

Magnetosphere-Ionosphere-Thermosphere Coupling through Anomalous Ionospheric Conductivity

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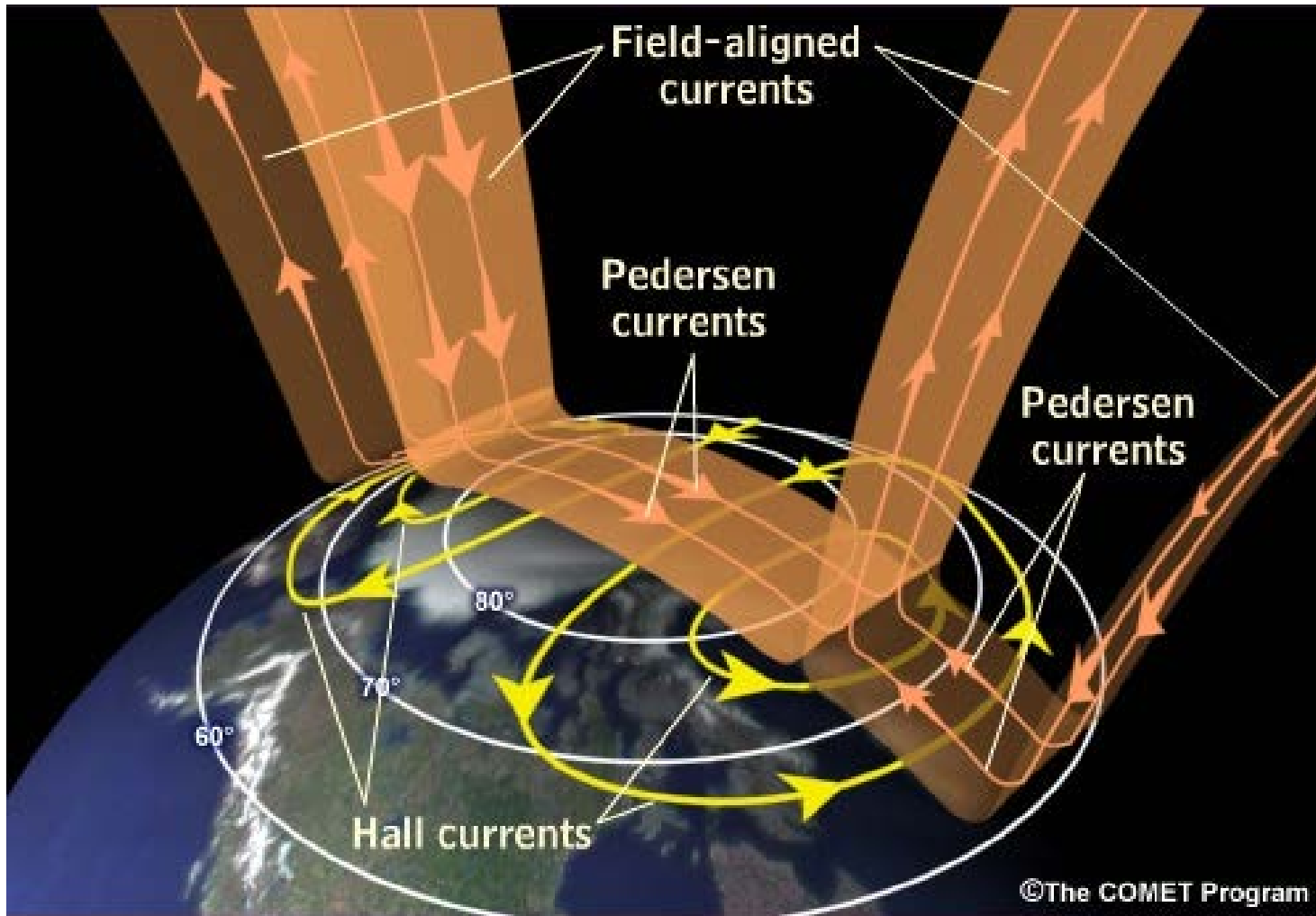
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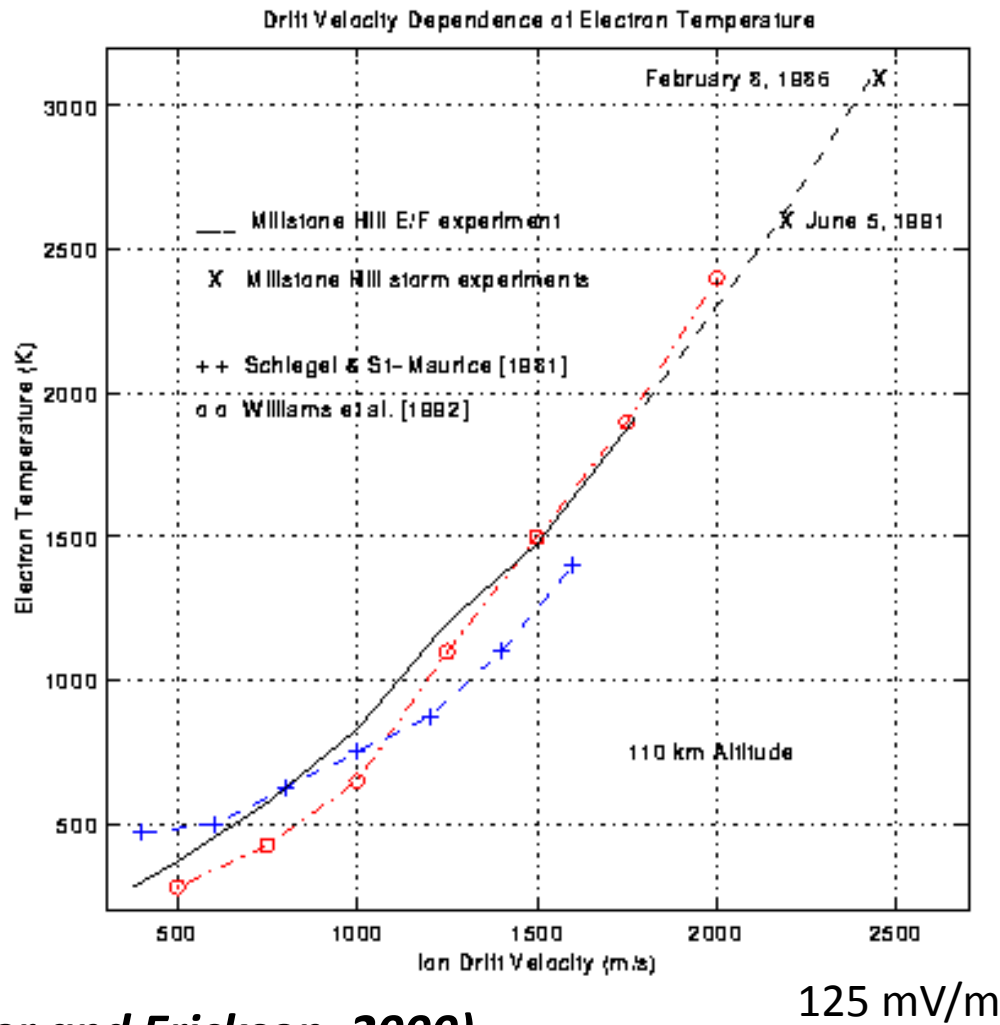
Magnetosphere-Ionosphere Coupling



Effects of small-scale E-region turbulence on large-scale ionospheric conductivities:

- Anomalous electron heating (AEH) → reduced recombination → increased plasma density
- Anomalous electron transport: nonlinear current (NC)

Anomalous electron heating

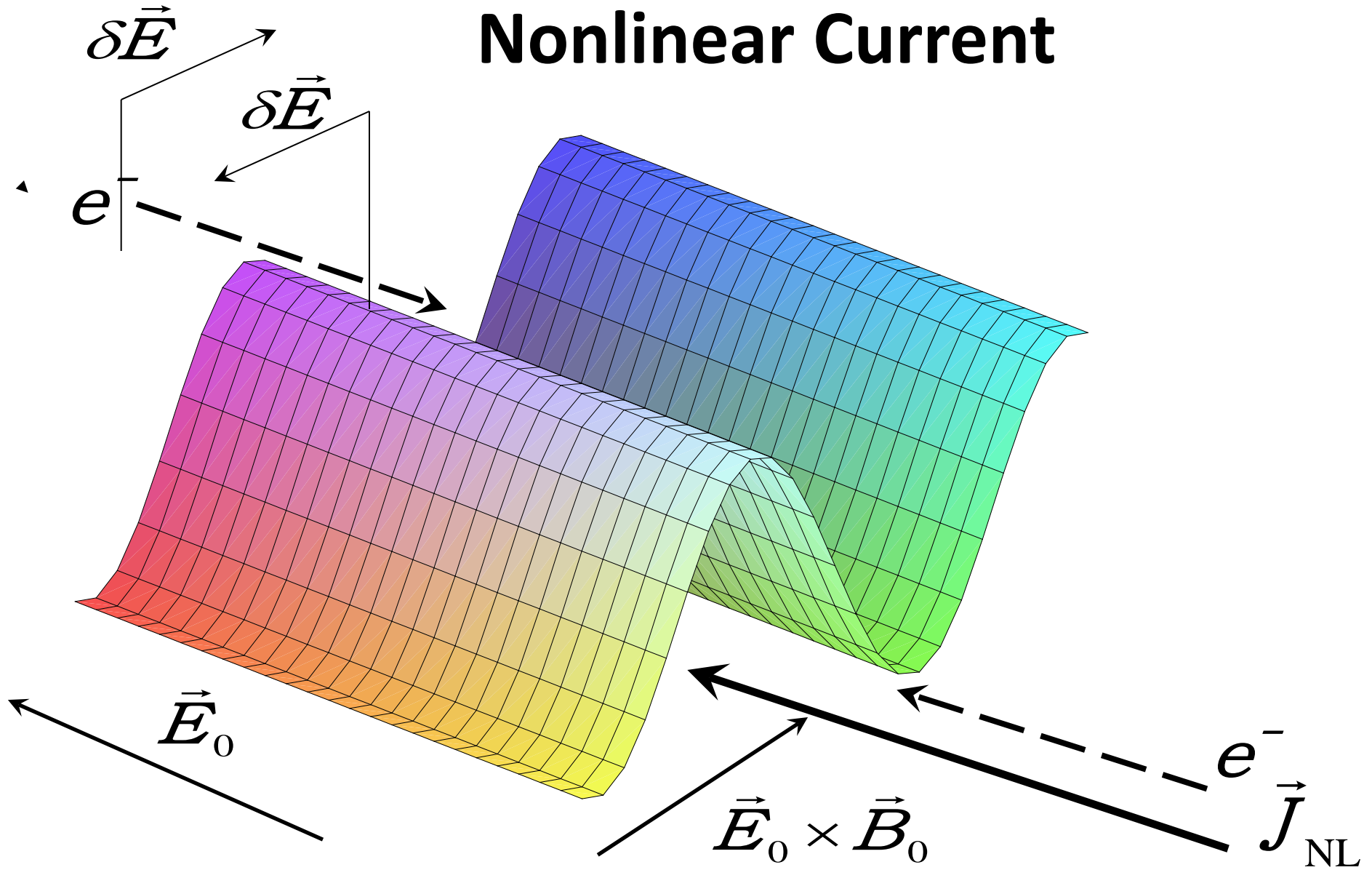


(Foster and Erickson, 2000)

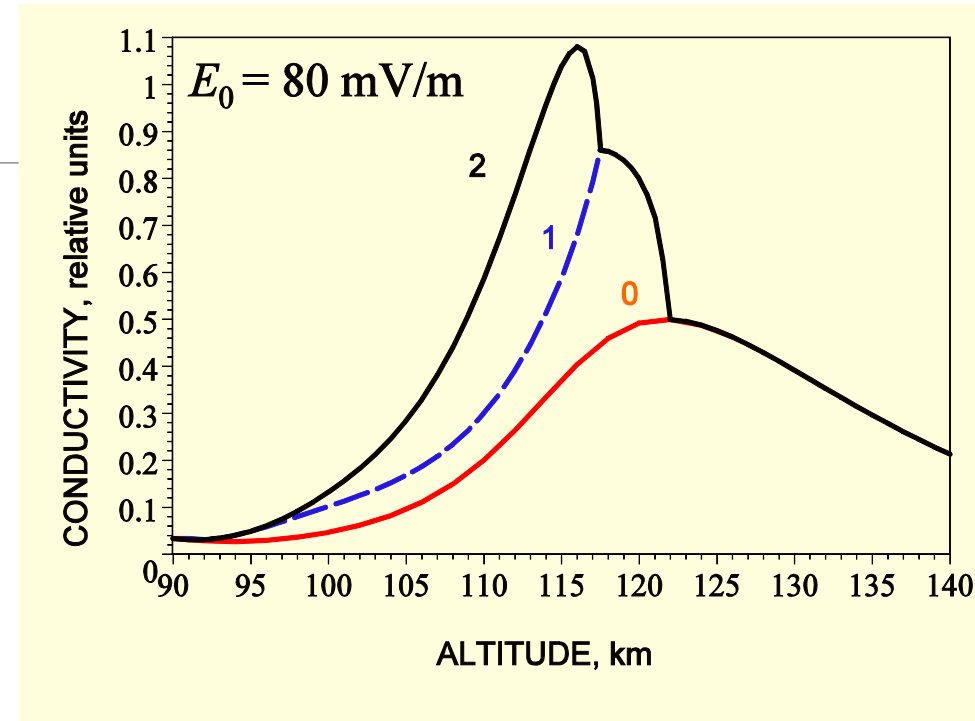
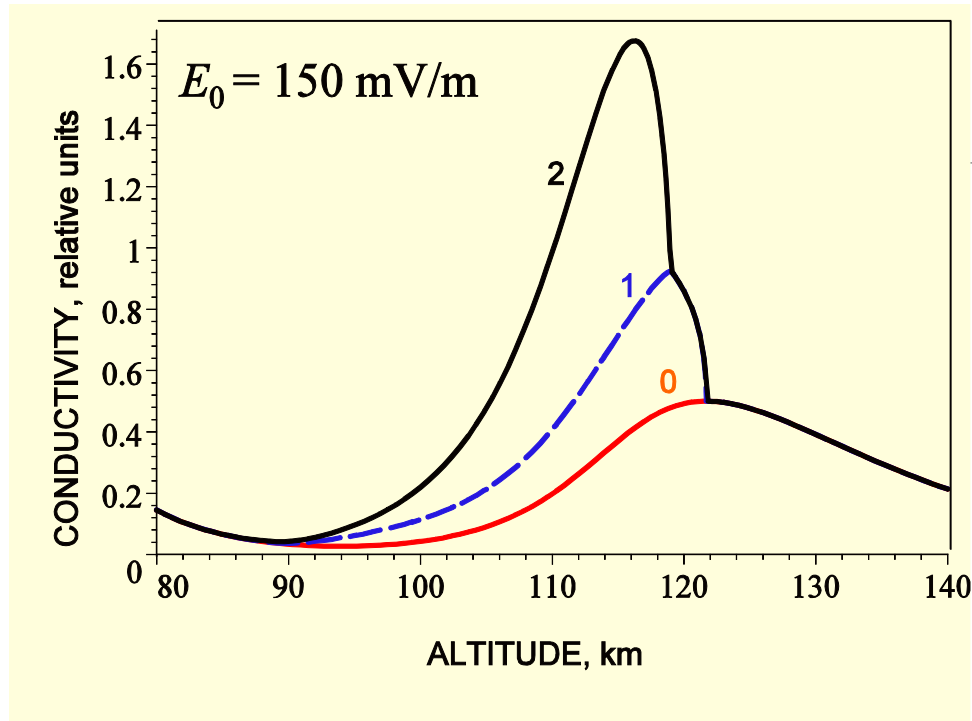
During magnetospheric storms/substorms, E-region turbulence at the high latitude electrojet heats up electrons dramatically.

This temperature elevation is induced mainly by turbulent electric fields. The small turbulent field component parallel to \mathbf{B}_0 plays a crucial role.

Nonlinear Current



Anomalous Pedersen Conductivity



Dimant and Oppenheim, JGR (2011)

0: Undisturbed ("normal") conductivity

1: Anomalous conductivity with nonlinear current (NC)

2: Anomalous conductivity with NC + AEH effect

Anomalous Conductance Multipliers

