

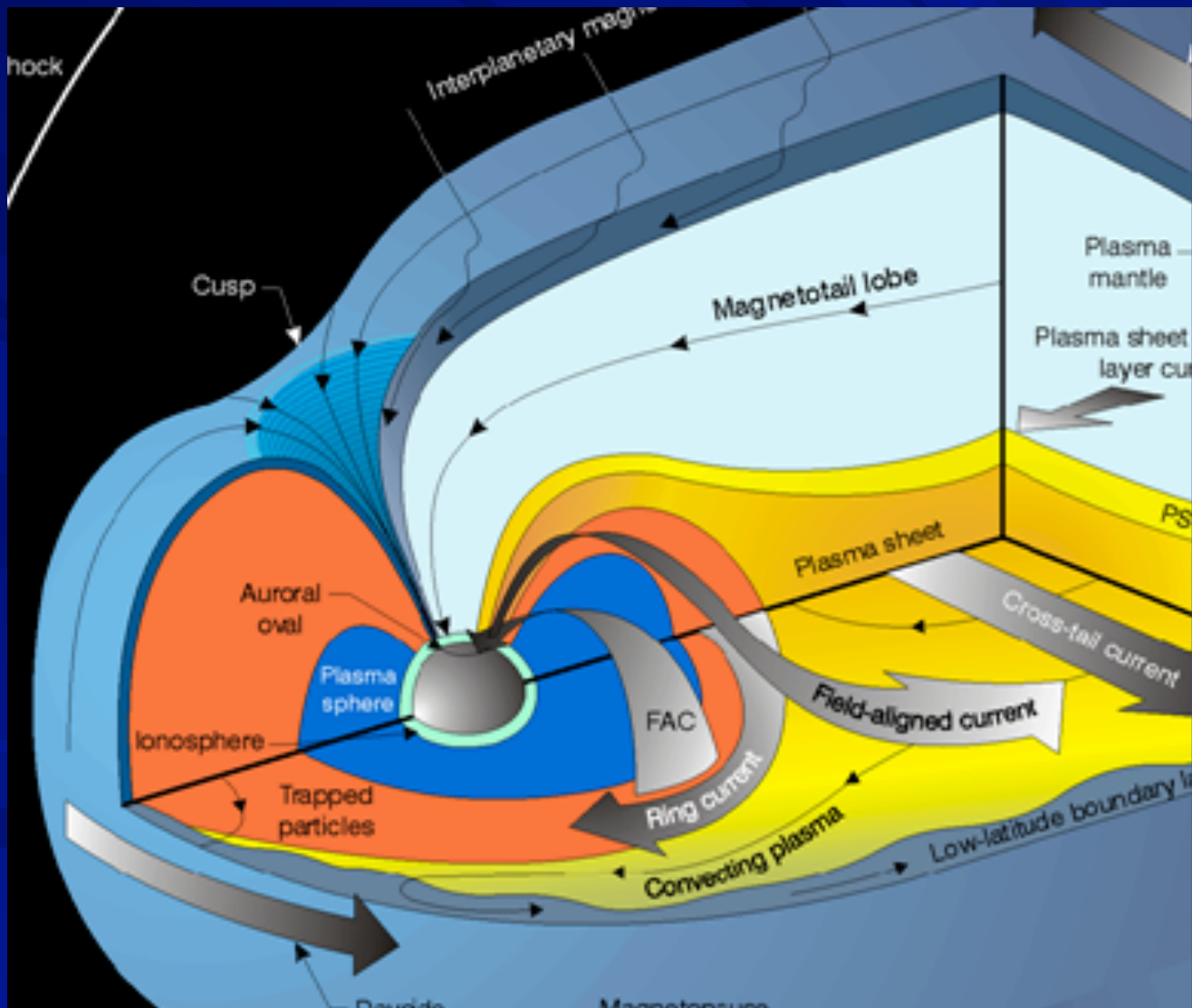
# Magnetosphere/Ionosphere Coupling

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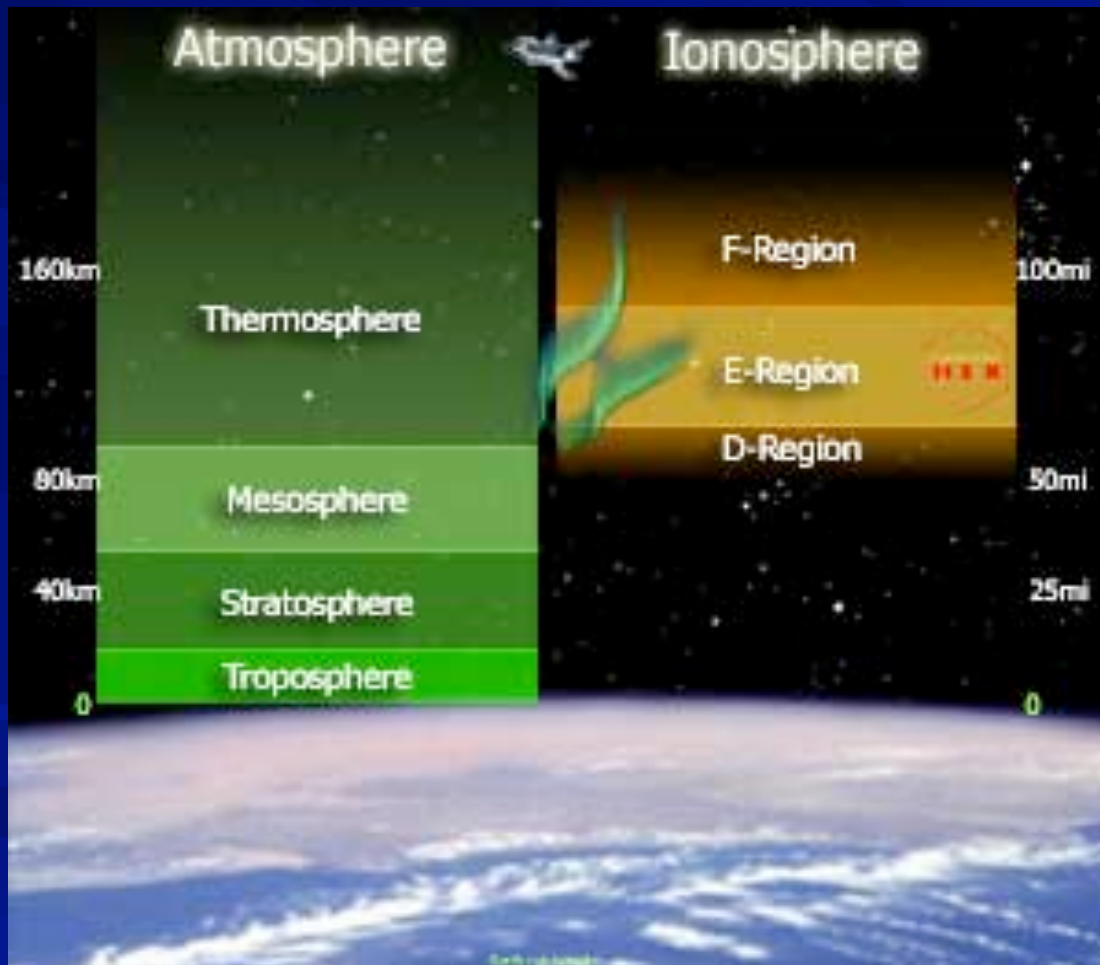
# Outline

- Magnetosphere
- Ionosphere
- Energy Dissipation Methods within the Ionosphere
- Coupling Processes

# Magnetosphere

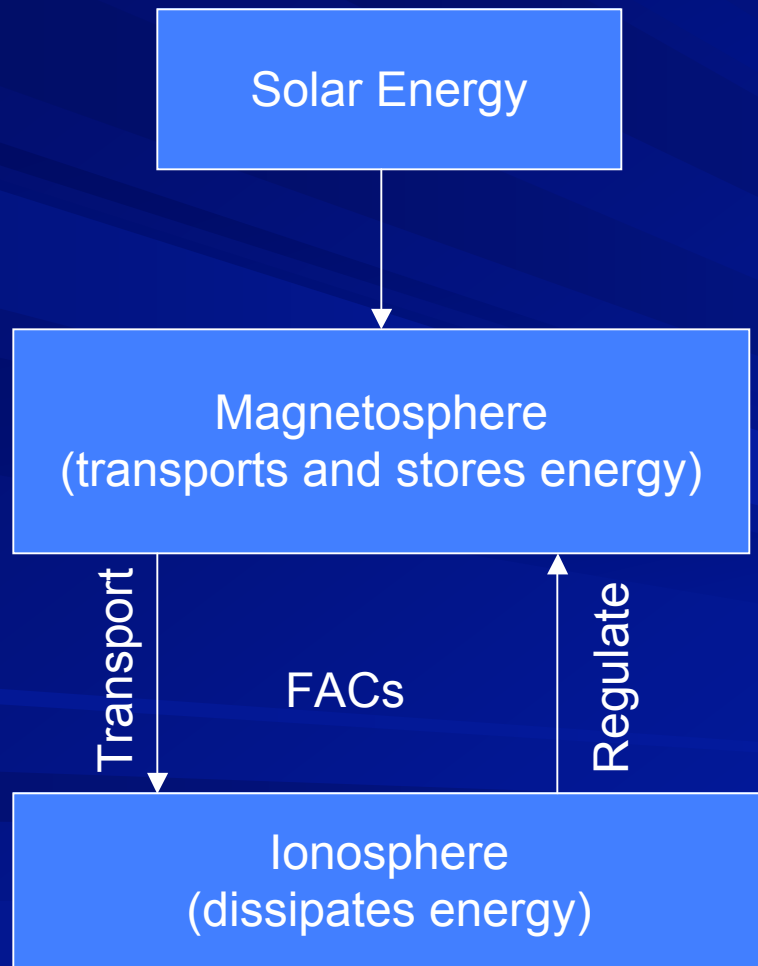


# Ionosphere



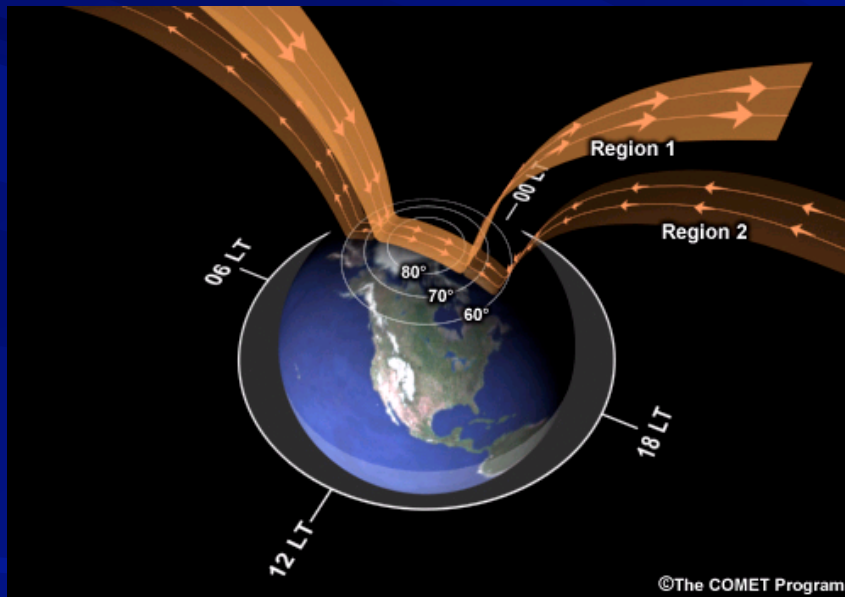
- Layers of Earth's atmosphere where solar radiation has ionized particles

# Coupling Processes



- **Magnetosphere-Ionosphere Coupling** refers to the processes which interconnect the lower-altitude, solar-produced, ionospheric plasma with the energized plasmas and mechanisms of the high-altitude magnetosphere.

# FACs (or Field-Aligned Currents)



- Substorm Current Wedge
  - Develop during substorms
  - Divert from Tail current
- Region 1 Currents
  - Magnetosphere boundary layer to Ionosphere
- Region 2 Currents
  - Plasma Sheet to Ionosphere



# Energy Dissipation Methods within the Ionosphere



Upward FACs are carried by downward electrons

# Energy Dissipation Methods within the Ionosphere

## ■ Joule heating

- Raises neutral and plasma temperatures

## ■ Momentum Exchange

- Imparts ion motion to neutral gas
- Modifies neutral winds

## ■ Poynting Vector

- Transfers electromagnetic energy flux to ionosphere from magnetosphere

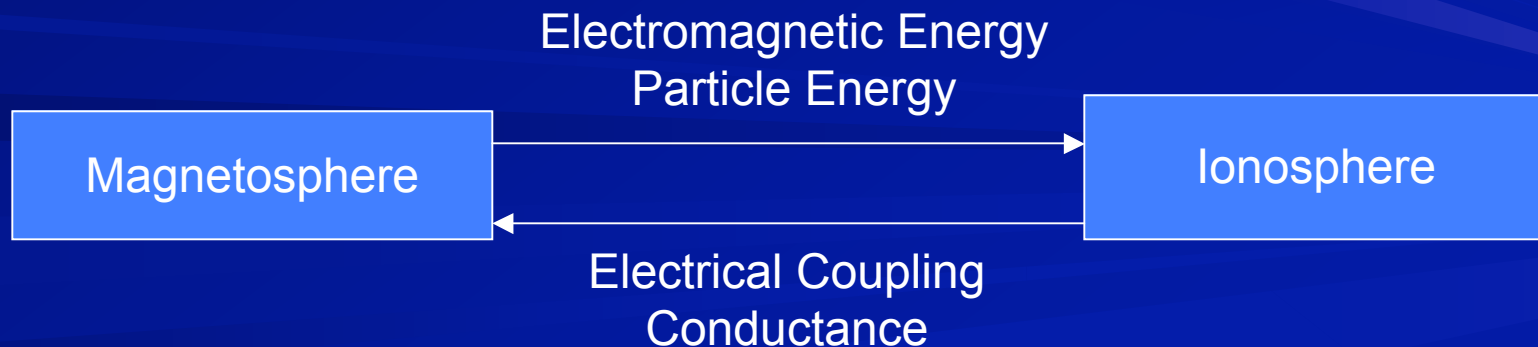


# Ionospheric Changes

- Plasma Outflow
- Conductance
  - Pederson Current and Conductivity
    - Closes FACs in the ionosphere
    - Regulates the amount of current

# Summary

- The Magnetosphere-Ionosphere system works like a circuit, with the Magnetosphere providing the energy and the Ionosphere providing the resistance.
- The Magnetosphere and Ionosphere are connected by Field Aligned Currents (FACs).



# Thank You

## Any Questions?

My Thanks to Xia Cai and Alex Glocer, whose presentations last year made this one possible