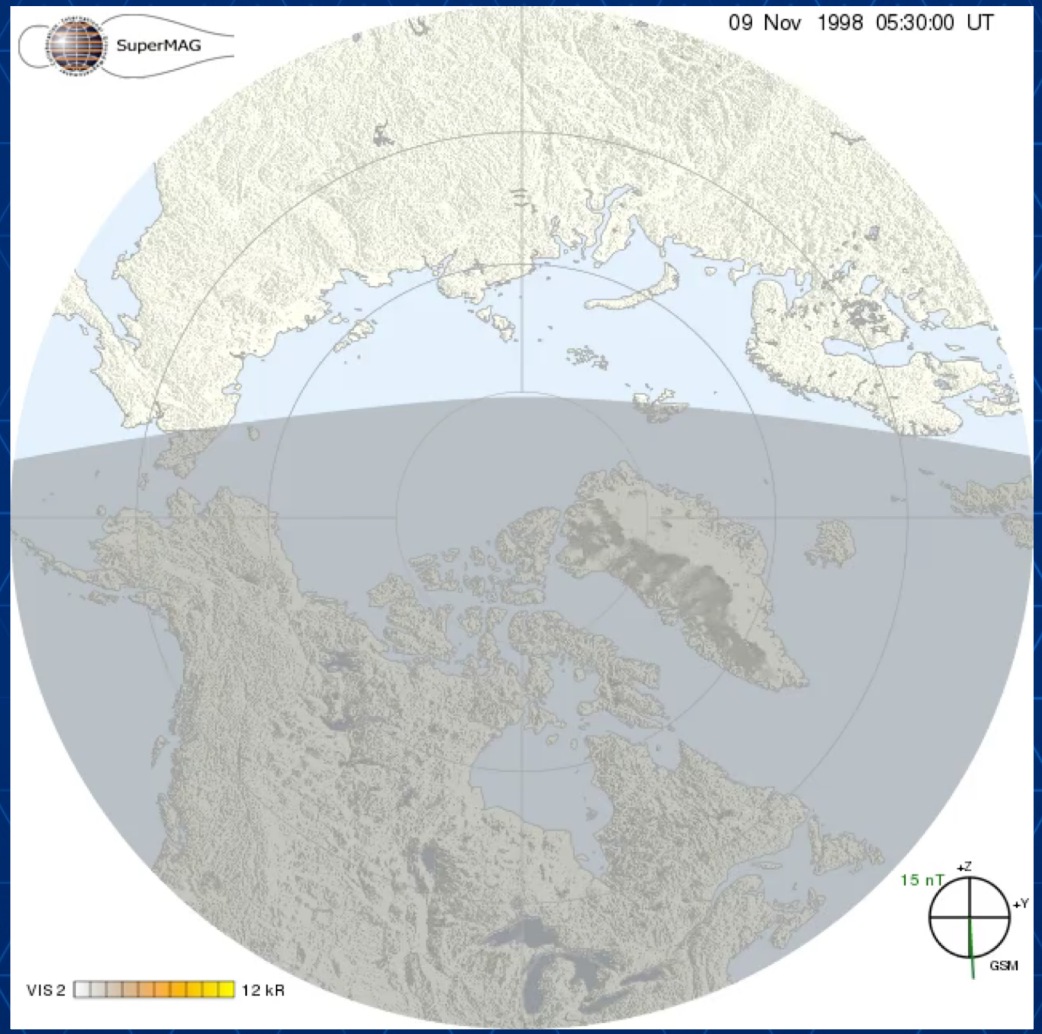
JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

Three Issues To Keep In Mind For GDC:

- Dynamics
- Spatial hierarchy
- Reference frame



J. Gjerloev and S. Ohtani

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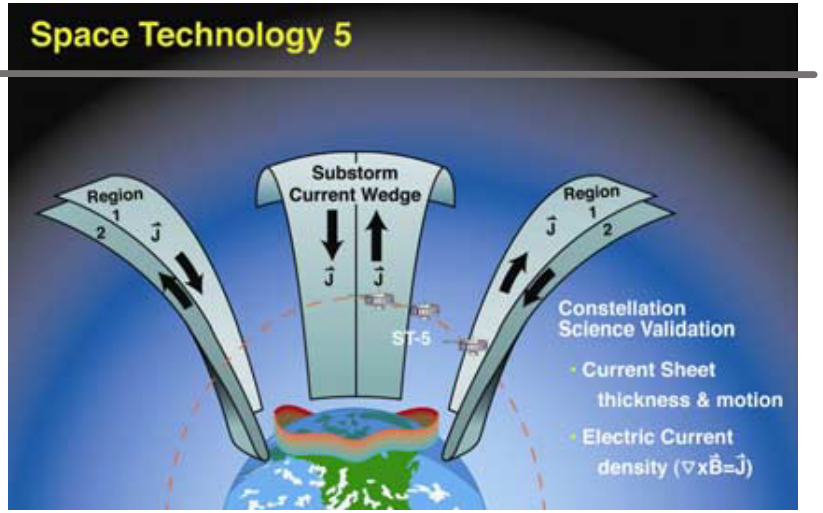
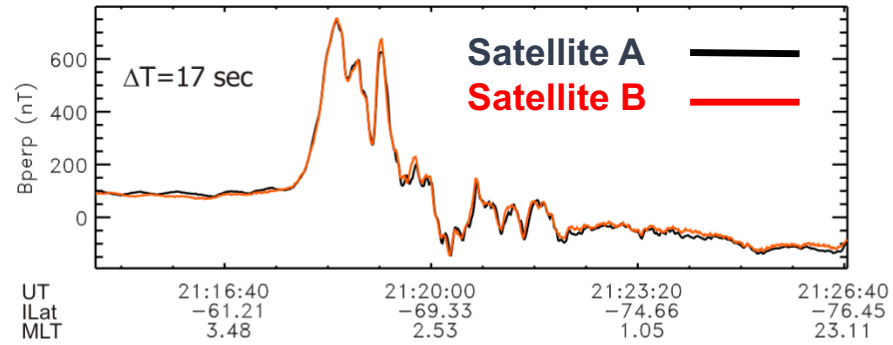
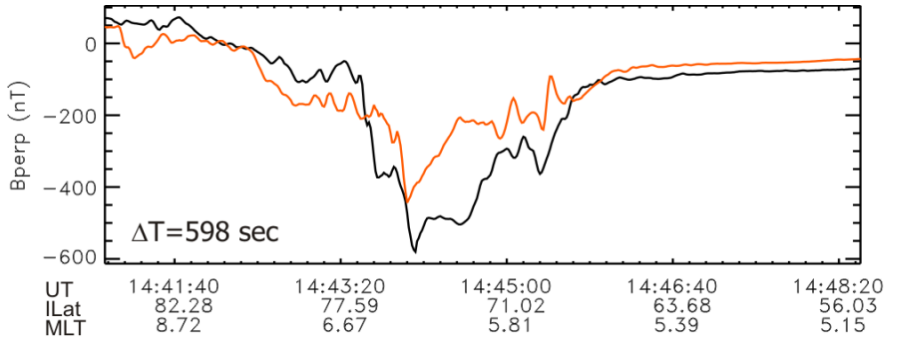
Dynamics – The Variable Magnetosphere-Ionosphere-Thermosphere System

- **Physical Parameter.** Time derivative of basic electrodynamic parameters.
- **Observational Challenge.** Single satellite measurements can typically not distinguish between spatial and temporal variations.
- **Solution.** Multi-point measurements either separated in time (e.g. co-orbital or pearls-on-a-string) or space (e.g. separated in local-time).

Slavin et al. [2007]







Gjerloev et al. [2011]

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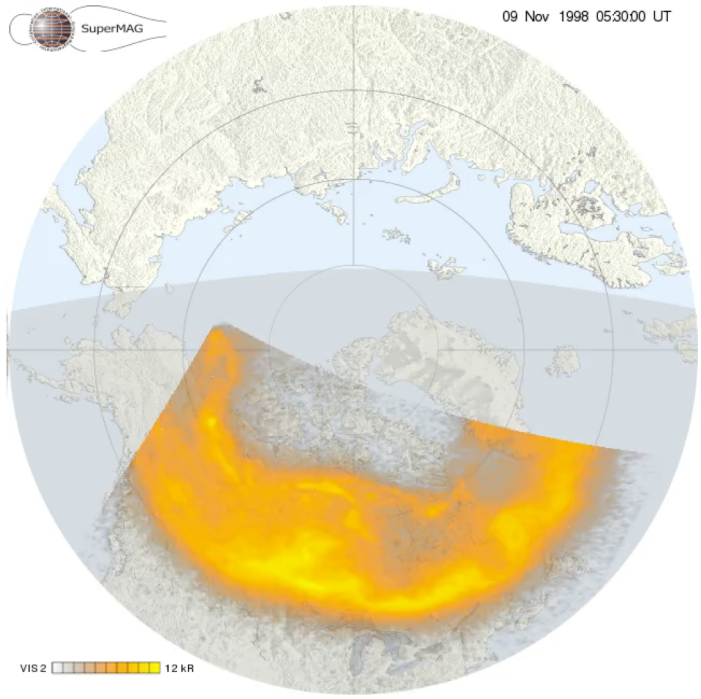
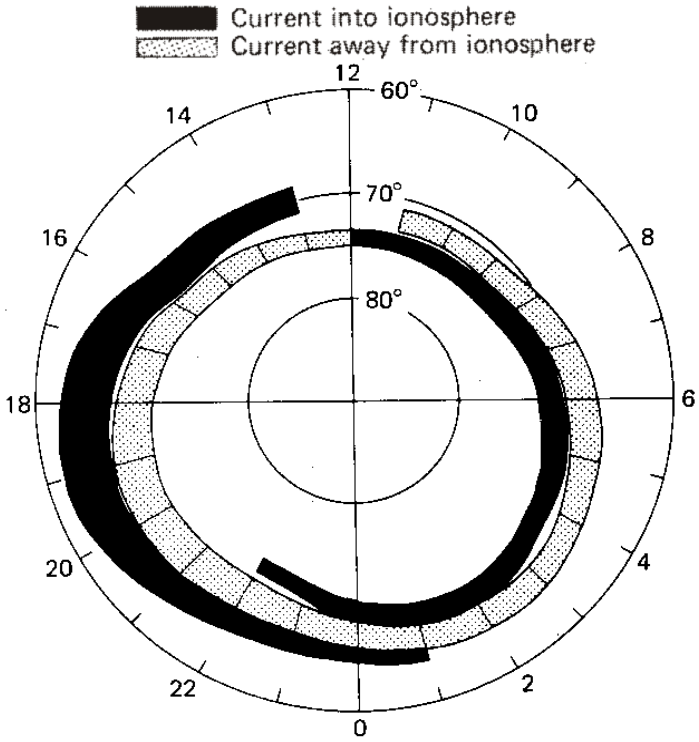
Questions:

- To what extent do large-scale static empirical models predict the actual distribution?



Iijima and Potemra, 1978



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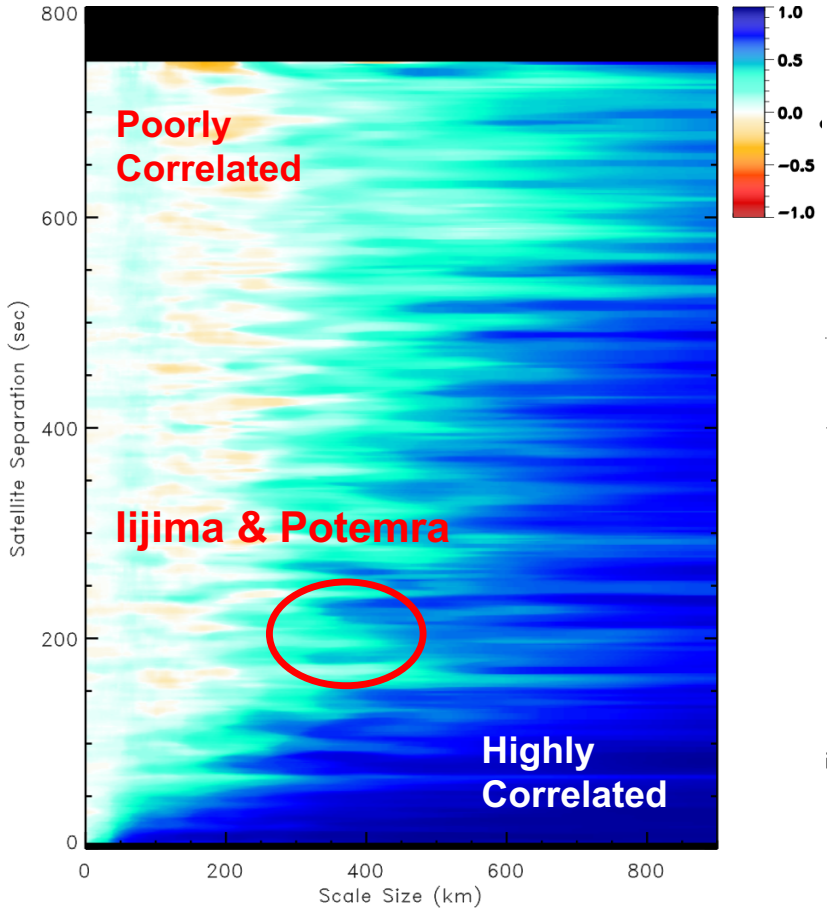
Question:

- How does energy and momentum transport depend on temporal and spatial scales of the M-I system?

Gjerloev et al. [2011]



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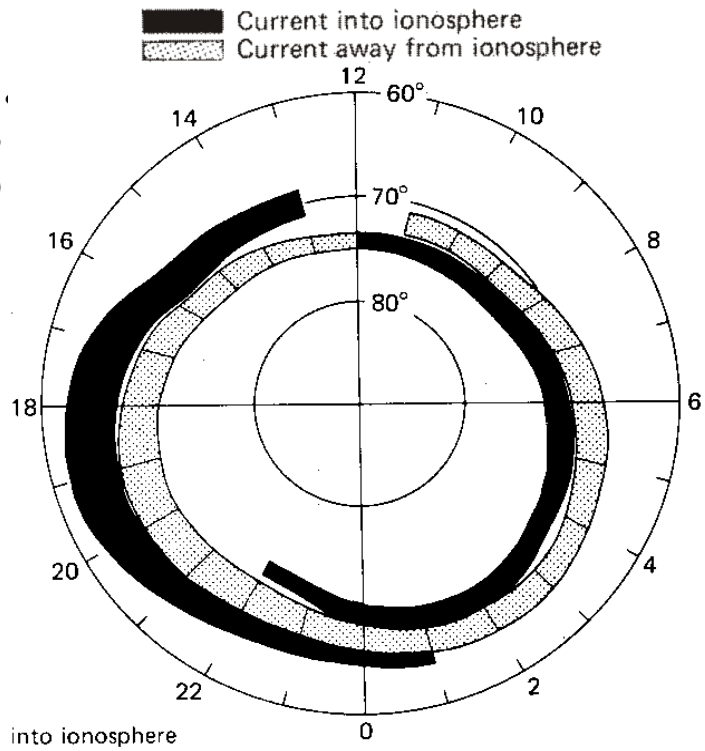
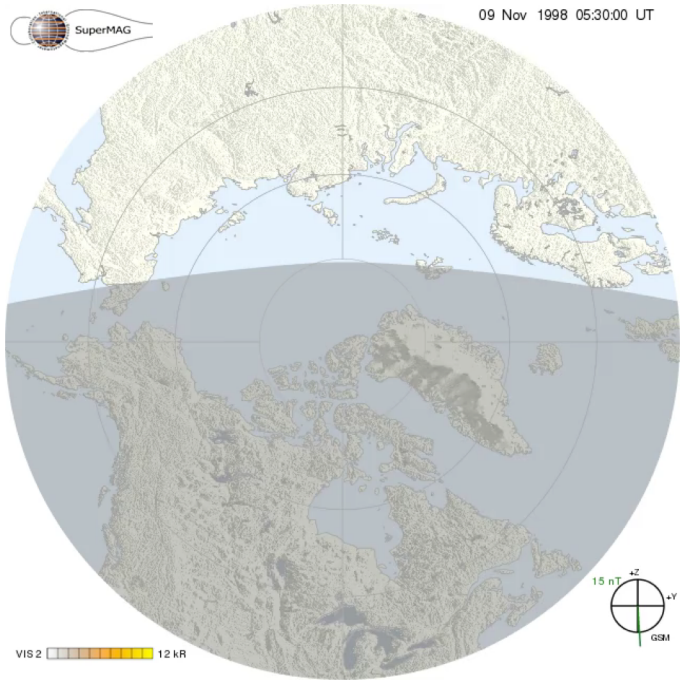


Reference Frame – needed to interpret local detailed measurements

- **Physical Parameter**. Global large-scale distribution of physical parameters.
- **Observational Challenge**.
  A) Satellites typically provide local high precision measurements but these should be interpreted in the context of global conditions.
  B) Electrodynamic parameters are organized by processes not, for example, magnetic coordinates.
- **Solution**. SuperMAG, SuperDARN, AMPERE provide context, near-global continuous solutions that allow satellite measurements to be organized spatially and temporally.



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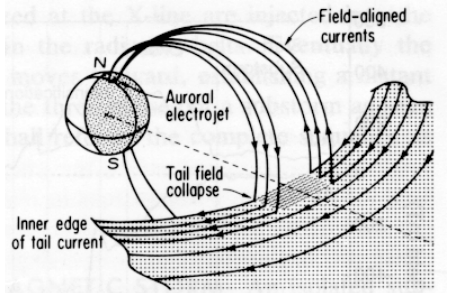
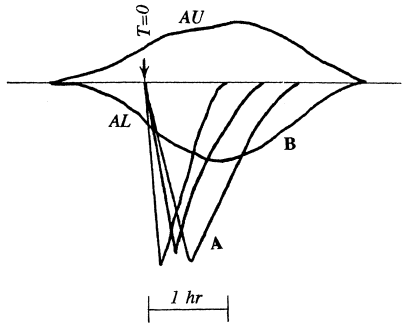
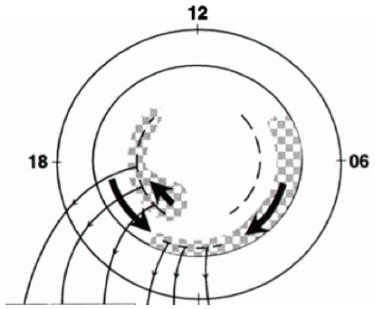
Substorm current wedge, McPherron et al.



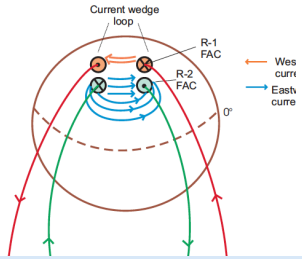
Two component model , Kamide et al.

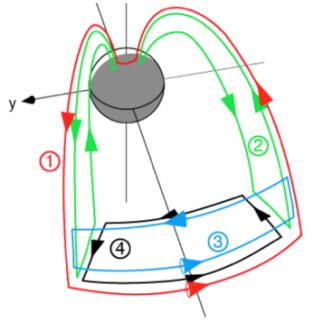


Boundary layer model, Rostoker

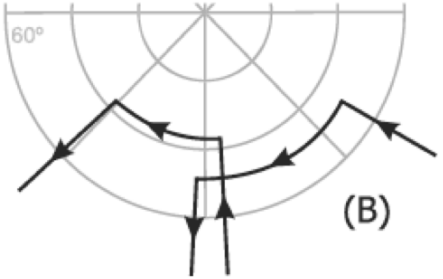


Improved Substorm model, Ritter and Lühr





Double wedge model, Gjerloev and Hoffman



Question:

- **Auroral electrojet feeding and drainage – when and where?**

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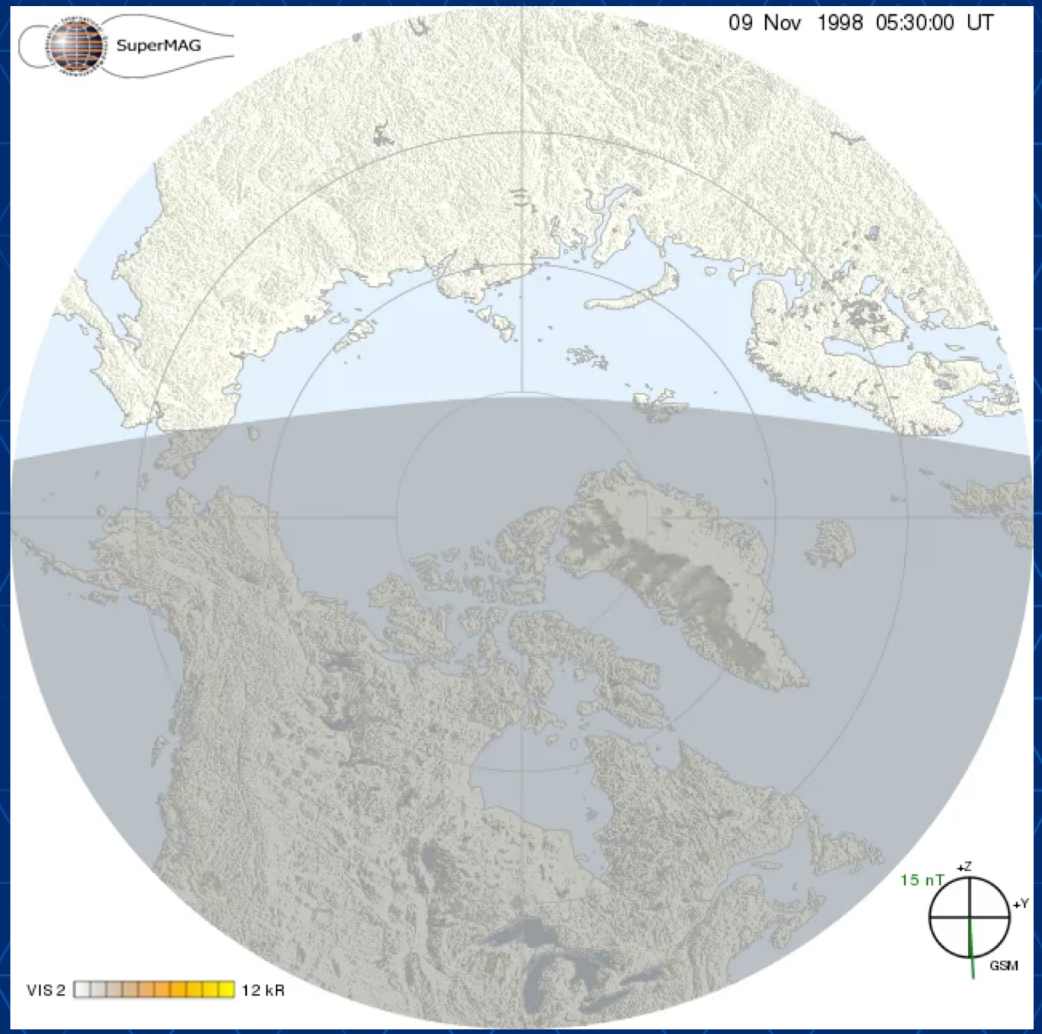

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