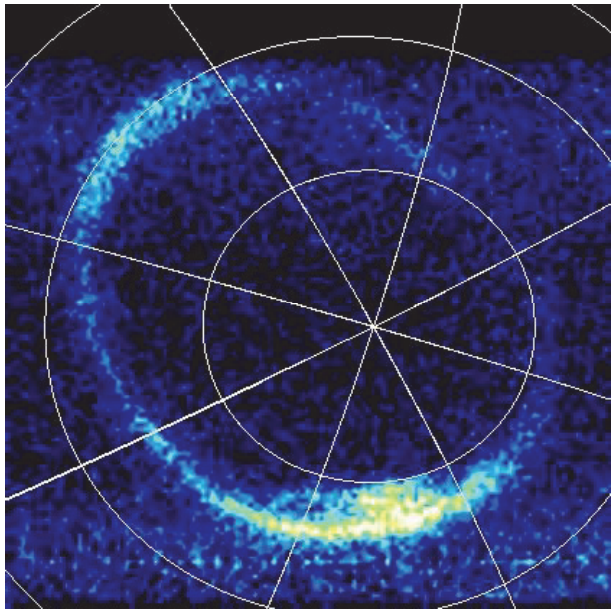


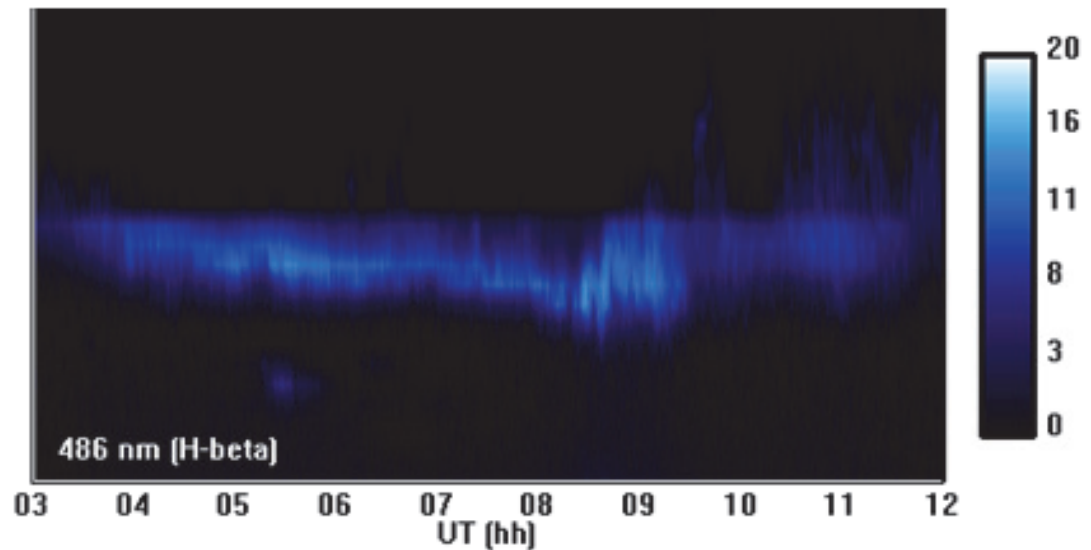
The Magnetospheric Source Location of the Proton Aurora

Eric Donovan and Emma Spanswick

Acknowledgements: Kepko, Lui, Liang, Jackel, Angelopoulos, McFadden, et al.



SI-12 Lyman-alpha H⁺ Auroral image from IMAGE

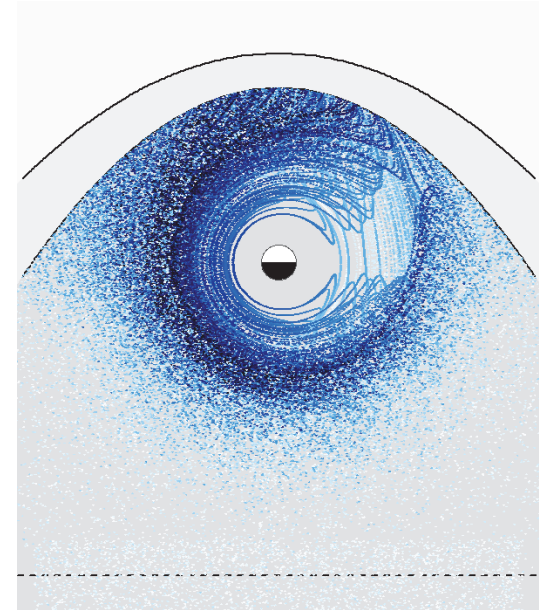
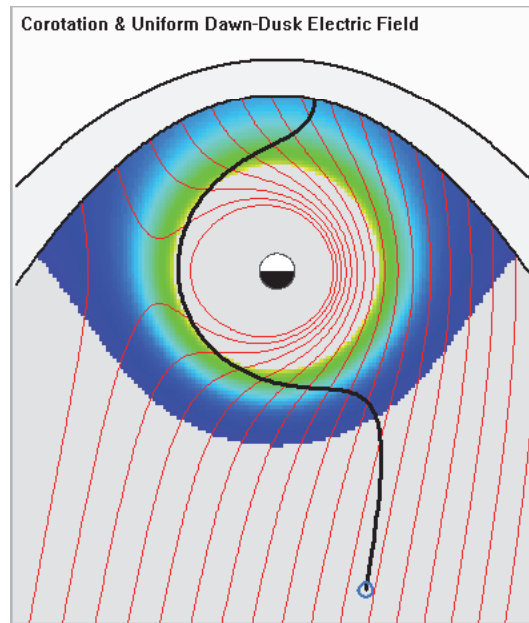
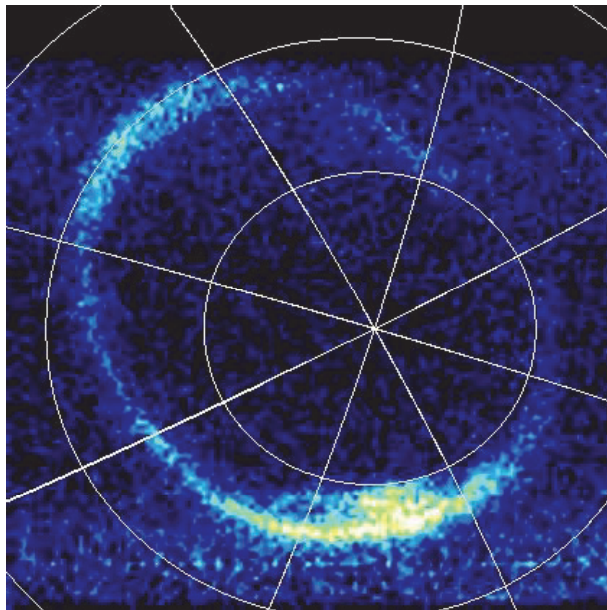


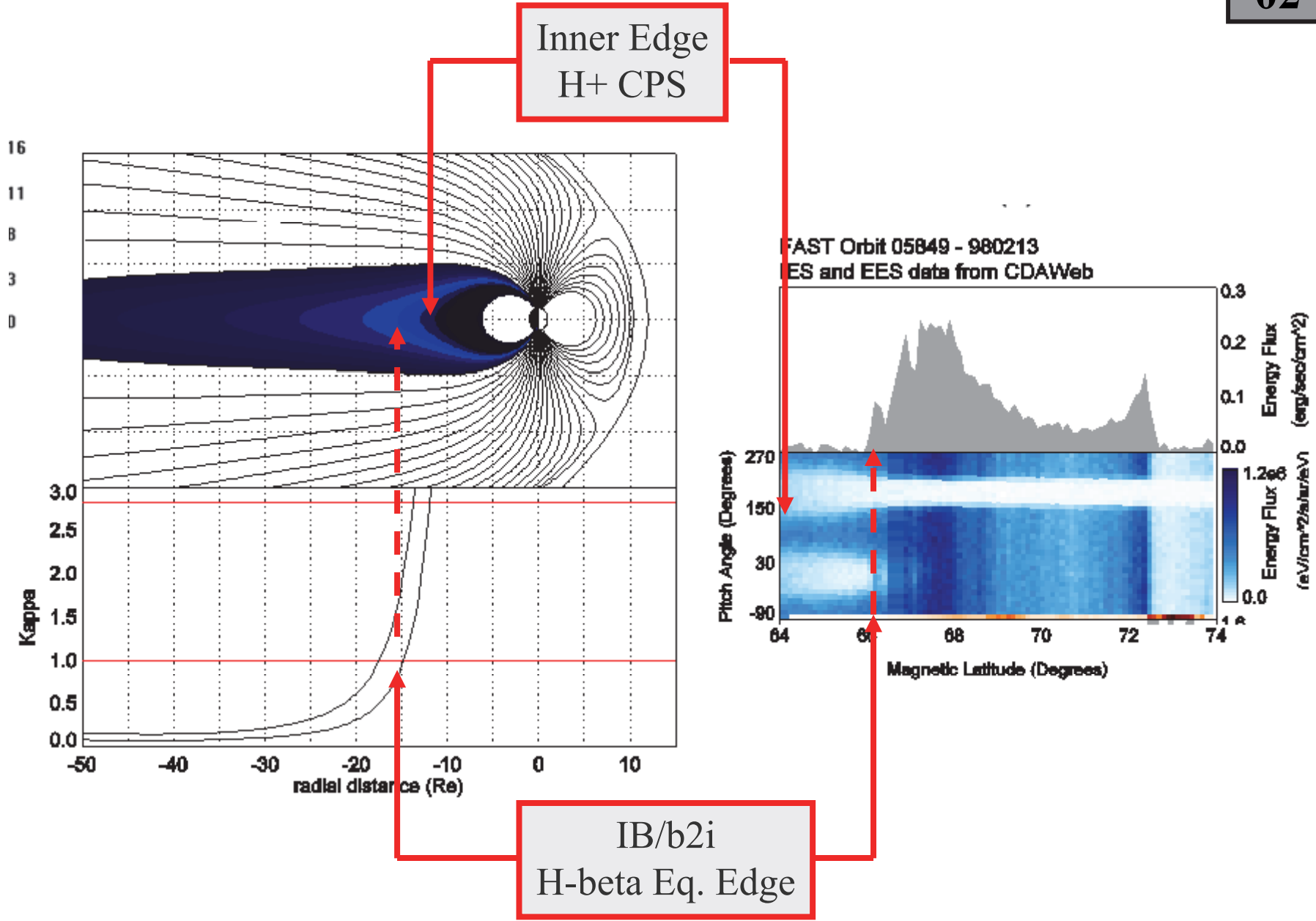
Keogram of Balmer-beta H⁺ luminosity from Gillam & Rankin Inlet NORSTAR MSPs

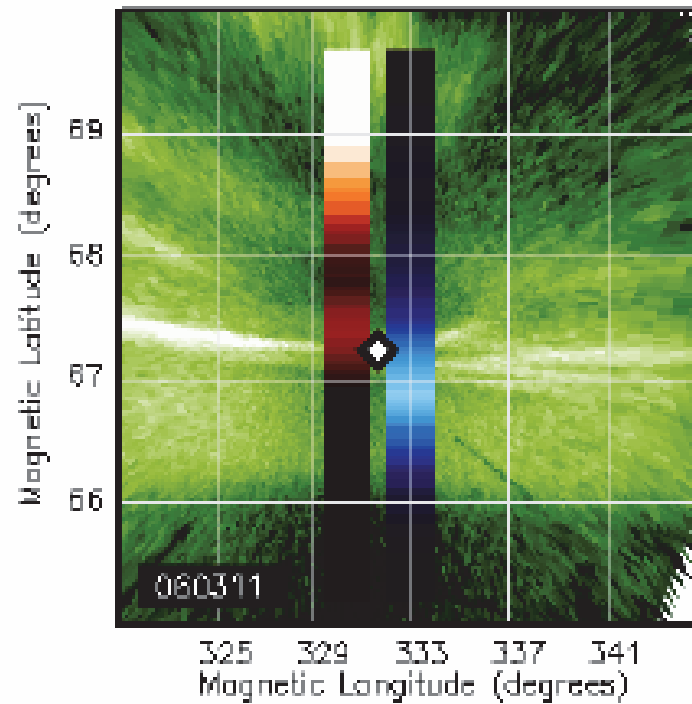
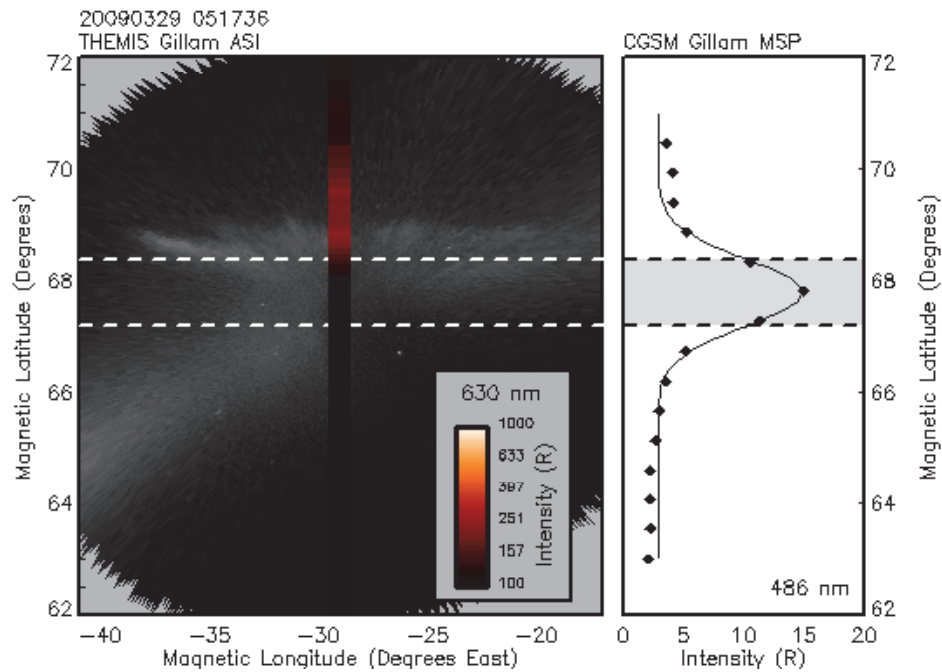
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Evidence from a number of sources argues that the field lines threading the onset arc cross the neutral sheet in or near the transition from tail-like to dipolar. Note that at this marks a logical fork in the road...

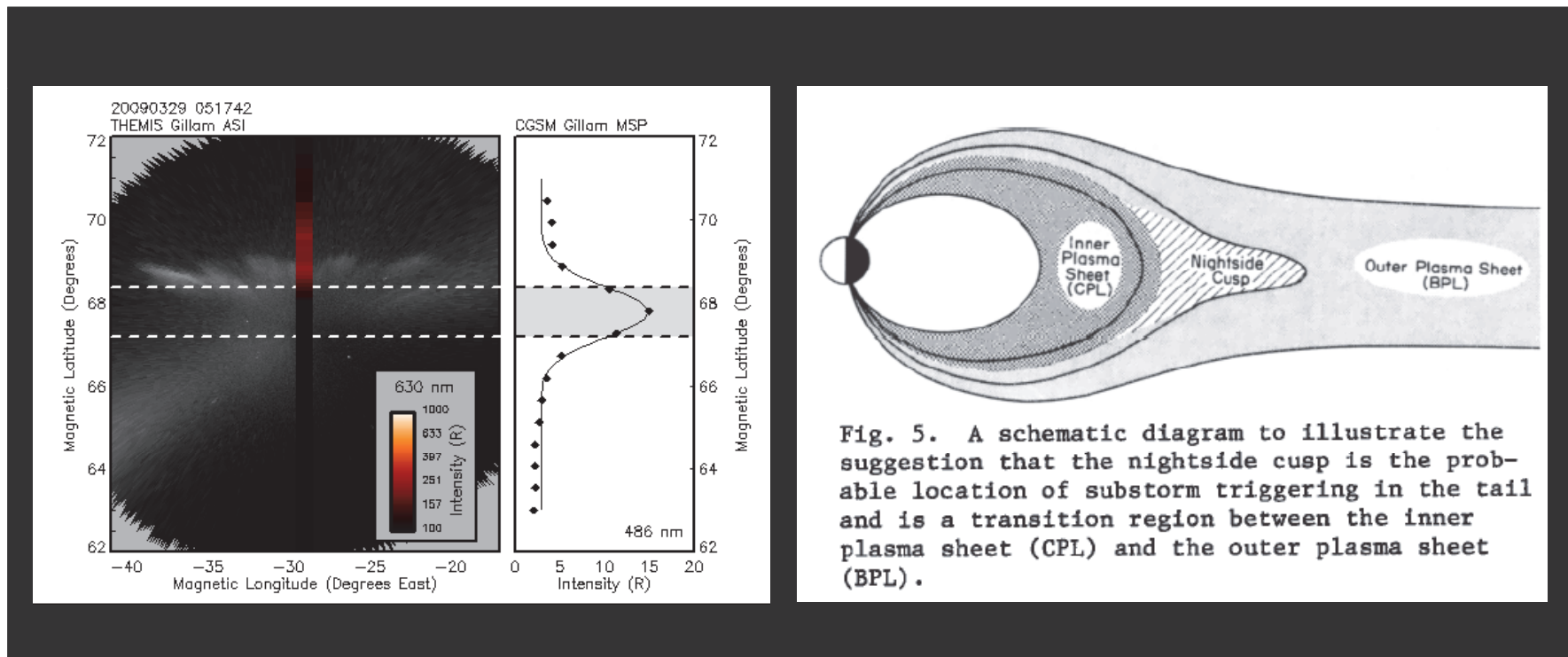
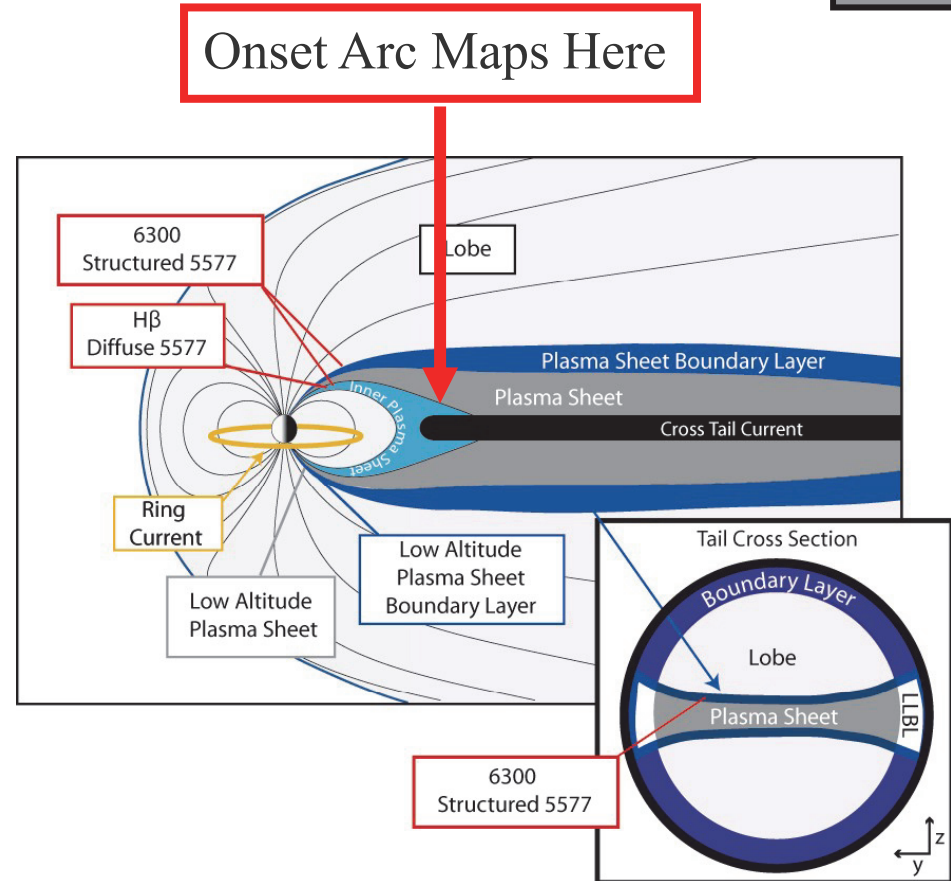
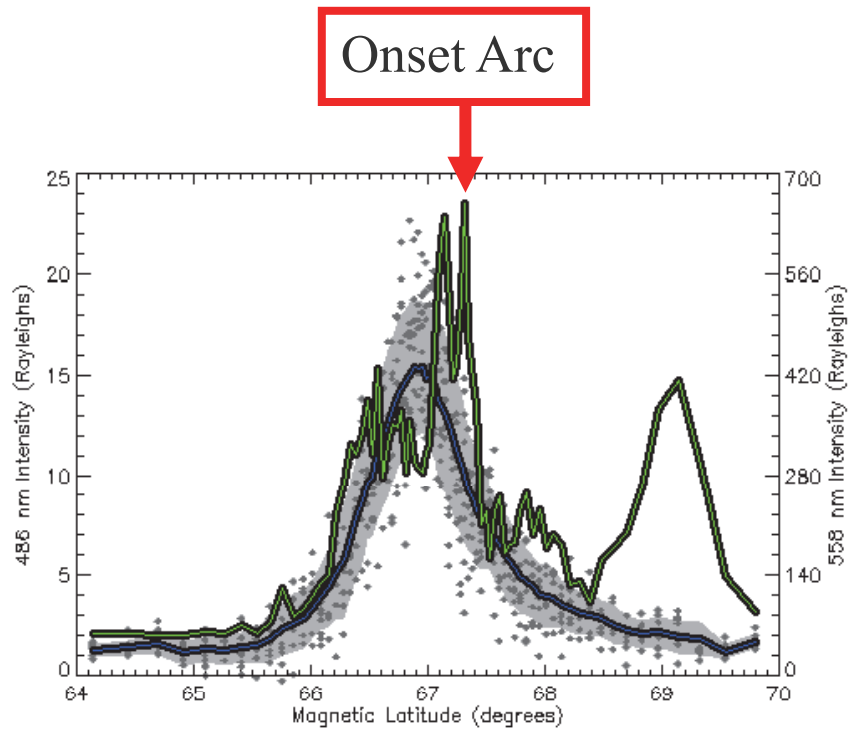


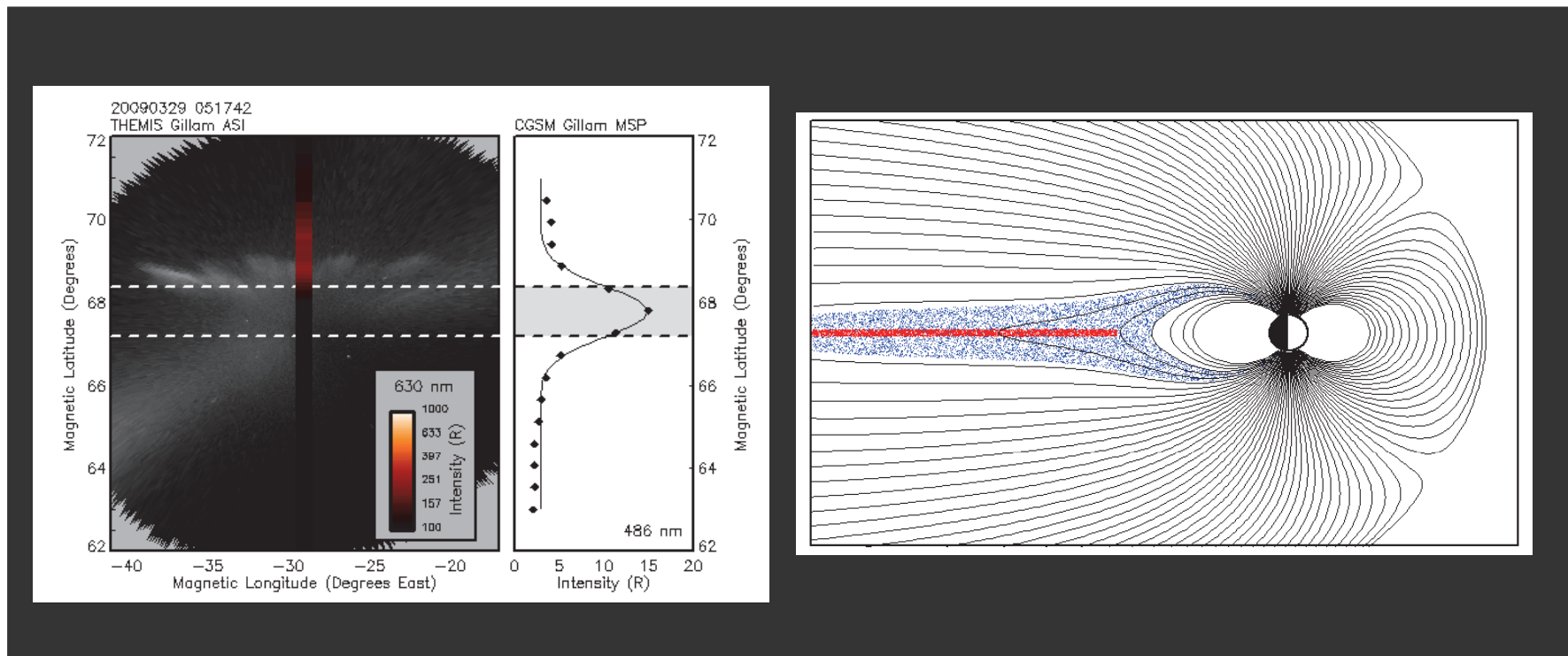
Fig. 5. A schematic diagram to illustrate the suggestion that the nightside cusp is the probable location of substorm triggering in the tail and is a transition region between the inner plasma sheet (CPL) and the outer plasma sheet (BPL).



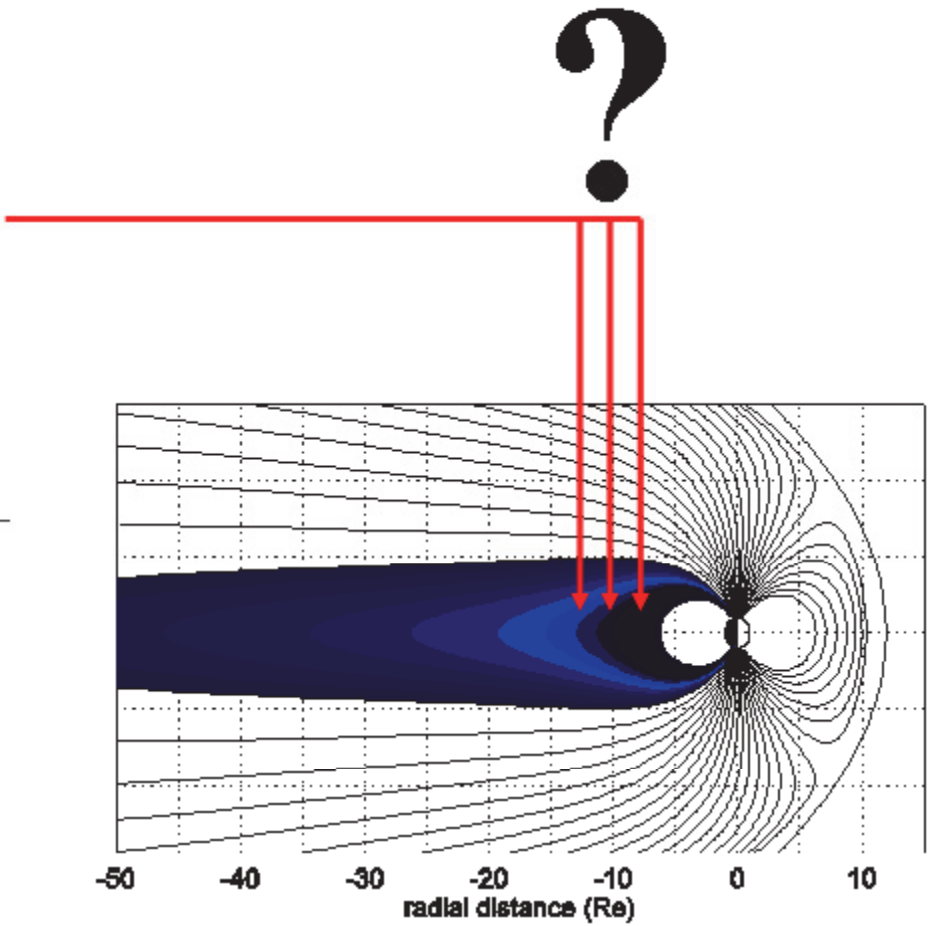
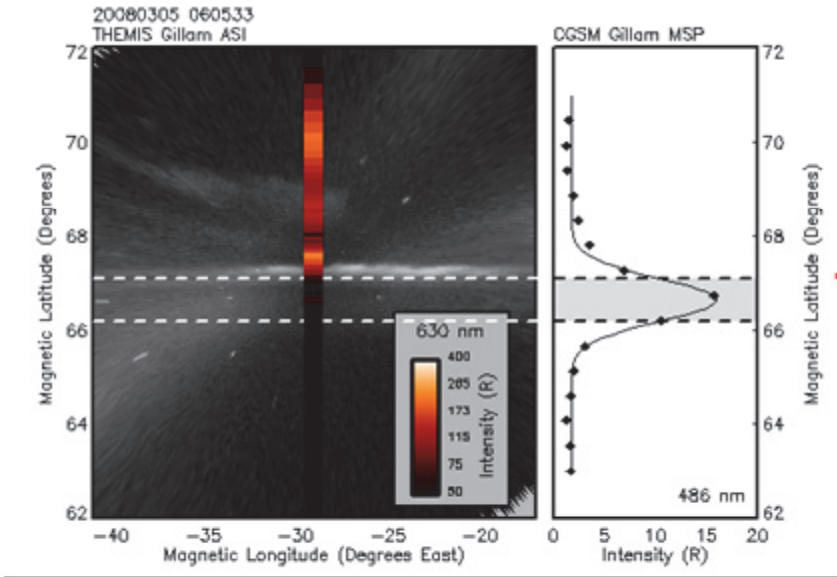
We know where the arc is relative to the H^+ aurora, and we have a very good idea what the H^+ aurora corresponds to in the magnetotail, but we do not know where that is on a case by case basis. Note that the onset arc is usually in a region of $\sim 10 R$ H -beta emission.

The picture of a monolithic (and rather latitude-extended transition region) is clearly too simple.

Evidence such as (1) the frequent late growth phase co-location of the breakup arc and an equatorward edge in redline luminosity; (2) the East-West (gmag) alignment of auroral arcs particularly in the late growth phase, and (3) the evolution of the dispersionless injection seen in riometer data argues for including the optics argues for a radially narrow transition between more stretched and less stretched (the TCS extends into the outer transition region). **Note – three (at least) relevant “edges”.**

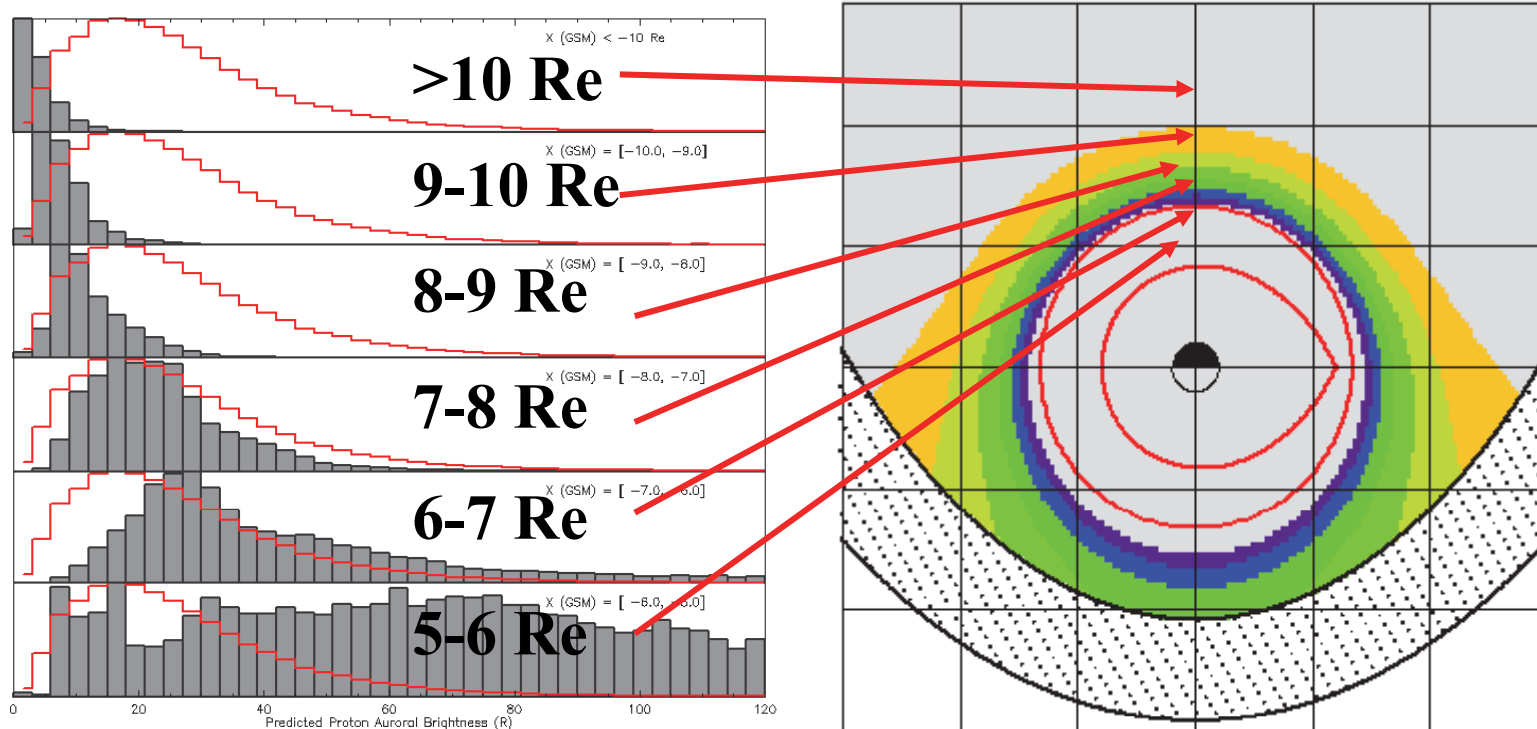


See also *Yahnin et al., Ann. Geophys., 1997*



THEMIS Plasma Sheet Observations

- Equivalent Proton Auroral Brightness



Result 1: Peak in brightness almost always maps to $<9 \text{ Re}$.
 Result 2: IB almost always maps to $>6 \text{ Re}$.

Result 3: Onset arc almost certainly maps to inside 10 Re.

