Analysis of the Relative Locations of the Ion Convection in Polar Regions using DMSP Satellite Measurements

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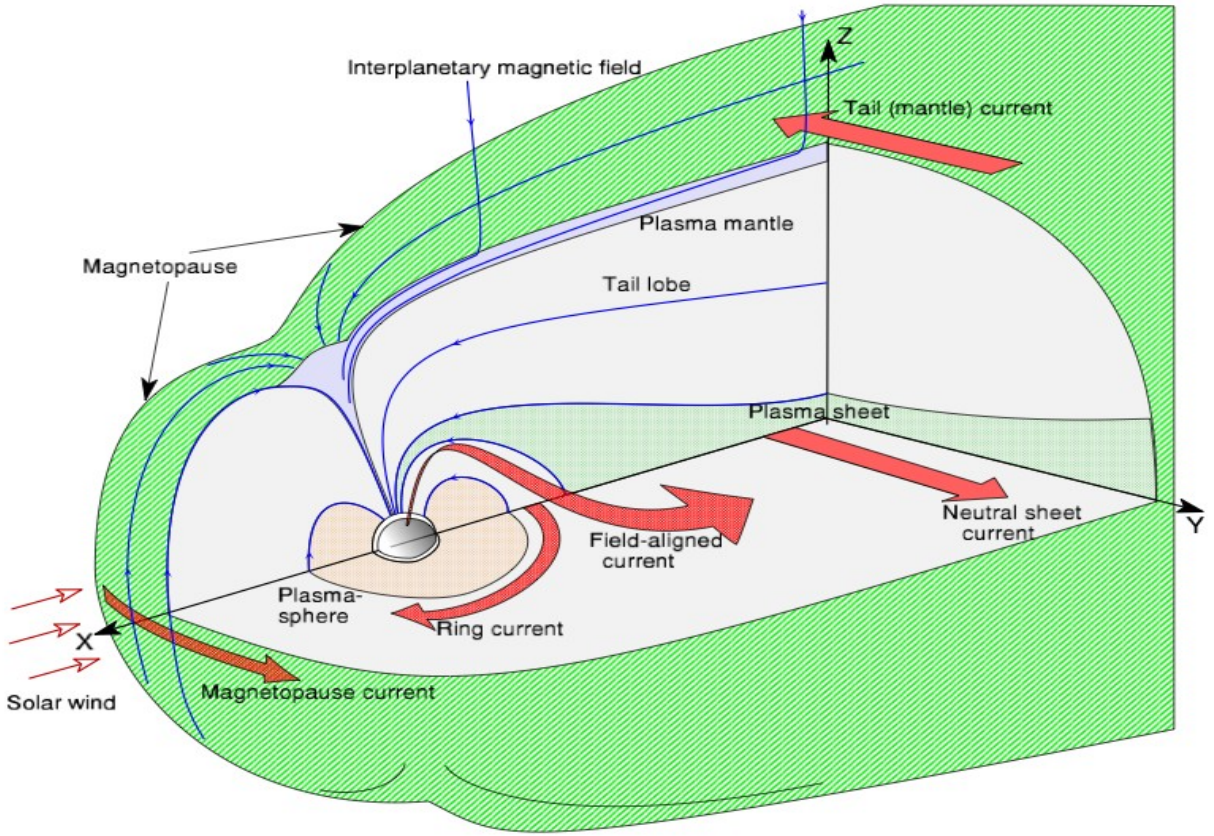
Objectives

- The goal of this research is to use DMSP (Defense Meteorological Satellite Program) data to find the location of the convection-reversal boundary in the polar regions of earth's ionosphere and to see how this location is affected by conditions such as varying IMF and earth's seasons.
- Finding this boundary will help us to analyze current models of the ionosphere and develop better future models

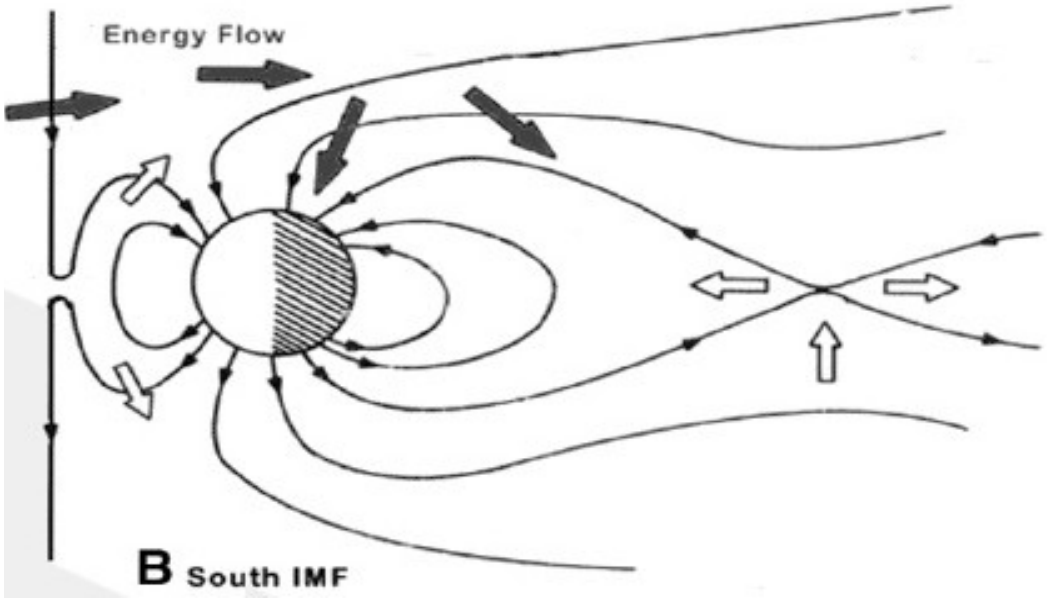
Background

- The polar regions of the earth can give us information about earth's entire magnetosphere because all of the field lines converge at the poles



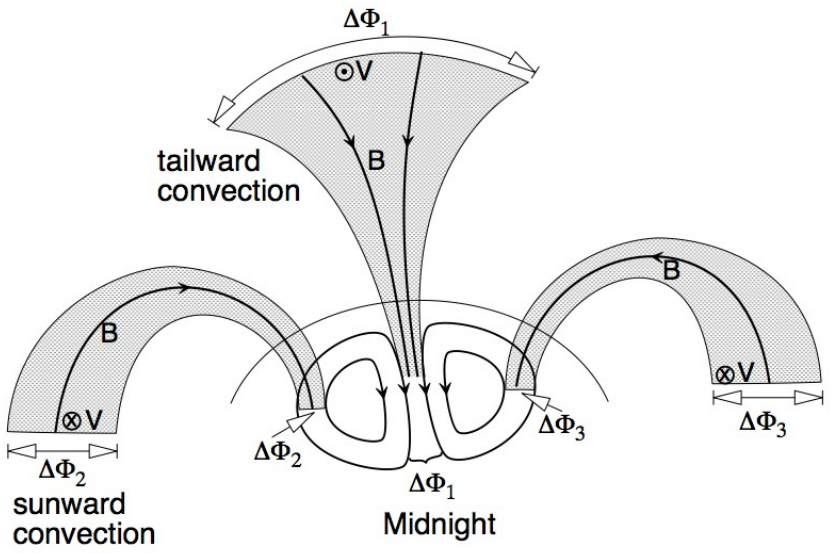
Background

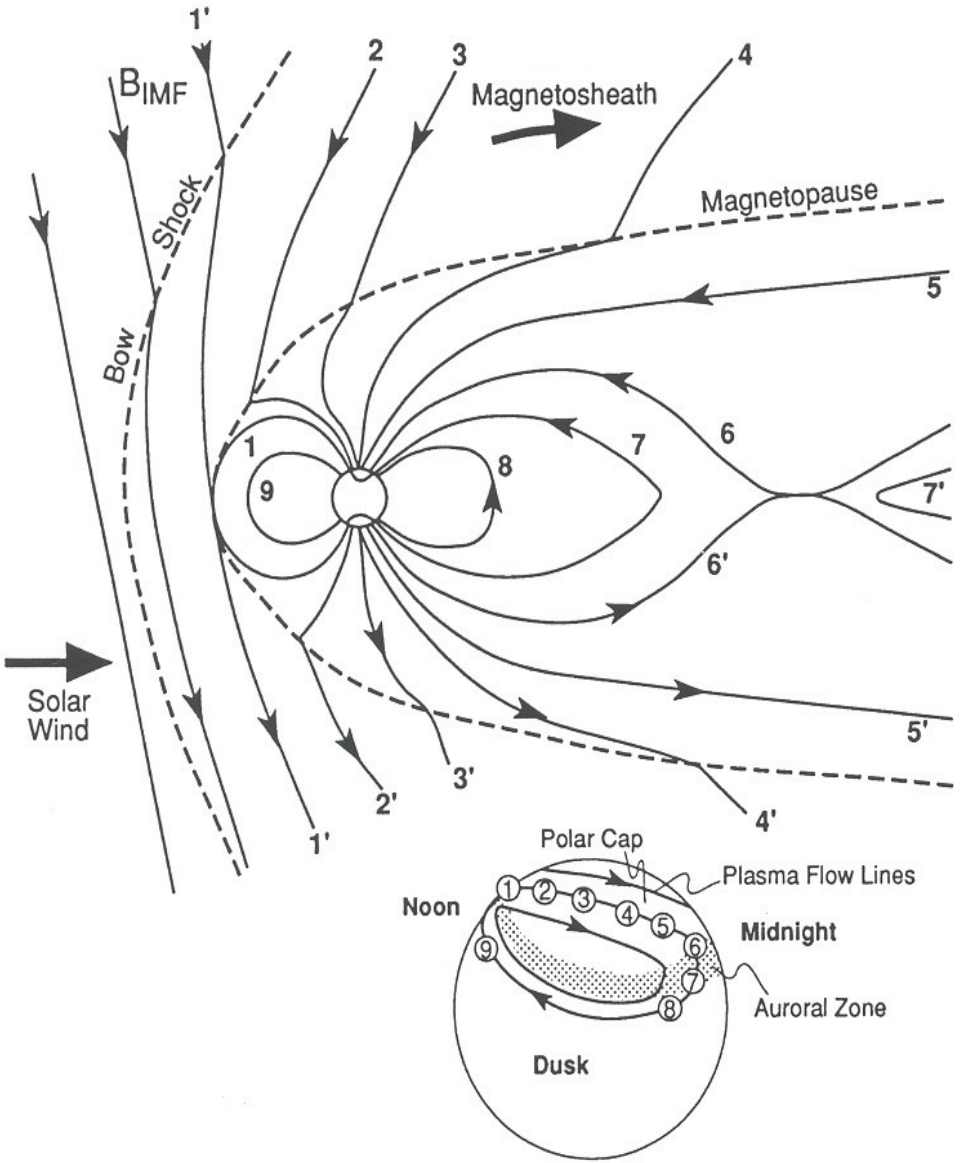
- My research is looking at passes where the z-component of the IMF (Interplanetary Magnetic Field) is southward (aka negative)
- When Bz is negative, the IMF and the earth's magnetic field lines are anti parallel and magnetic reconnection can occur:



Background

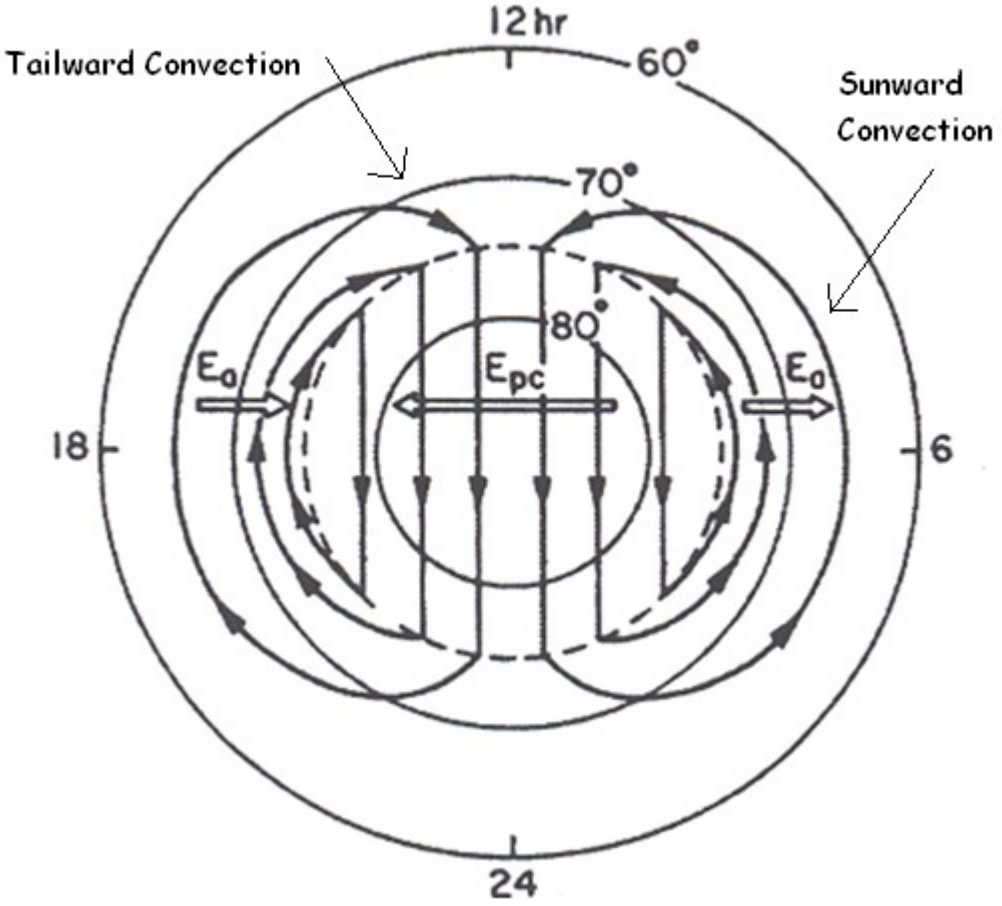
- This is a dynamic process leading to the circulation of the field lines in the magnetosphere

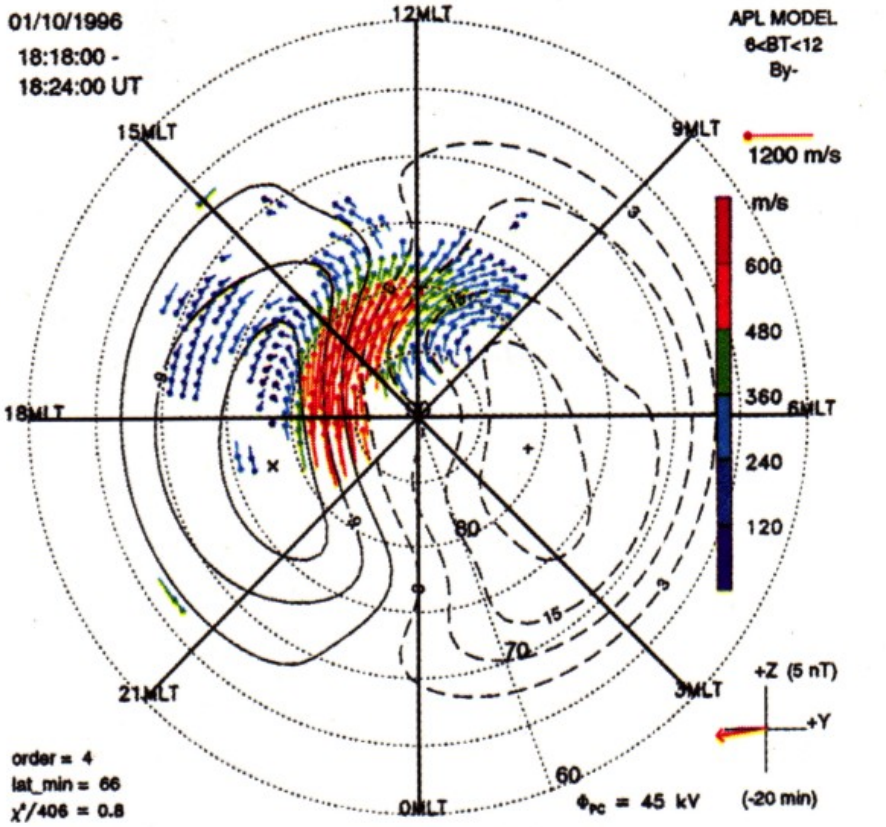




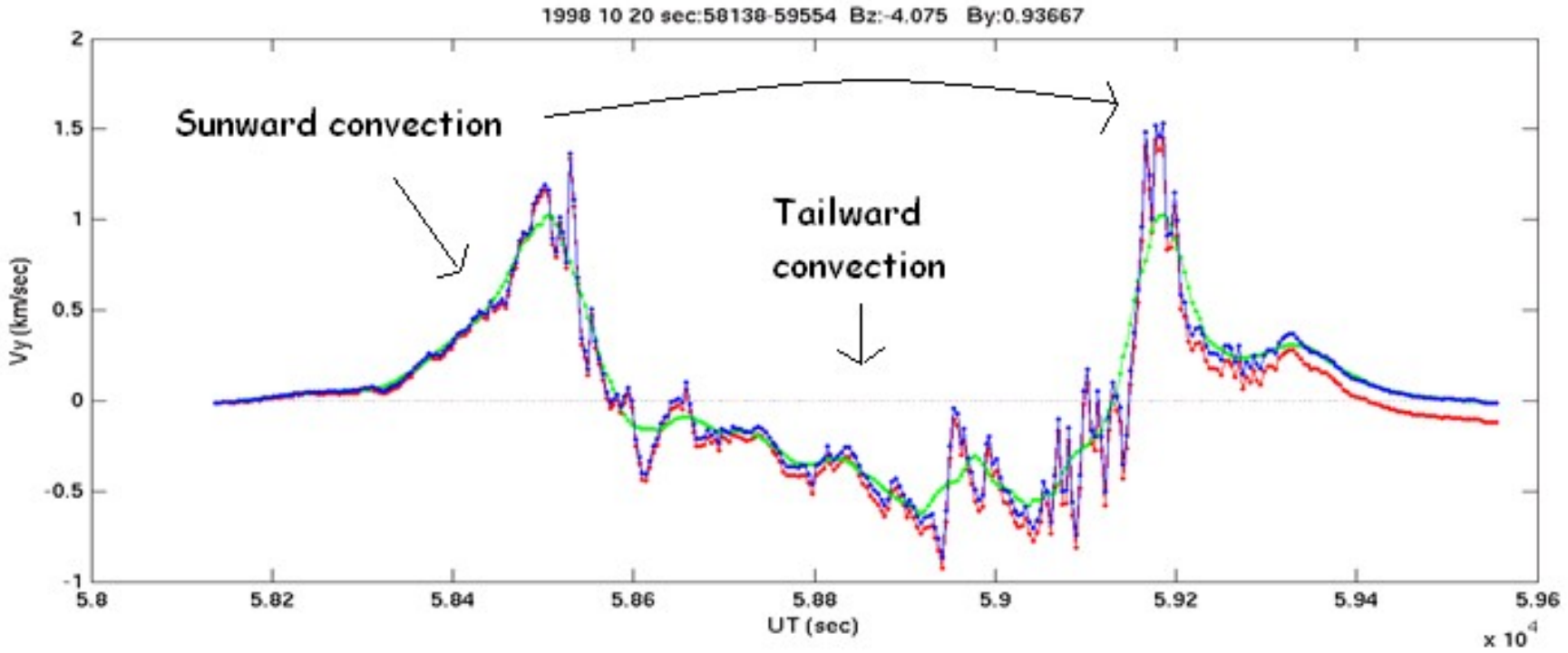
What I'm looking at:

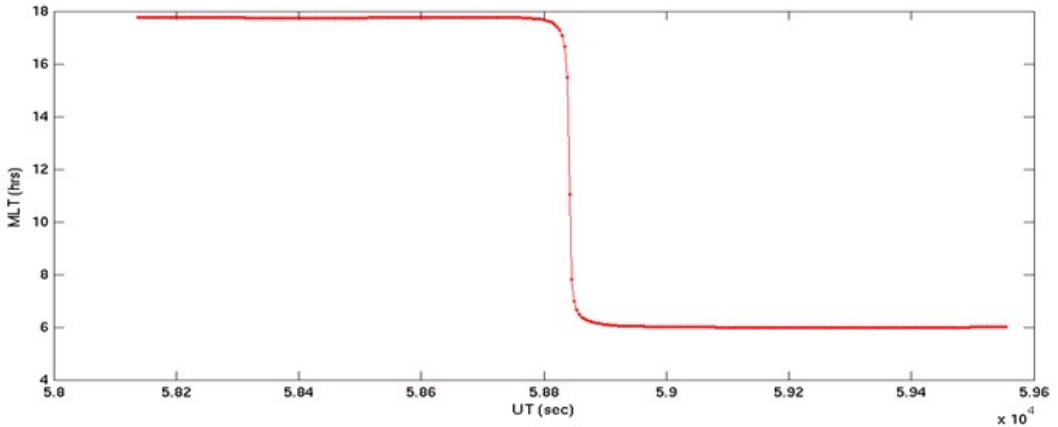
- Convection Patterns in the high-latitude polar regions





Plots that I'm working on:





Future Plans

- Once we have finished the algorithm for determining the zero crossings on each pass we hope to complete a larger scale (10-15 years) statistical study
- Binning by IMF conditions (Bz, By, avg)
- Binning by seasonal effects
- Comparison with the Weimer 2001 and 2005 models to determine which model is more accurate

Credits

- Images taken from Stefan Eriksson and P. A. Delamere's slide show presentations
- Thanks to all my mentors: Barbara Emery, Astrid Maute, Delores Knipp, Liam Kilcommons