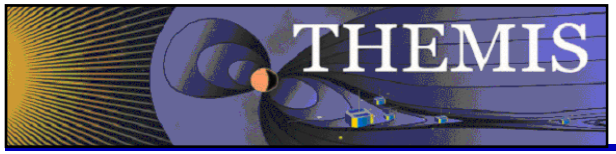
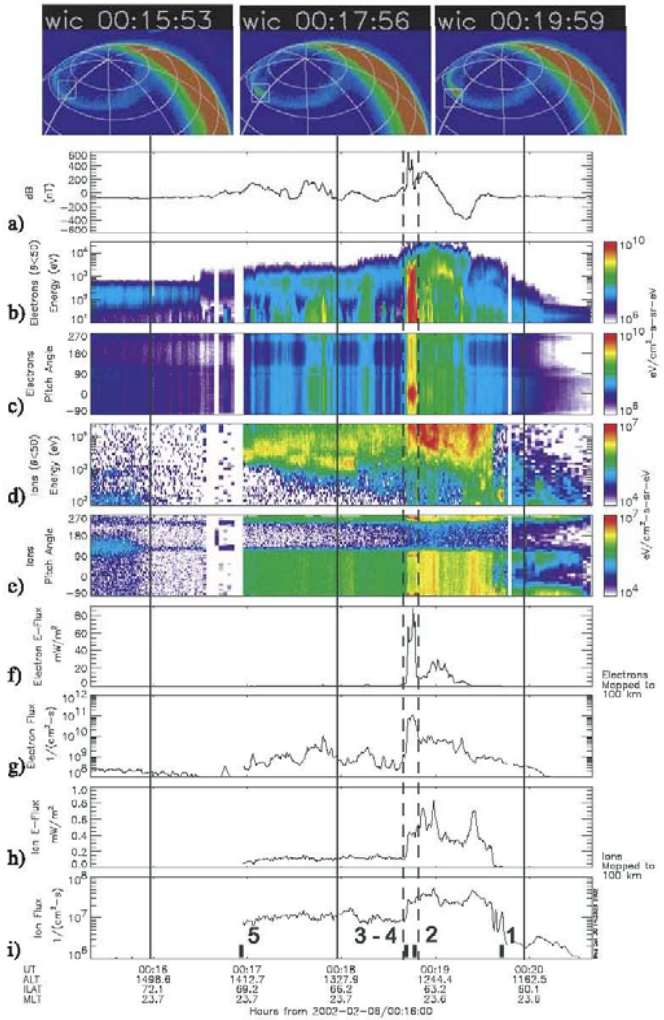


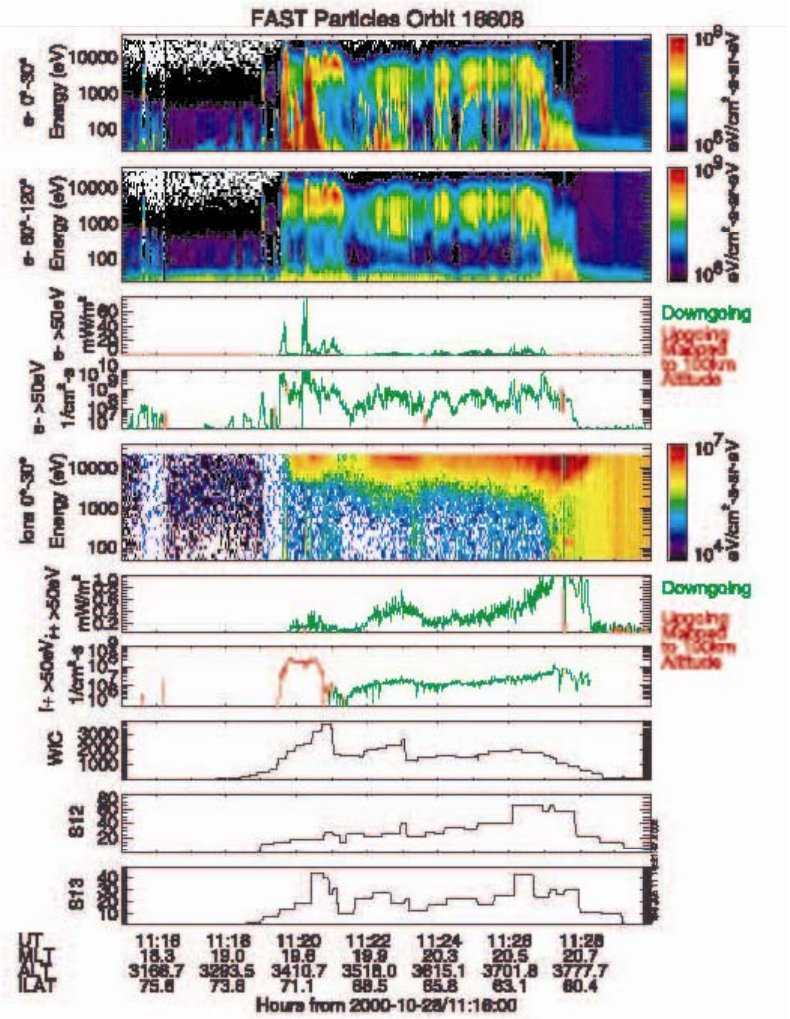
Alfvénic arcs observed by FAST and the THEMIS GBO all-sky cameras

H.U. Frey, S.B. Mende
SSL, University of California, Berkeley

FAST operated until 2009-04-30

Earlier observations

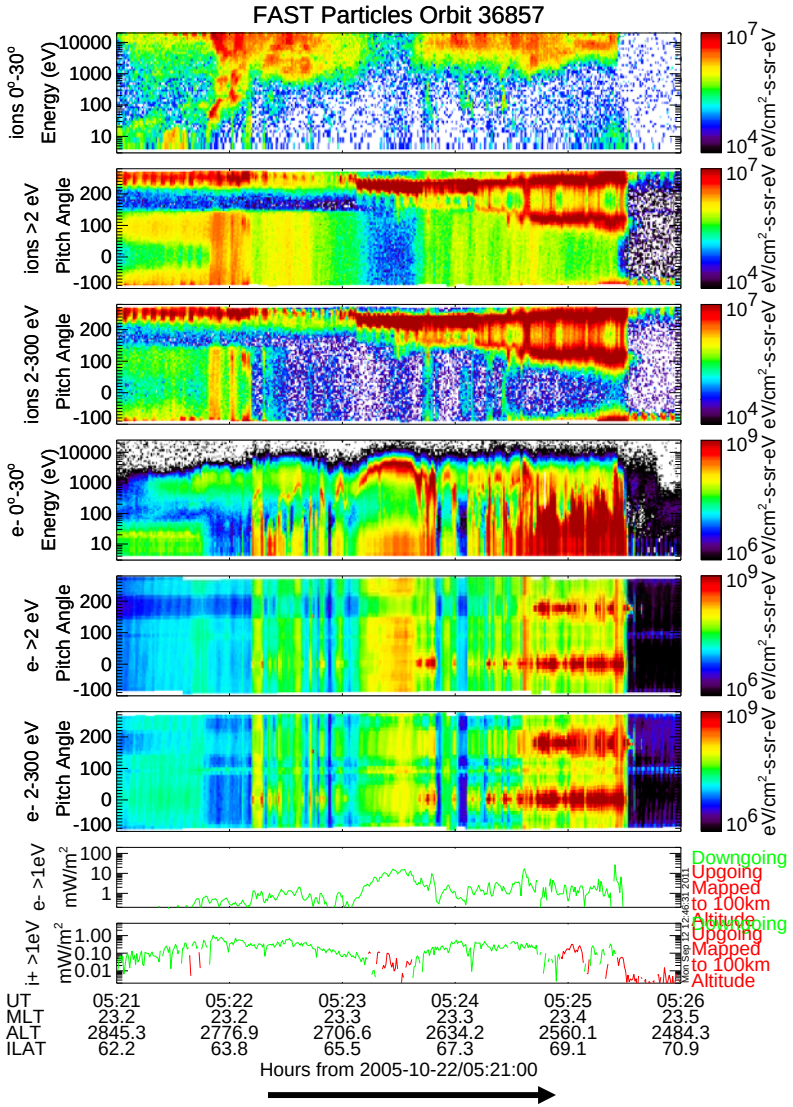


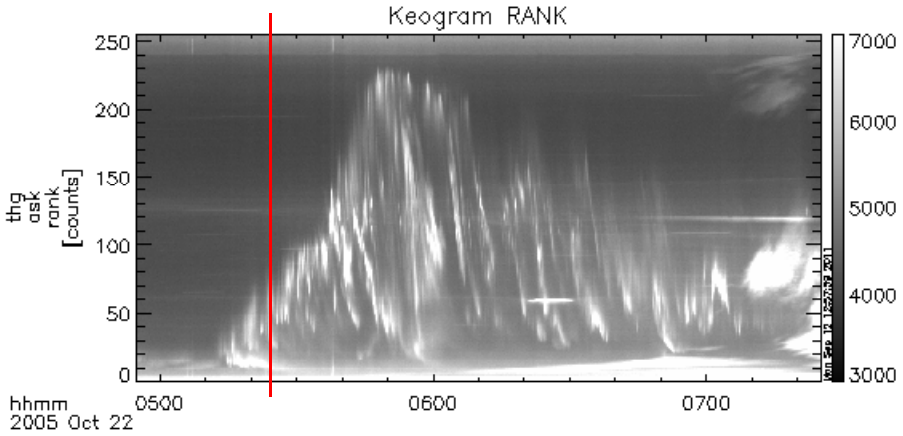


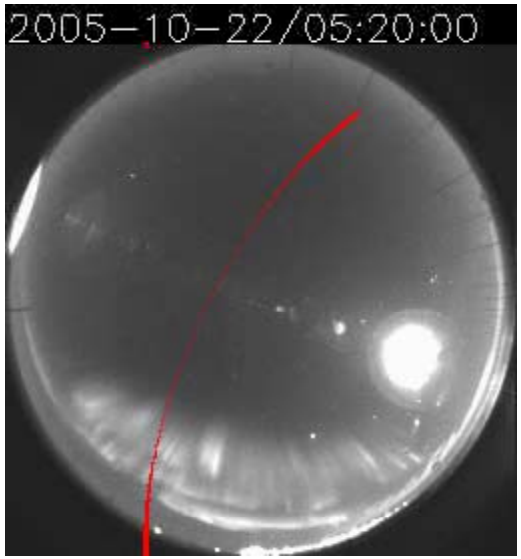
Mende et al., FAST and IMAGE-FUV observations of a substorm onset, JGR, 2002JA009787, 2003

Mende et al., IMAGE-FUV and in situ FAST particle observations of substorm aurorae, JGR, 2002JA009787, 2003

Marking poleward border after substorm onset

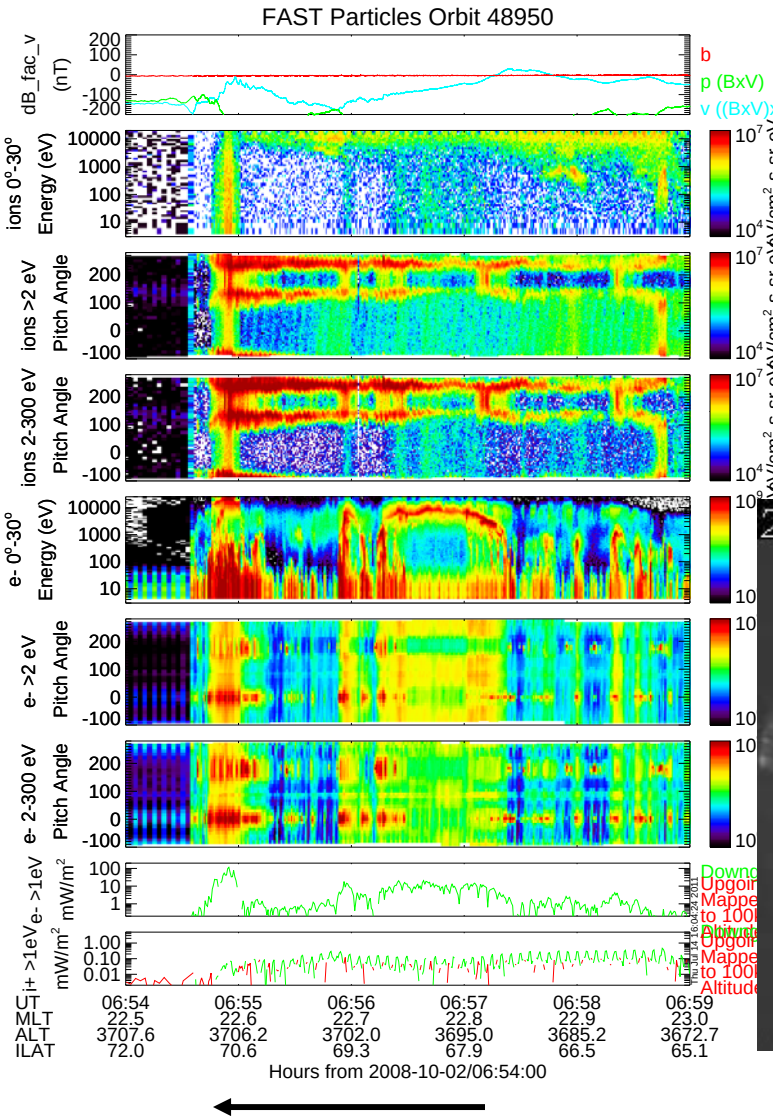




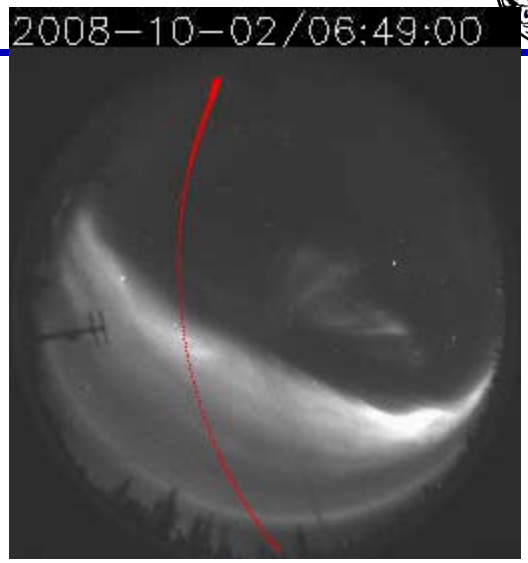


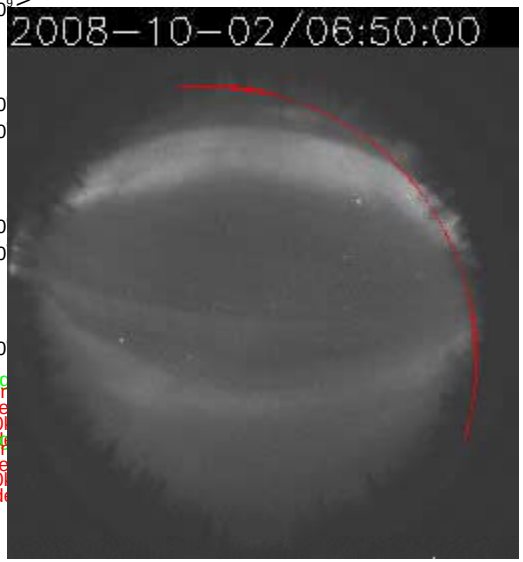
RANK

Marking poleward border after substorm onset

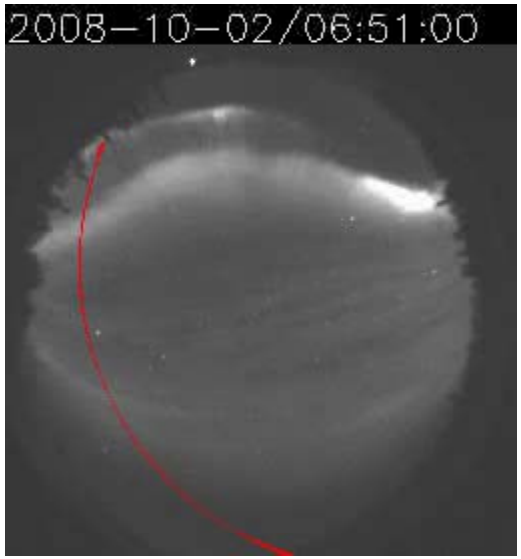


YKNF



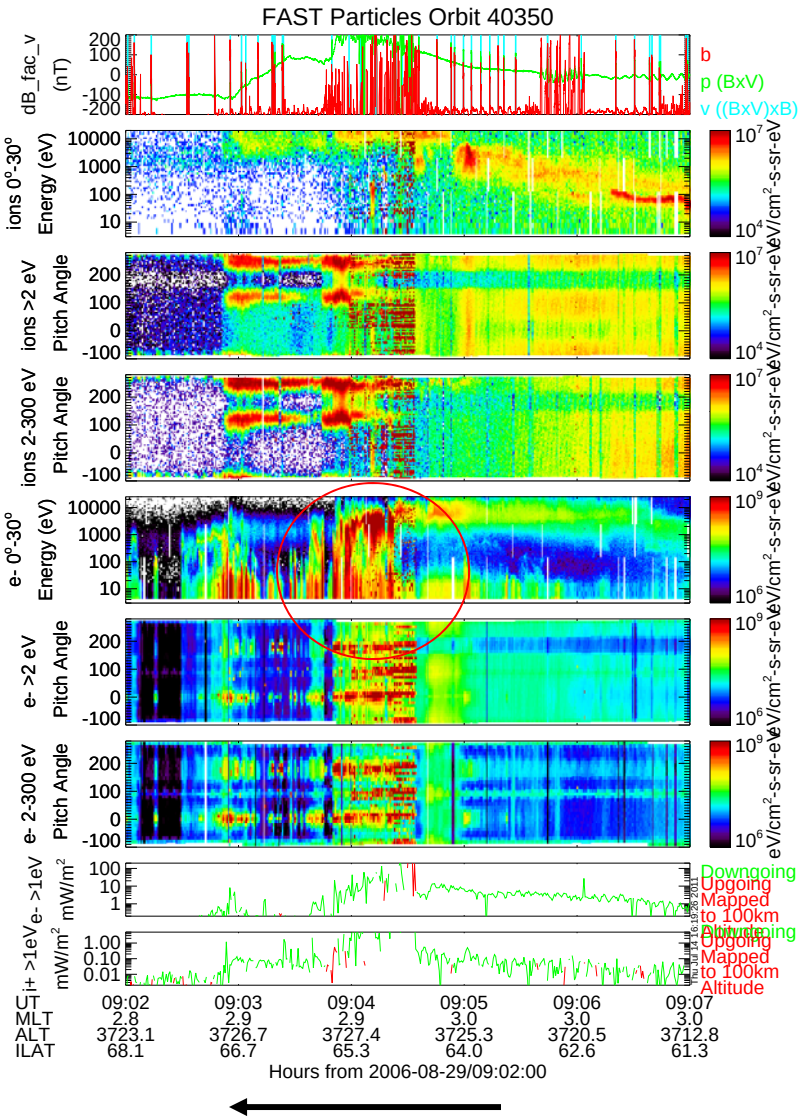


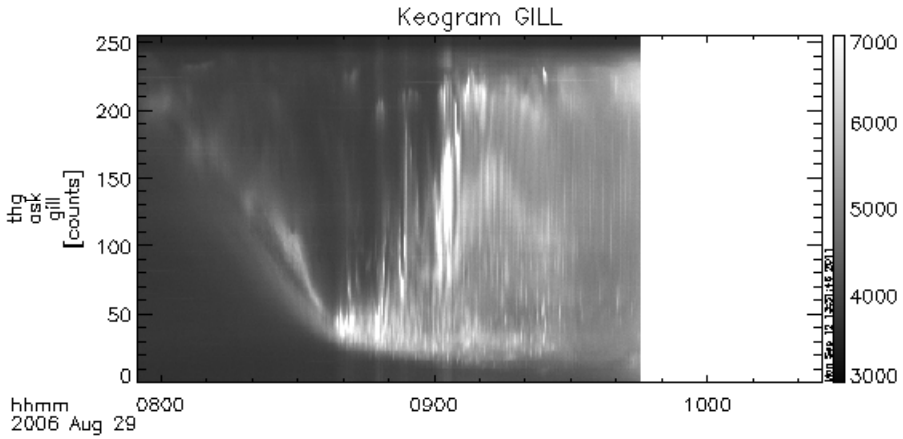
FSIM

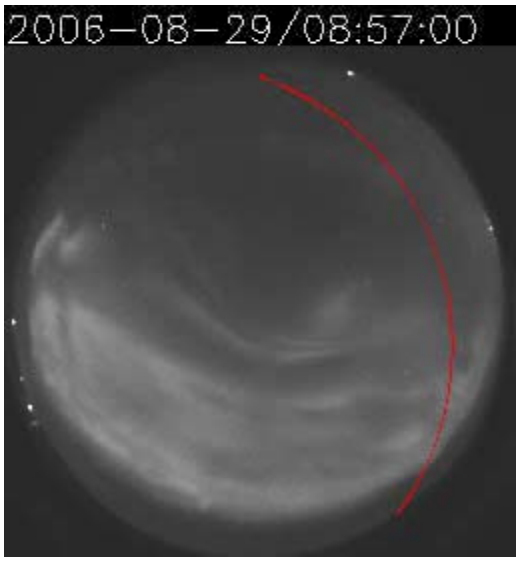


FSMI

Poleward border of pulsating aurora

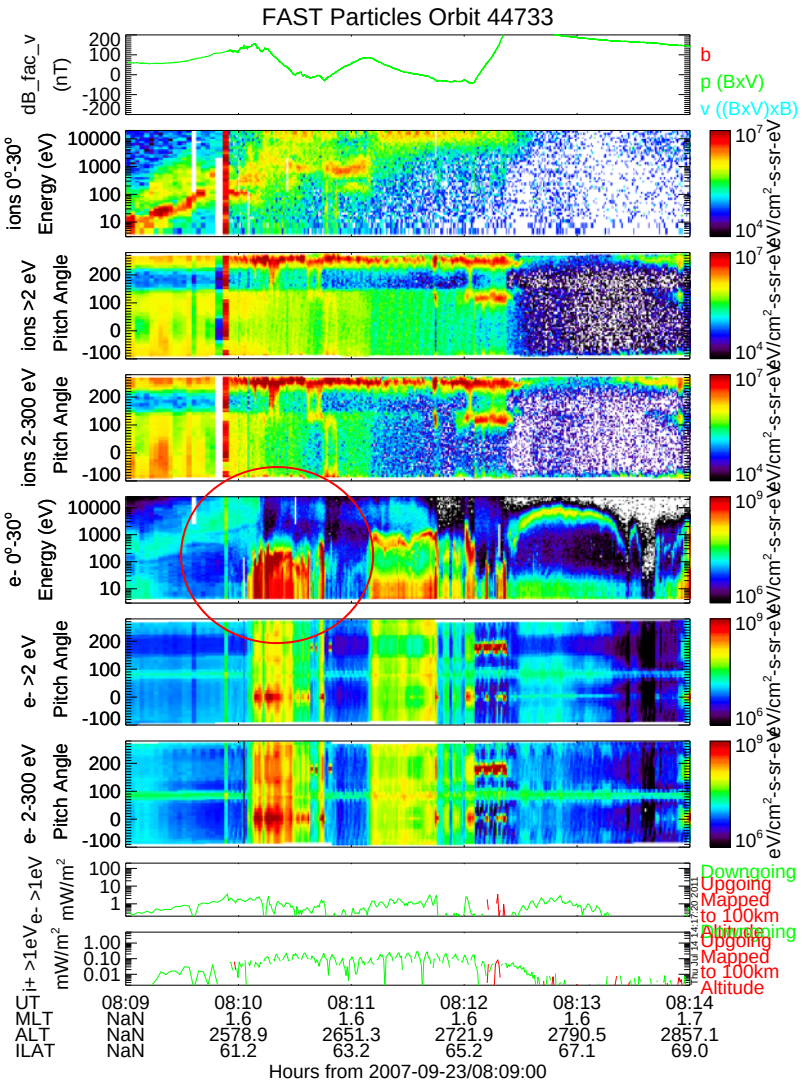




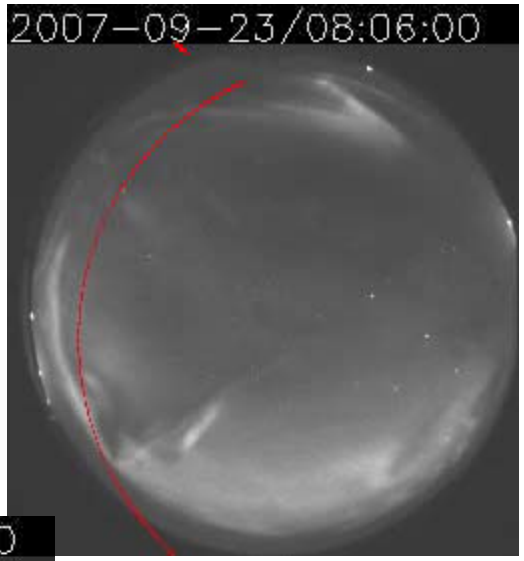


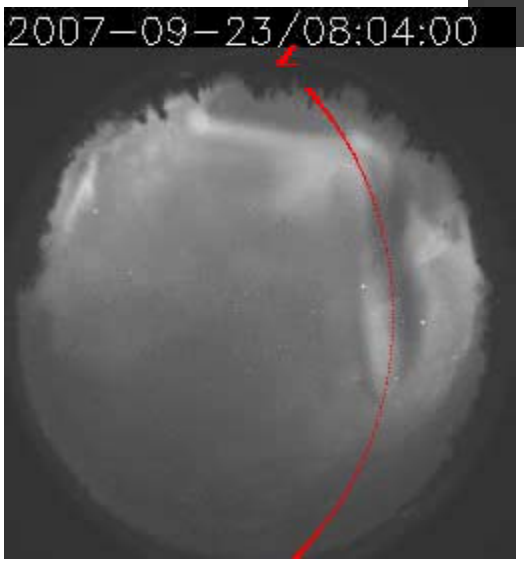
GILL

Poleward border of pulsating aurora



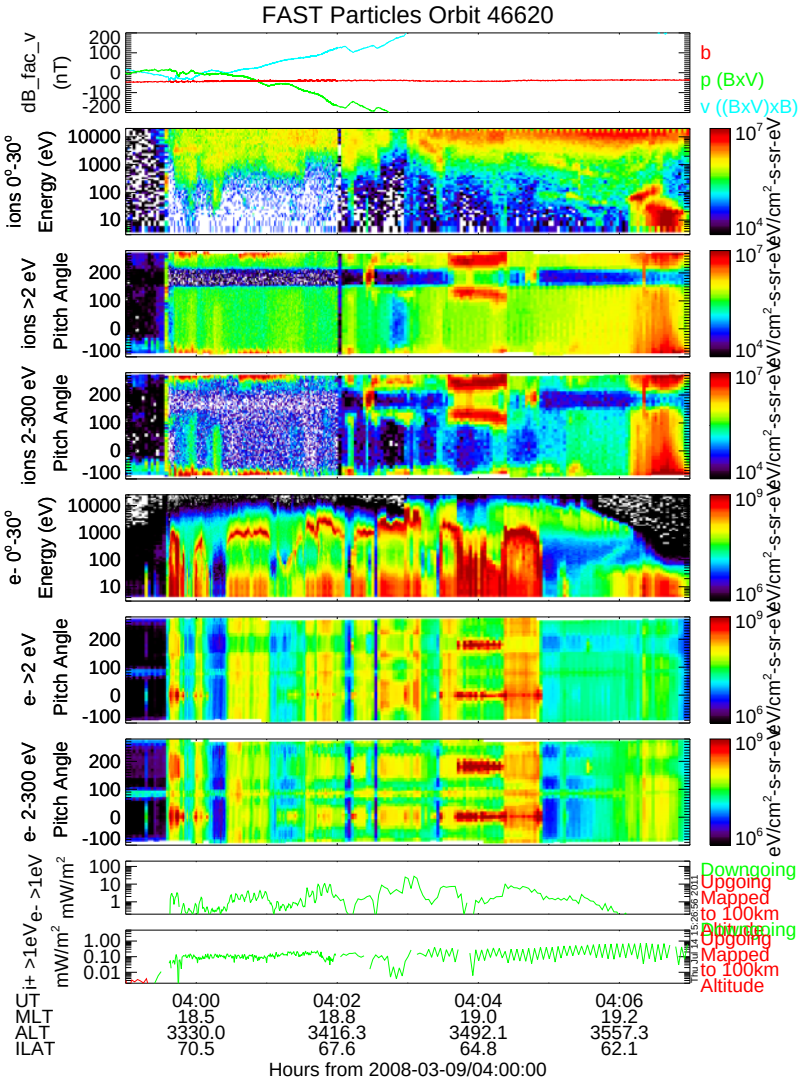
GILL

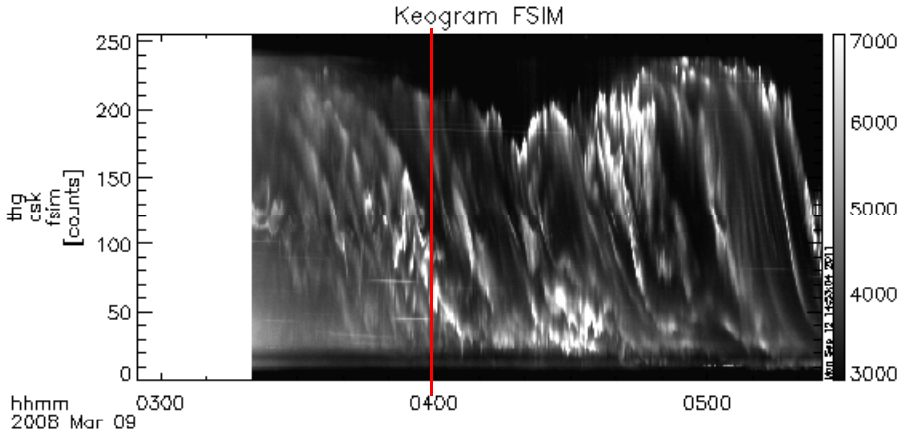


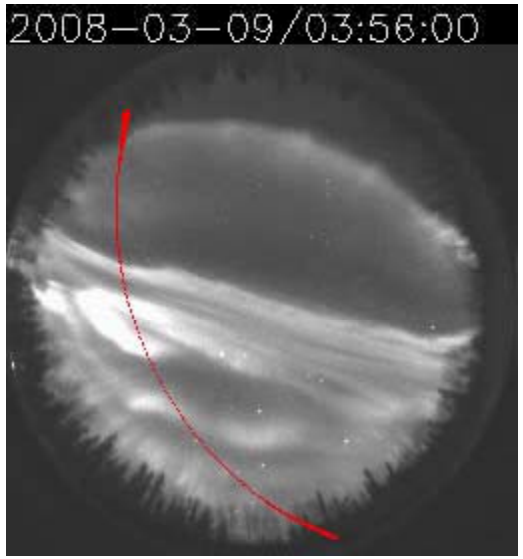


TPAS

Single Alfvenic arc poleward of oval

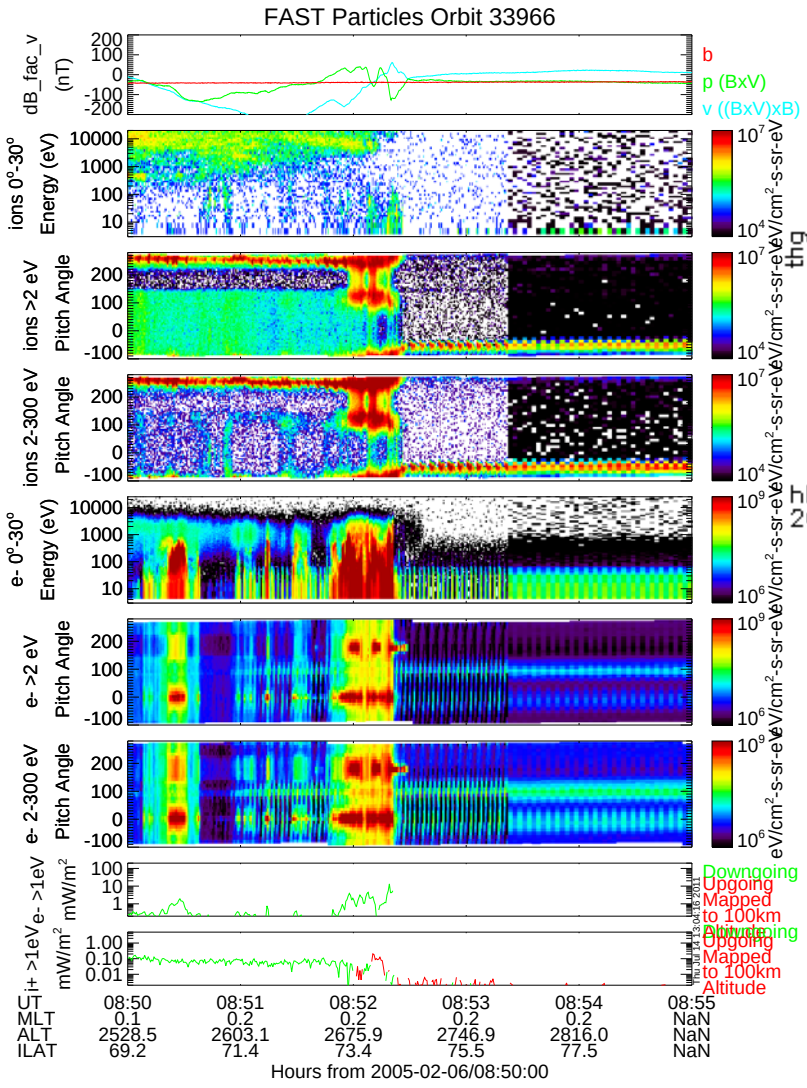


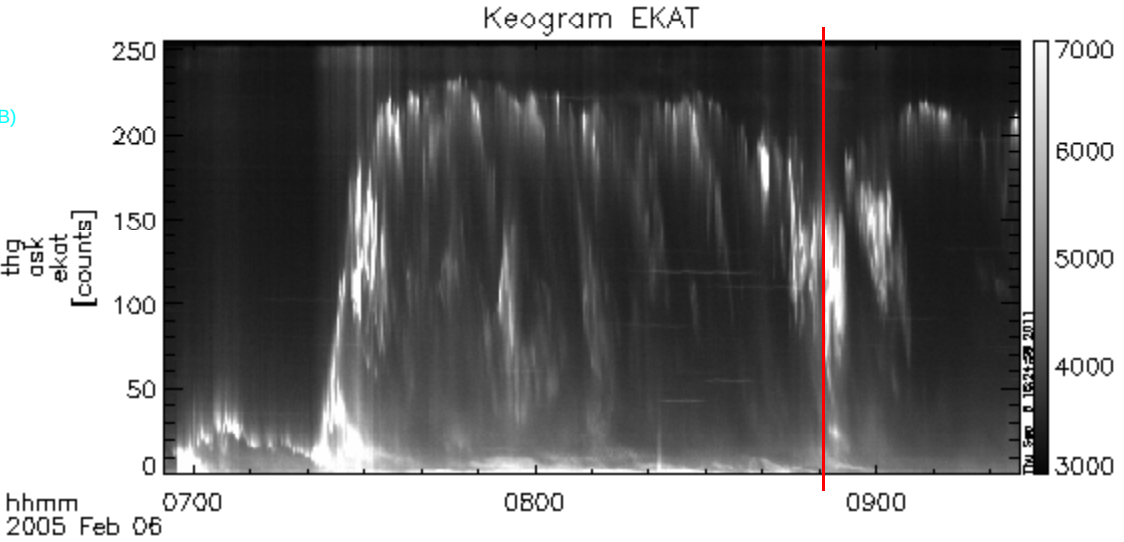


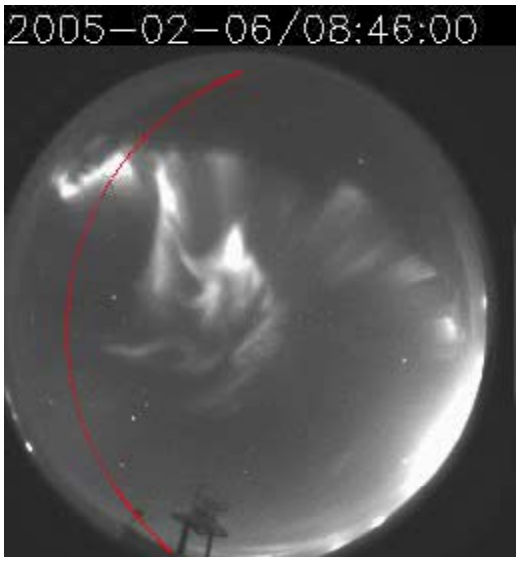


FSIM

Single Alfvenic arc poleward of oval

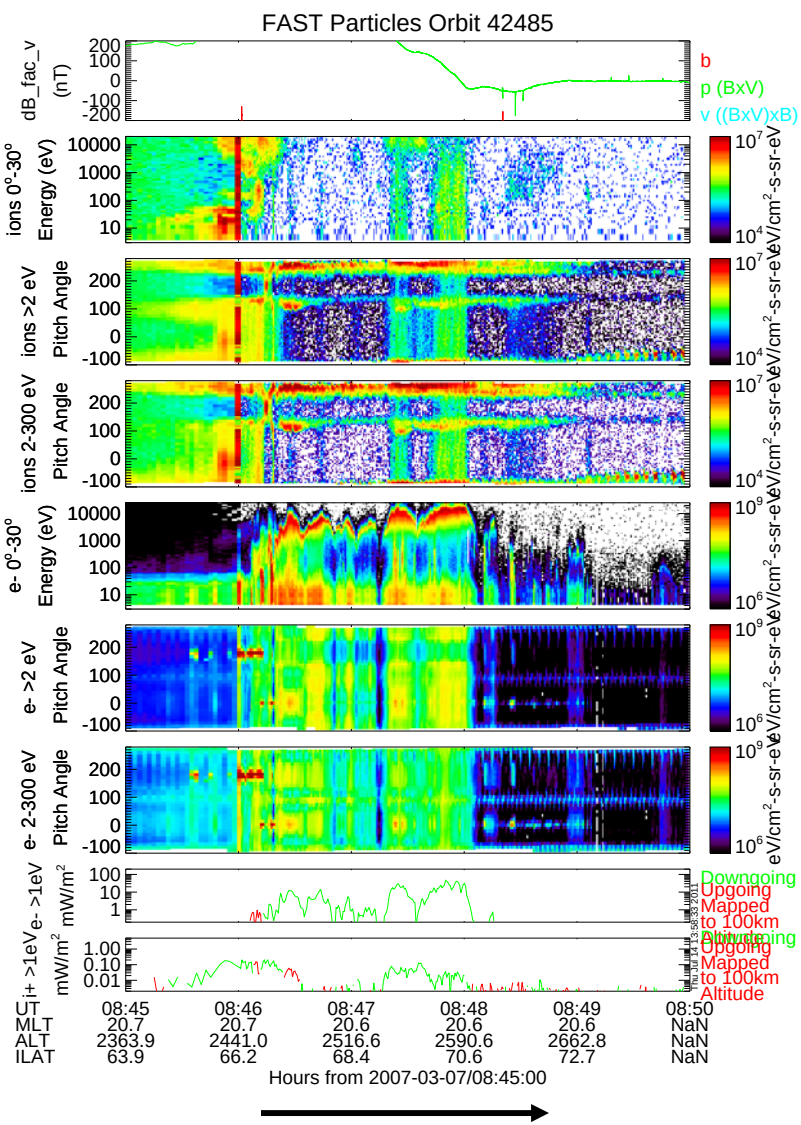


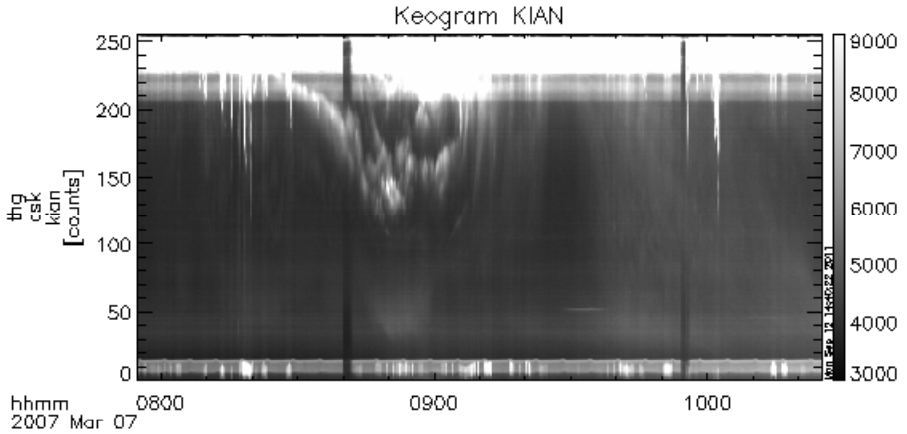


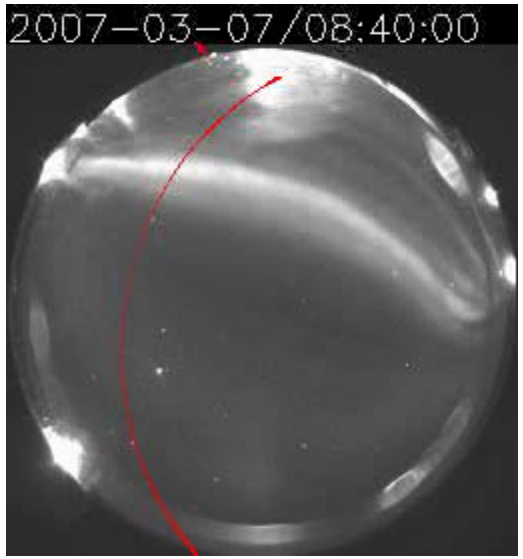


EKAT

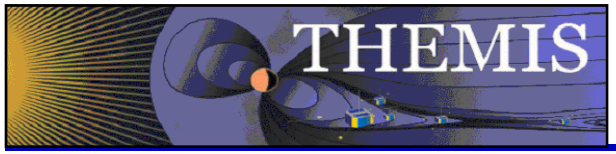
Single Alfvenic arc equatorward of oval







KIAN



Summary

- Alfvénic arcs are most often found at the poleward edge of a system of auroral arcs.
- The fact that they appear on the poleward side of inverted-V-type arcs filling the auroral bulge during substorms suggests clearly an origin at the interface of the stretched tail field and the more dipolar magnetosphere.
- They are characterized by:
    - strongly structured field-aligned currents and electric fields,
    - rapidly varying ray structure,
    - strongly field-aligned fluxes of medium energy electrons, and
    - transversely heated ions, including O+.
- The transversely heated ions coincide with substantial density depletions and are probably causally related [Lundin et al., 1994].
- Another distinguishing feature is that the associated field-aligned current system consists of balanced upward and downward currents over the width of the auroral emissions.

Haerendel, Six auroral generators, JGR, 2010JA016425, 2011