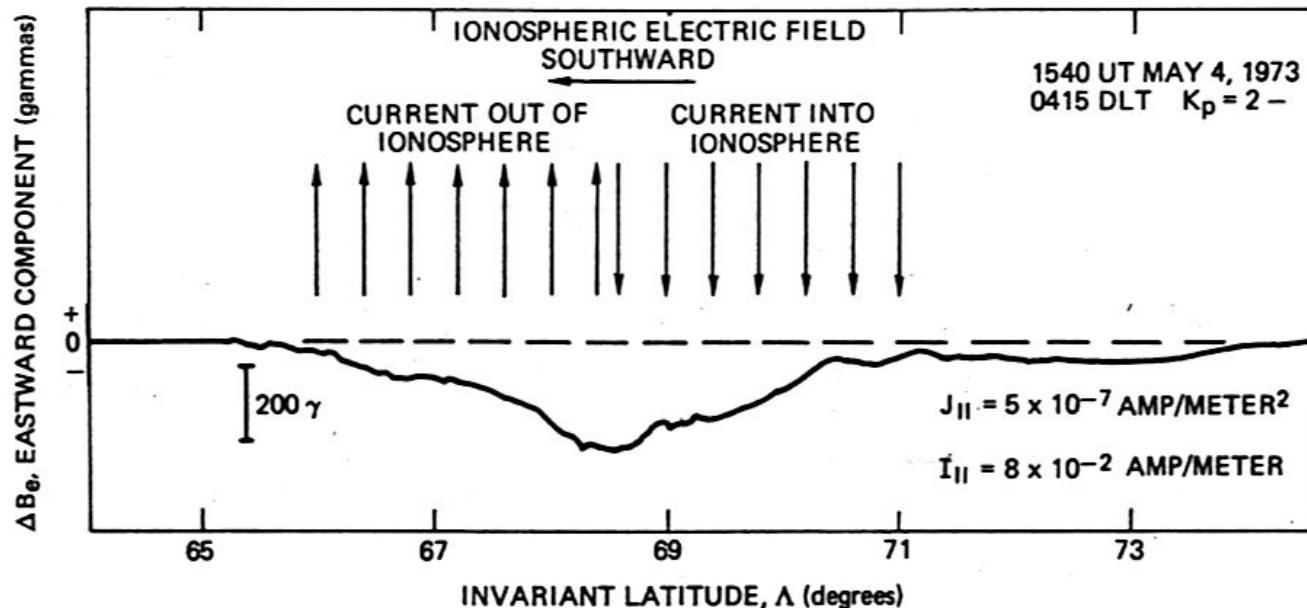


Northern Lights over Canada, seen from the International Space Station



Field-Aligned Currents from the Triad satellite



Zmuda and Armstrong, 1974.
JGR Vol. 79, No. 31
(© AGU 1974)

Effects of Field-Aligned Currents on the Structure of the Ionosphere

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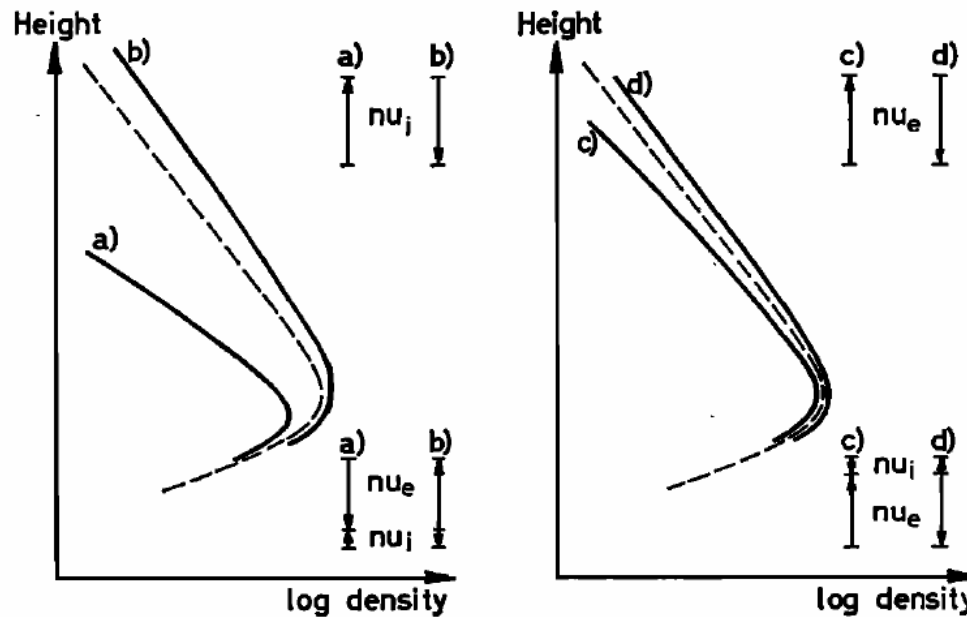
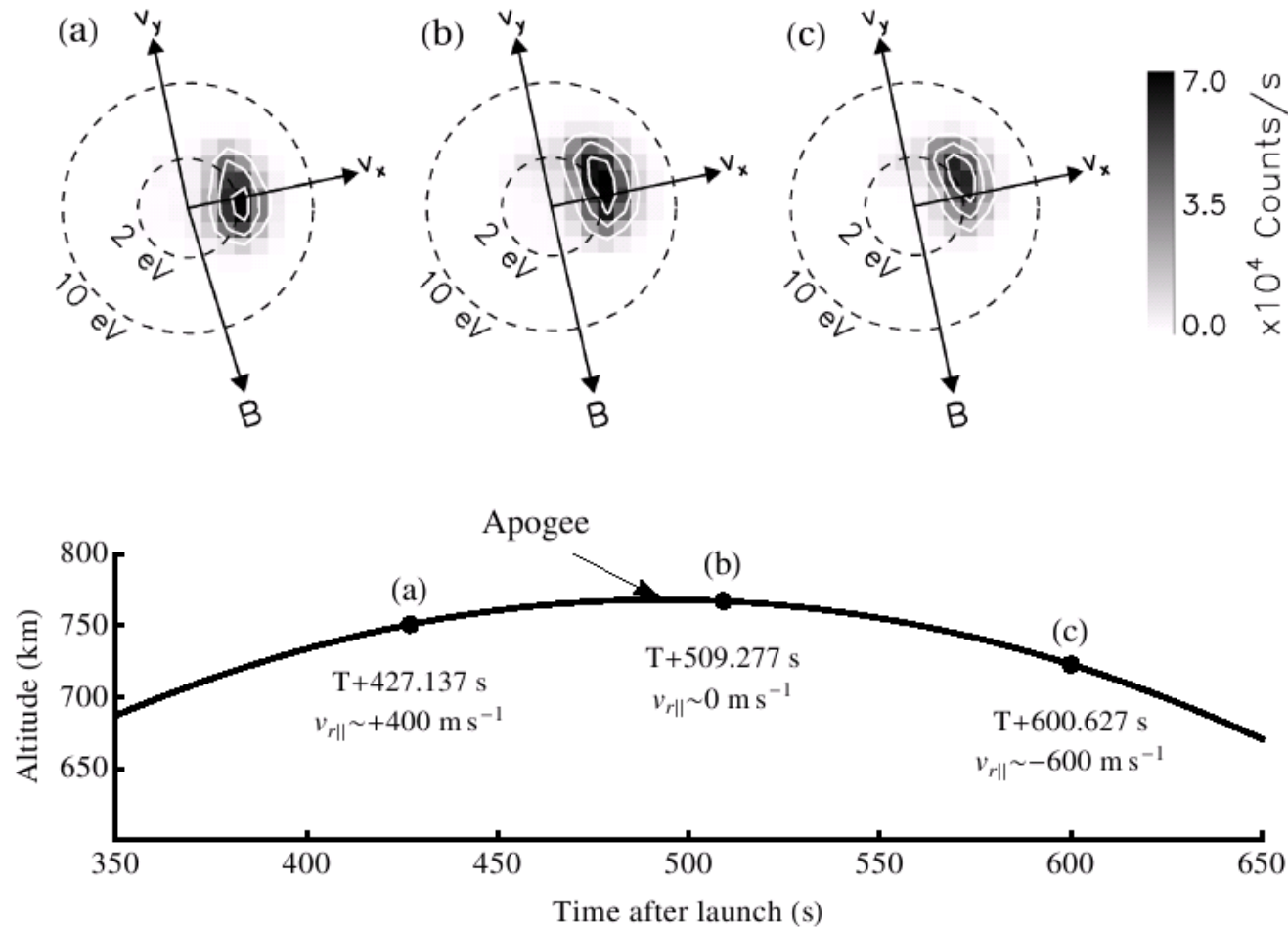


Fig. 1. Density change due to field-aligned currents in four elementary cases. Full curves show actual density; dashed curves show density in absence of current. (a) Upward ion flow, no precipitation; (b) ion precipitation, no upward flow; (c) upward electron flow, no precipitation; (d) electron precipitation, no upward flow.

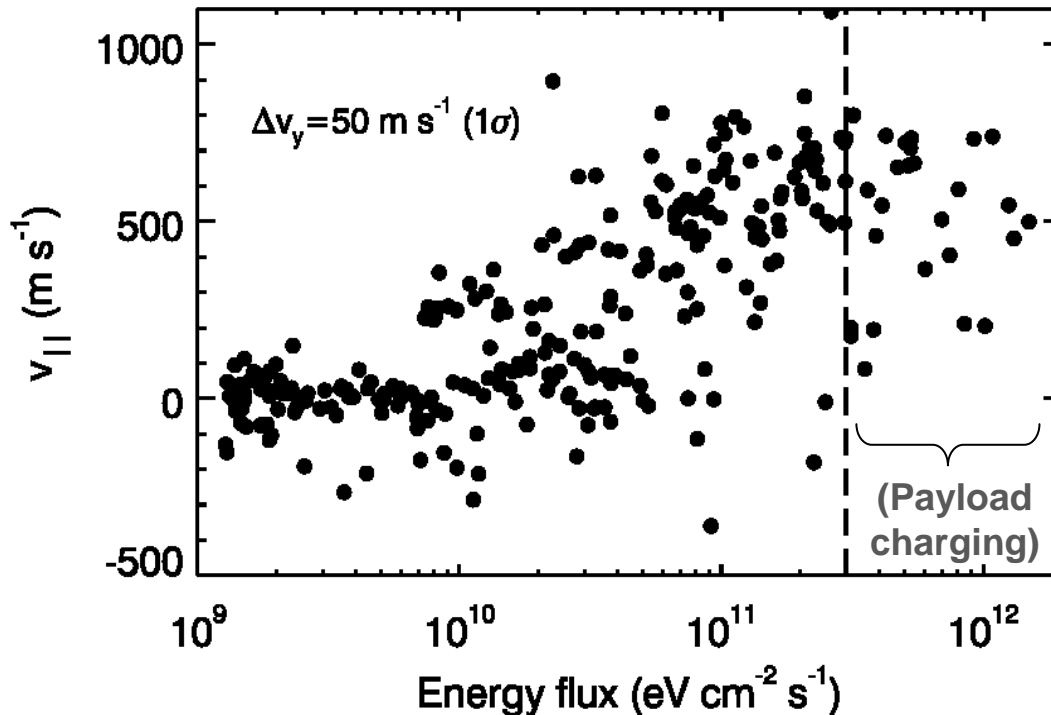
(© AGU 1968)

Cusp-2002 Sounding Rocket: The SII measured ion distributions in topside cusp ionosphere



Ion upflow correlates positively with the energy flux of precipitating soft electrons

Ion upflow vs. 0-45° e⁻ energy flux

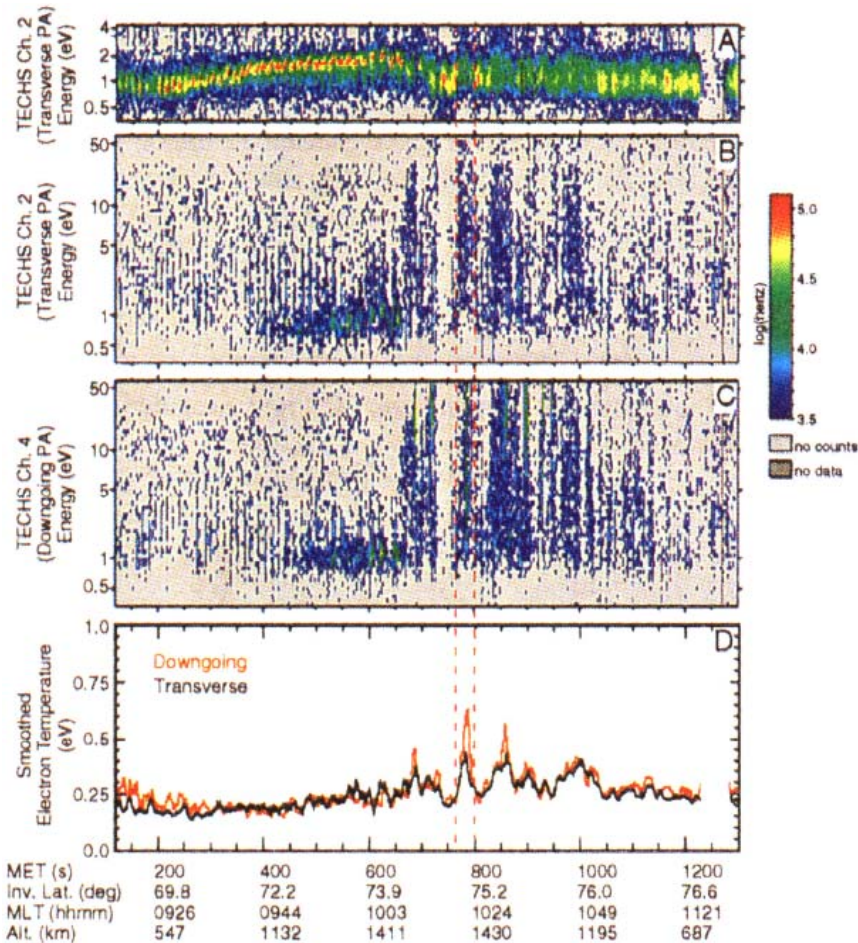


Pearson R=0.62

Electron energy flux threshold

What effect do soft electrons have on the thermal ionospheric electrons?

Day-time observations from SCIFER (TECHS) 25 Jan 1995

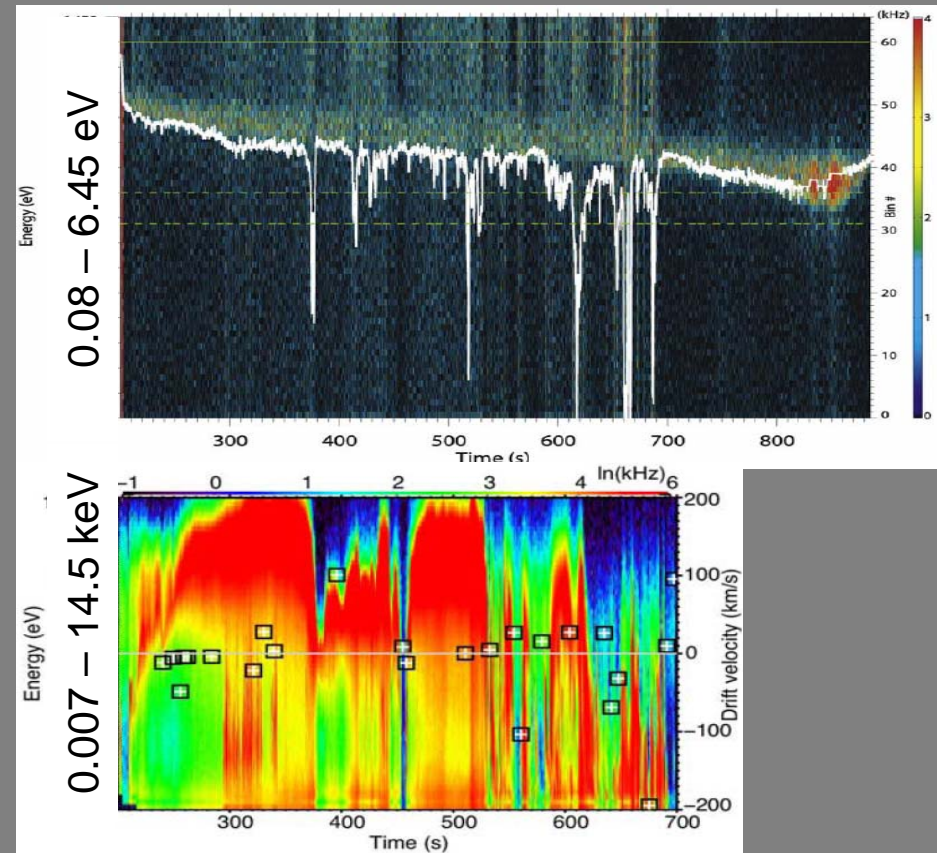


Pollock et al., 1996
(Figure © AGU 1996.)

Burchill 2010/04/15

CSA Workshop on suborbital
platforms and nanosats

Night-time observations from SIERRA (TED) 14 Jan 2002



MacDonald et al., 2006: attempt
thermal electron flow estimate
(Figures © AGU 2006.)

DETECT

Detection of Elusive Thermal Electron Currents Topside

- Thermal Electron Spectrometer
- Impedance probe
- Langmuir probe
- Suprathermal/Energetic particles
- Magnetic fields
- Electric fields
- Attitude control
- Ground-based optics, mags

Launch into fine-structured auroral arc system, 1500 km apogee



GEODESIC launch into aurora, 26 February 2000.
(© Paul Nicklen Photography)