

# SAMI3@CMCC: UPDATE

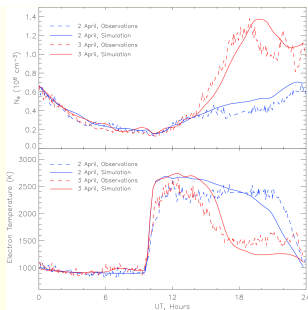
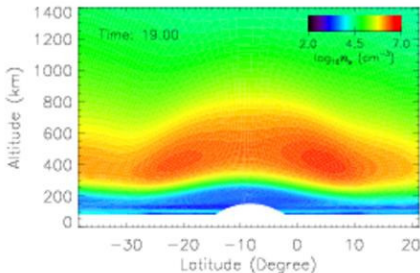
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CCMC Workshop  
June 2022  
College Park, MD

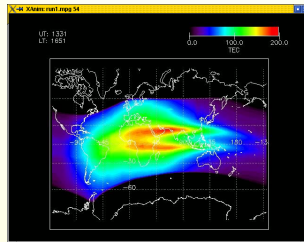
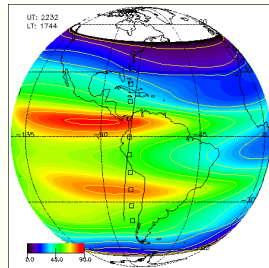
# HISTORY OF SAMI2 AT CCMC

the early years

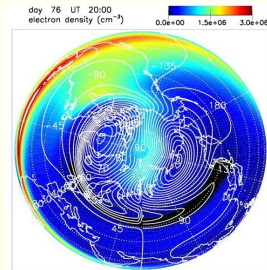
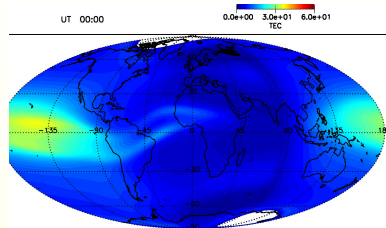
- SAMI2-1.00: 2002 - 2012
  - 2D ionosphere model
  - low- to mid-latitude (i.e.,  $\pm 60^\circ$ )
  - IGRF-like field model
  - E  $\times$  B drift Fejer-Scherliess
  - MSIS/HWM
  - novel features:
    - multi-ion (all equal)
- ( $H^+$ ,  $He^+$ ,  $N^+$ ,  $O^+$ ,  $N_2^+$ ,  $NO^+$ , and  $O_2^+$ )
- ion inertia along B
  - eulerian grid
- and the promise to upgrade to SAMI3



- SAMI3-1.00: 2012 - 2022
- 3D global ionosphere model
- simply SAMI2 run for different longitudes
- and again promises to upgrade to an improved version of SAMI3



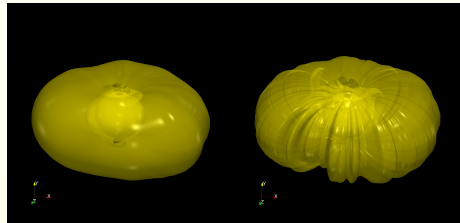
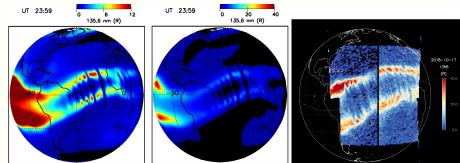
- finally upgraded to the 'latest' version
- SAMI3-3.22: 2022 - ...
- new features
  - self-consistently solve neutral dynamo potential
  - global:  $\pm 89^\circ$
  - Richmond apex model (i.e., IGRF field)
  - high latitude potential: Weimer05



- thermosphere models in lieu of MSIS/HWM
  - TIEGCM
  - WACCM-X
  - GITM
- storm studies
  - SAMI3/RCM
- equatorial plasma bubble studies

- SAMI3/TIEGCM developed for the ICON mission
- currently SAMI3 and TIEGCM running independently at CCMC
- simply need to implement codes that convert TIEGCM netcdf data into SAMI3 input files and run SAMI3

- developed SAMI3 to use WACCM-X thermosphere data
- currently WACCM-X running at CCMC
- run at high resolution (longitude  $.625^\circ \sim 70$  km)
- able to capture equatorial plasma bubbles and plasmasphere irregularities



- currently GITM running at CCMC
- SAMI3 able to use GITM thermosphere data
  - one-way coupled
- coupled SAMI3/GITM in development



- RCM running at CCMC
- coupled (electrodynamically) SAMI3/RCM code developed
- should be 'straightforward' to implement SAMI3/RCM at CCMC

# SUMMARY

- finally have 'latest' version SAMI3/MSIS/HWM running at CCMC (sami3-3.22)
- next step: implement SAMI3/TIEGCM  
(only one-way coupled)
- following that: implement SAMI3/WACCM-X  
(only one-way coupled)
- and then: implement SAMI3/GITM and SAMI3/RCM  
(coupled)
- should proceed in a timely fashion with new ionosphere/thermosphere CCMC personnel (yue/chou/wang)