

2024-06-11

Plasma waves and turbulence

M. Oppenheim. 2024. "Plasma Waves and Turbulence"

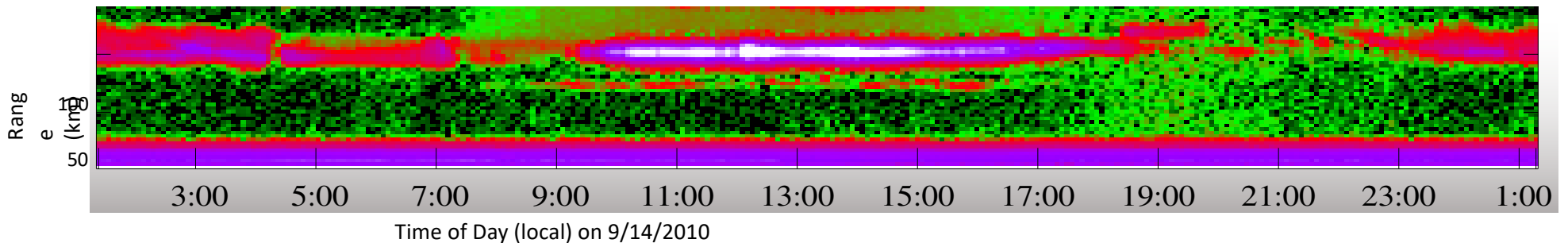
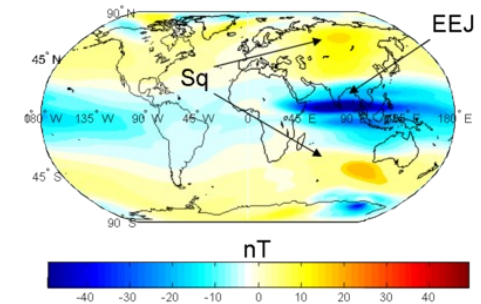
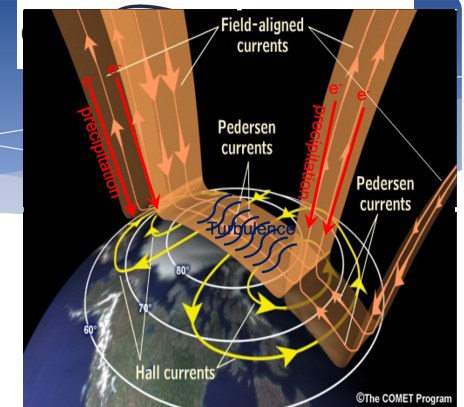
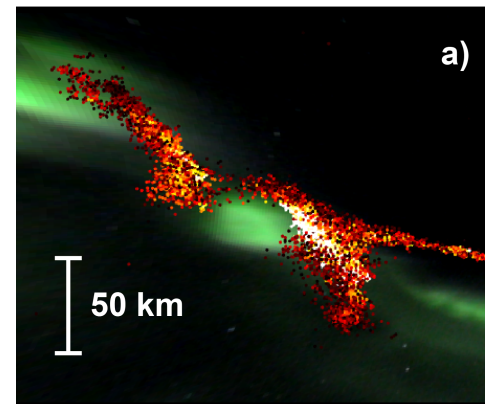
<https://hdl.handle.net/2144/50073>

"Downloaded from OpenBU. Boston University's institutional repository."

Plasma Waves and Turbulence

- Strong Electrojet currents become turbulent
- Turbulence modifies conductivities and currents
- What type of waves?
 - Streaming instability: Farley-Buneman Waves
 - Gradient Drift Waves
- Where do they exist?
 - Partially Ionized, Cold Plasmas
 - Region with strong electric fields (or neutral winds)
- How are they detected:
 - Radar Echoes
 - Rocket Data

Radar & Optical Data:
 Red shows EJ waves
 Green shows precipitation

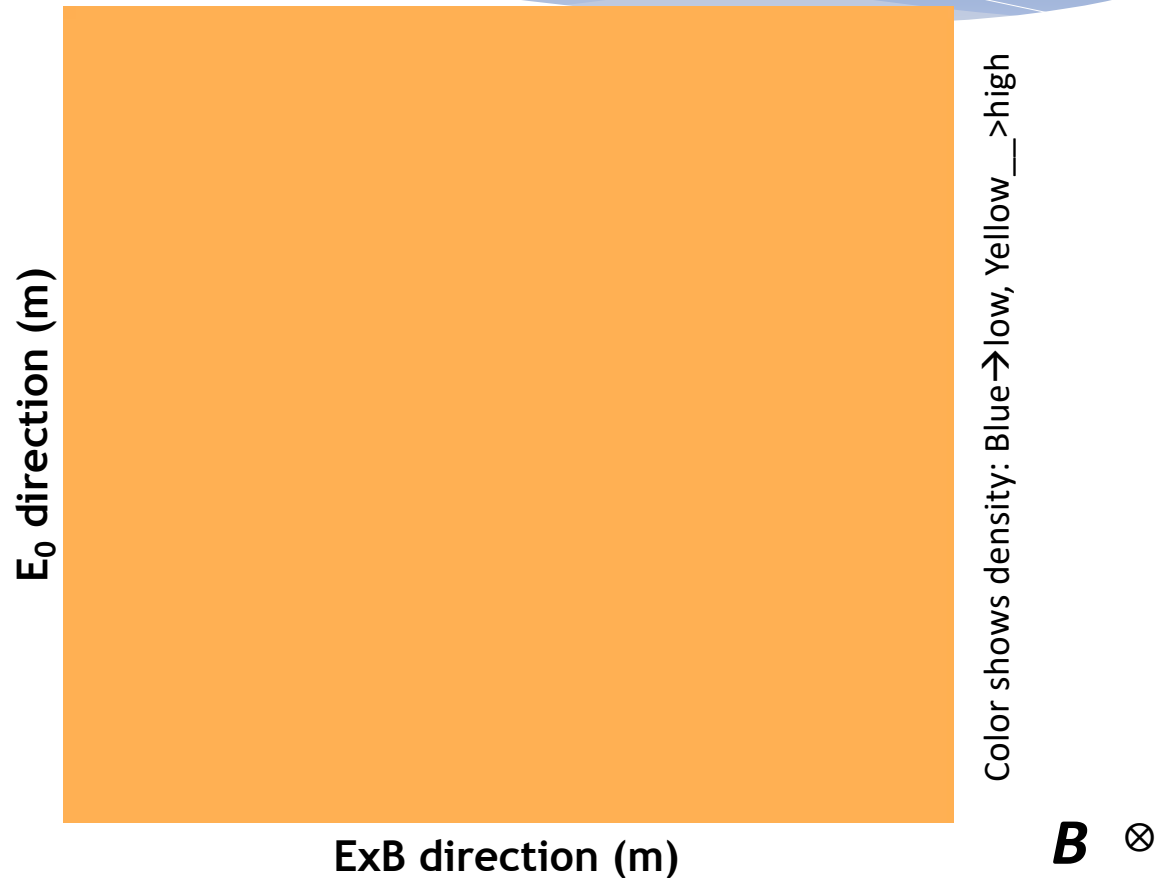


Electrojet PIC Simulations show how turbulence modifies conductivity

Instability-driven plasma turbulence drives:

- Turbulent electrostatic fields create wave-induced nonlinear currents (NC).
- Anomalous electron heating (AEH) reduces recombination, leading to plasma density increases.

These microscopic processes modify global-scale macroscopic ionospheric conductances

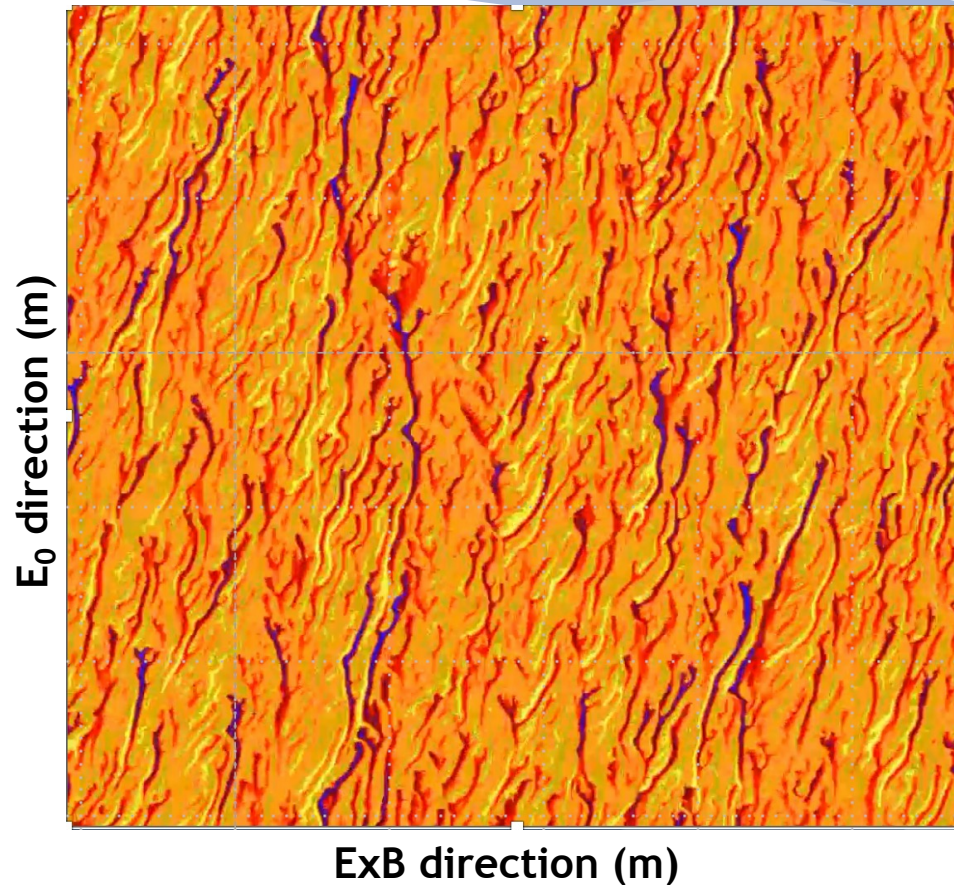


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