

Effects of high-latitude drivers on IT model results: Preliminary results

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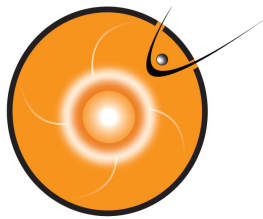
Modelers : B. Emery, M. Foerster, B. Foster, and D. Weimer

Data providers : A. Coster, L. Goncharenko, L. Lomidze, X. Pi

<http://ccmc.gsfc.nasa.gov>

NASA Goddard Space Flight Center

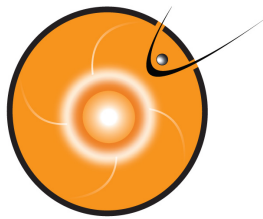




Setup

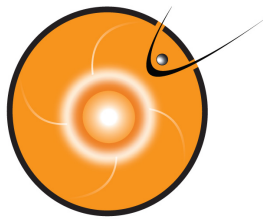
- High-latitude Electric Potential Models :
 1. Weimer 2005 using 15-min averages of the IMF input parameters lagged -5 to -20 min provided by the NCAR and the CCMC
 2. AMIE provided by Aaron Ridley (University of Michigan)
 3. Global magnetosphere models provided by the CCMC (David Berrios):
 - SWMF
 - OpenGGCM
 - LFM
 - etc.

<ftp://hanna.ccmc.gsfc.nasa.gov/pub/GEM-CEDAR/out/high-latitude-drivers/>



Setup

- Physical parameter :
 - global TEC, NmF2, and hmF2
 - Ne, Te, Ti, Tn, Un, Vn, Wn and etc.
- Time interval :
 - TEC/NmF2/hmF2 : 2006.347-2006.349
(2006/12/13 00:00 UT - 12/15 23:45 UT)
 - Ne, Te, Ti, Tn, Un, Vn, Wn and etc. : 2006.348-2006.349
(2006/12/13 12:00 UT - 12/15 23:45 UT)

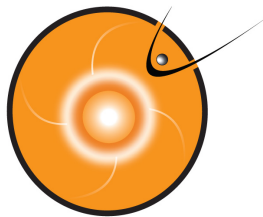


Model Settings

	Model Setting ID	
1	1_TIE-GCM*	TIE-GCM1.93 driven by Heelis electric potential model with constant critical co-latitudes
2	2_TIE-GCM	TIE-GCM1.94 driven by Weimer electric potential model with dynamic critical co-latitudes
3	5_TIE-GCM	TIE-GCM1.94 driven by AMIE with constant critical cross-over latitudes (fixed at 55 and 70 mlat)
4	1_UAM	Upper Atmosphere Model (UAM), A.A. Namgaladze et al., FAC as external driver
5	2_UAM	UAM with AMIE electric potentials as external drivers
6	3_UAM	UAM with Weimer-2005 (and/or Weimer-96) electric potentials

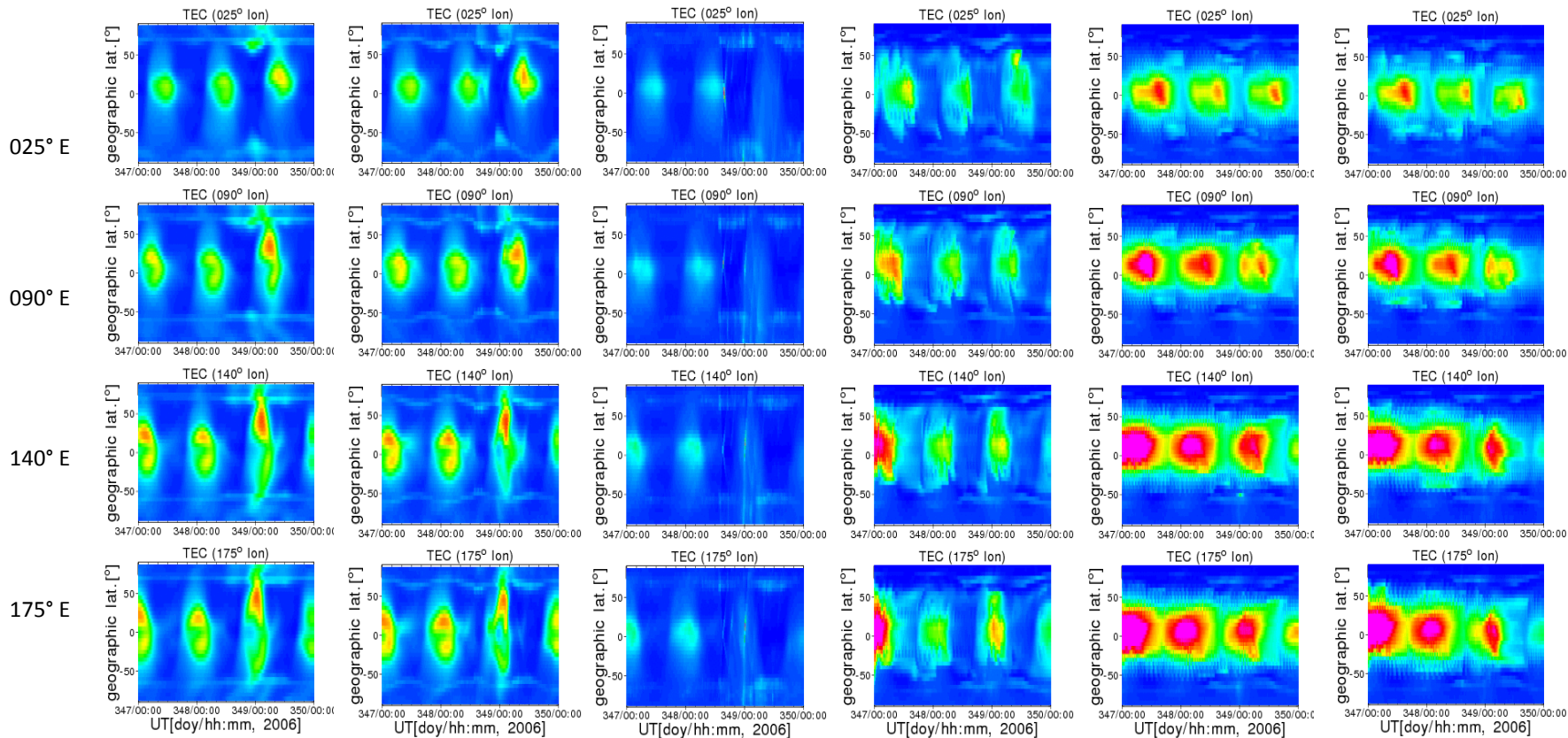
*Runs performed at the CCMC

- Blue : Weimer
- Red: AMIE
- Green: others

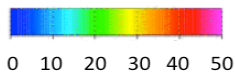


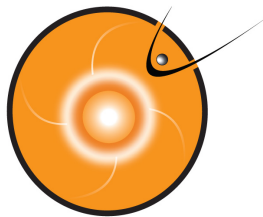
TEC

1_TIE-GCM (Heelis) 2_TIE-GCM(Weimer) 5_TIE-GCM(AMIE) 1_UAM(FAC) 3_UAM(Weimer) 2_UAM(AMIE)

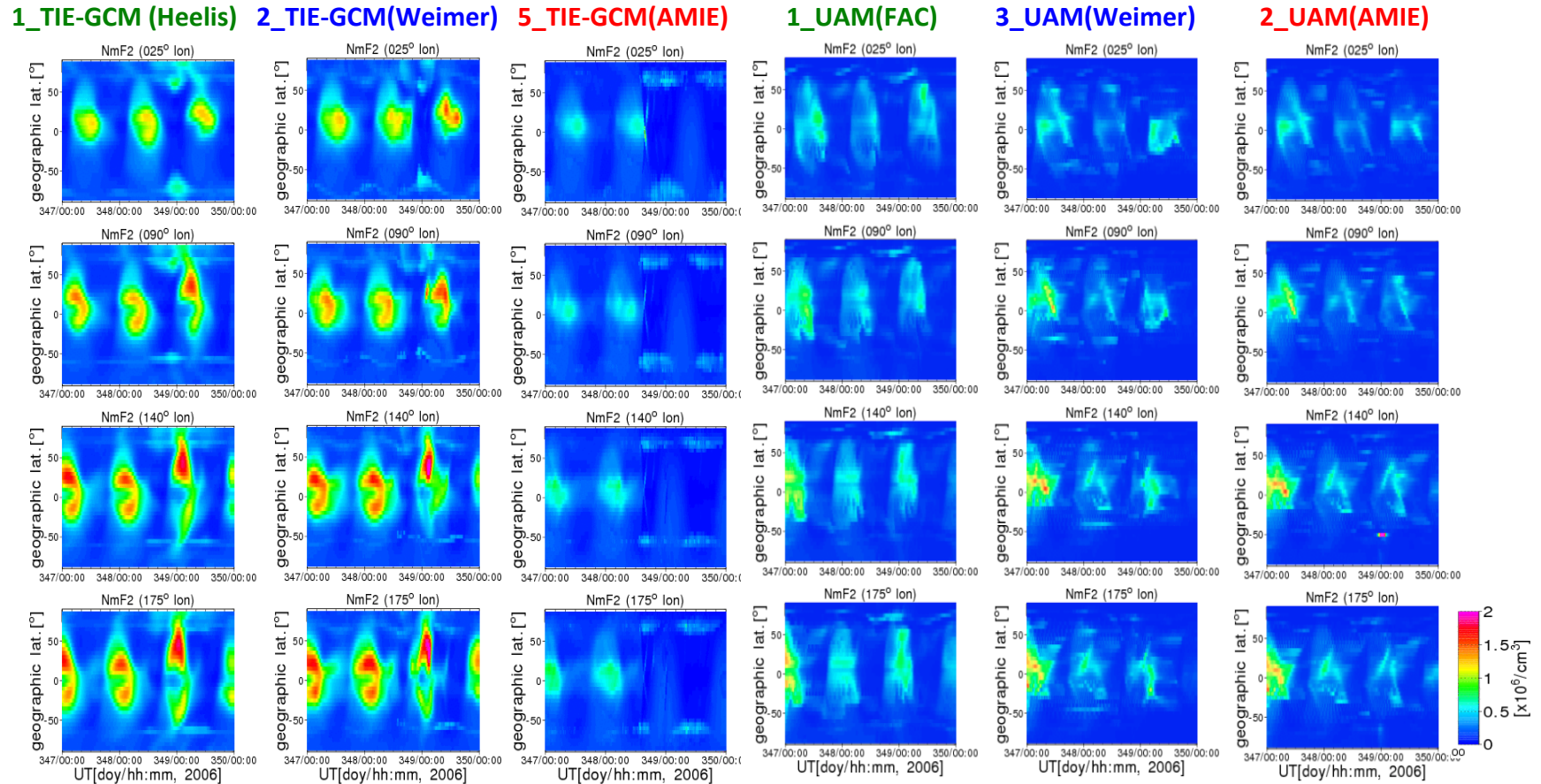


- 1_TIE-GCM (Heelis) ~ 2_TIE-GCM(Weimer) , 2_TIE-GCM(Weimer) > 5_TIE-GCM(AMIE)
- 1_UAM(FAC) < 3_UAM(Weimer), 2_UAM(AMIE) ~ 3_UAM(Weimer)
- Effect of drivers varies with models.

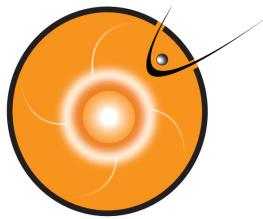




NmF2

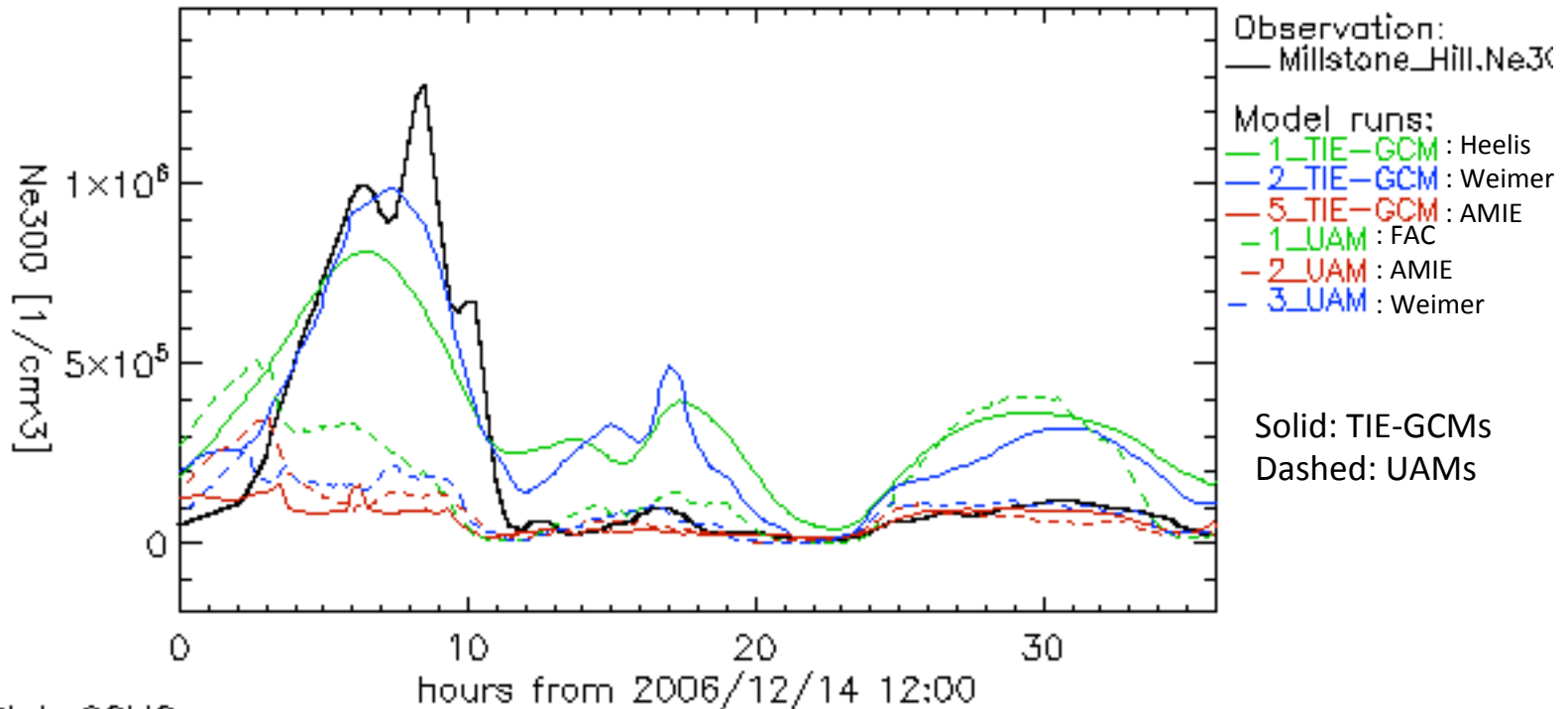


- 1_TIE-GCM (Heelis) ~ 2_TIE-GCM(Weimer) , 2_TIE-GCM(Weimer) > 5_TIE-GCM(AMIE)
- 1_UAM(FAC) ~ 2_UAM(AMIE) ~ 3_UAM(Weimer)
- Sensitivity of models to drivers varies with parameters.



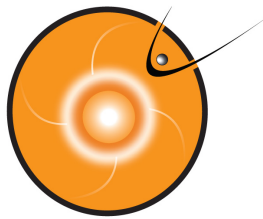
Ne at 300 km in middle latitude (Millstone Hill)

Ne300 from observatory file: Millstone_Hill.Ne300.2006.348.dat

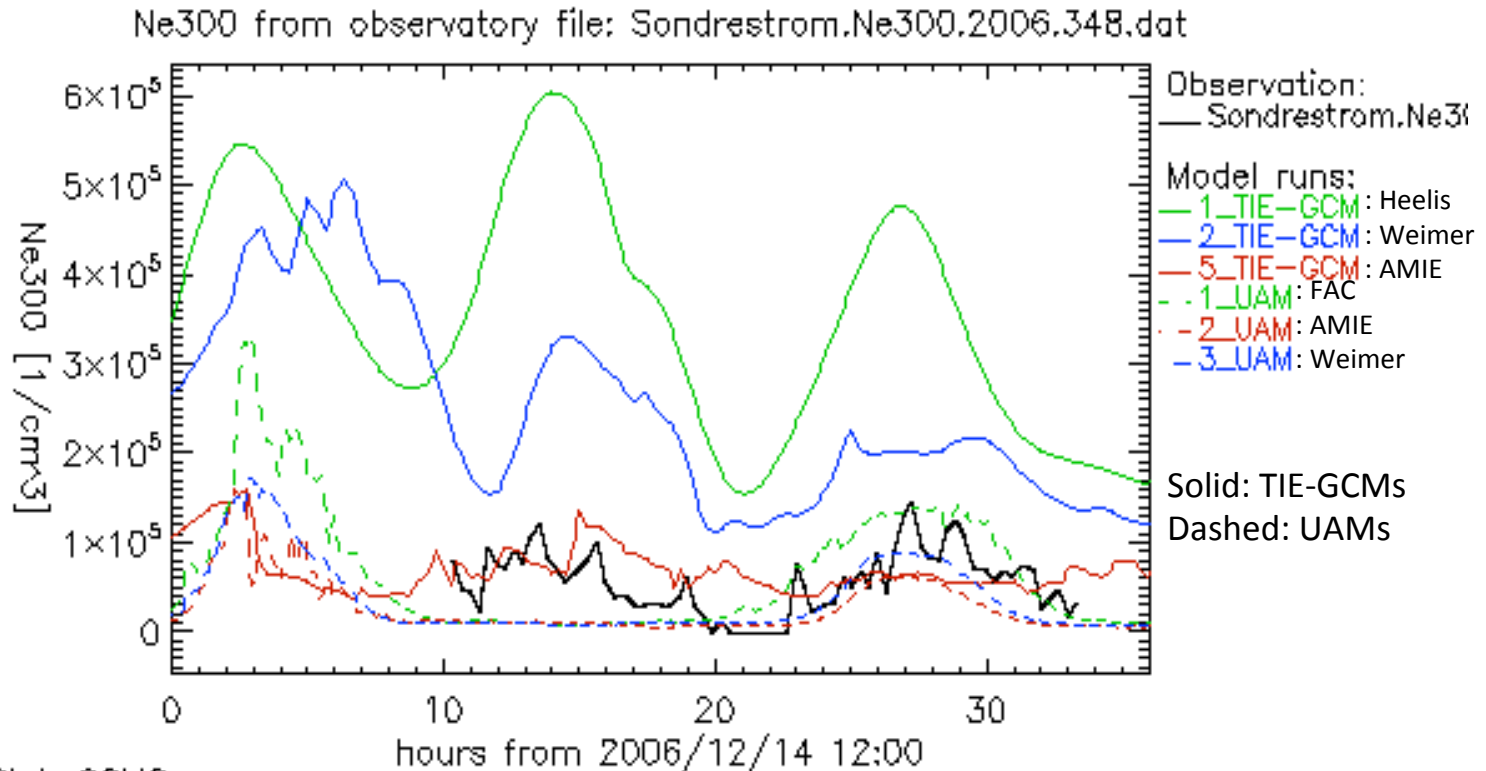


Plot: CCMC

- TIE-GCMs > UAMs
- 1_TIE-GCM (Heelis) ~ 2_TIE-GCM(Weimer) , 2_TIE-GCM(Weimer) > 5_TIE-GCM(AMIE)
- Difference among UAMs during the storm < during quiet time
- Difference among TIE-GCMs during the storm > during quiet time

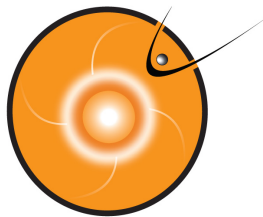


Ne at 300 km in high latitude (Sondrestrom)



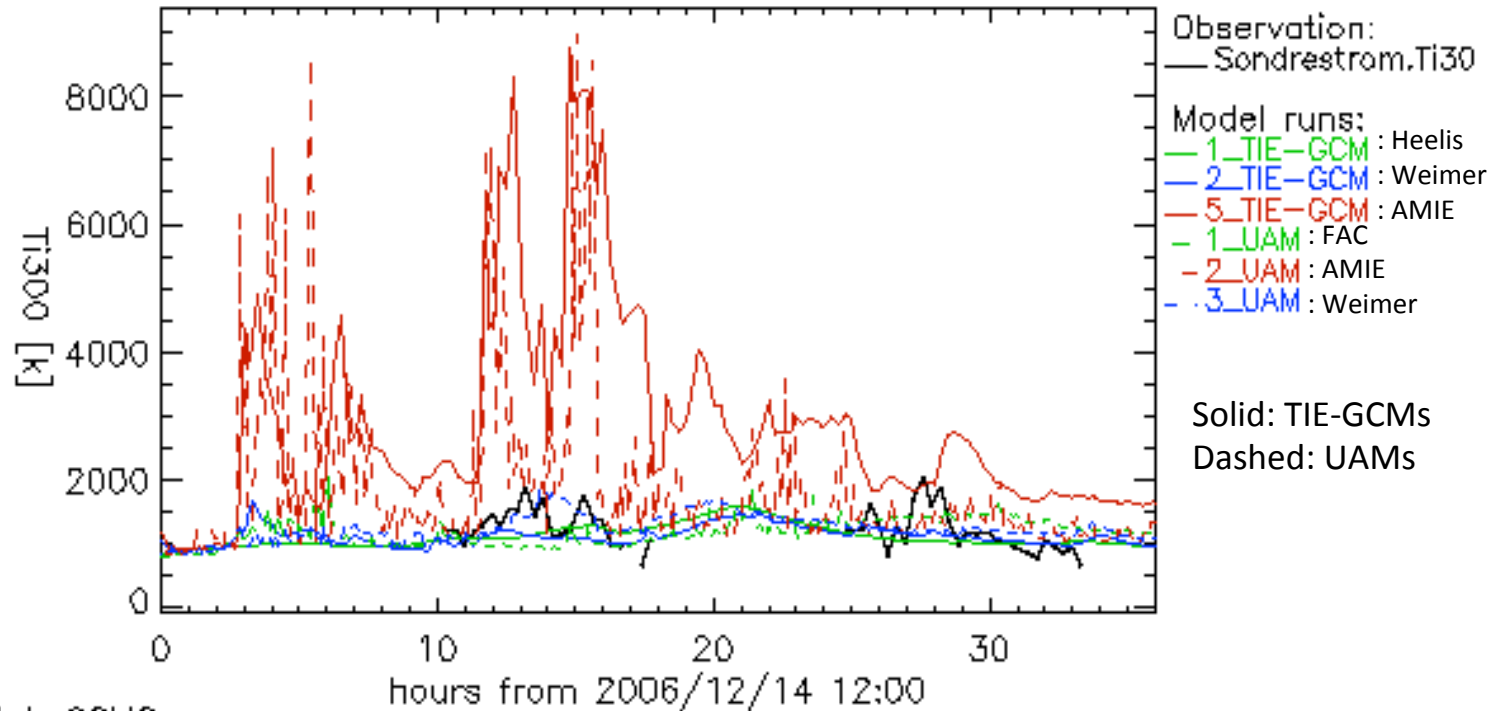
Plot: CCMC

- TIE-GCMs > UAMs
- 1_TIE-GCM (Heelis), 2_TIE-GCM (Weimer) > 5_TIE-GCM (AMIE)
- 1_UAM (FAC) > 3_UAM (Weimer) ~ 2_UAM (AMIE)



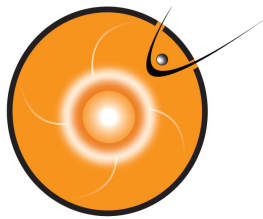
Ti at 300 km in high latitude (Sondrestrom)

Ti300 from observatory file: Sondrestrom.Ti300.2006.348.dat



Plot: CCMC

- 1_TIE-GCM (Heelis), 2_TIE-GCM(Weimer) < 5_TIE-GCM(AMIE)
- 1_UAM(FAC), 3_UAM(Weimer) < 2_UAM(AMIE)



Summary

TEC :

- TIE-GCM: $1_TIE-GCM(Heelis) \sim 2_TIE-GCM(Weimer)$,
 $2_TIE-GCM(Weimer) > 5_TIE-GCM(AMIE)$
- UAM: $1_UAM(FAC) < 3_UAM(Weimer)$,
 $2_UAM(AMIE) \sim 3_UAM(Weimer)$

NmF2 :

- TIE-GCM: $1_TIE-GCM(Heelis) \sim 2_TIE-GCM(Weimer)$,
 $2_TIE-GCM(Weimer) > 5_TIE-GCM(AMIE)$
- UAM: $1_UAM(FAC) \sim 2_UAM(AMIE) \sim 3_UAM(Weimer)$

Ne and Ti at 300 km for both TIE-GCM and UAM :

- $Ne_Weimer > Ne_AMIE$
- $Ti_Weimer > Ti_AMIE$
- Effect of drivers varies with models.
- Sensitivity of models to drivers varies with parameters.

Need MORE model submissions!