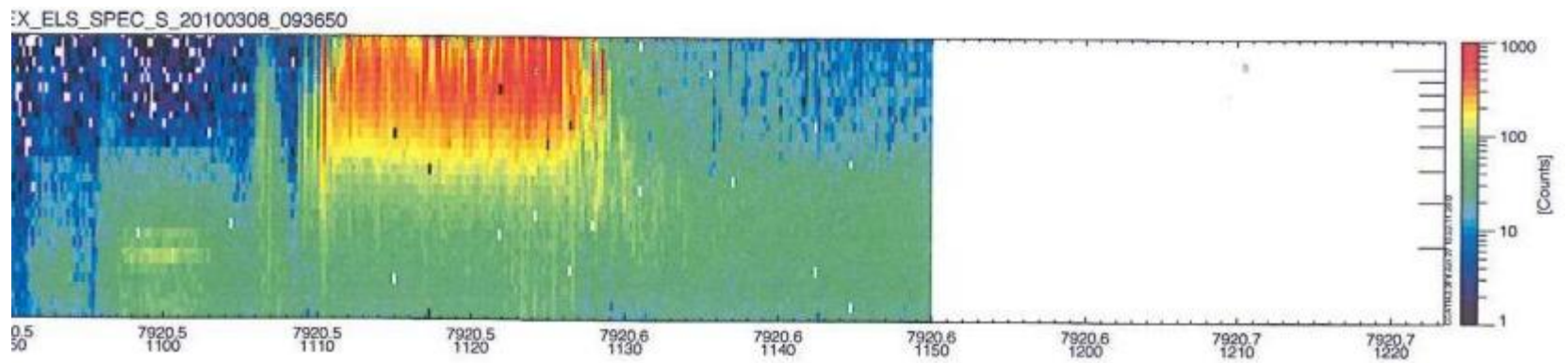
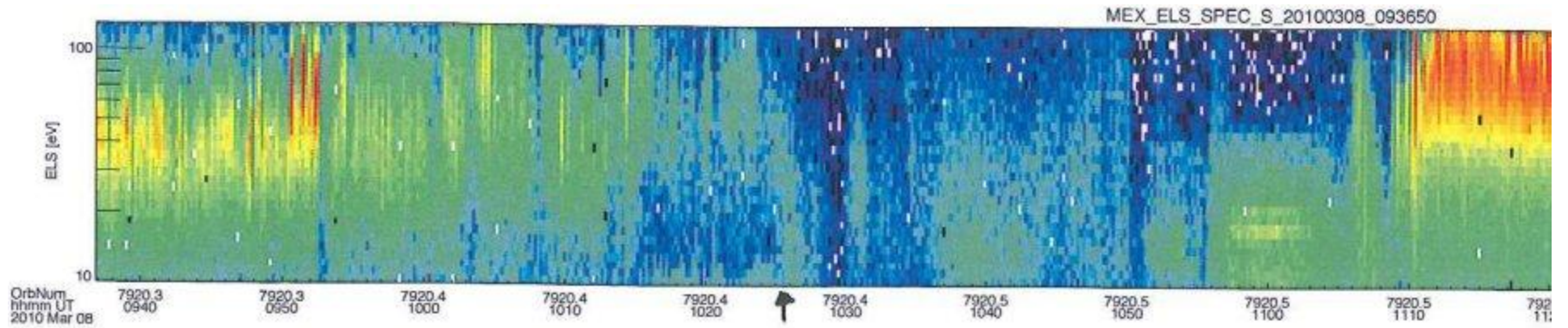
Orbit 7919
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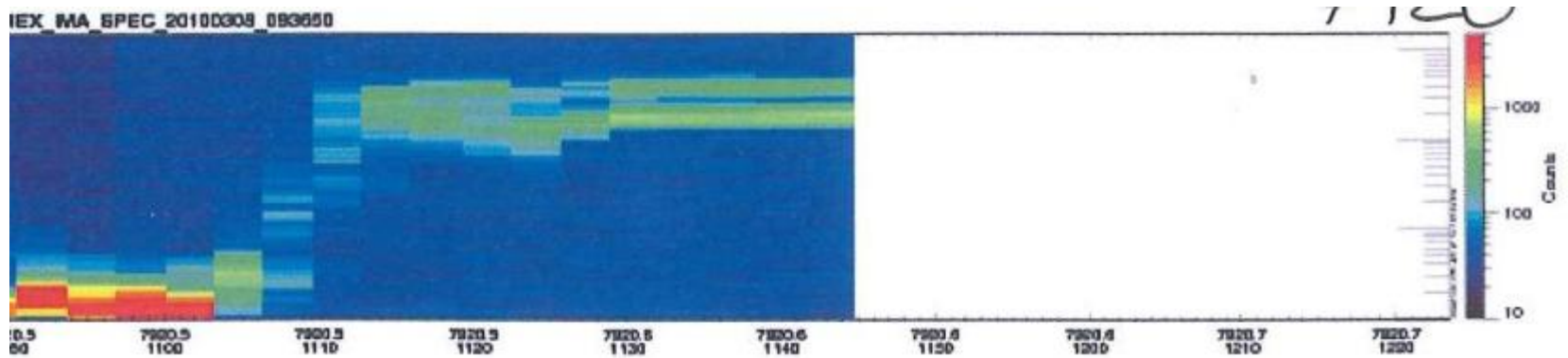
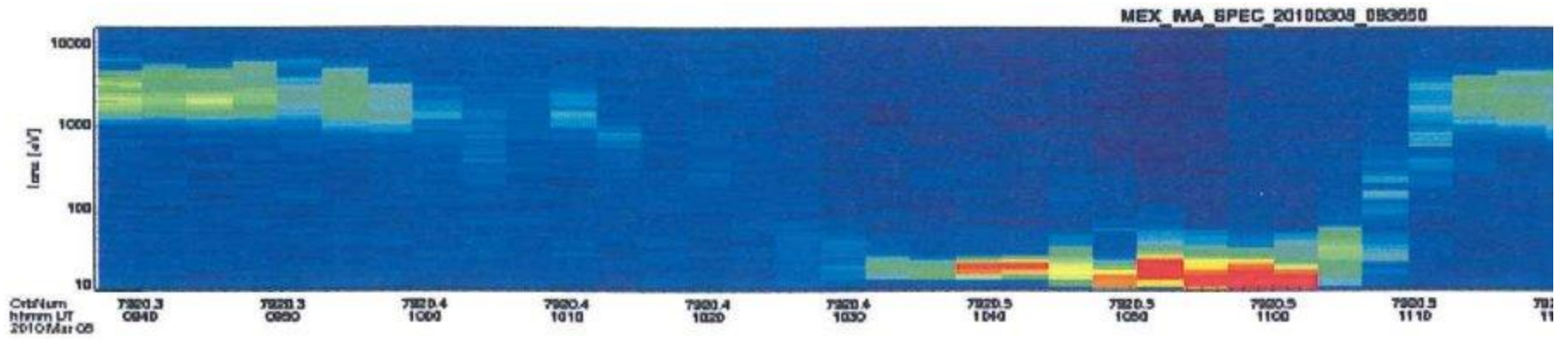


Orbit 7920

68.84S, 191.39E, SZA=93.45 degrees

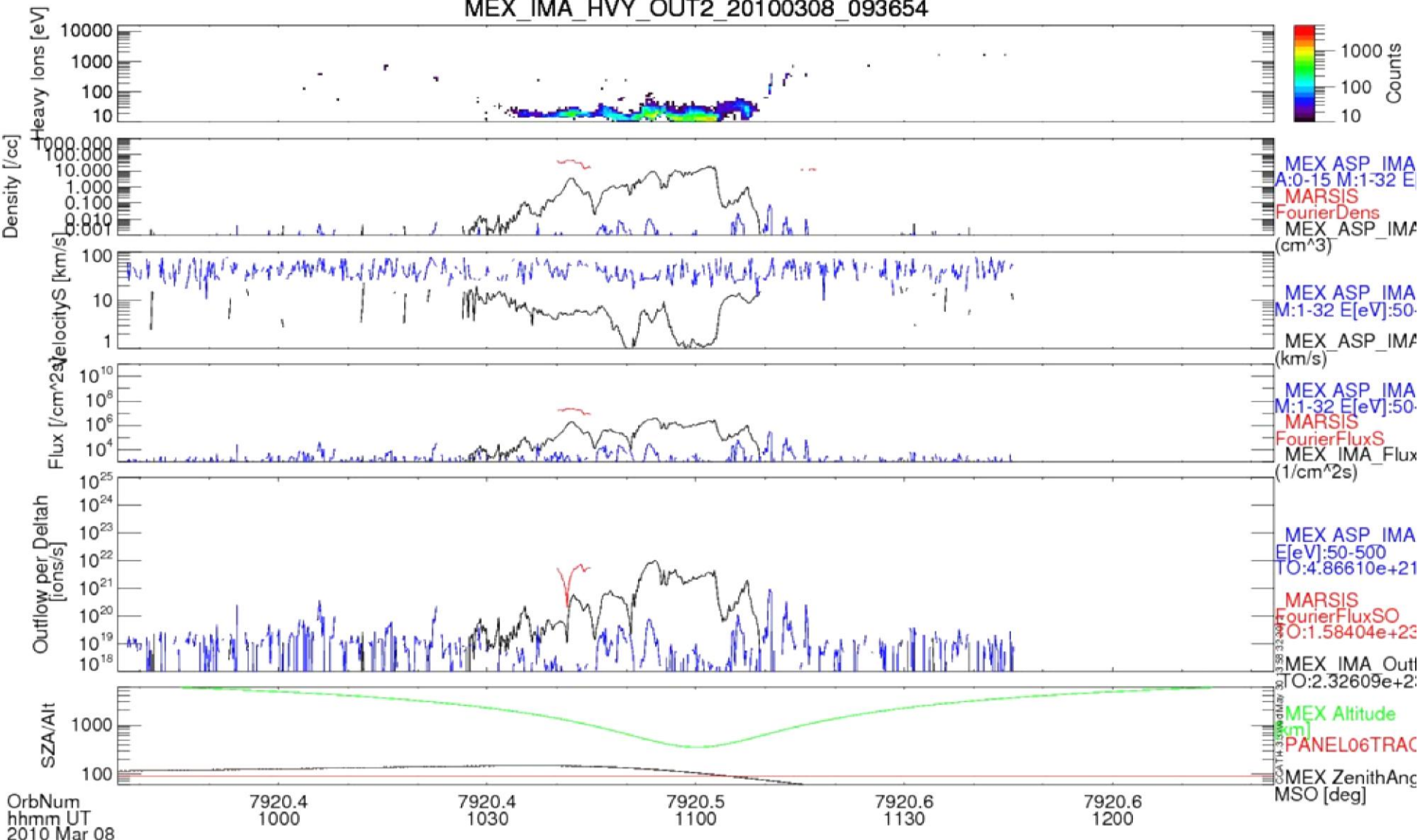


Orbit 7920
ASPERA ELS data



Orbit 7920
ASPERA IMA data

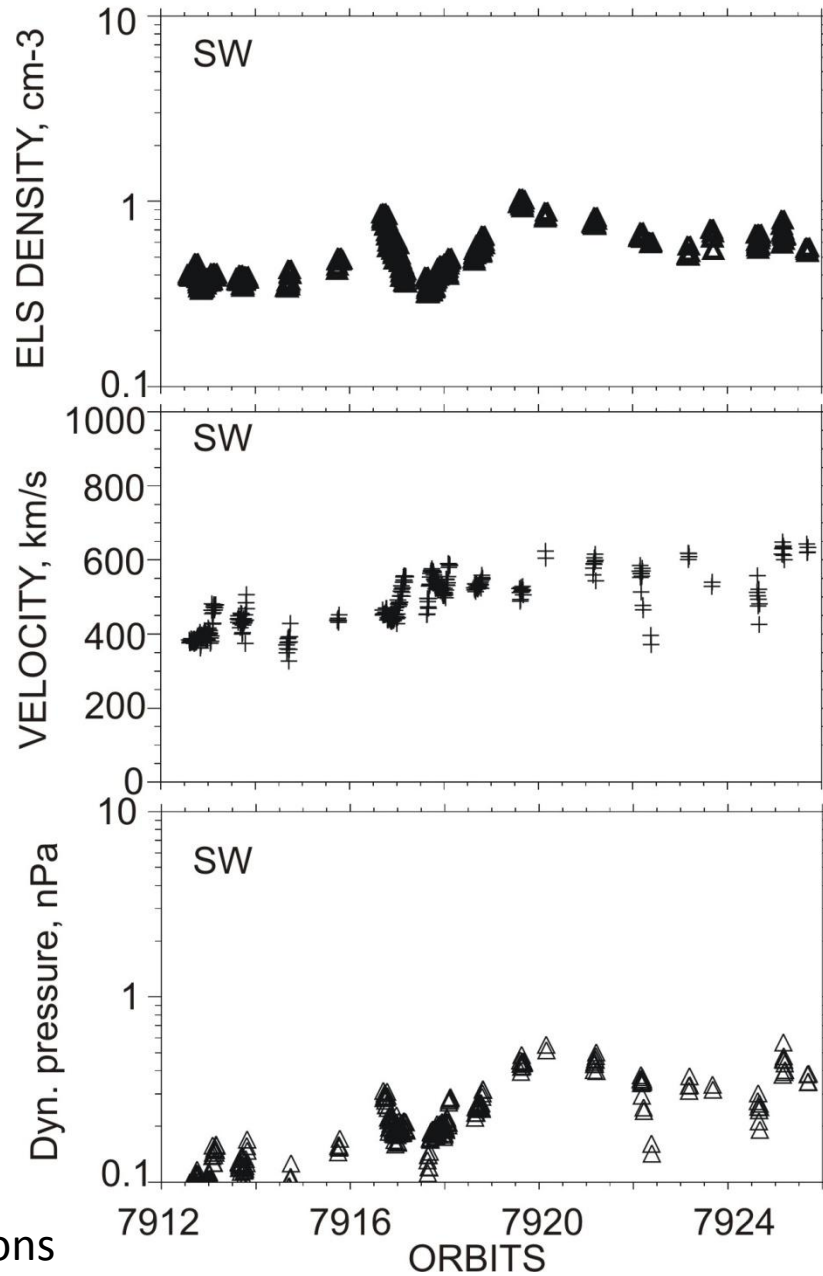
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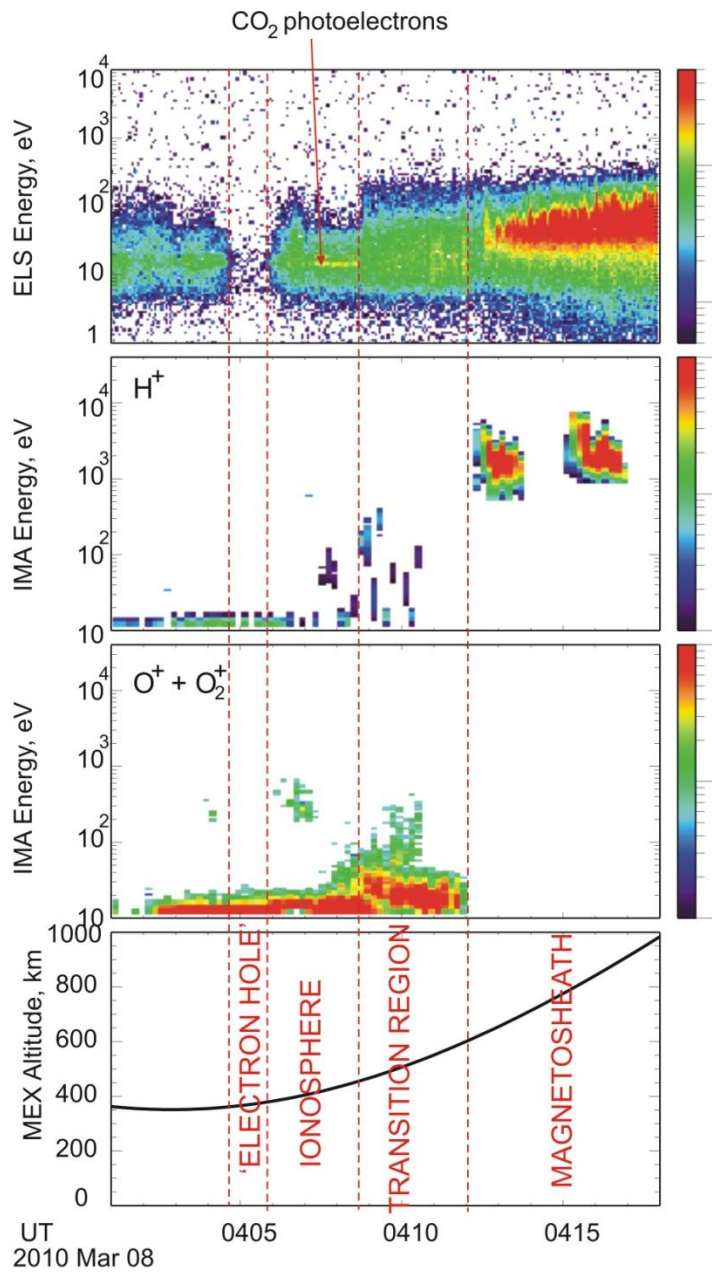
Orbit 7920

ASPERA IMA data

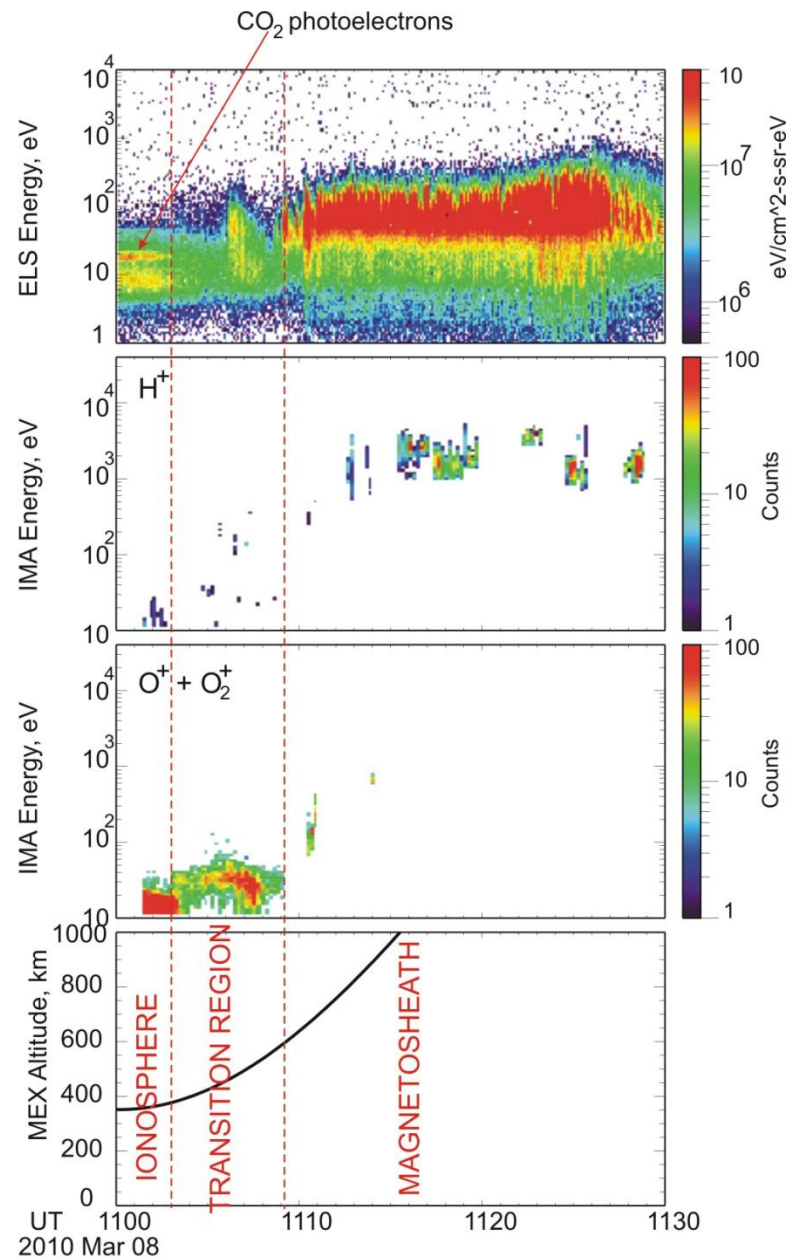
MEX SOLAR WIND March 6- March 10, 2010



ASPERA data on solar wind conditions

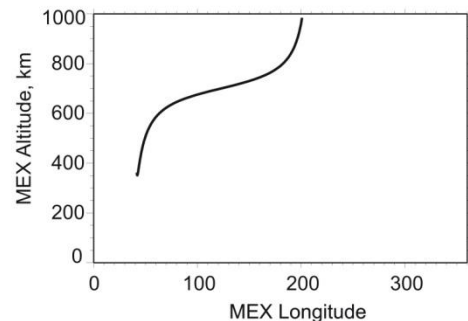
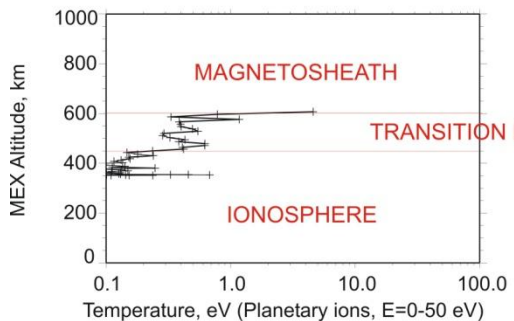
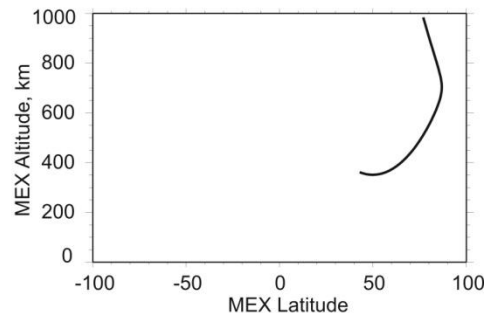
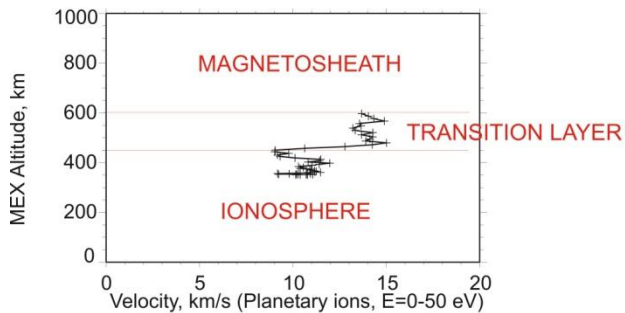
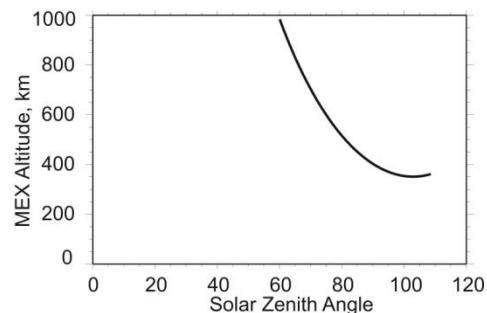
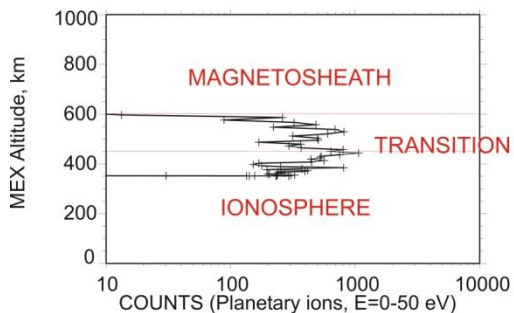
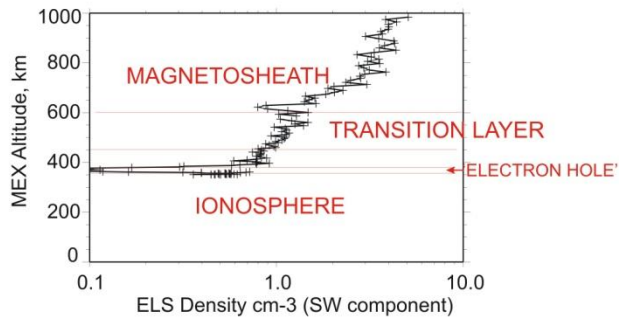


Orbit 7919
ASPERA data



Orbit 7920
ASPERA data

Orbit 7919 ASPERA data



11:00-11:30 UT March 8, 2010 Orbit 7920

Orbit 7920 ASPERA data

