Integrity ★ Service ★ Excellence

Small Scale Effects During Magnetic Storms

Cheryl Huang[1], Yanshi Huang[2,3] and Yi-Jiun Su[1]
[1]AFRL
[2] U. New Mexico
[3] COSMIAC

Magnetospheric Energy Input and MIT Coupling

21 June 2016
CEDAR

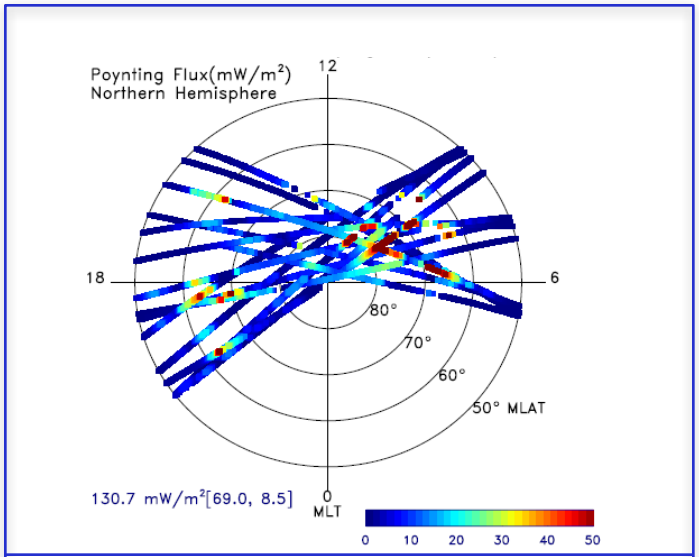
Poynting Flux Comparison: DMSP and Weimer 2005 (W05) Model – August 2011 Magnetic Storm

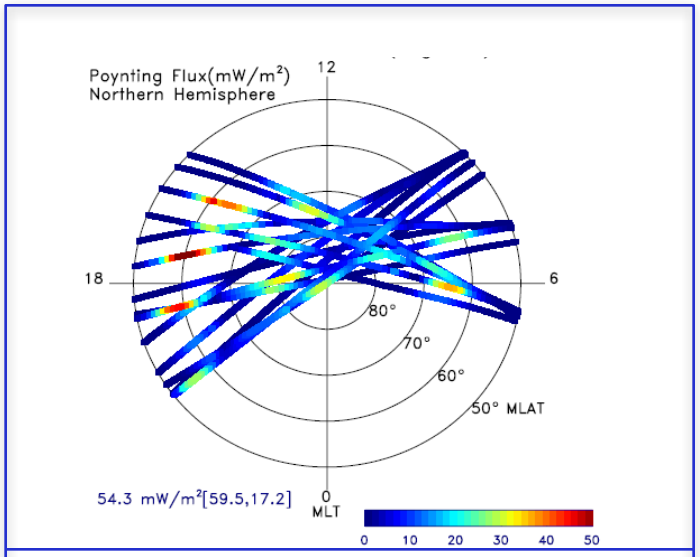
DMSP Observations

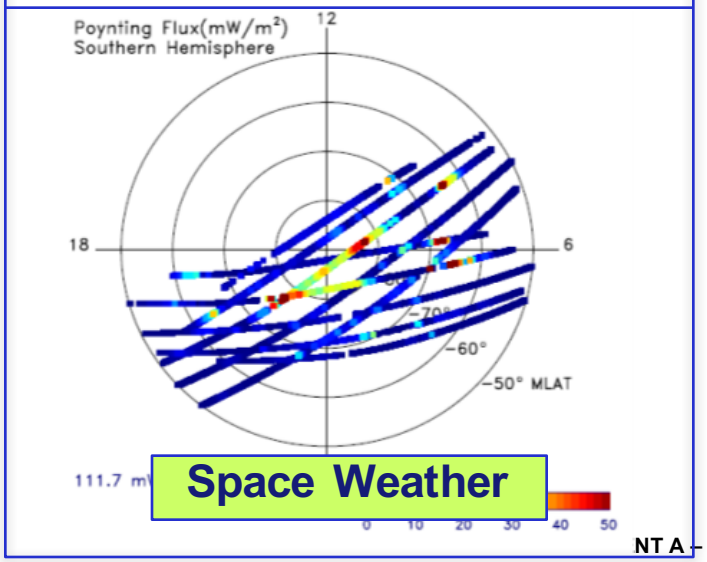
W05 Model Predictions

NH

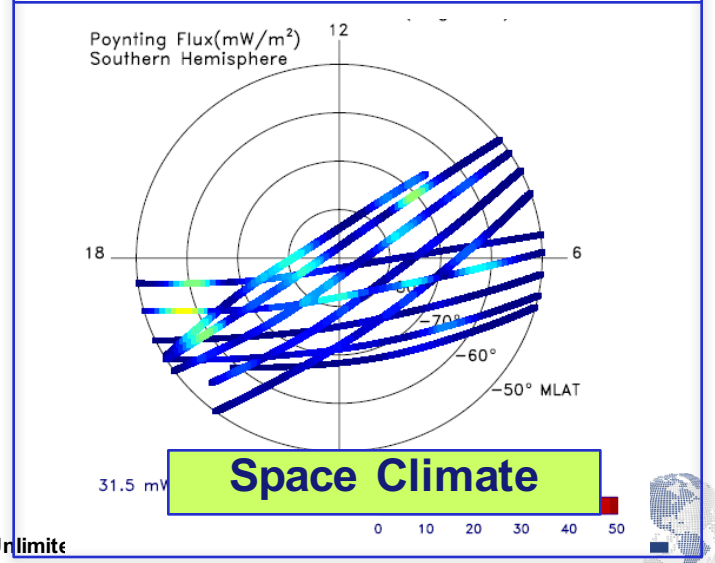
SH







Space Weather

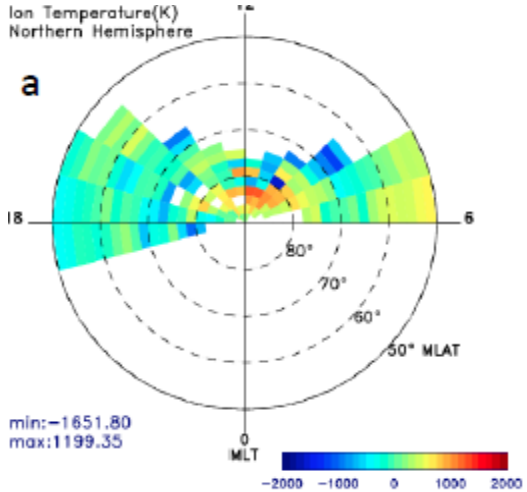


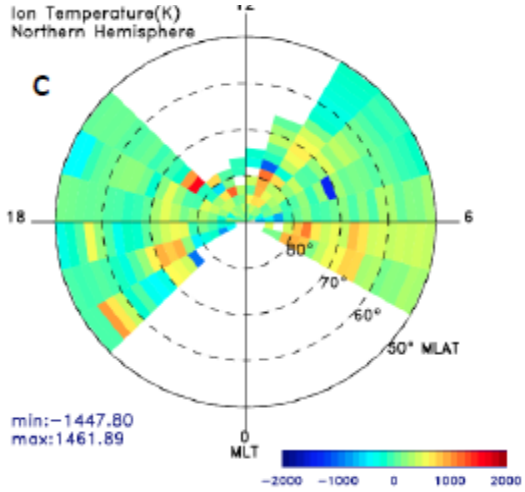
Space Climate

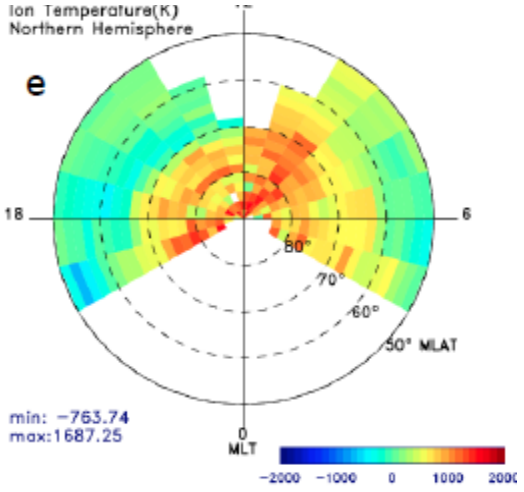
DMSP Change in Ion Temperatures During 3 Storm Main Phases

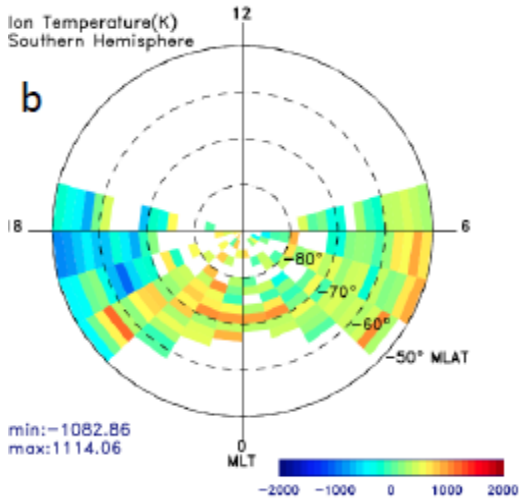
NH

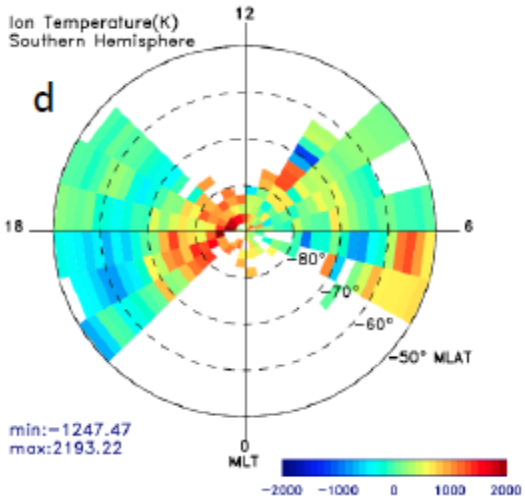
SH

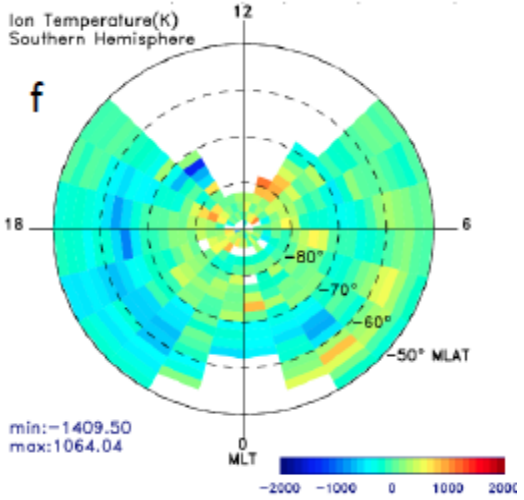








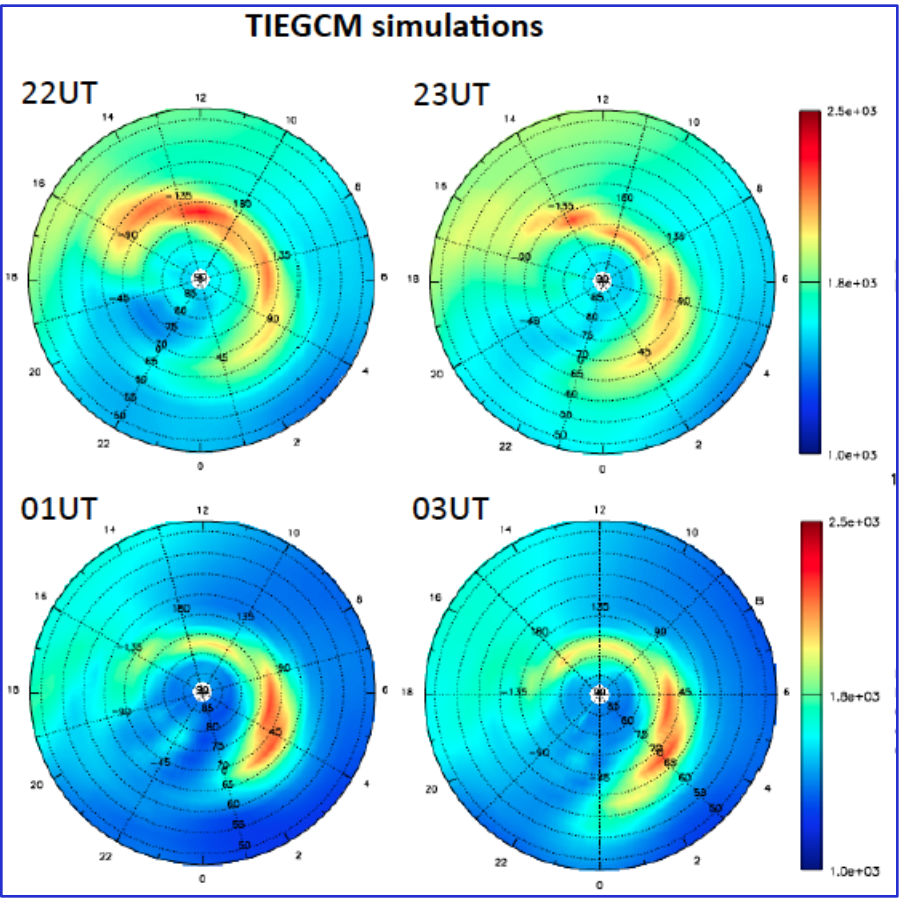




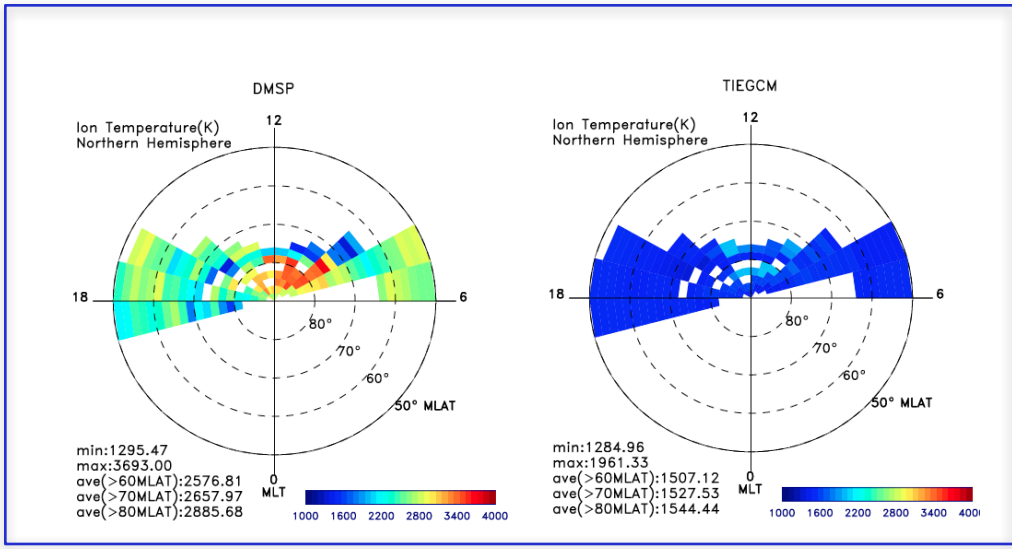
August 2011 September 2011 January 2012

TIEGCM (drivers: W05, Roble & Ridley) Predictions of T_i at 500 km

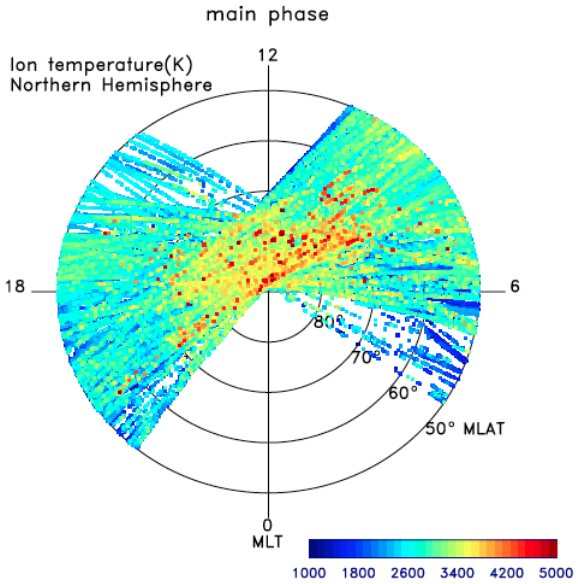
August 2011 Magnetic Storm – Comparison with Data

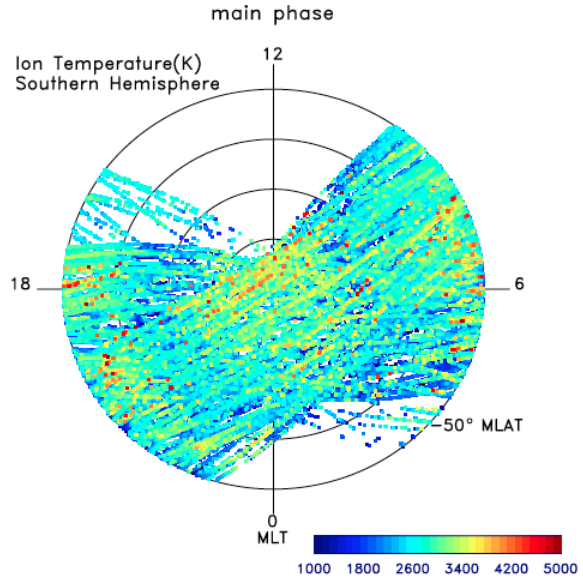


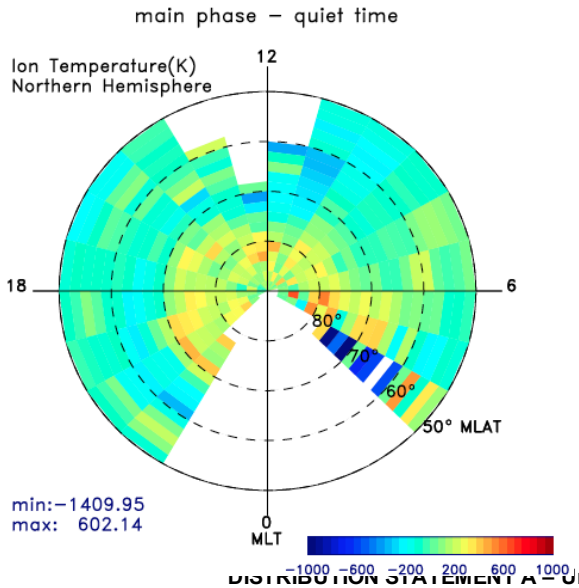
DMSP – TIEGCM Comparison

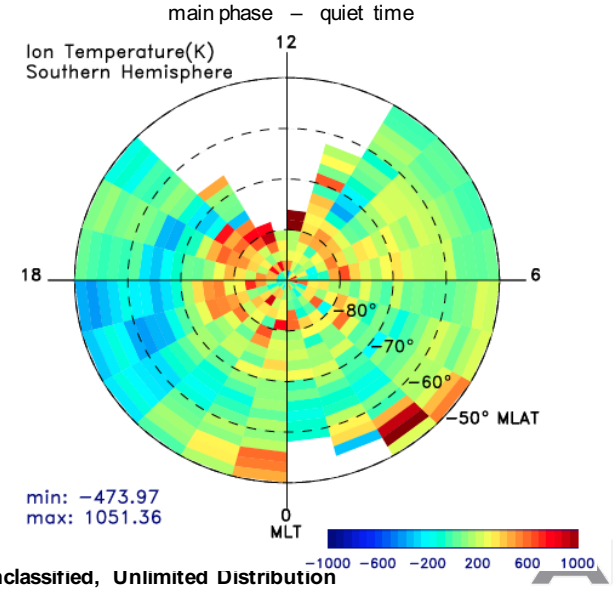


DMSP Observations of Ti
14 Moderate Storms







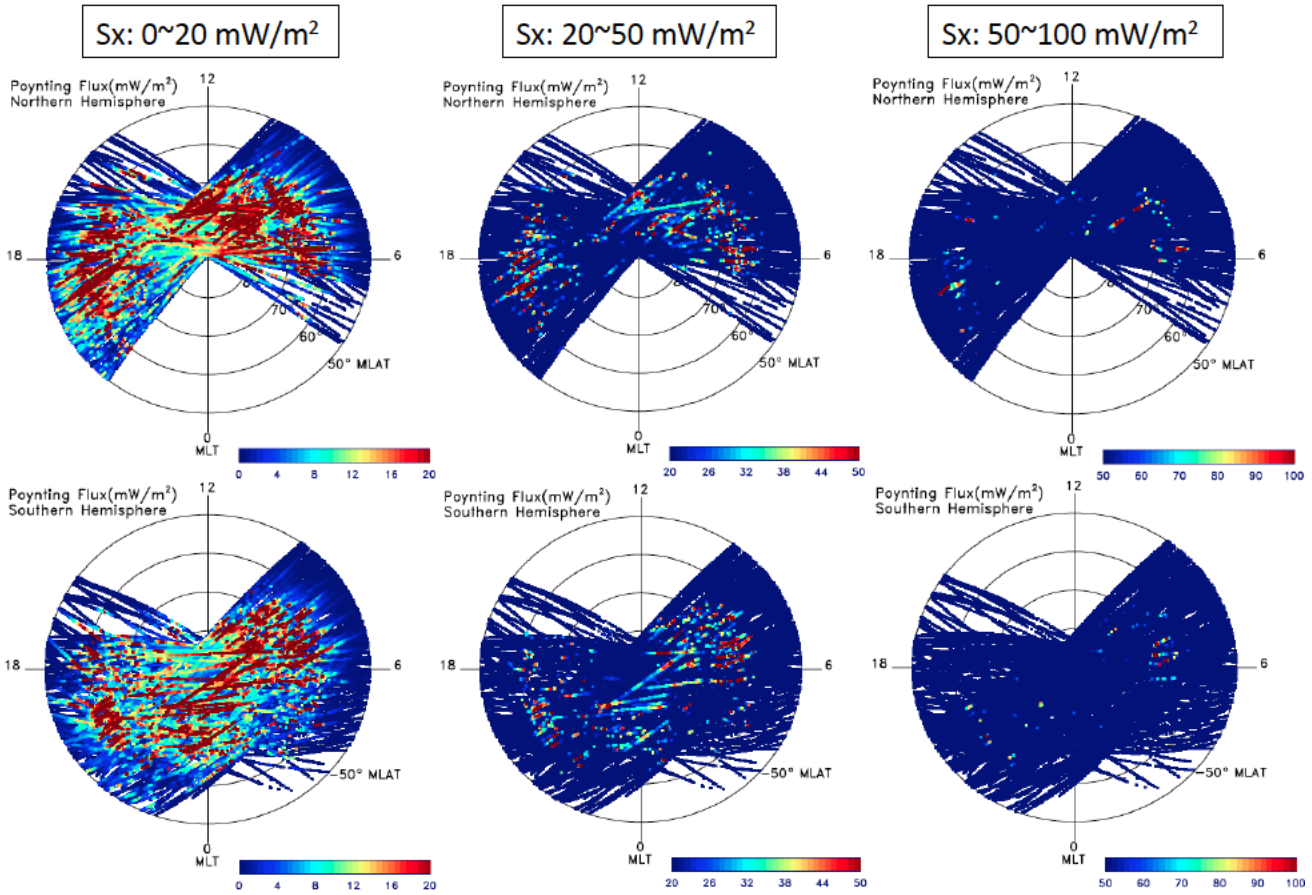


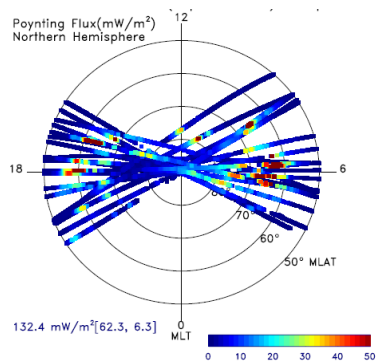
Summary

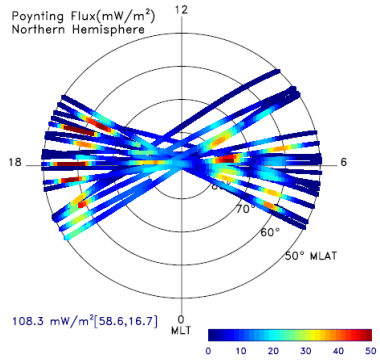
- Heated ions and neutrals (not shown) persistently appear in the polar cap, most clearly during magnetic storms, but also during quiet conditions. Highest ion temperatures occur at highest magnetic latitudes This is not predicted by models driven with empirical input.
- Is this due to small (in time and/or space) scale energy input?
- Note that Poynting flux does *not* persistently peak in the polar cap.
- What is the connection between energy input and energy dissipation?

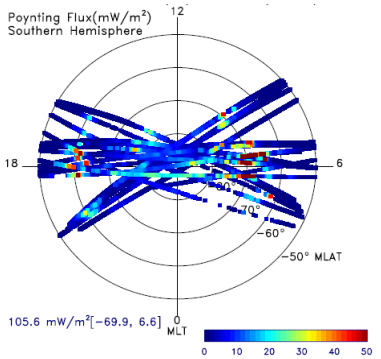
AFRL

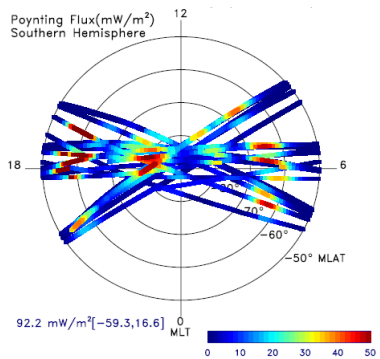
DMSP Poynting Fluxes
14 Moderate Storms (-200 nT ■ SymH ■ -100 nT)



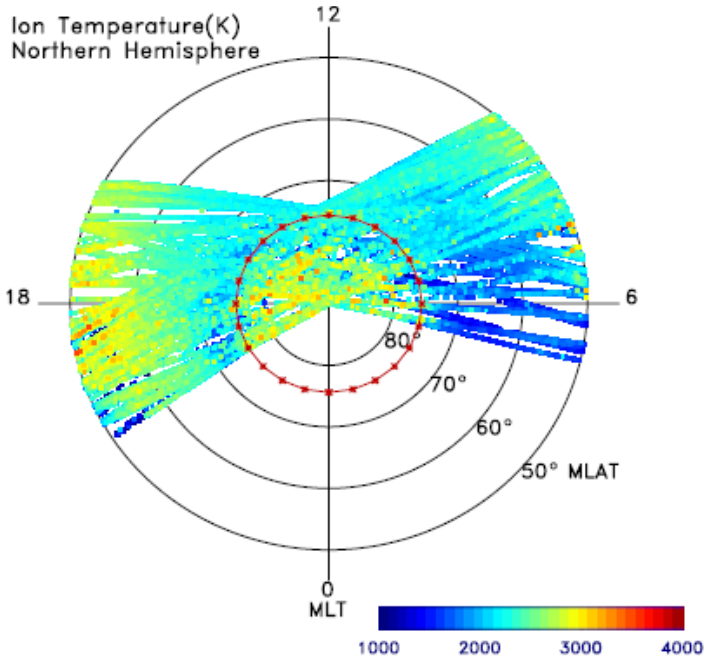




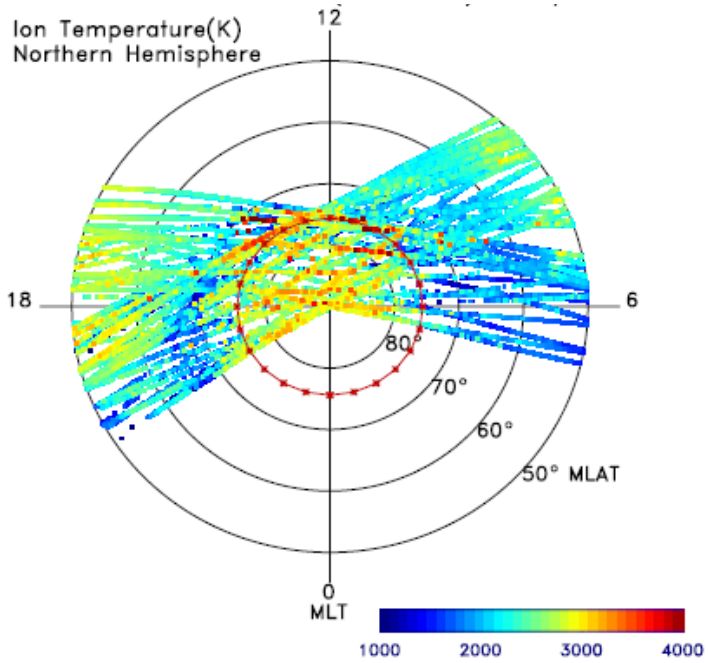




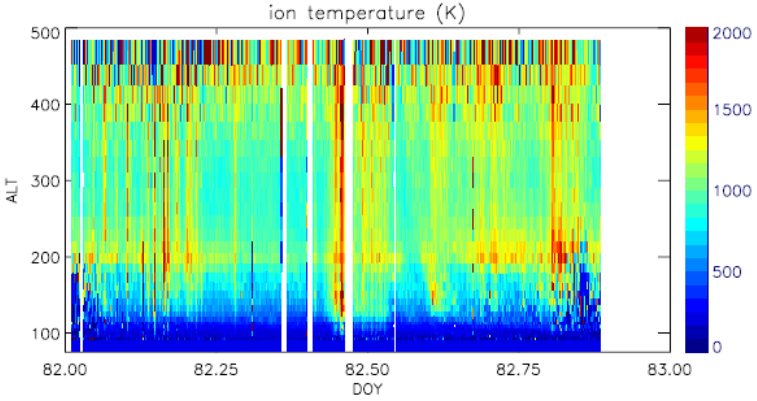
a



b



c



d