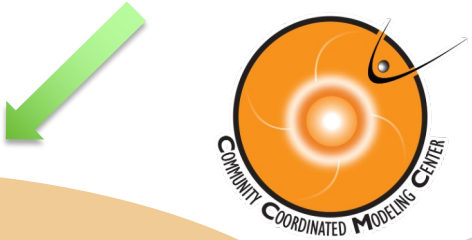
Introduction to NASA/NSF Community Coordinated Modeling Center (CCMC)

Min-Yang Chou and CCMC team
min-yang.chou@nasa.gov

- NASA Goddard Space Flight Center, Community Coordinated Modeling Center, Greenbelt, MD, USA,
- Department of Physics, Catholic University of America, Washington, DC, USA,

Multi-agency strategic investment in US space weather program

CCMC Goals



Facilitate
space weather & space science
research &
model development

Support
transition of
advances in research to
space weather operations

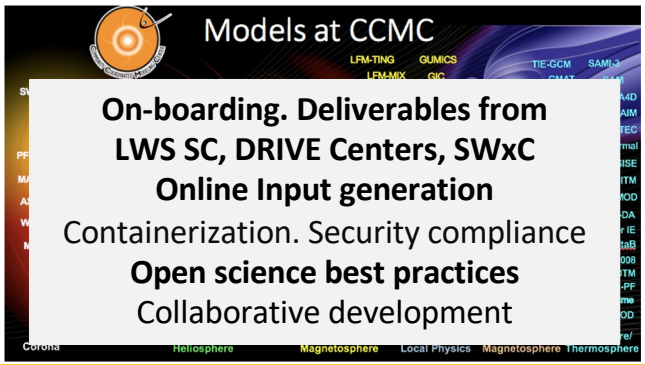
Established in 2000

Original team: Michael Hesse (founding director), Masha Kuznetsova (deputy), Lutz Rastaetter

NASA CCMC Team

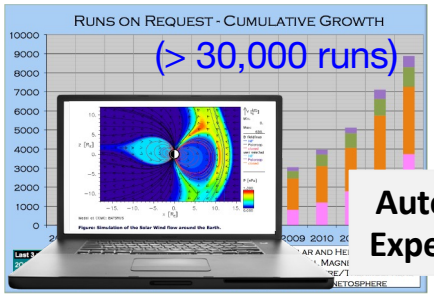
CCMC Core Functions

Models



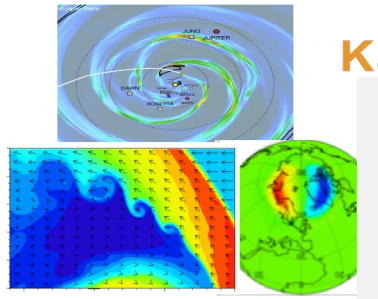
On-boarding. Deliverables from LWS SC, DRIVE Centers, SWxC
Online Input generation
Containerization. Security compliance
Open science best practices
Collaborative development

Simulation Services Open Use of Models



Automated & Expert-Guided

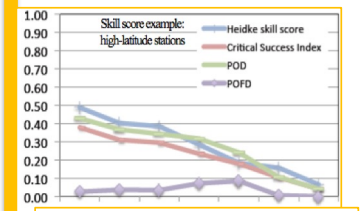
Open Use of Simulation Results



Kamodo

Post-processing
Visualization
Metadata
Databases with
'Search by …'

Validation & Community Support



Enable, Support

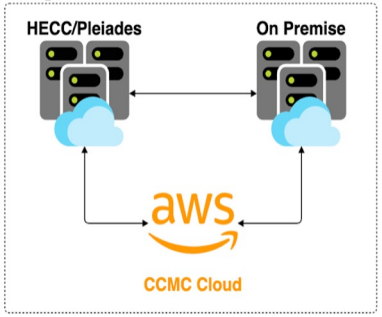
Modeling Challenges

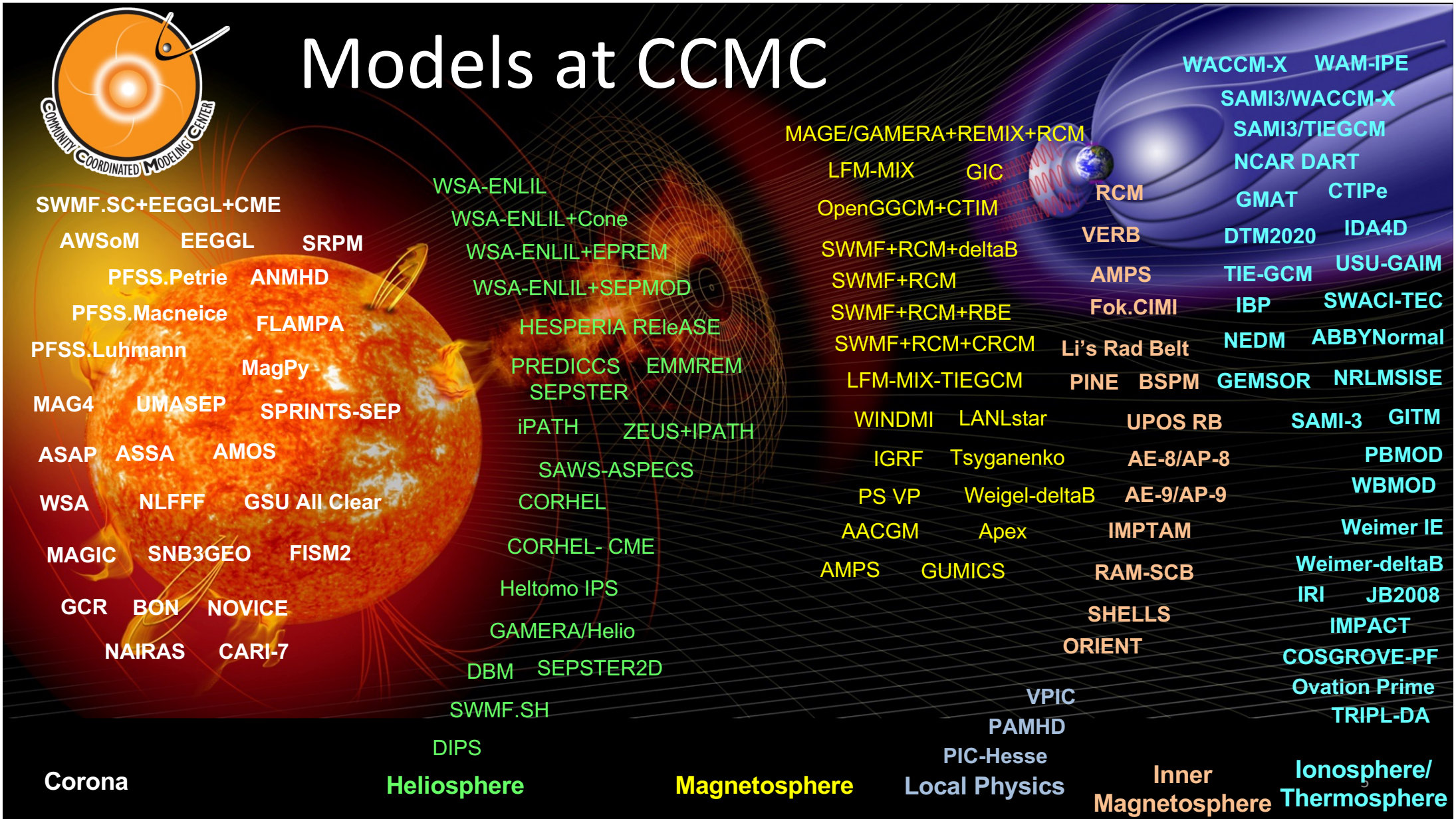
Heliophysics Big Year

NASA Missions Support

Infrastructure

(prerequisite for all functions)

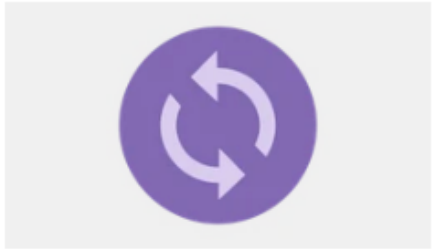



Models at CCMC
SWMF.SC+EEGGL+CME
AWSoM
EEGGL
SRPM
PFSS.Petrie
ANMHD
PFSS.Macneice
FLAMPA
PFSS.Luhmann
MagPy
MAG4
UMASEP
SPRINTS-SEP
ASAP
ASSA
AMOS
WSA
NLFFF
GSU All Clear
MAGIC
SNB3GEO
FISM2
GCR
BON
NOVICE
NAIRAS
CARI-7
WSA-ENLIL
WSA-ENLIL+Cone
WSA-ENLIL+EPREM
WSA-ENLIL+SEPMOD
HESPERIA REleASE
PREDICCS
EMMREM
SEPSTER
iPATH
ZEUS+IPATH
SAWS-ASPECS
CORHEL
CORHEL- CME
Heltomo IPS
GAMERA/Helio
DBM
SEPSTER2D
SWMF.SH
DIPS
MAGE/GAMERA+REMIX+RCM
LFM-MIX
GIC
OpenGGCM+CTIM
SWMF+RCM+deltaB
SWMF+RCM
SWMF+RCM+RBE
SWMF+RCM+CRCM
LFM-MIX-TIEGCM
WINDMI
LANLstar
IGRF
Tsyganenko
PS VP
Weigel-deltaB
AACGM
Apex
AMPS
GUMICS
VPIC
PAMHD
PIC-Hesse
RCM
VERB
AMPS
Fok.CIMI
Li's Rad Belt
PINE
BSPM
UPOS RB
AE-8/AP-8
AE-9/AP-9
IMPTAM
RAM-SCB
SHELLS
ORIENT
WACCM-X
WAM-IPE
SAMI3/WACCM-X
SAMI3/TIEGCM
NCAR DART
GMAT
CTIPe
DTM2020
IDA4D
TIE-GCM
USU-GAIM
IBP
SWACI-TEC
NEDM
ABBYNormal
GEMSOR
NRLMSISE
SAMI-3
GITM
PBMOD
WBMOD
Weimer IE
Weimer-deltaB
IRI
JB2008
IMPACT
COSGROVE-PF
Ovation Prime
TRIPL-DA
Corona
Heliosphere
Magnetosphere
Local Physics
Inner Magnetosphere
Ionosphere/ Thermosphere

CCMC Model Simulation Service

Runs on Request

Runs on Request (ROR) is a simulation service accessible to anyone wishing to execute space science and space weather models hosted by the CCMC.



Continuous/Real-time Run

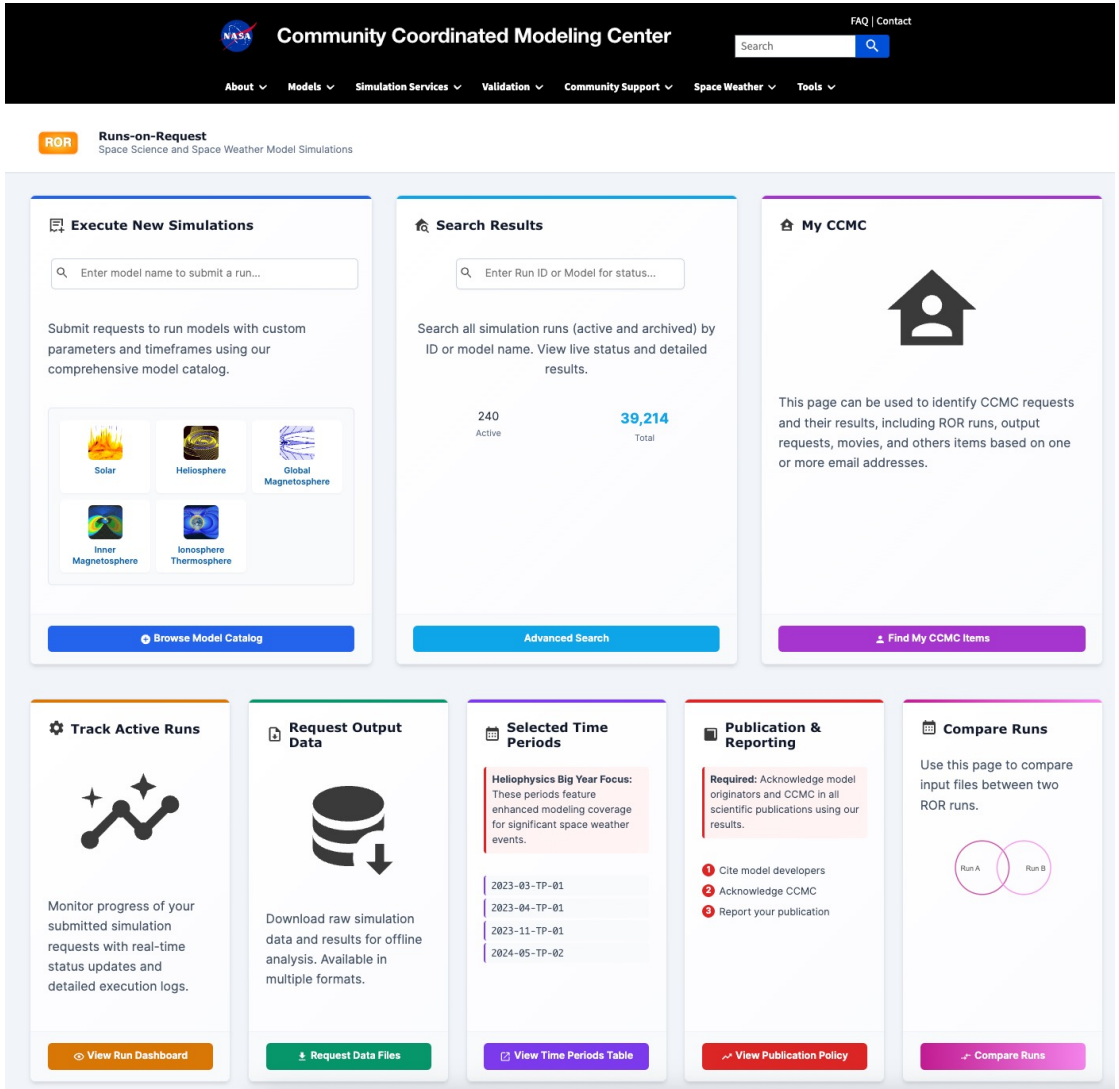
Continuous/real-time runs are models that CCMC executes using near real-time observation data as inputs. Post processed results of such runs are sent to ISWA for display.

Instant Run

Simulation models that are available for instant execution and viewing of results online via the Instant-Run web app.

CCMC Model Catalog

CCMC Runs-on-Request Service

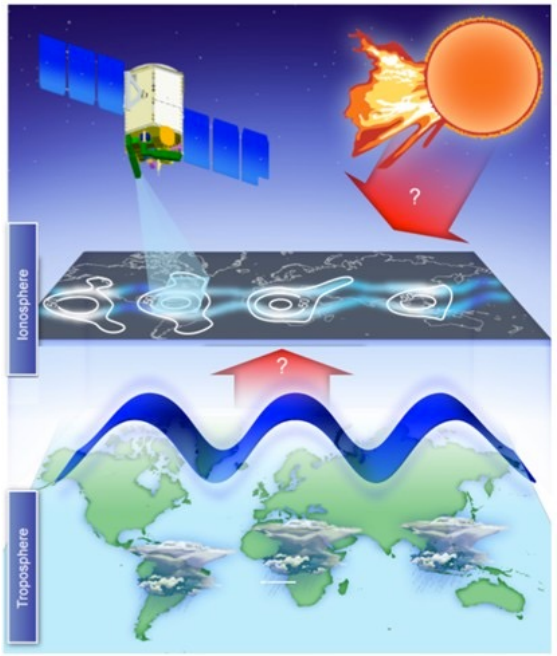


64 Models for RoR
50+ Phenomena
6 Space weather

https://ccmc.gsfc.nasa.gov/ror/index.php

CCMC ROR service provides a solution for the coupled magnetosphere/Ionosphere/thermosphere system

Space Weather Related to Forcing from above and below



Ionosphere Models: SAMI3, PBMod

Neutral Atmos: HWM,TIE-GCM WACCM-X, GITM

Drivers From Above

- High-Latitude Electric Potential Models
- Particle Precipitation Models
- Penetration Electric Field Models
- Solar irradiance Models (FISM2)

CCMC Software

Ionosphere-Thermosphere Models: CTIPe, TIE-GCM, GITM

CCMC Software

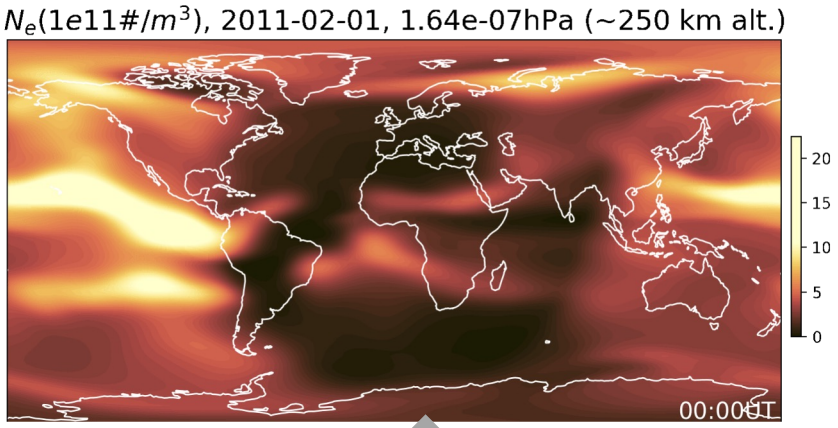
- Lower Atmosphere Models
- Low Atmosphere Observations

Drivers From Below

Whole Atmosphere Models (WACCM-X, WAM-IPE)

Data Assimilation (NCAR DART)

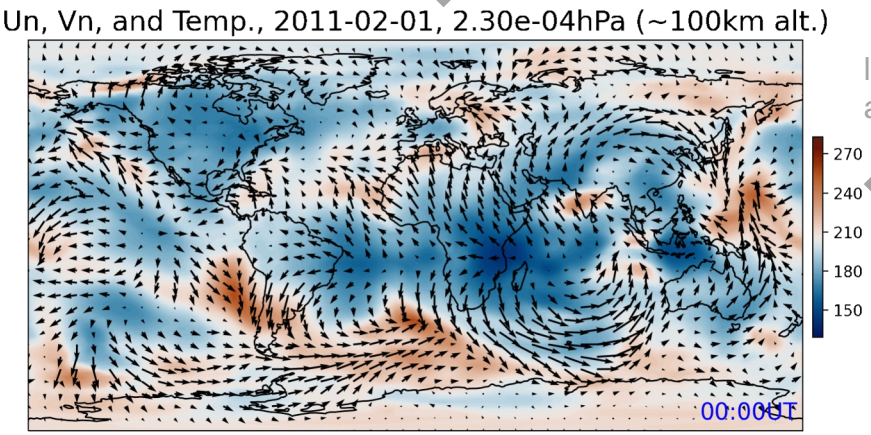
WACCM-X: the Whole Atmosphere Community Climate Model with thermosphere and ionosphere extension



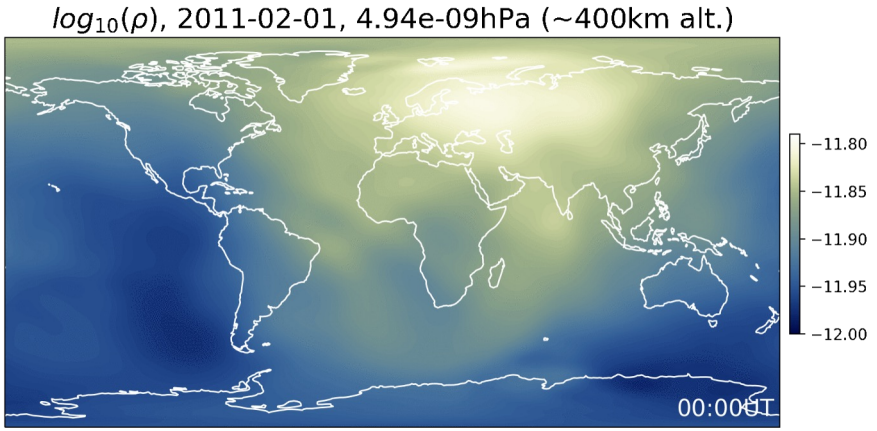
- Model domain from surface to 500 and 700 km
- Couples to ocean, sea ice, and land components, enabling studies of thermospheric/ionospheric coupling with the lower atmosphere
- **WACCMX is available for ROR at CCMC**
- **Working on WACCMX/SWMF**
- **High-resolution WACCMX (0.5 degree)**

dynamics-chemistry coupling

ion-neutral coupling

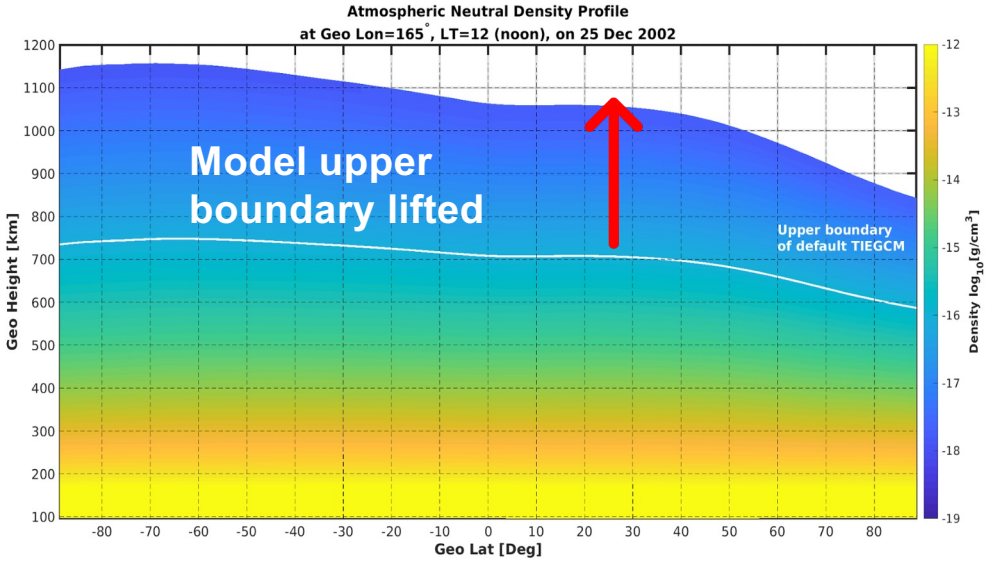


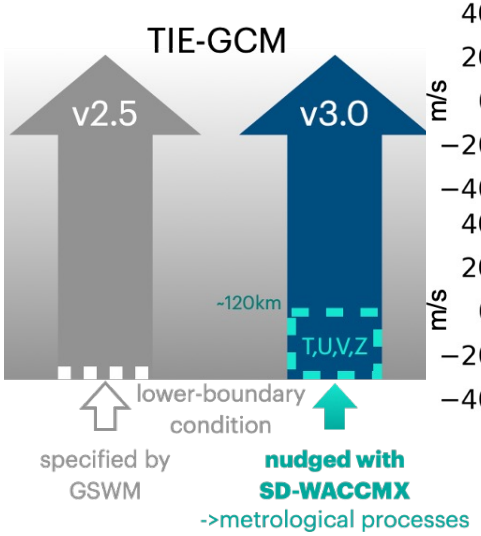
lower-upper atm. coupling

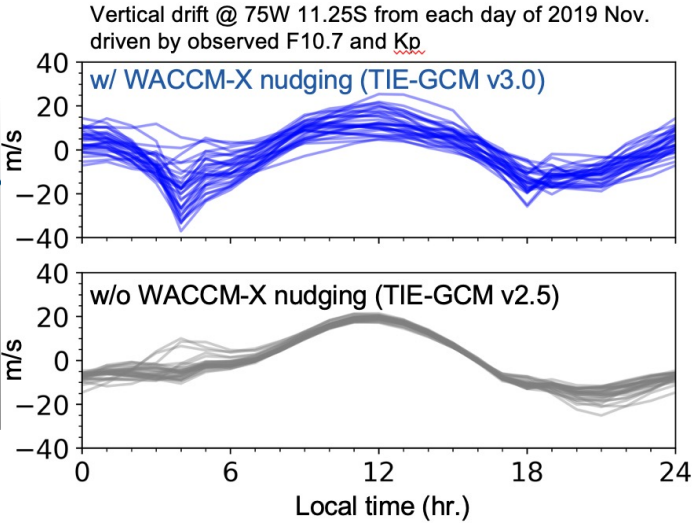


TIE-GCM v3.0 for Runs-on-Request

- TIEGCM 3.0 is available at CCMC for ROR
- Enhanced spatial resolution (1.25 degree in lat and lon)
- Elevated upper boundary for the topside ionosphere (500 to 1000 km)
- Lower model boundary condition: GSWM (default) and SD-WACCMX (up to 120 km)
- TIE-GCM v3.0 is capable of reproducing observed features of day-to-day variability in the IT system



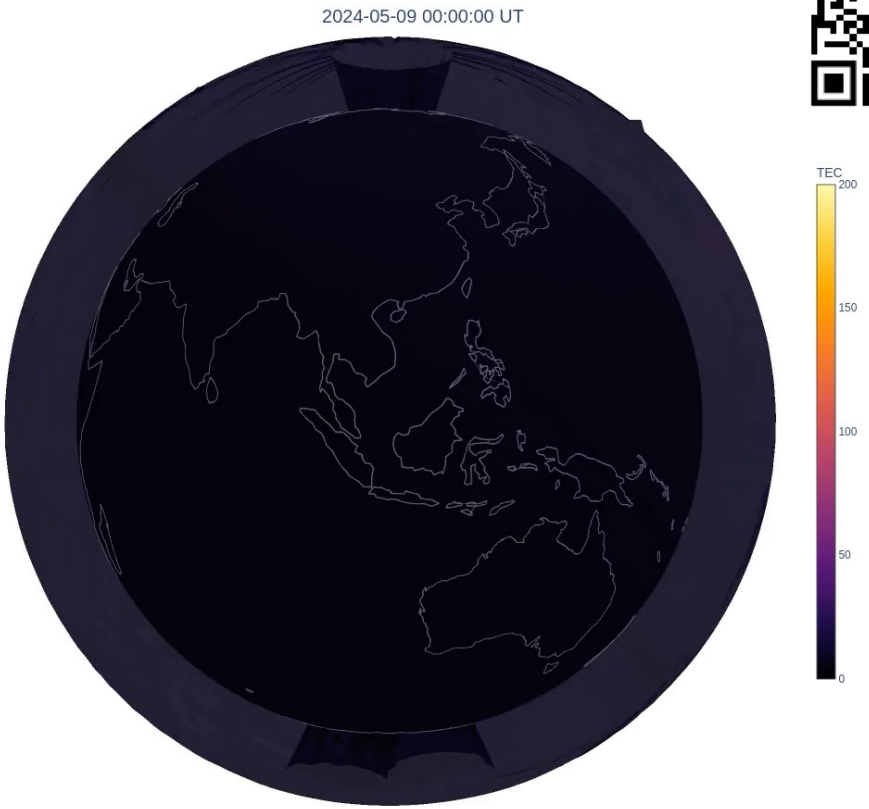




Sami3 is A Model of the Ionosphere (SAMI3)

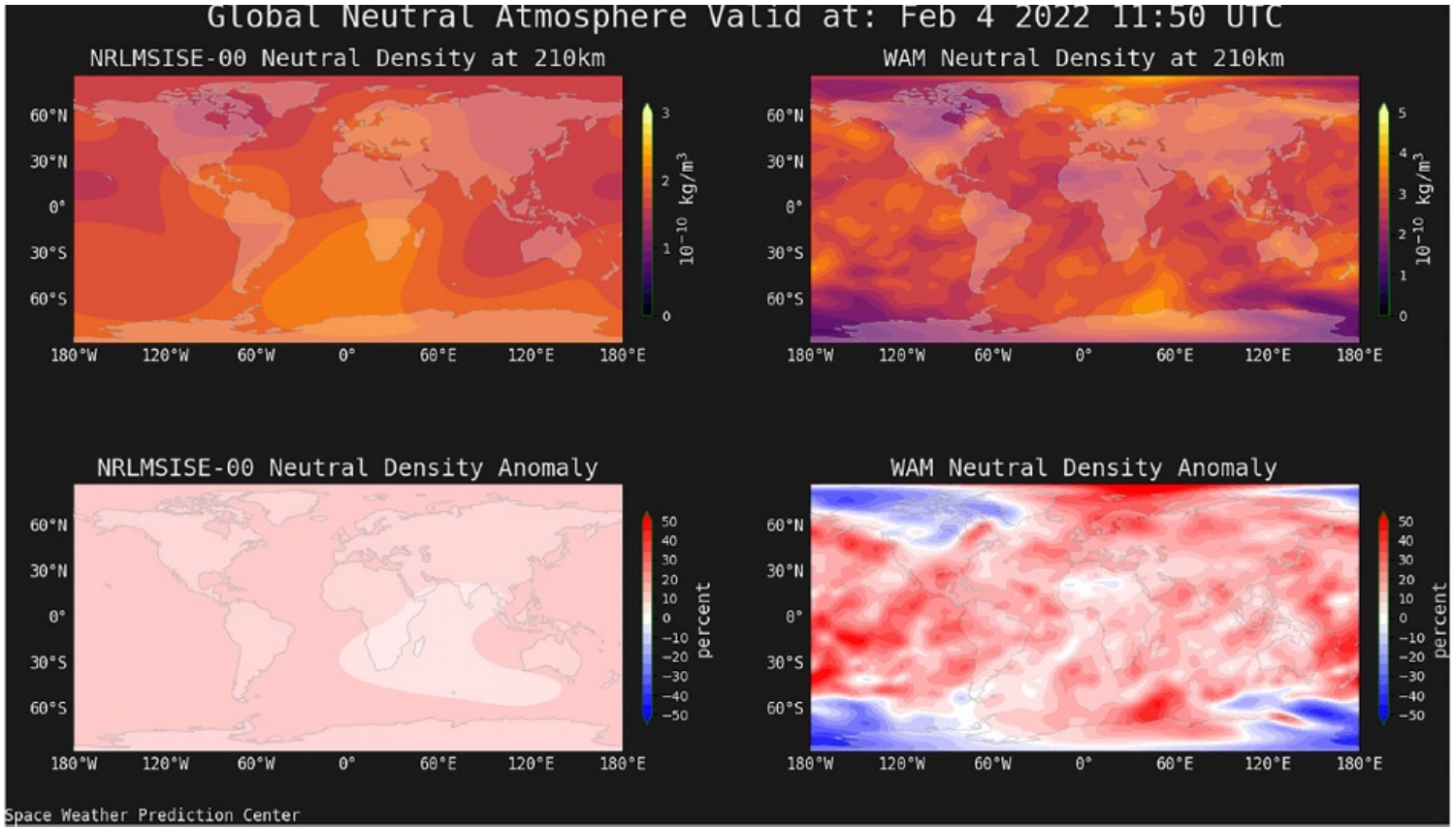
- Developer Dr. Joe Huba is working closely with CCMC.
- SAMI3 is available at CCMC for ROR
  - SAMI3/WACCMX
  - SAMI3/TIEGCM2.0
  - SAMI3/ICON-TIEGCM
  - SAMI3/HWM-MSIS
- Future plan: SAMI3/GITM, SAMI3/RCM, SAMI3/CIMI, SAMI3/REMIX
- Equatorial plasma bubble, storm and plasmasphere studies

Super plasma bubbles simulated by SAMI3/WACCM-X during the 2024 Gannon Storm



NOAA/SWPC Whole Atmosphere Model-Ionosphere Plasmasphere Electrodynamics (WAM-IPE)

CCMC supports the R2O2R of NOAA/SWPC WAM-IPE by providing WAM-IPE RoR to community and enabling research



Fang et al., Space Weather 2022, Starlink incident

Instant Run

Explore space weather models instantly

Ionosphere / Thermosphere

GEMSOR

The GEMSOR provides occurrence rates (ORs) of blanketing sporadic-E with intensities of fbEs ≥ 3 MHz. ORs are estimated from a combination of ionosonde & GNSS radio occultation observations, with a Karhunen–Loéve Expansion (KLE) used to improve temporal resolution.

HWM

Horizontal Wind Model 2014 (HWM14)

IBP

Ionospheric Bubble Probability (IBP) model.

IRI

International Reference Ionsophere (IRI).

NRLMSIS

Predictive models from NRLMSIS 00 and 2.0

SuperDARN Convection Models

Statistical convection models from the Super Dual Auroral Radar Network (SuperDARN).

Swipe

The Swipe model is an empirical model of high-latitude ionospheric electrodynamics based on Swarm ion drift measurements, and Swarm and CHallenging Minisatellite Payload (CHAMP) magnetic field measurements.

WBMOD 17

Wideband ionospheric scintillation model.

Weimer

Weimer models are statistical electric potential models for the high-latitude ionosphere.

Zeeman-Stokes

This tool provides an online interactive platform to generate instantaneous polarimetric radiances with 4 Stokes parameters and their Jacobians near the 118.75 O2 spectral line by taking user specified inputs.

Geoelectric field calculation tool

The Geoelectric Field Calculator Tool allows computation of the ground geoelectric field for a given single-point geomagnetic field time series coupled with either a one-dimensional (1D) ground conductivity, or a three-dimensional (3D) surface impedance, ground response model.

Magnetosphere

AE-8/AP-8 RADBELT

This software package includes (1) an improved and updated version of the old MODEL program (MODEL87), (2) an interactive driver program (RADBELT), (3) the electron AE-8 and proton AP-8 flux maps for solar maximum and minimum, and (4) the interpolation subroutines.

CM5

CM5 is a member of a suite of "Comprehensive Models" (CMs) that describes the near-Earth magnetic field. CM5 is an empirical inverse model derived from pre-Swarm satellite data (CHAMP, Oersted, and SAC-C) and ground observatory data from August 2000 to January 2013.

IGRF

The International Geomagnetic Reference Field (IGRF) model is the empirical representation of the Earth's magnetic field recommended for scientific use by a special Working Group of the International Association of Geomagnetism and Aeronomy (IAGA).

Tsyganenko Magnetic Field

Tsyganenko models are semi-empirical best-fit representations for the magnetic field, based on a large number of satellite observations (IMP, HEOS, ISEE, POLAR, Geotail, GOES, etc). The models include the contributions from major external magnetospheric sources: ring current, magnetotail current system, magnetopause currents, and large-scale system of field-aligned currents.

Windmi

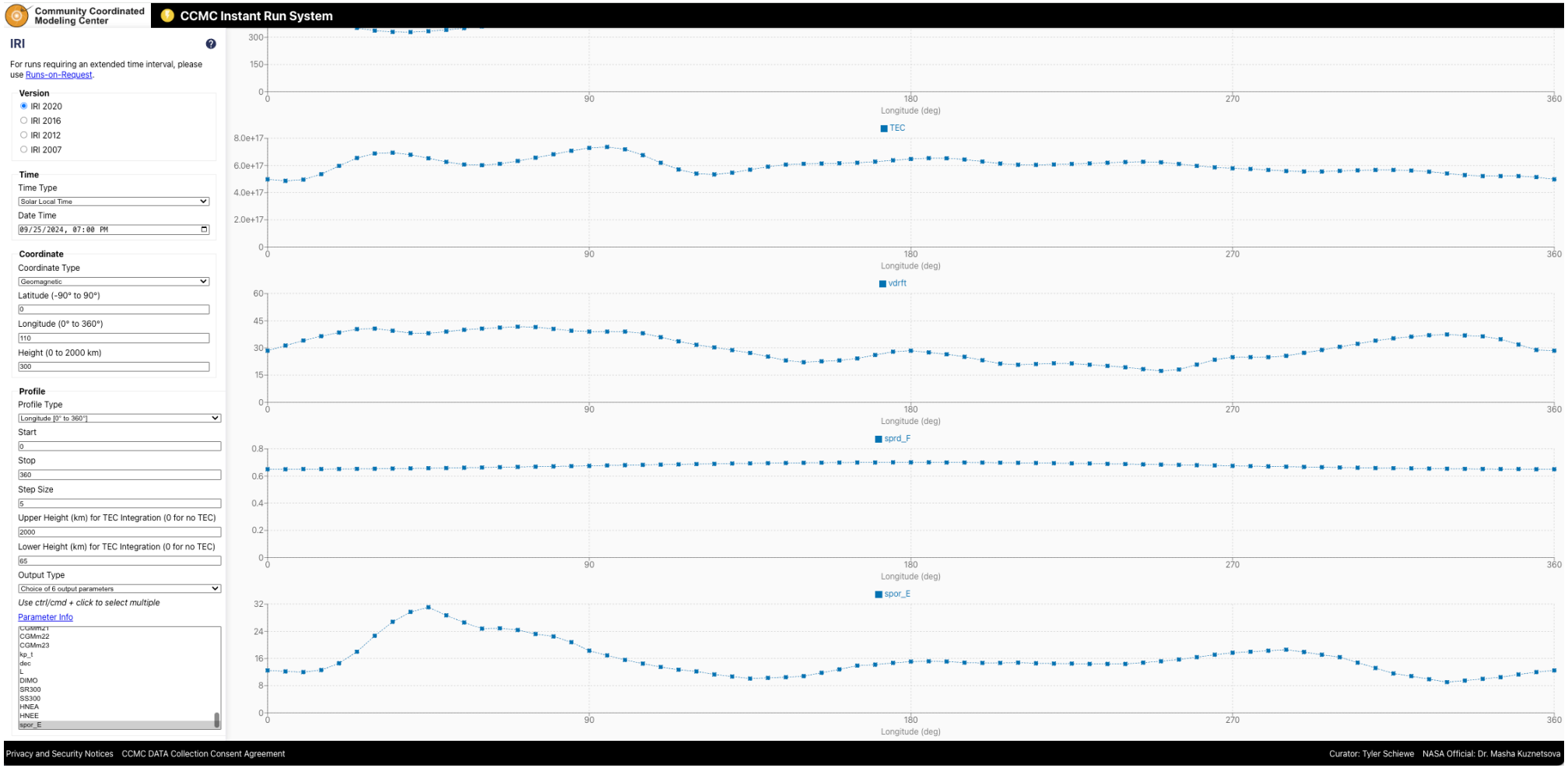
WINDMI is a low-dimensional model of the energy transfer from the solar wind through and into the ionosphere.

Heliosphere

DBM

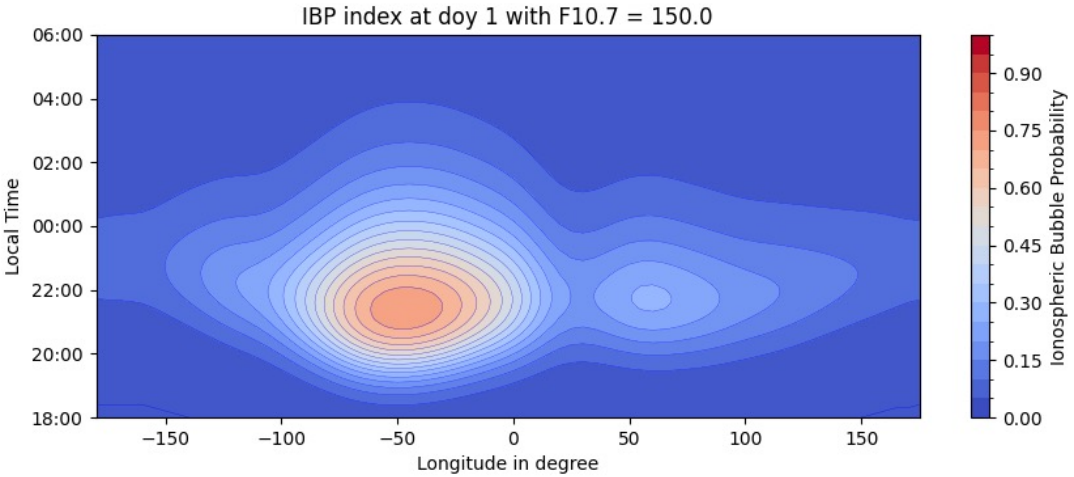
The Drag-Based Model (DBM) tool provides prediction of the interplanetary coronal ma expansion and its prediction of arrival at arbitrary location (or preselected planet or sate plane.

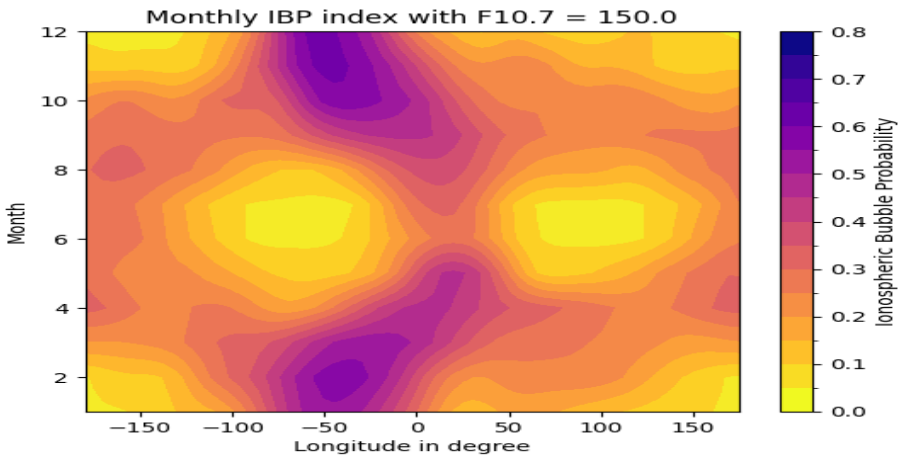
International Reference Ionosphere (IRI)



Ionospheric Bubble Probability (IBP) Model

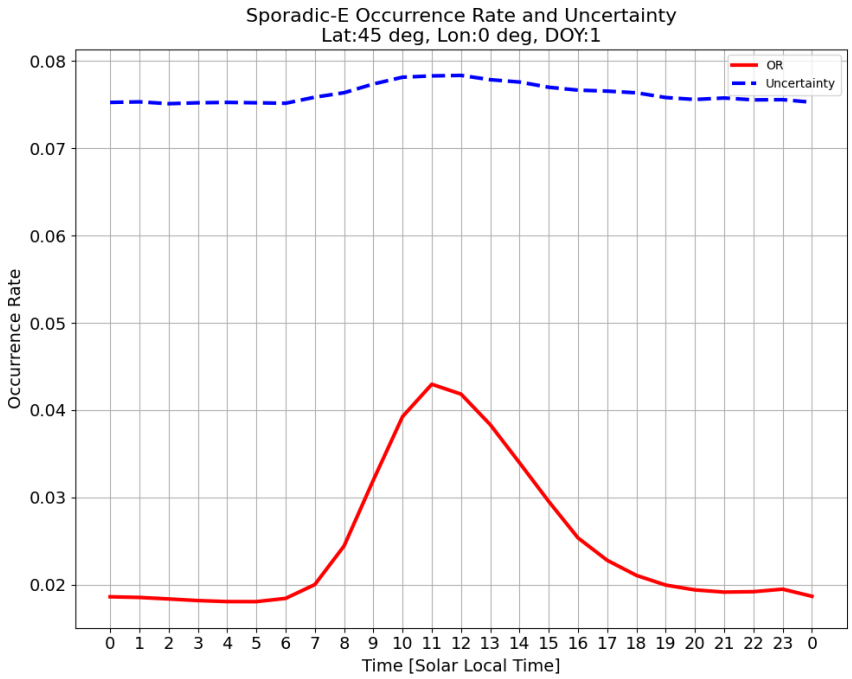
IBP is an empirical model of the plasma bubble occurrence rate derived from CHAMP and Swarm observations

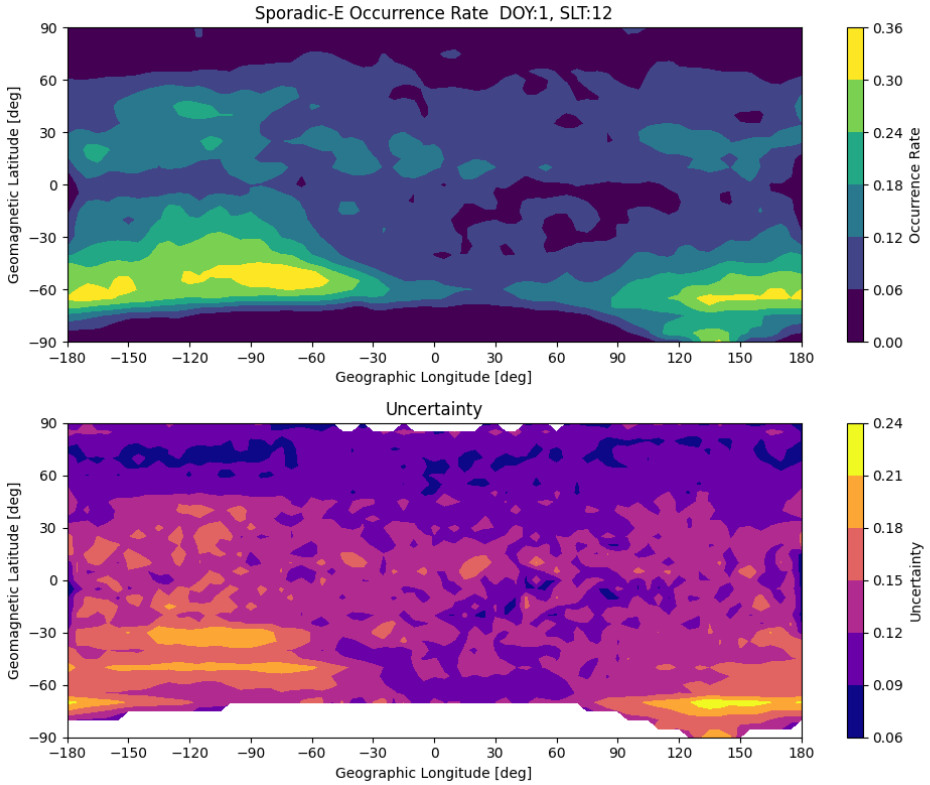




Stolle, C., Siddiqui, T. A., Schreiter, L., Das, S. K., Rusch, I., Rother, M., & Doornbos, E. (2024). An empirical model of the occurrence rate of low latitude post-sunset plasma irregularities derived from CHAMP and Swarm magnetic observations. *Space Weather*, 22, e2023SW003809. https://doi.org/10.1029/2023SW003809

Global Empirical Model of Sporadic E Occurrence (GEMSOR)





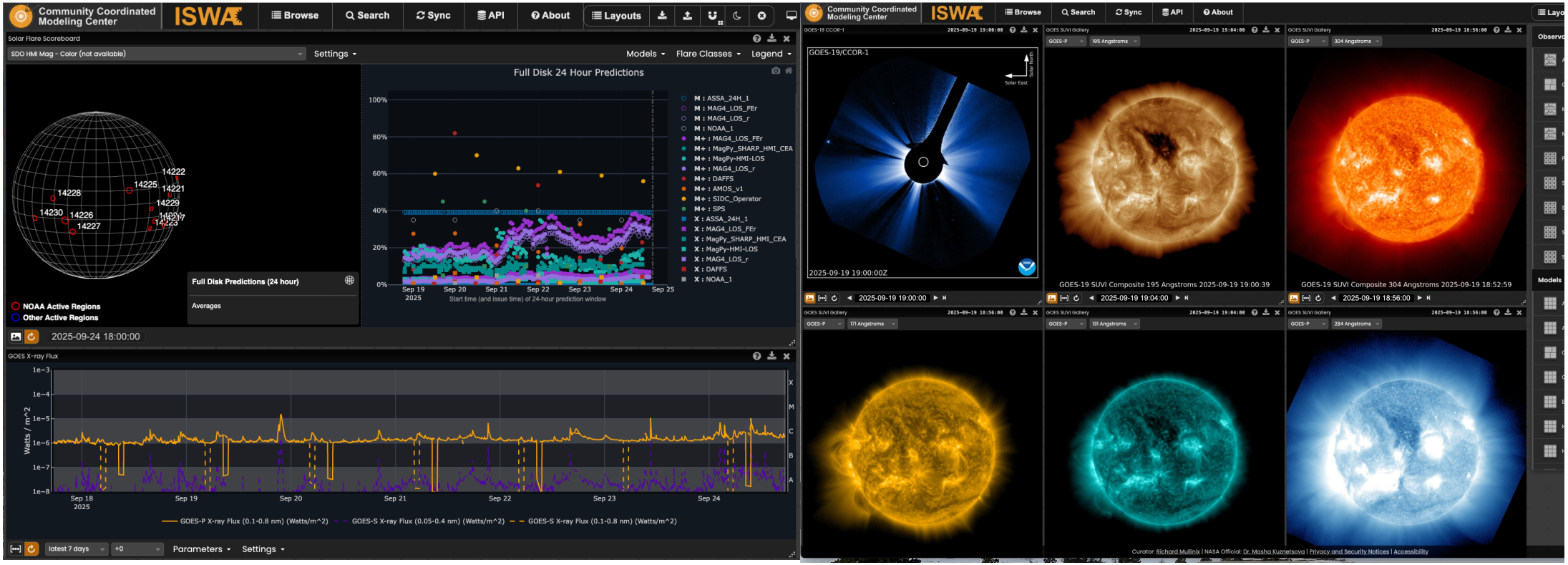
Parsch EV, Franz AL, Dao EV, Wu DL, Swarnalingam N, Salinas CCJH and Emmons DJ (2024) Global Empirical Model of Sporadic-E Occurrence Rates. Front. Astron. Space Sci. 11:1434367. doi: 10.3389/fspas.2024.1434367

Continuous Run

Continuous/real-time runs are models that CCMC executes continuously or in batch mode using near real-time observation data as inputs. Post processed results of such runs are often sent to ISWA (**Integrated Space Weather Analysis**), Flare Scoreboard, and/or SEP Scoreboard for display.

Continuous run

ISWA



CCMC Ionospheric Model Validation Projects

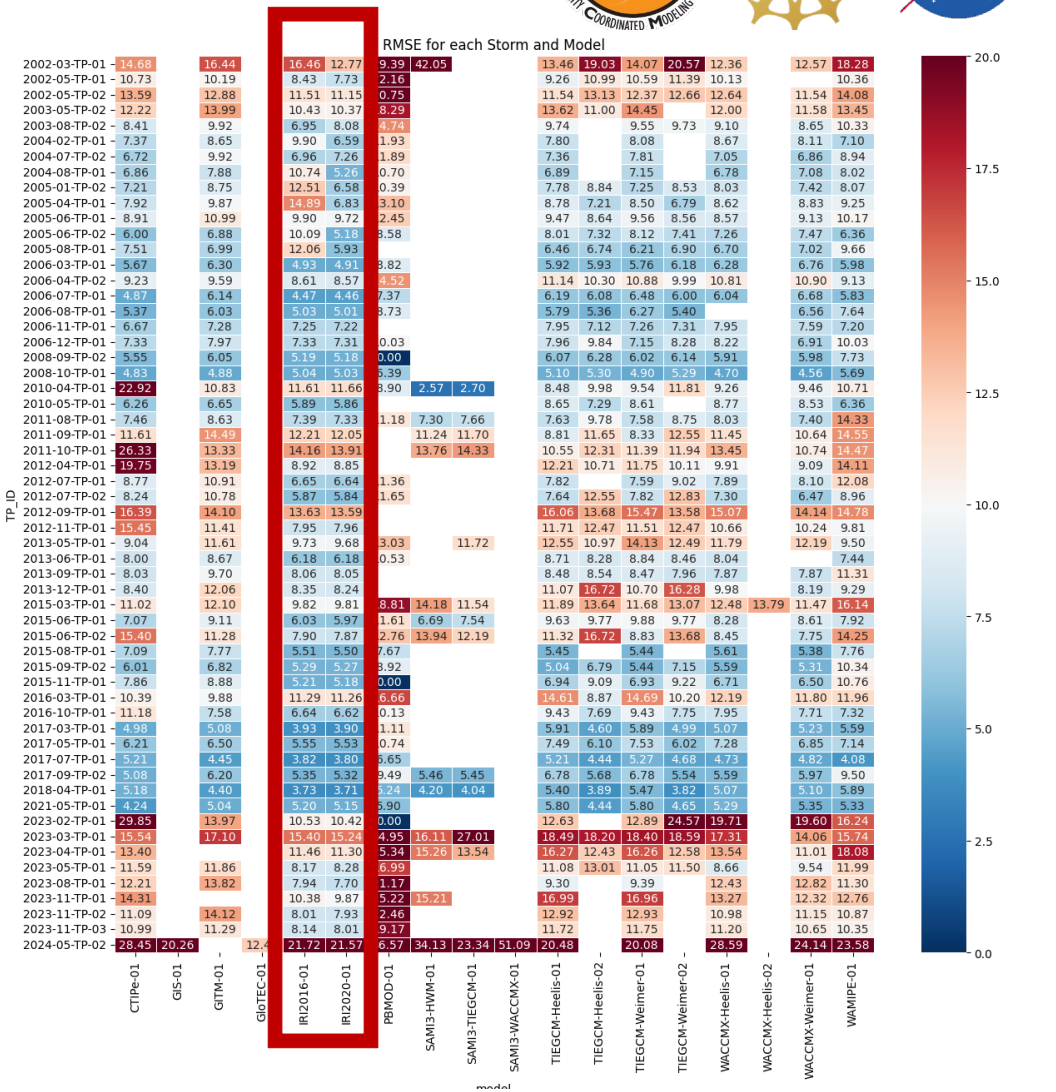
- CCMC has initiated the historic storm event (2000-2024) model validation campaign
- key parameters including:
  - **Total Electron Content (TEC)**
  - **Critical frequency of the F2 layer (foF2)**
  - **Peak height of the F2 layer (hmF2)**
  - **Neutral density**
- Using ground-based GNSS TEC, GNSS RO, ionosonde, ISR, HamSCI, etc.
- Develop ITMAP and CAMEL webapp tools to visualize the validation results

List of all Time Periods:

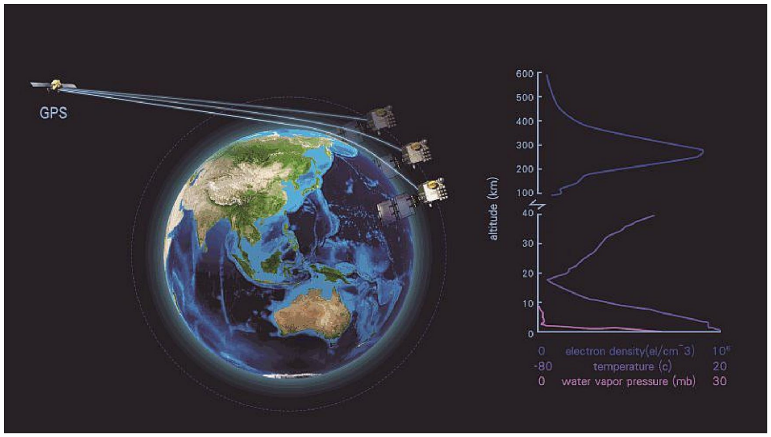
TPID	StartTime	EndTime	Max Kp	Min Dst	GM Run Series	ITM Run Series	Publications
2000-04-TP-01	2000-04-05T00:00:00Z	2000-04-09T00:00:00Z	8.667	-292.0	• SWMF-01_2000-04-TP-01_050623_1 • SWMF-01_2000-04-TP-01_080423_2		10.1029/2018SW002064
2000-11-TP-01	2000-11-03T12:00:00Z	2000-11-08T12:00:00Z	7.0	-159.0	• SWMF-01_2000-11-TP-01_081123_2		
2001-03-TP-01	2001-03-18T12:00:00Z	2001-03-23T12:00:00Z	7.333	-149.0			
2001-03-TP-02	2001-03-29T00:00:00Z	2001-04-04T00:00:00Z	8.667	-387.0	• SWMF-01_2001-03-TP-02_080623_2	• JB2008-01_2001-03-TP-02_030224_IT_1 • DTM2013-01_2001-03-TP-02_030324_IT_1 • DTM2020-01_2001-03-TP-02_030324_IT_1 • CTIPe-01_2001-03-TP-02_030324_IT_1 • TIEGCM-Weimer-01_2001-03-TP-02_030224_IT_1 • WACCMX-Heelis-01_2001-03-TP-02_030324_IT_1 • TIEGCM-Heelis-01_2001-03-TP-02_030324_IT_1 • TIEGCM-Heelis-02_2001-03-TP-02_030324_IT_1 • TIEGCM-Weimer-02_2001-03-TP-02_021424_IT_1 • WACCMX-Weimer-01_2001-03-TP-02_021324_IT_1	10.1029/2018SW002027 10.1029/2018SW002064
2001-04-TP-01	2001-04-11T00:00:00Z	2001-04-14T00:00:00Z	8.333	-271.0		• DTM2020-01_2001-04-TP-01_021824_IT_1 • DTM2013-01_2001-04-TP-01_021824_IT_1 • JB2008-01_2001-04-TP-01_021824_IT_1 • TIEGCM-Heelis-01_2001-04-TP-01_021824_IT_1 • TIEGCM-Weimer-01_2001-04-TP-01_021824_IT_1 • WACCMX-Heelis-01_2001-04-TP-01_021824_IT_1 • CTIPe-01_2001-04-TP-01_021824_IT_7 • TIEGCM-Heelis-02_2001-04-TP-01_021824_IT_1 • TIEGCM-Weimer-02_2001-04-TP-01_021824_IT_1 • GITM-01b_2001-04-TP-01_021824_IT_1 • GITM-01a_2001-04-TP-01_021824_IT_1 • WACCMX-Weimer-01_2001-04-TP-01_021824_IT_1	
2001-08-TP-01	2001-08-31T00:00:00Z	2001-09-02T00:00:00Z	4.0	-40.0			10.1002/swe.20056 10.1029/2018SW002064
2001-09-TP-01	2001-09-22T00:00:00Z	2001-09-28T00:00:00Z	7.333	-102.0		• WACCMX-Weimer-01_2001-09-TP-01_072524_IT_1 • TIEGCM-Heelis-01_2001-09-TP-01_101324_IT_1 • TIEGCM-Weimer-02_2001-09-TP-01_101324_IT_1 • TIEGCM-Heelis-02_2001-09-TP-01_101324_IT_1 • DTM2013-01_2001-09-TP-01_112324_IT_1 • DTM2020-01_2001-09-TP-01_112324_IT_1 • JB2008-01_2001-09-TP-01_112324_IT_1 • CTIPe-01_2001-09-TP-01_112324_IT_1 • WACCMX-Heelis-01_2001-09-TP-01_112324_IT_1 • GITM-01_2001-09-TP-01_011125_IT_1 • WAMIPE-01_2001-09-TP-01_033125_IT_1 • TIEGCM-Weimer-01_2001-09-TP-01_043225_IT_1	
2001-09-TP-02	2001-09-29T00:00:00Z	2001-10-06T00:00:00Z	7.0	-166.0		• WACCMX-Weimer-0 • TIEGCM-Weimer-02 • TIEGCM-Heelis-02_ • DTM2013-01_2001-0 • DTM2020-01_2001-0 • JB2008-01_2001-09 • CTIPe-01_2001-09- • WACCMX-Heelis-01	

CCMC ionospheric model TEC validation for historic storm events

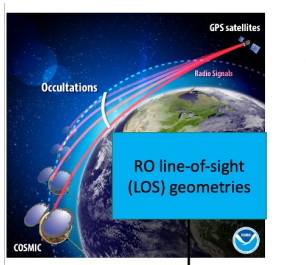
- **60 geomagnetic storms** (2002-2024) with a single Dst trough were selected for TEC model validation
- **Ionospheric models** hosted by CCMC are used in the validation.
- **Preliminary results** show that RMSE from both empirical and physics-based ionospheric models varies significantly with the solar cycle.
- Additional model simulations will be included in the final analysis

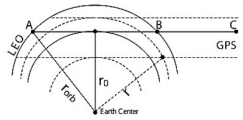


Ionospheric Model foF2 and hmF2 Validation Using GNSS Radio Occultation OSSE



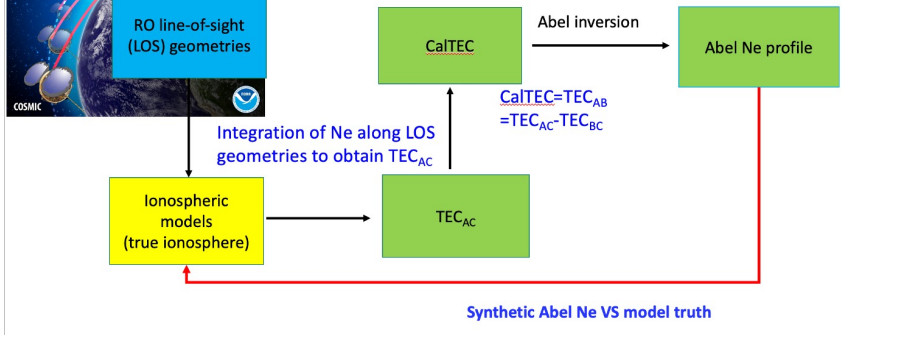
Observing System Simulation Experiment (OSSE)



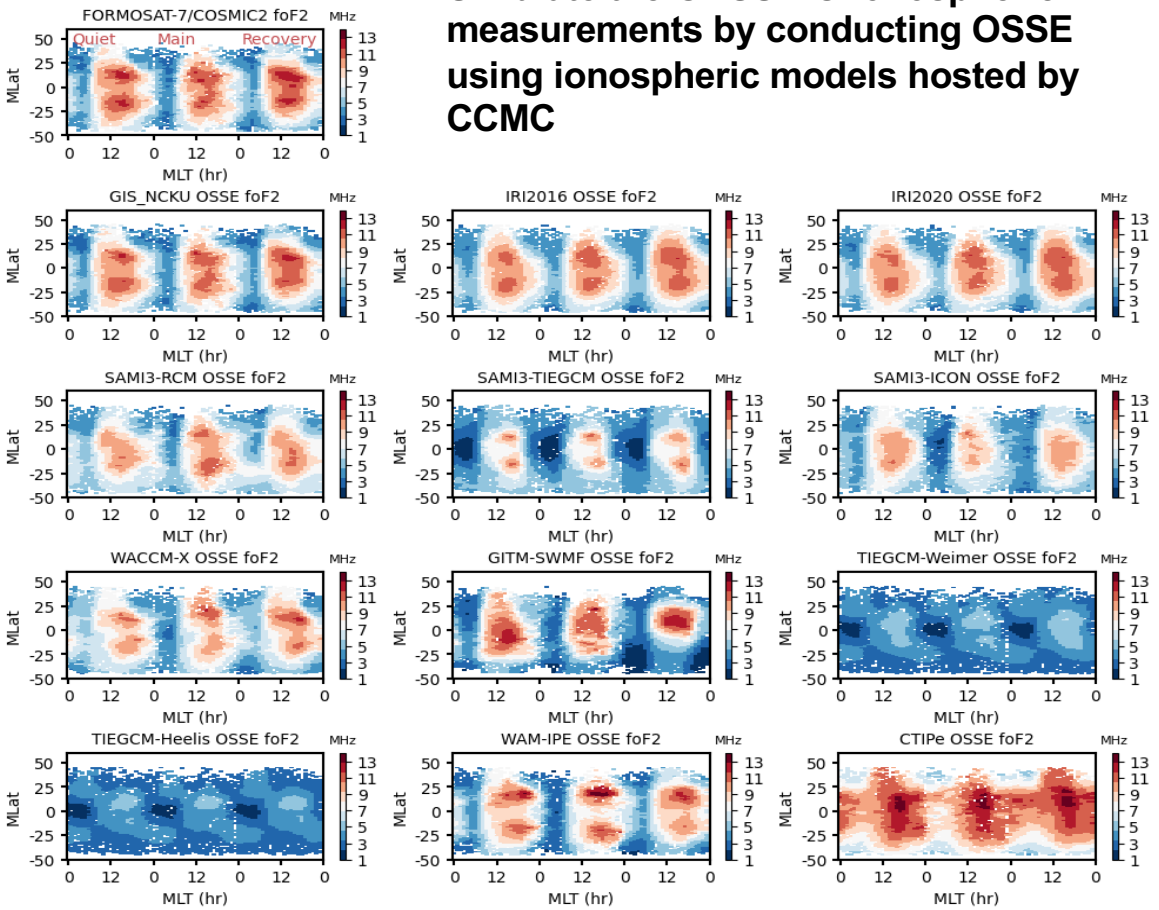


$$N(p_i) = c_{i,0}^{-1}\left(\frac{\tilde{T}(p_i)}{p_i} - \sum_{k=1}^{m} c_{i,k} N(p_{i+k})\right)$$

Lei et al. 2007

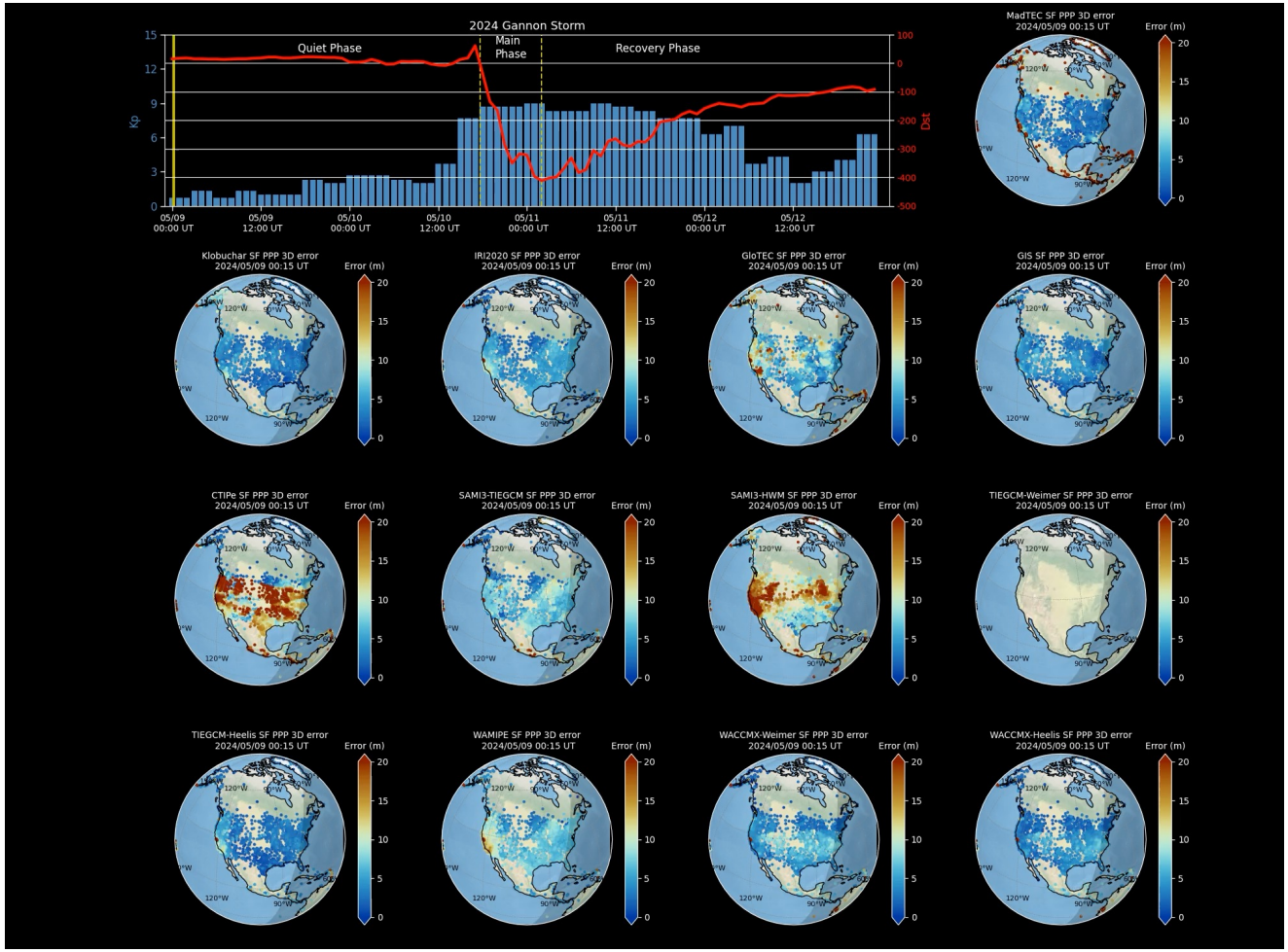


Simulate the GNSS RO ionospheric measurements by conducting OSSE using ionospheric models hosted by CCMC



Evaluate Model Performance in Single Frequency GNSS Precise Point Positioning during the 2024 May Storm

- **Ionosphere is the major error source** for single-frequency (SF) GNSS
- The broadcast **Klobuchar model** is widely used but lacks accuracy
- We evaluate the community-developed advanced ionospheric models **in real world application**



CCMC Model Validation Tools and Scoreboards

CAMEL

CAMEL is an integrated and flexible framework for comparing space weather and space science model outputs with observational data sets.

ITMAP

ITMAP is a web application for interactive and comprehensive evaluation of ionosphere and thermosphere (IT) models.

Flare Scoreboard

Real-time Forecasting Methods Validation for predicting Solar Flare events.

CME Arrival Time Scoreboard

Real-time Forecasting Methods Validation for Coronal Mass Ejections arrival time at Earth.

SEP Scoreboard

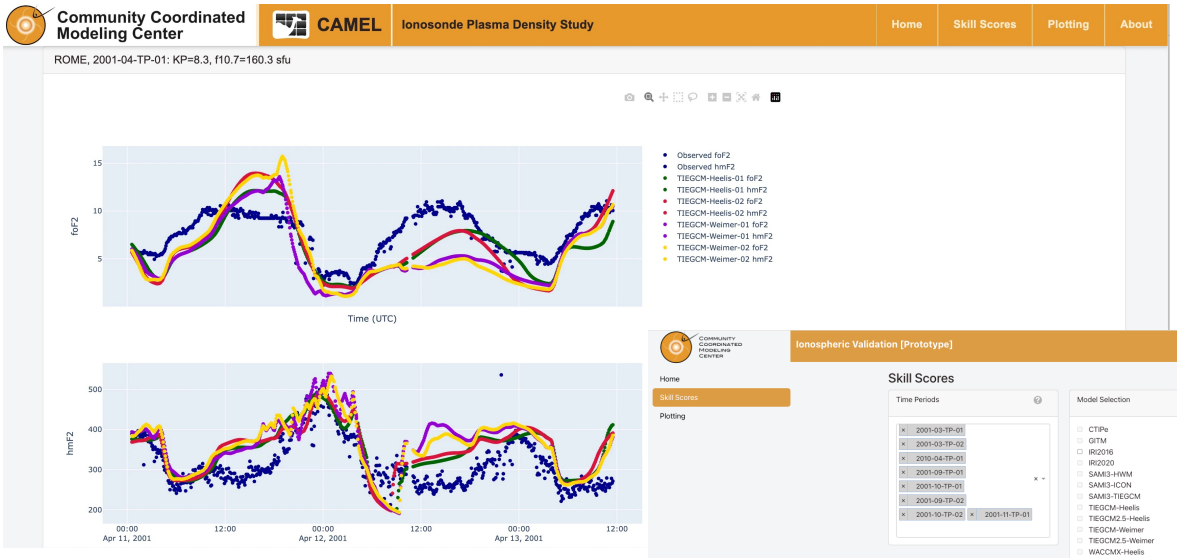
Real-time Forecasting Methods Validation for predicting Solar Energetic Particle (SEP) events.

IMF Bz Scoreboard

Real-time Forecasting Methods Validation for interplanetary magnetic field forecasts at L1.

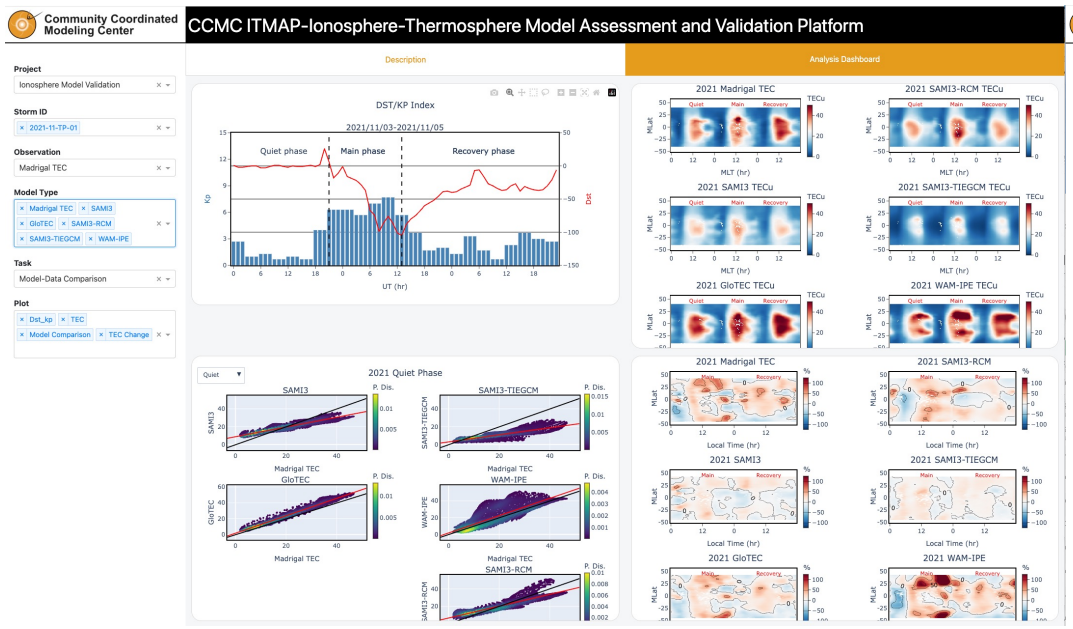
The Comprehensive Assessment of Models and Events using Library Tools (CAMEL)

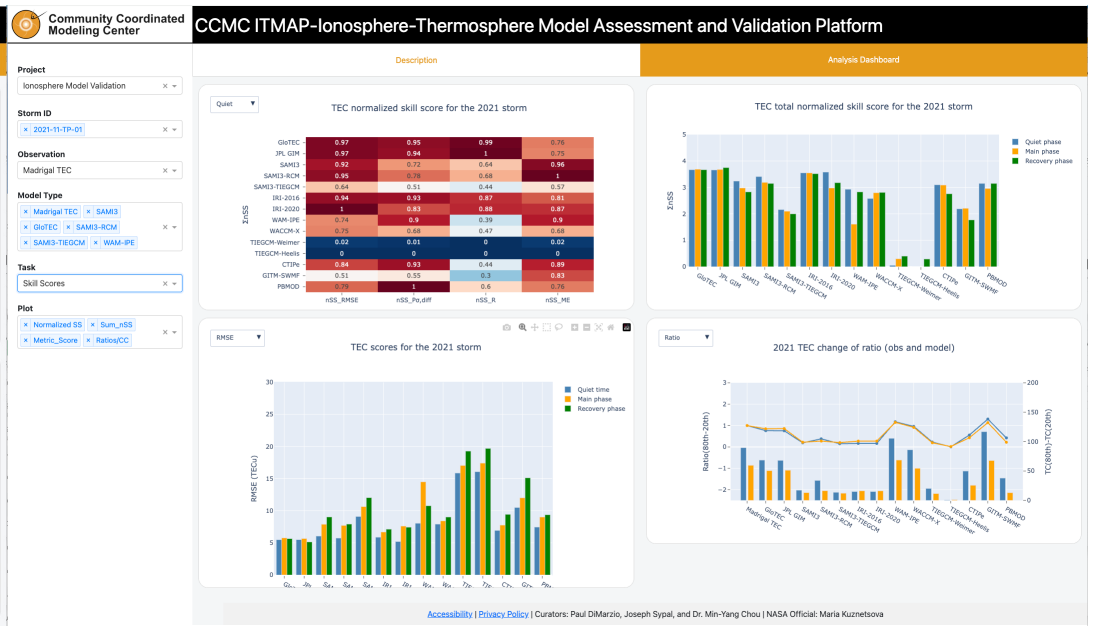
- Developing CAMEL webapp to show ionospheric model validation results for the historic storm events
- foF2 and hmF2 validation using ionosonde observations from GIRO
- Ionospheric foF2 and hmF2 validation is important since it greatly impacts the HF radio wave communications.



CCMC Ionosphere-Thermosphere Model Assessment and Validation Platform (ITMAP)

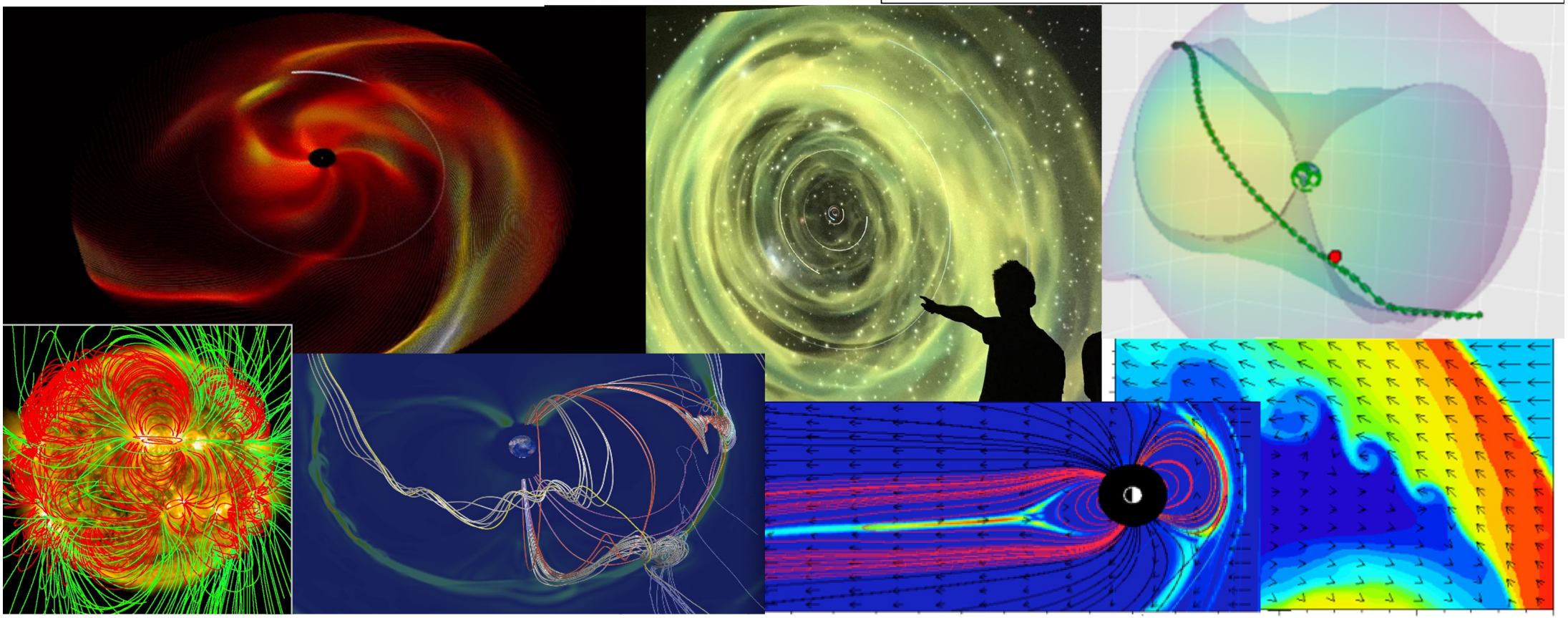
- CCMC (interns: Paul and Joe) has developed ITMAP webapp to visualize CCMC model validation projects.
- Support NASA open science
- Projects include TEC, foF2, hmF2, neutral density, GNSS positioning, ray-tracing





Interactive Visualization

Lutz Rastaetter, Darren De Zeeuw, Tyler Schiewe,
Elon Olsson, Anders Lundkvist



Basic model output and derived quantities
User-ordered custom variables
Automated movie & time series generation

On-click advanced options
Field/flow lines (preset and custom)
Interfaces with Planetariums

Model Visualization and Archive

YI-AN_KO_052124_IT_8

Run Status: Run Complete

Status updated: 2024-05-21T13:29:57+0000

Run Metadata

Metadata Record:	View Full Run Metadata in the CCM
Metadata as JSON:	View Full Run Metadata as JSON
Model Domain:	IT
Model Name:	IRI
Model Version:	IRI2016
Coordinate System for the output:	GEO
Run type:	event
Start Time (Year/Doy):	2023/152
Duration of the run:	19 days

Output Data

- View 3D Ionosphere/Thermosphere
- Create Timeseries in 3D Ionosphere/Thermosphere
- View output in Kamodo

Run Services

- Request output data as a single archive file
- Browse output data

CCMC model visualization

Model data archive

- CMR Home
- View Metadata
- Login

Run Description

CCMC ROR run for IRI 2016 with RORID YI-AN_KO_052124_IT_8

Simulation Time:

Simulation Start Time: 2023-06-01T00:00:00Z
Simulation End Time: 2023-06-20T00:00:00Z
Time Step in second: 900
Simulation Time Description:
Simulation Time Caveats:

Temporal Dependence (whether the outputs of the simulation code are time-dependent?): ***true***

Regions:

Earth.NearSurface.Ionosphere

Simulation Domain :

Contacts :

YIAN.KO, ModelUser

List of Run Input Parameter Grouping and their associated properties :

Name	Description	Caveats	Properties				
			Name	Description	Caveats	Units	Default Value or
			LAY_version	Standard profile or Lay-function formalism			standard
			Ne_Topside	Ne_Topside model with the following options 1.IRI-2001 2.CORI2 3.IRIcor 4.NeQuick			NeQuick
			foF2_model	foF2 model with the following options 1.CCIR 2.URSI-88			URSI-88
			foF2_storm	foF2_storm: t (on)=with storm model and f (off)=without			on
			hmF2_model	hmF2 model with the following options: 1.f(M3000F2) 2.AMTB-model 3.Shubin-COSMIC model			AMTB-model
			Bottomside_thickness_B0	B0 bottomside thickness with the following options: 1. BI-2000 2. ABT-2009 3. Gul-1987			ABT-2009

View 3D Ionosphere/Thermosphere

Update Plot *Update Plot* will update (generate) the plot with the chosen time and plot parameters below.
This will take some time (typically 10-30s) as data are read in and processed.

Choose data time:
Date: 2023/06/01 Time: 00:30:00

Change time (relative to selected time above)

Create GIF movie (and archive of ASCII data outputs) with current plot settings

Choose **Plot Mode**:
Contour (2D)

Show advanced options

Choose quantity to be displayed:
Q 1: N_e
Customized variables are possible!
Email the formula that you would like to see and that uses existing quantities to Lutz and it will be tested and added.

Plot Options for selected Plot Modes:

Contour:
show values with contour levels
16 **Number of Levels**

Lock range:
Min.: 0 Max.: 1
Log scale (use all data>0 in non-negative fields)

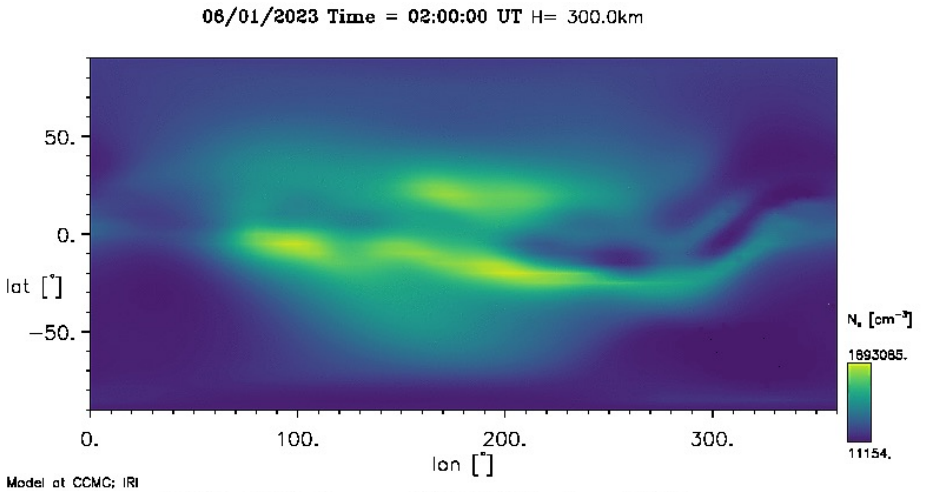
Choose Plot Area:
All **Plot Modes** except **Line Plot** and **Vertical Plot**: Select lower left corner of plot area on the left, and the upper right corner on the right.

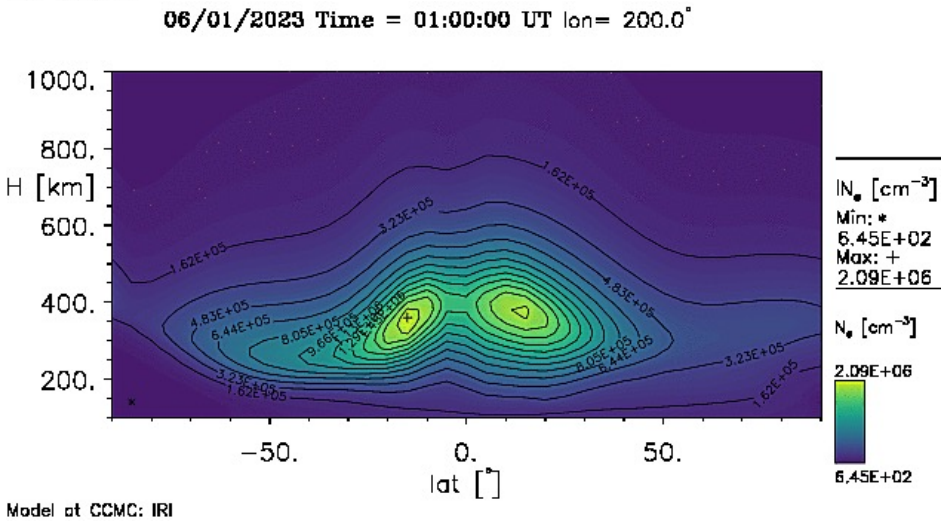
Choose Cut Plane:

Range: 0 ... 360 deg — lon=constant 200

lat_1 -90 lat_2 90 Range: -90 ... 90 deg — lat=constant 0

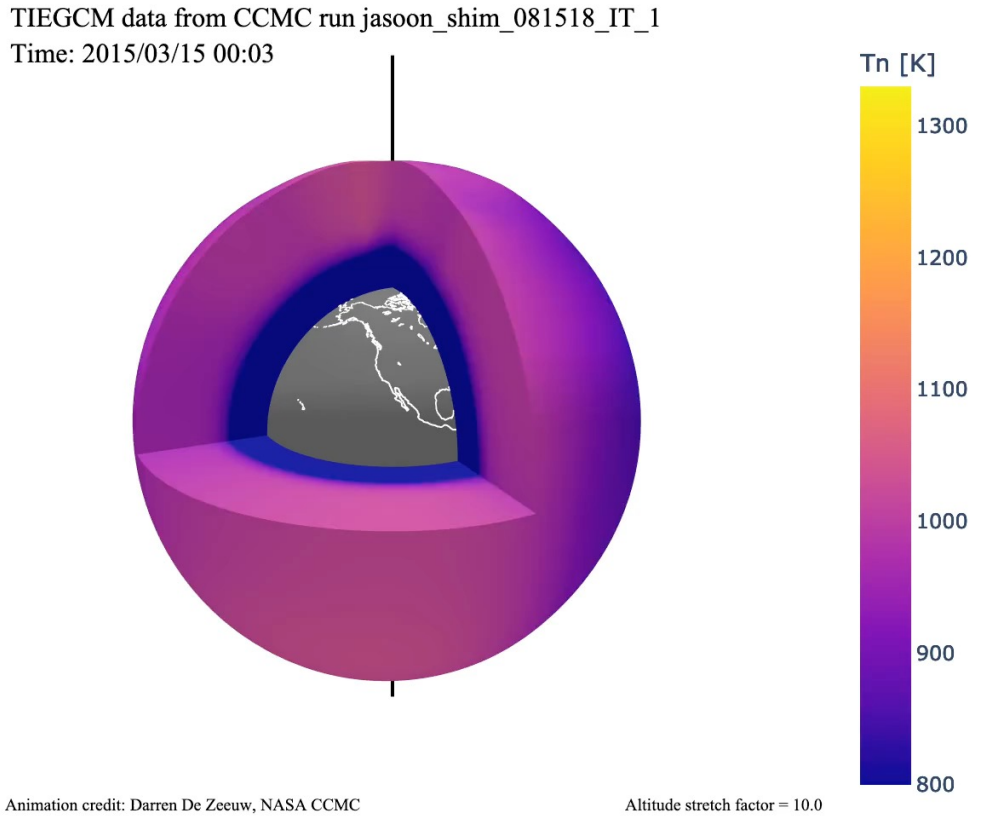
H_1 100 H_2 1000 Range: 100 ... 1000 km — H=constant 300





Kamodo Community Use Tool

- Kamodo is a CCMC tool for access, interpolation, and visualization of space weather models and data in python.
- NASA open source Python project on GitHub
- Access, interpolation, and visualization of space weather models
- Unit conversions, coordinate transformations
- Satellite flythrough extraction
- Dynamic interactive visualizations
- Core package in PyHC



Access and Usage of IRI at CCMC

CCMC Instant Run Service

Instant Run (IR) system allow users to execute models and view results immediately via the IR web interface.

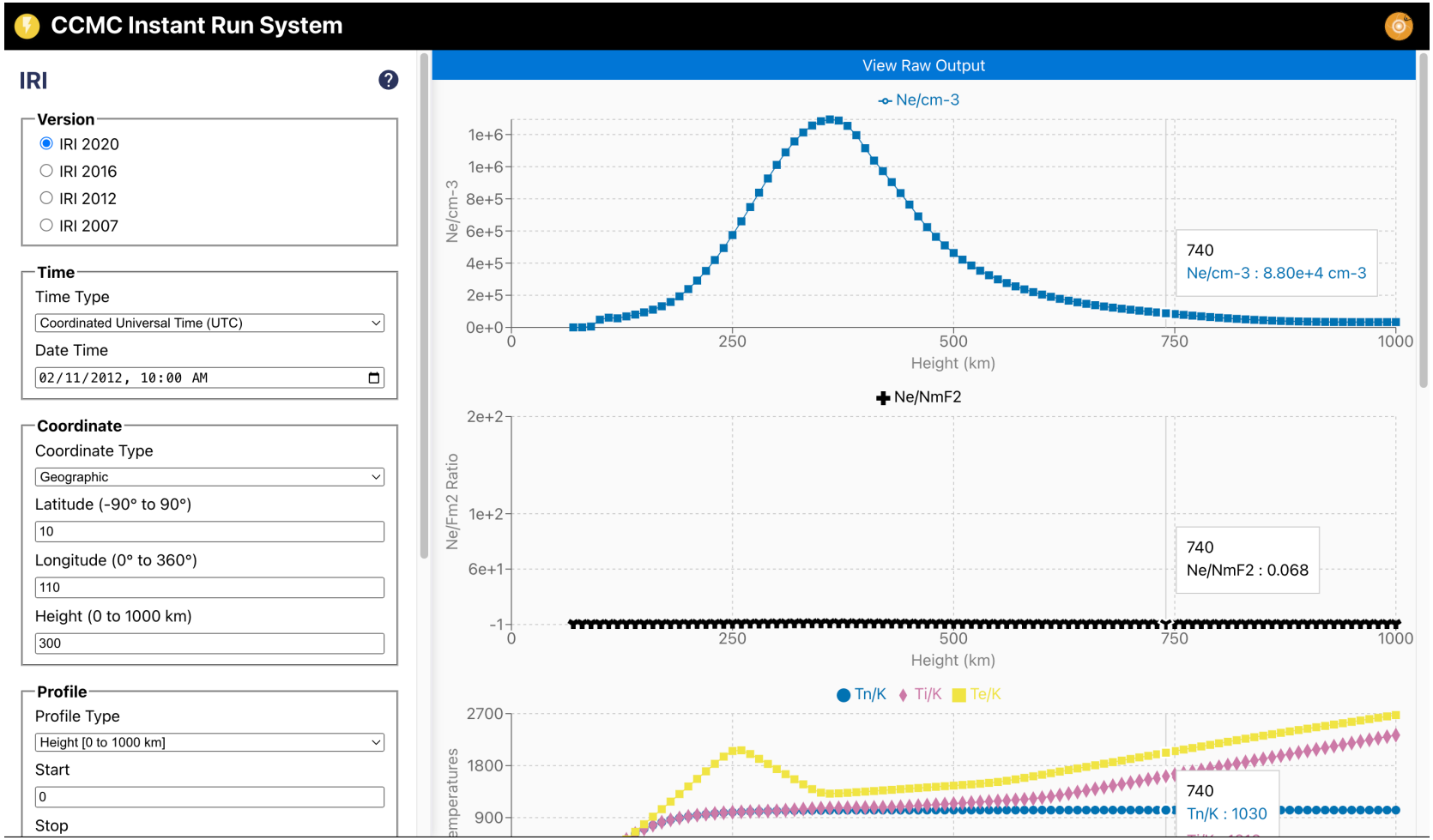
https://kauai.ccmc.gsfc.nasa.gov/instantrun/iri/

CCMC Instant Run Service

Four versions of IRI
2020, 2016, 2012, 2007

UTC or LT

Geographic or
Geomagnetic
Lat, Lon, Height

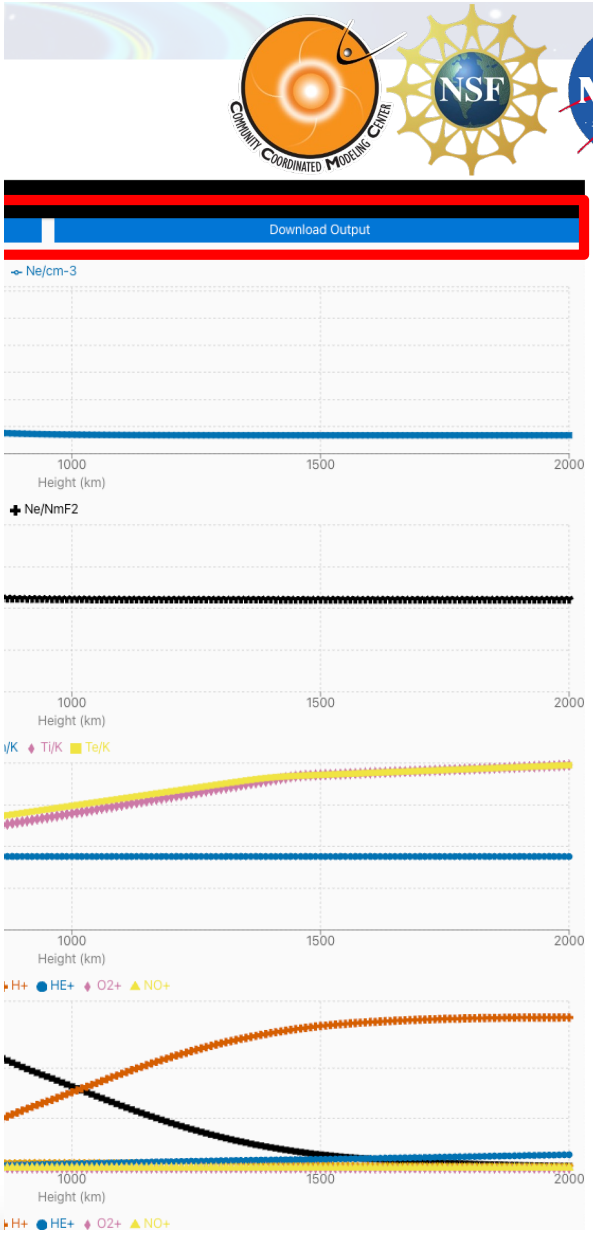


CCMC Instan

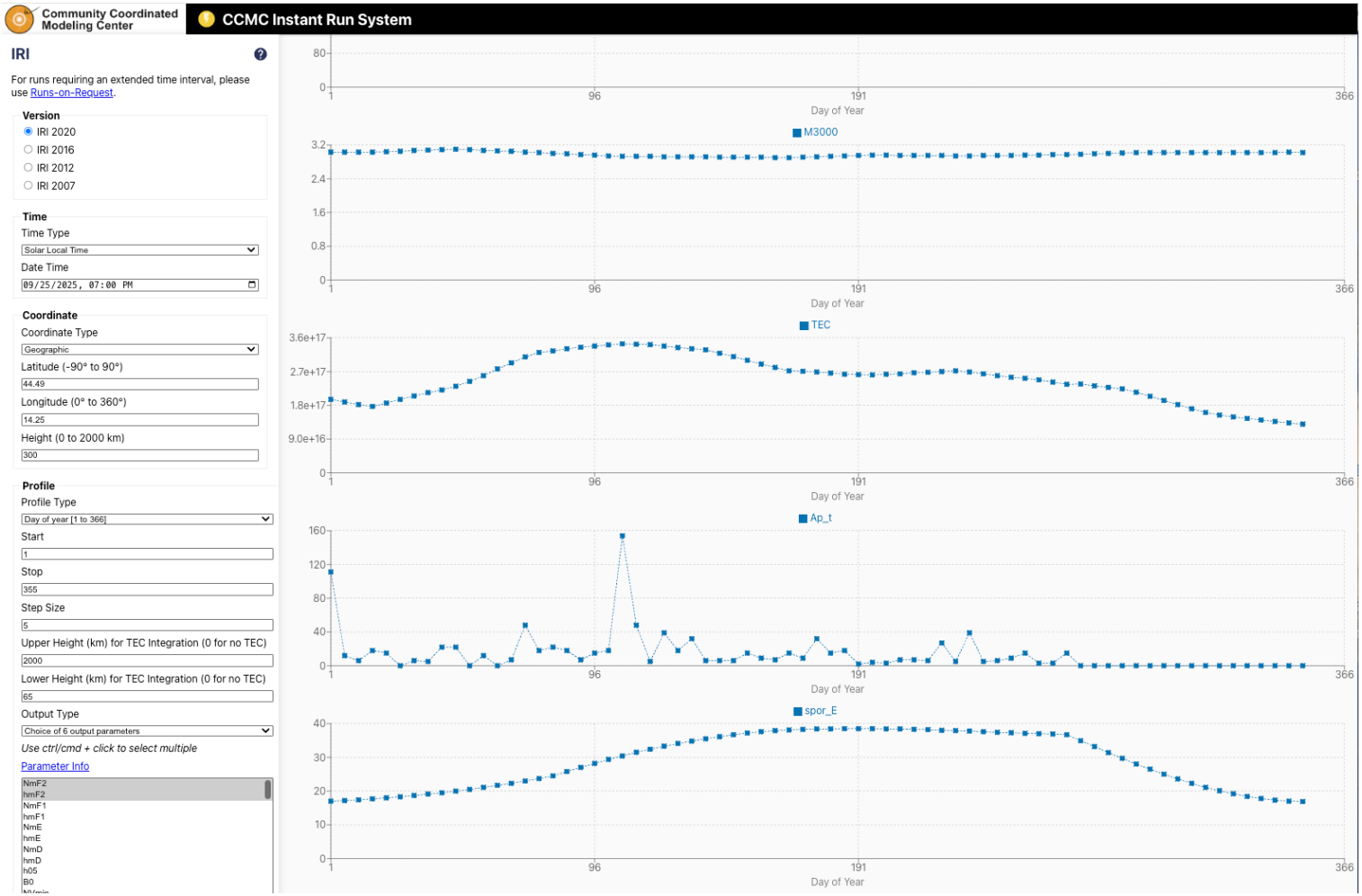
Profile Type:
- Height [0 to 1000 km]
- Latitude (-90 to 90 deg)
- Longitude (0 to 360 deg)
- Year (1961 to current)
- Month (1 to 12)
- Day of Month (1 to 31)
- Day of Year (1 to 366)
- Hour of Day (1 to 24)

Data Option:
- Standard IRI Parameters
- Peak heights and densities
- Plasma frequency, B0, M3000, Valley, width, depth
- Default 6 parameters of your choice
- D-region models at 60,65,..,110 km)

```
yyyy/mmdd(or -ddd)/hh.h):2012/ -42/10.0UT  geog Lat/Long/Alt= 10.0/ 110.0/ 300.0

IRIcor2 is used for topside Ne profile
URSI maps are used for the F2 peak density (NmF2)
foF2 STORM model is turned on
Shubin2015model is used for F2 peak height (hmF2)
ABT-2009 option is used for the bottomside thickness parameter B0
Scotto-97 no L   option is used for the F1 occurrence probability
foE auroral storm model is turned off
IRI-1990   option is used for D-region
TBT-2012 with solar dependence is used for the electron temperature
Tru-2021 option is used for the ion temperature
RBV10+TBT15 option is used for ion composition
CGM coordinates not computed
auroral boundaries not computed

Solar and magnetic parameter for the 1st profile point:
Solar Zenith Angle/degree                              62.8
Dip (Magnetic Inclination)/degree                       5.87
Modip (Modified Dip)/degree                             5.89
Solar Sunspot Number (12-months running mean) Rz12     66.8
Ionospheric-Effective Solar Index IG12                 77.9
Solar radio flux F10.7 (daily)                        109.4
Solar radio flux F10.7 (81-day average)               116.9

TEC [1.E16 m-2] is obtained by numerical integration in 1km steps
  from 50 to  2000.0 km. t is the percentage of TEC above the F peak.

_
   HOUR ELECTRON DENSITY    TEMPERATURES      ION PERCENTAGES[%]*10     1E16m-2
   U.T.   Ne/cm-3 Ne/NmF2 Tn/K  Ti/K  Te/K  O+  N+  H+ He+ O2+ NO+ Clust TEC t/%
    1.0 0.9397E+06 0.994   839   868  1956 984  15   0   0   0   0  -1  25.7  66
    2.0 0.9863E+06 0.920   885   888  1869 985  14   0   0   0   0  -1  30.3  61
    3.0 0.9015E+06 0.847   927   927  1889 987  13   0   0   0   0  -1  31.9  58
    4.0 0.8450E+06 0.822   966   966  1921 987  12   0   0   0   0  -1  32.1  56
    5.0 0.8402E+06 0.827   995   995  1927 988  12   0   0   0   0  -1  31.9  56
    6.0 0.8913E+06 0.842  1015  1015  1911 988  12   0   0   0   0  -1  32.4  57
    7.0 0.9886E+06 0.847  1030  1030  1924 988  12   0   0   0   0  -1  34.1  58
    8.0 0.1069E+07 0.832  1038  1038  1918 989  11   0   0   0   0  -1  36.2  59
    9.0 0.1071E+07 0.802  1033  1033  1865 989  10   0   0   0   0  -1  36.9  59
   10.0 0.1011E+07 0.781  1017  1018  1740 991   9   0   0   0   0  -1  35.5  59
   11.0 0.9373E+06 0.787   988   988  1390 992   8   0   0   0   0  -1  32.1  61
   12.0 0.8952E+06 0.845   946   946  1118 993   6   0   0   0   0  -1  27.9  63
   13.0 0.8947E+06 0.947   902   902   973 994   6   0   0   0   0  -1  24.3  66
   14.0 0.8840E+06 1.000   864   864   871 994   5   1   0   0   0  -1  22.1  69
   15.0 0.8475E+06 0.992   836   839   839 994   5   1   0   0   0  -1  20.8  71
   16.0 0.7702E+06 0.973   824   824   824 993   6   1   0   0   0  -1  19.1  73
   17.0 0.6469E+06 0.943   820   820   820 993   5   1   0   0   0  -1  16.9  76
   18.0 0.5620E+06 0.967   820   820   820 994   5   1   0   0   0  -1  14.5  77
   19.0 0.4605E+06 0.980   810   810   882 995   4   1   0   0   0  -1  12.3  76
   20.0 0.3172E+06 0.982   794   794   872 994   5   1   0   0   0  -1   9.2  76
   21.0 0.1936E+06 0.981   776   779   878 993   6   1   0   0   0  -1   6.2  78
   22.0 0.1767E+06 0.980   763   796  1173 990   9   1   1   0   0  -1   5.9  79
   23.0 0.3196E+06 0.982   767   836  1890 987  12   1   1   0   0  -1   9.8  77
   24.0 0.6376E+06 0.998   789   859  2169 985  14   1   1   0   0  -1  17.8  71
```

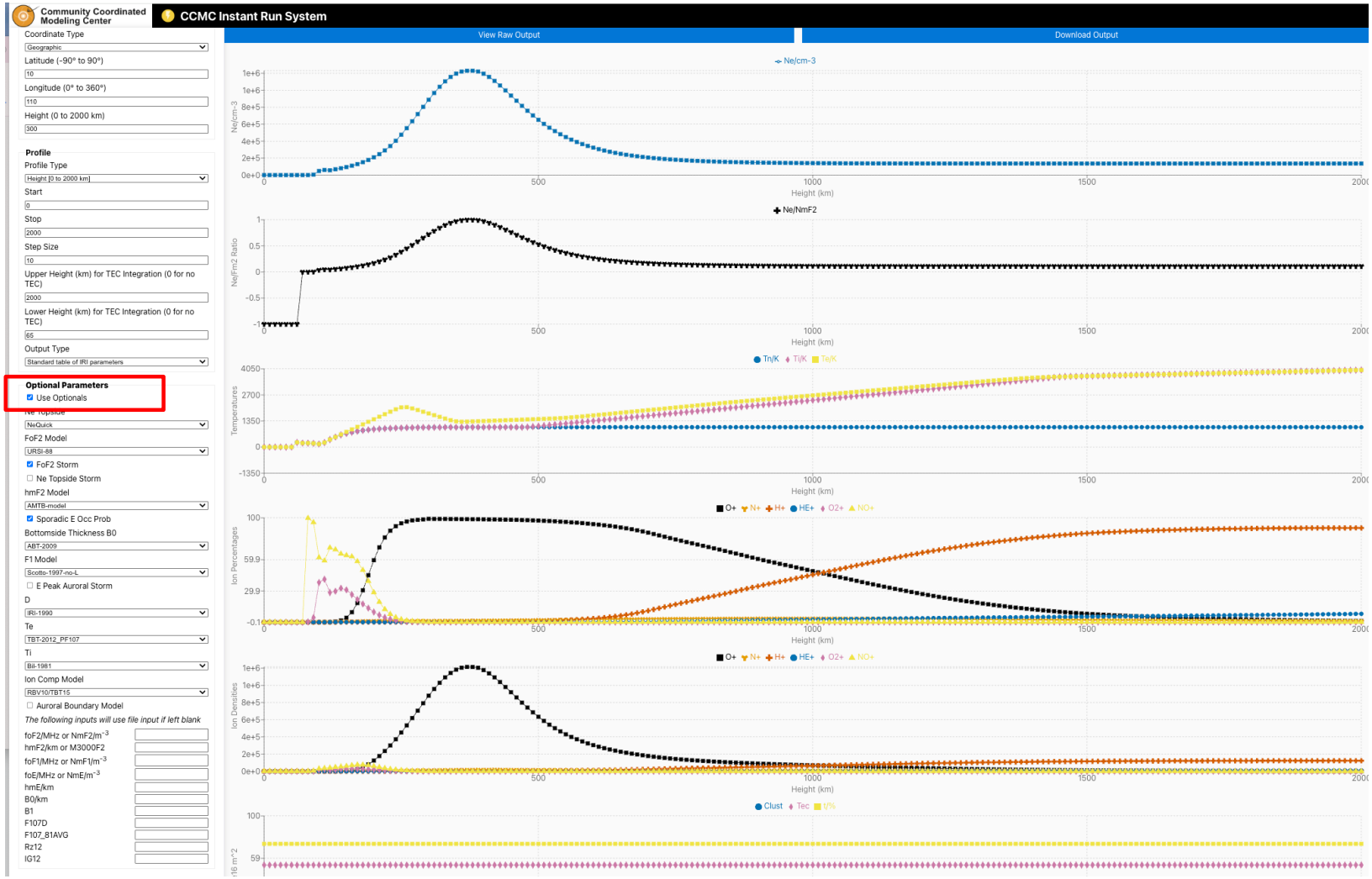


Sporadic E Occurrence Rate in ITCP, Trieste, Italy



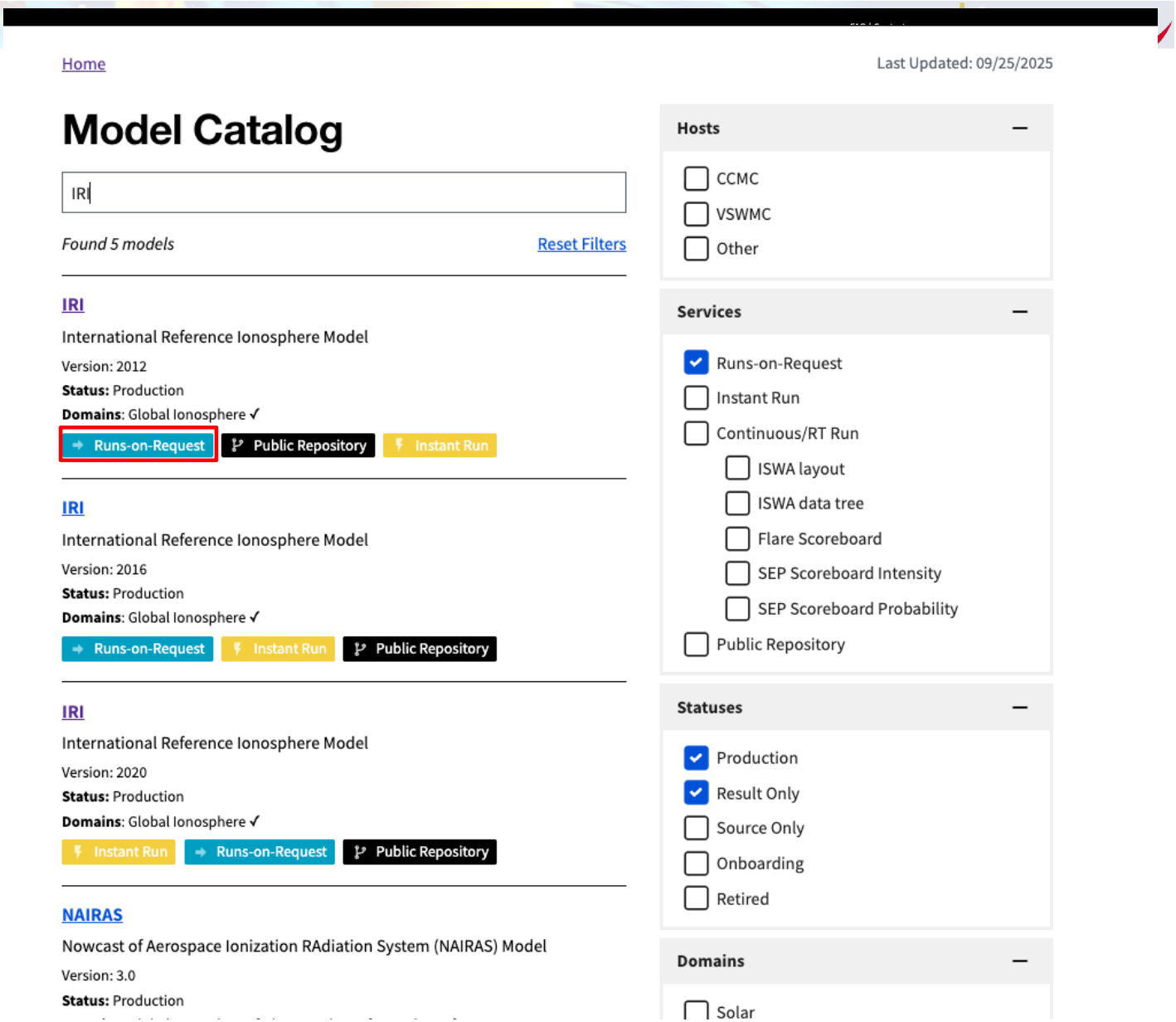
CCMC Instant Run Service-Optional Parameters

Optional parameters
Ne topside
foF2 model
hmF2 model
Sporadic E Occ Prob
Bottomside Thickness B0
F1 model
D model
Te model
Ti model
Ion Comp model
Auroral Boundary Model
Input parameters

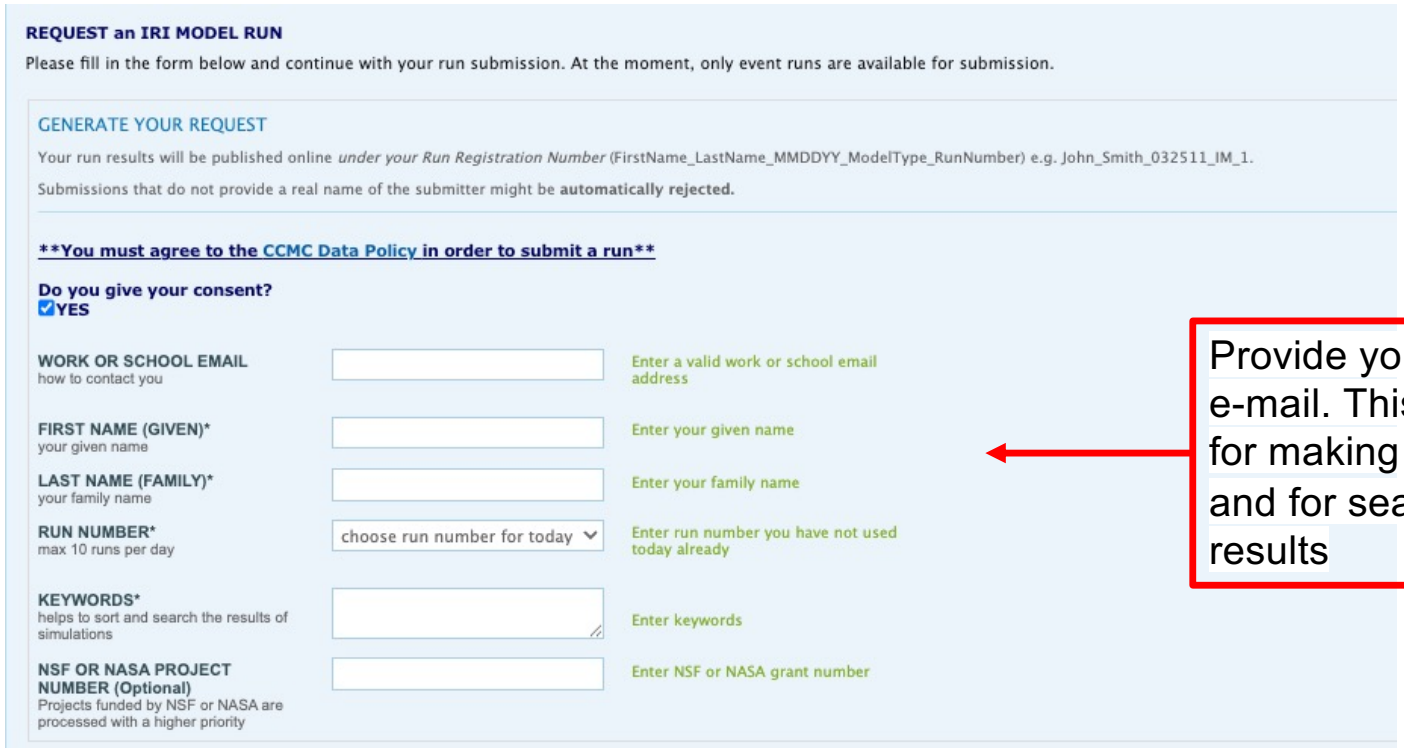


IRI ROR Service

Go to the CCMC website!
https://ccmc.gsfc.nasa.gov/

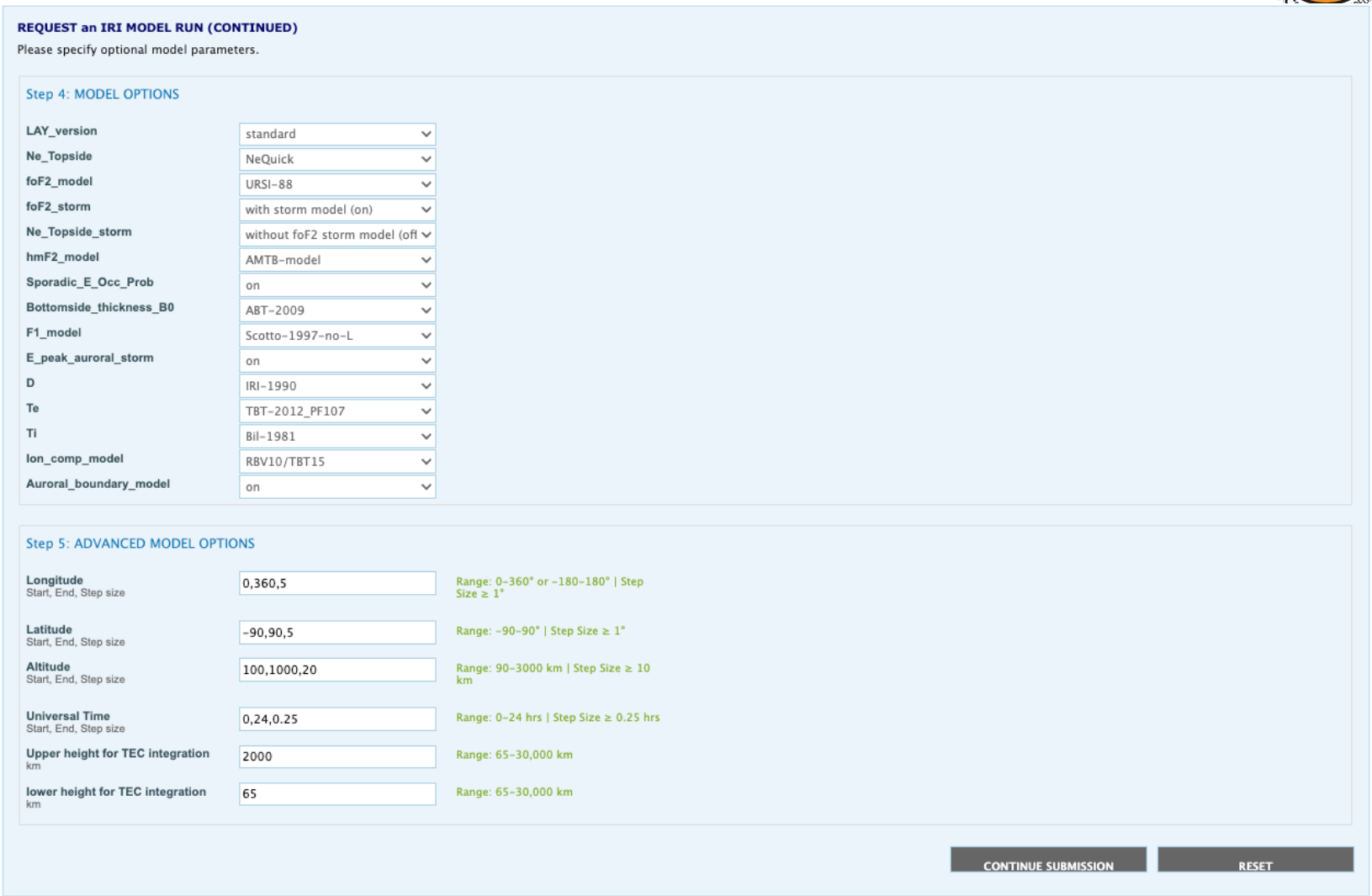


IRI ROR Service



Provide your first name, last name, and e-mail. This will generate a run number for making inquiries about your request and for searching/viewing the run's results

IRI ROR Service



REQUEST an IRI MODEL RUN (CONTINUED)

Please specify optional model parameters.

Step 4: MODEL OPTIONS

LAY_version	standard
Ne_Topside	NeQuick
foF2_model	URSI-88
foF2_storm	with storm model (on)
Ne_Topside_storm	without foF2 storm model (off
hmF2_model	AMTB-model
Sporadic_E_Occ_Prob	on
Bottomside_thickness_B0	ABT-2009
F1_model	Scotto-1997-no-L
E_peak_auroral_storm	on
D	IRI-1990
Te	TBT-2012_PF107
Ti	Bil-1981
Ion_comp_model	RBV10/TBT15
Auroral_boundary_model	on

Step 5: ADVANCED MODEL OPTIONS

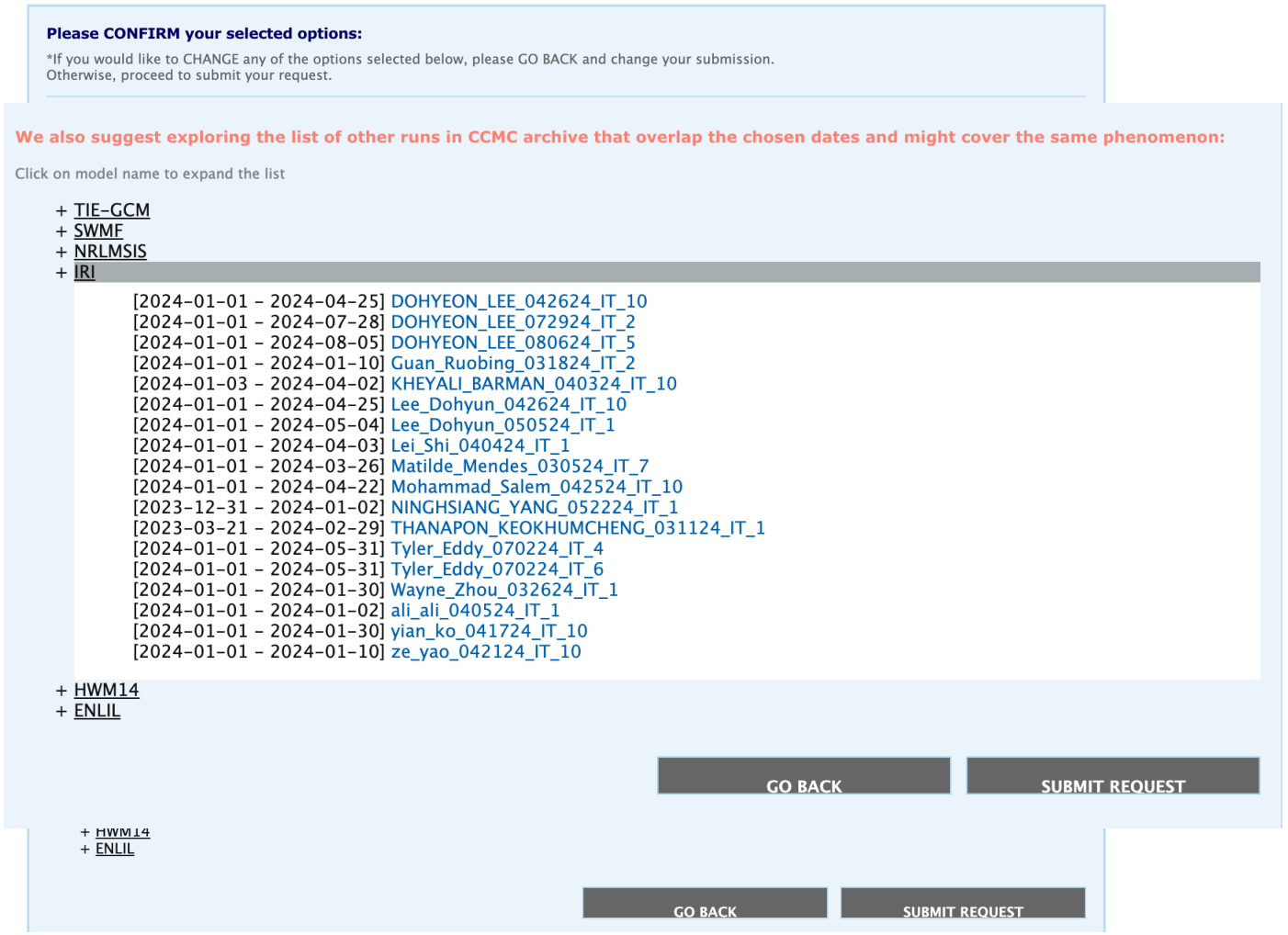
Longitude Start, End, Step size	0,360,5	Range: 0-360° or -180-180° | Step Size ≥ 1°
Latitude Start, End, Step size	-90,90,5	Range: -90-90° | Step Size ≥ 1°
Altitude Start, End, Step size	100,1000,20	Range: 90-3000 km | Step Size ≥ 10 km
Universal Time Start, End, Step size	0,24,0.25	Range: 0-24 hrs | Step Size ≥ 0.25 hrs
Upper height for TEC integration km	2000	Range: 65-30,000 km
lower height for TEC integration km	65	Range: 65-30,000 km

CONTINUE SUBMISSION RESET

IRI

s

IRI ROR Service-Historic runs



Please CONFIRM your selected options:

*If you would like to CHANGE any of the options selected below, please GO BACK and change your submission.
Otherwise, proceed to submit your request.

We also suggest exploring the list of other runs in CCMC archive that overlap the chosen dates and might cover the same phenomenon:

Click on model name to expand the list

+ TIE-GCM
+ SWMF
+ NRLMSIS
+ IRI

[2024-01-01 - 2024-04-25] DOHYEON_LEE_042624_IT_10
[2024-01-01 - 2024-07-28] DOHYEON_LEE_072924_IT_2
[2024-01-01 - 2024-08-05] DOHYEON_LEE_080624_IT_5
[2024-01-01 - 2024-01-10] Guan_Ruobing_031824_IT_2
[2024-01-03 - 2024-04-02] KHEYALI_BARMAN_040324_IT_10
[2024-01-01 - 2024-04-25] Lee_Dohyun_042624_IT_10
[2024-01-01 - 2024-05-04] Lee_Dohyun_050524_IT_1
[2024-01-01 - 2024-04-03] Lei_Shi_040424_IT_1
[2024-01-01 - 2024-03-26] Matilde_Mendes_030524_IT_7
[2024-01-01 - 2024-04-22] Mohammad_Salem_042524_IT_10
[2023-12-31 - 2024-01-02] NINGHSIANG_YANG_052224_IT_1
[2023-03-21 - 2024-02-29] THANAPON_KEOKHUMCHENG_031124_IT_1
[2024-01-01 - 2024-05-31] Tyler_Eddy_070224_IT_4
[2024-01-01 - 2024-05-31] Tyler_Eddy_070224_IT_6
[2024-01-01 - 2024-01-30] Wayne_Zhou_032624_IT_1
[2024-01-01 - 2024-01-02] ali_ali_040524_IT_1
[2024-01-01 - 2024-01-30] yian_ko_041724_IT_10
[2024-01-01 - 2024-01-10] ze_yao_042124_IT_10

+ HWM14
+ ENLIL

GO BACK SUBMIT REQUEST

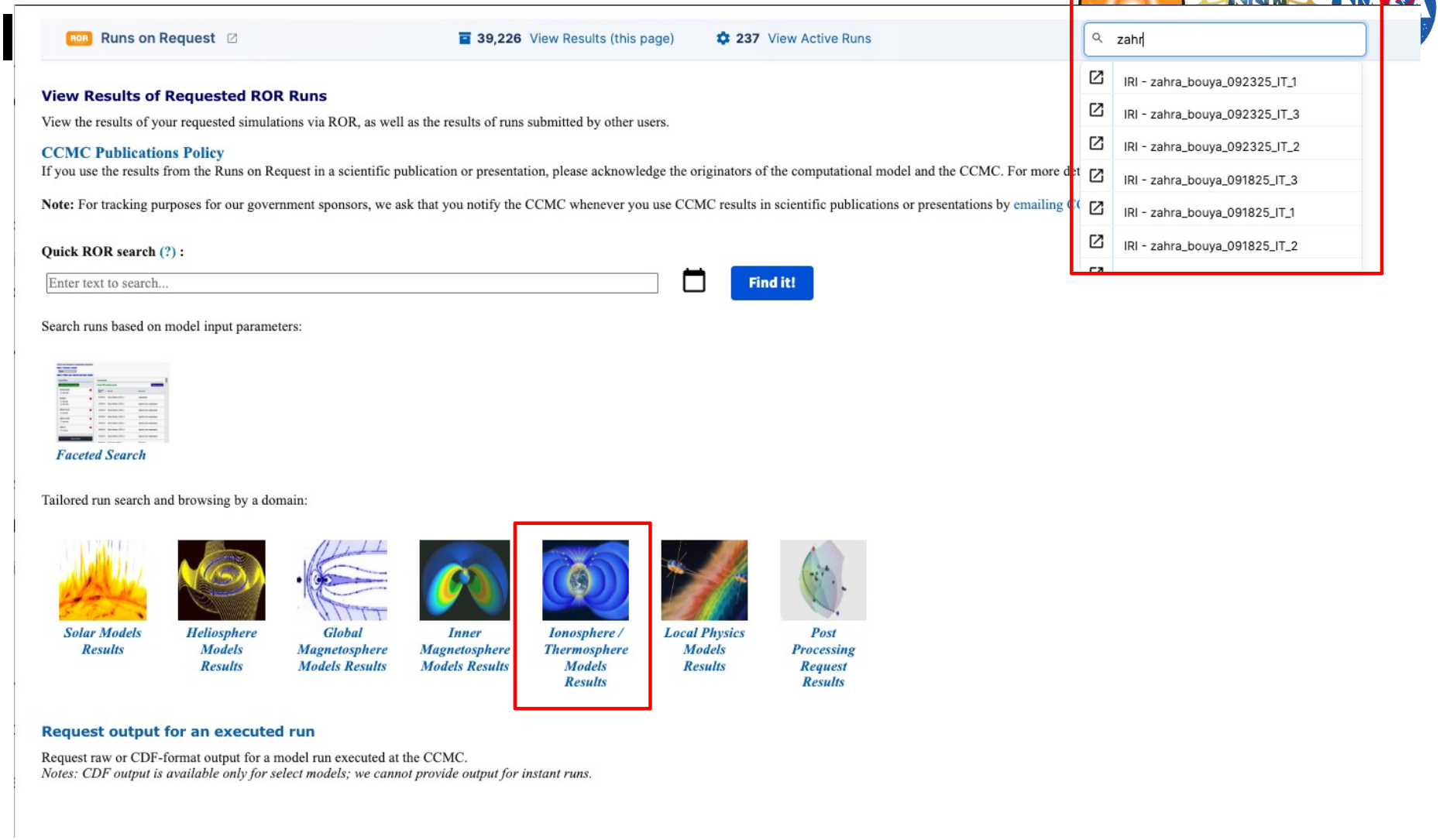
+ HWM14
+ ENLIL

GO BACK SUBMIT REQUEST

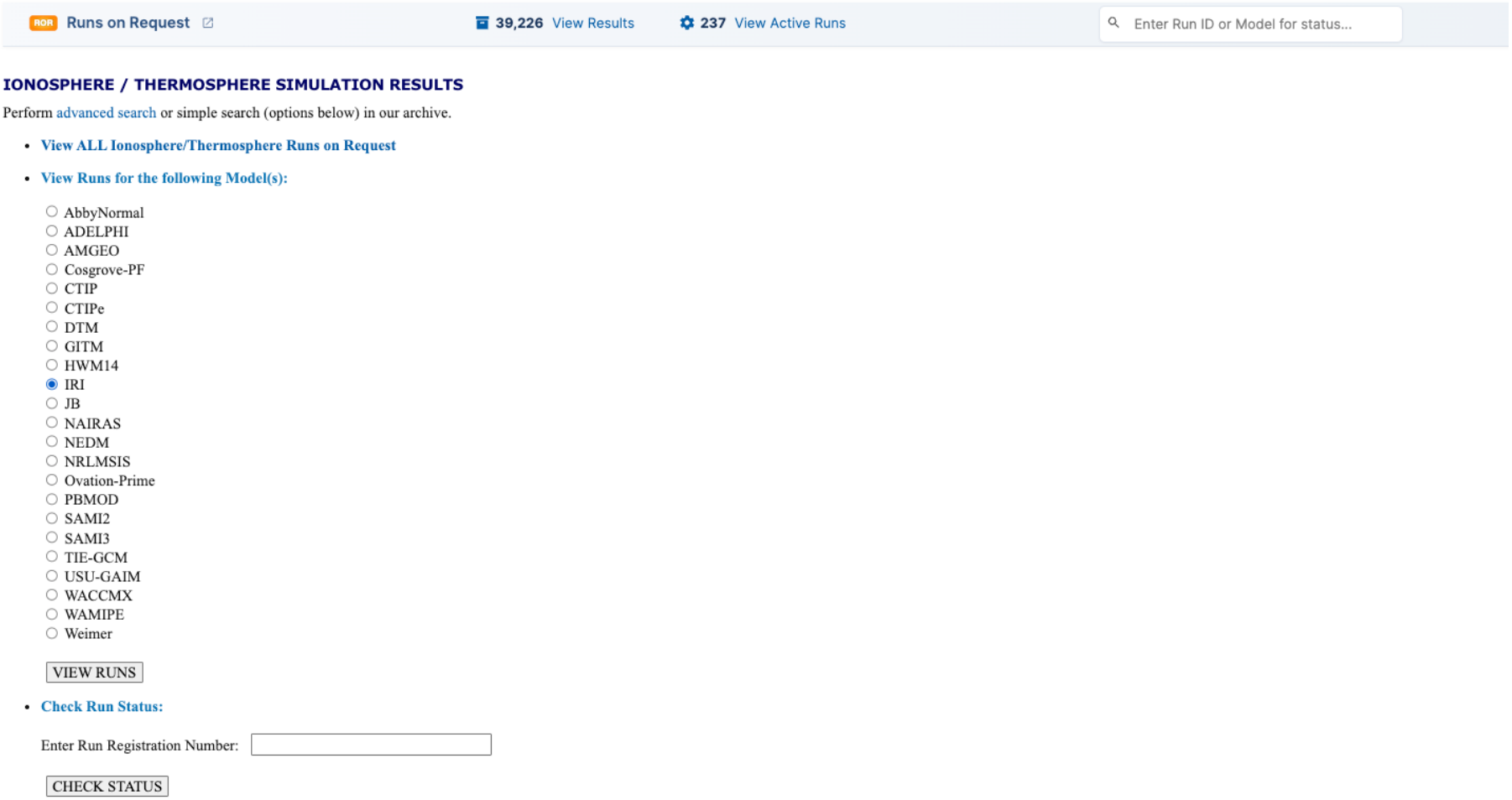
Important!

Every submission takes time and resource

Model


Runs on Request
39,226 View Results (this page)
237 View Active Runs
View Results of Requested ROR Runs
View the results of your requested simulations via ROR, as well as the results of runs submitted by other users.
CCMC Publications Policy
If you use the results from the Runs on Request in a scientific publication or presentation, please acknowledge the originators of the computational model and the CCMC. For more de
Note: For tracking purposes for our government sponsors, we ask that you notify the CCMC whenever you use CCMC results in scientific publications or presentations by emailing C
Quick ROR search (?) :
Enter text to search...
Find it!
Search runs based on model input parameters:
Faceted Search
Tailored run search and browsing by a domain:
Solar Models Results
Heliosphere Models Results
Global Magnetosphere Models Results
Inner Magnetosphere Models Results
Ionosphere / Thermosphere Models Results
Local Physics Models Results
Post Processing Request Results
Request output for an executed run
Request raw or CDF-format output for a model run executed at the CCMC.
Notes: CDF output is available only for select models; we cannot provide output for instant runs.
zahr
IRI - zahra_bouya_092325_IT_1
IRI - zahra_bouya_092325_IT_3
IRI - zahra_bouya_092325_IT_2
IRI - zahra_bouya_091825_IT_3
IRI - zahra_bouya_091825_IT_1
IRI - zahra_bouya_091825_IT_2

Model Visualization and Archive



Model Visualization and Archive

▸Runs on Request: IT Simulations Results

Total Number of Runs in the Database: 12847
Total Number of Search Results in this Database: 1389

* Please scroll on the table horizontally to see all of the columns

Status	Run Number	Key Words	Model	Model Version	Validation Level	Year	DoY at Start	F10.7 at Start	F10.7 (three year average)	Run Type	Input Type	Event Date	Start Time	Run Duration	2D or 3D Model	Geographic Latitude of Magnetic Longitudinal Slice (for 2D Model)	Geographic Longitude of Magnetic Longitudinal Slice (for 2D Model)	Minimum Altitude at Magnetic Equator (for 2D Model)	Maximur Altitude at Magneti Equator (for 2D Model)
Published	Aswini_SL_092525_IT_1	IONOSPHERE TEC	IRI	IRI2020	--	2024	286	0.00000	0.00	event	--	12, 2024	00:00:00	5760	--	0.00	0.00	--	--
Published	zahra_bouya_092325_IT_2	research	IRI	IRI2020	--	2023	60	0.00000	0.00	event	--	01, 2023	00:00:00	43200	--	0.00	0.00	--	--
Published	zahra_bouya_092325_IT_1	research	IRI	IRI2020	--	2025	220	0.00000	0.00	event	--	08, 2025	00:00:00	66240	--	0.00	0.00	--	--
Published	zahra_bouya_092325_IT_3	research	IRI	IRI2020	--	2023	90	0.00000	0.00	event	--	31, 2023	00:00:00	43200	--	0.00	0.00	--	--
Published	chen_haonan_092225_IT_1	2017250	IRI	IRI2020	--	2017	249	0.00000	0.00	event	--	06, 2017	00:00:00	2880	--	0.00	0.00	--	--
Published	Jie_Zhang_092225_IT_5	TEC	IRI	IRI2020	--	2025	100	0.00000	0.00	event	--	10, 2025	00:00:00	72000	--	0.00	0.00	--	--
Published	Jie_Zhang_092125_IT_5	TEC	IRI	IRI2020	--	2025	100	0.00000	0.00	event	--	10, 2025	00:00:00	72000	--	0.00	0.00	--	--
Published	zahra_bouya_091825_IT_1	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	38880	--	0.00	0.00	--	--
Published	zahra_bouya_091825_IT_2	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	40320	--	0.00	0.00	--	--
Published	zahra_bouya_091825_IT_3	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	40320	--	0.00	0.00	--	--
Published	zahra_bouya_091725_IT_3	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	38880	--	0.00	0.00	--	--
Published	zahra_bouya_091725_IT_4	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	38880	--	0.00	0.00	--	--
Published	zahra_bouya_091725_IT_5	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	38880	--	0.00	0.00	--	--
Published	zahra_bouya_091725_IT_1	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	38880	--	0.00	0.00	--	--
Published	Prajakta_Chougule_091625_IT_1	Total Electron content over India\r\n	IRI	IRI2020	--	2023	59	0.00000	0.00	event	--	28, 2023	00:00:00	102240	--	0.00	0.00	--	--
Published	zahra_bouya_091525_IT_2	research	IRI	IRI2020	--	2023	81	0.00000	0.00	event	--	22, 2023	00:00:00	63360	--	0.00	0.00	--	--
Published	zahra_bouya_091525_IT_1	research	IRI	IRI2020	--	2025	232	0.00000	0.00	event	--	20, 2025	00:00:00	36000	--	0.00	0.00	--	--
Published	cy_Fei_091325_IT_5	2020TEC	IRI	IRI2016	--	2020	1	0.00000	0.00	event	--	01, 2020	00:00:00	524160	--	0.00	0.00	--	--
Published	cy_Fei_091325_IT_4	2021TEC	IRI	IRI2020	--	2021	1	0.00000	0.00	event	--	01, 2021	00:00:00	524160	--	0.00	0.00	--	--
Published	cy_fei_091225_IT_1	TEC2020	IRI	IRI2020	--	2020	1	0.00000	0.00	event	--	01, 2020	00:00:00	524160	--	0.00	0.00	--	--
Published	cy_fei_091225_IT_2	2020fof2	IRI	IRI2020	--	2020	1	0.00000	0.00	event	--	01, 2020	00:00:00	524160	--	0.00	0.00	--	--
Published	cy_fei_091225_IT_3	2020tec	IRI	IRI2020	--	2020	1	0.00000	0.00	event	--	01, 2020	00:00:00	524160	--	0.00	0.00	--	--
Published	RAJESH_BARAD_091025_IT_1	rkb	IRI	IRI2020	--	2025	200	0.00000	0.00	event	--	19, 2025	00:00:00	28800	--	0.00	0.00	--	--
Published	Lin_Zhishu_090925_IT_1	--	IRI	IRI2016	--	2020	200	0.00000	0.00	event	--	18, 2020	00:00:00	1440	--	0.00	0.00	--	--
Published	anahita_roshani_090325_IT_1	--	IRI	IRI2020	--	2025	1	0.00000	0.00	event	--	01, 2025	00:00:00	2880	--	0.00	0.00	--	--
Published	zahra_bouya_090325_IT_4	--	IRI	IRI2020	--	2025	236	0.00000	0.00	event	--	24, 2025	00:00:00	12960	--	0.00	0.00	--	--
Published	haijun_wu_090225_IT_1	--	IRI	IRI2020	--	2013	76	0.00000	0.00	event	--	17, 2013	00:00:00	1440	--	0.00	0.00	--	--
Published	Gabriela_Felix_090125_IT_10	--	IRI	IRI2016	--	2001	1	0.00000	0.00	event	--	01, 2001	00:00:00	525600	--	0.00	0.00	--	--
Published	Malkiat_Singh_083125_IT_1	--	IRI	IRI2016	--	2025	160	0.00000	0.00	event	--	09, 2025	00:00:00	1440	--	0.00	0.00	--	--
Published	Maryna_Shulha_082825_IT_1	--	IRI	IRI2020	--	2008	292	0.00000	0.00	event	--	18, 2008	00:00:00	17280	--	0.00	0.00	--	--
Published	Hager_Salah_082825_IT_10	--	IRI	IRI2020	--	2024	1	0.00000	0.00	event	--	01, 2024	00:00:00	524160	--	0.00	0.00	--	--
Published	Maryna_Shulha_082725_IT_1	--	IRI	IRI2020	--	2008	297	0.00000	0.00	event	--	23, 2008	00:00:00	12960	--	0.00	0.00	--	--
Published	kexin_ZHOU_082725_IT_10	--	IRI	IRI2020	--	2024	5	0.00000	0.00	event	--	05, 2024	00:00:00	522720	--	0.00	0.00	--	--

Model Visualization and Archive

YI-AN_KO_052124_IT_8

Run Status: Run Complete

Status updated: 2024-05-21T13:29:57+0000

Run Metadata

Metadata Record:	View Full Run Metadata in the CCM
Metadata as JSON:	View Full Run Metadata as JSON
Model Domain:	IT
Model Name:	IRI
Model Version:	IRI2016
Coordinate System for the output:	GEO
Run type:	event
Start Time (Year/Doy):	2023/152
Duration of the run:	19 days

CCMC model visualization

Output Data

- View 3D Ionosphere/Thermosphere
- Create Timeseries in 3D Ionosphere/Thermosphere
- View output in Kamodo

Run Services

Model data archive

- Request output data as a single archive file
- Browse output data

- CMR Home
- View Metadata
- Login

Run Description

CCMC ROR run for IRI 2016 with RORID YI-AN_KO_052124_IT_8

Simulation Time:

Simulation Start Time: 2023-06-01T00:00:00Z
Simulation End Time: 2023-06-20T00:00:00Z
Time Step in second: 900
Simulation Time Description:
Simulation Time Caveats:

Temporal Dependence (whether the outputs of the simulation code are time-dependent?): ***true***

Regions:

Earth.NearSurface.Ionosphere

Simulation Domain :

Contacts :

YIAN.KO, ModelUser

List of Run Input Parameter Grouping and their associated properties :

Name	Description	Caveats	Properties				
			Name	Description	Caveats	Units	Default Value or
			LAY_version	Standard profile or Lay-function formalism			standard
			Ne_Topside	Ne_Topside model with the following options 1.IRI-2001 2.CORI 3.IRIcor 4.NeQuick			NeQuick
			foF2_model	foF2 model with the following options 1.CCIR 2.URSI-88			URSI-88
			foF2_storm	foF2_storm: t (on)=with storm model and f (off)=without			on
			hmF2_model	hmF2 model with the following options: 1.f(M3000F2) 2.AMTB-model 3.Shubin-COSMIC model			AMTB-model
			Bottomside_thickness_B0	B0 bottomside thickness with the following options: 1. BI-2000 2. ABT-2009 3. Gul-1987			ABT-2009

View 3D Ionosphere/Thermosphere

Update Plot *Update Plot* will update (generate) the plot with the chosen time and plot parameters below.
This will take some time (typically 10-30s) as data are read in and processed.

Choose data time:
Date: 2023/06/01 Time: 00:30:00

Change time (relative to selected time above)

Create GIF movie (and archive of ASCII data outputs) with current plot settings

Choose **Plot Mode**:
Contour (2D)

Show advanced options

Choose quantity to be displayed:
Q 1: N_e
Customized variables are possible!
Email the formula that you would like to see and that uses existing quantities to Lutz and it will be tested and added.

Plot Options for selected Plot Modes:

Contour:
show values with contour levels
16 **Number of Levels**

Lock range:
Min.: 0 Max.: 1
Log scale (use all data>0 in non-negative fields)

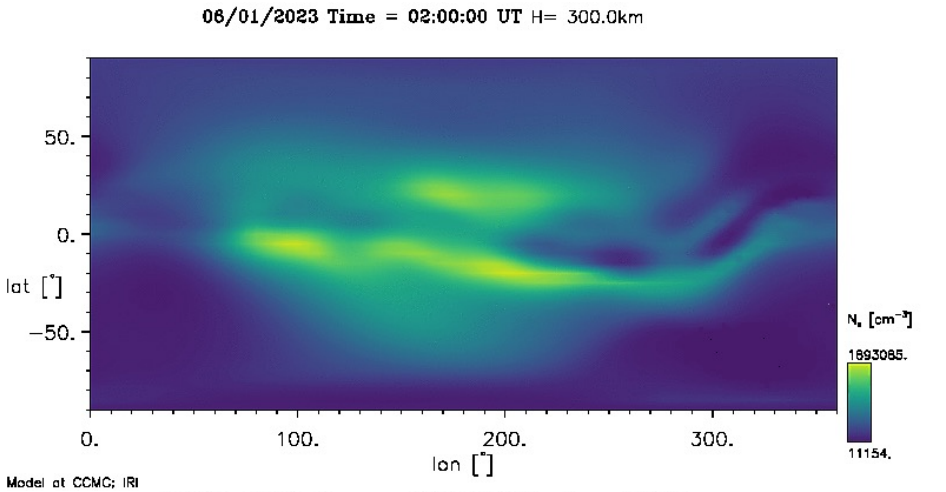
Choose Plot Area:
All **Plot Modes** except **Line Plot** and **Vertical Plot**: Select lower left corner of plot area on the left, and the upper right corner on the right.

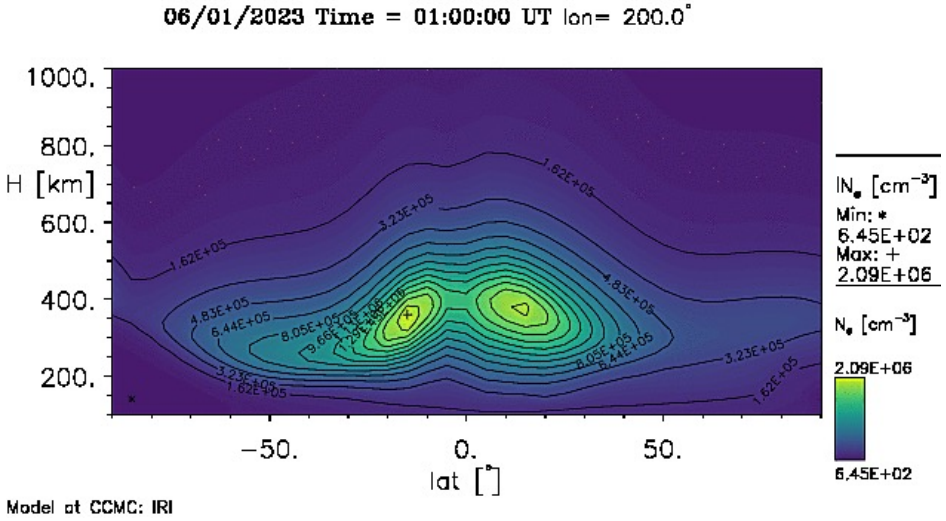
Choose Cut Plane:

Range: 0 ... 360 deg — lon=constant 200

lat_1 -90 lat_2 90 Range: -90 ... 90 deg — lat=constant 0

H_1 100 H_2 1000 Range: 100 ... 1000 km — H=constant 300





Add Satellite Position to Plot

Choose data time:
Date: 2023/06/01 Time: 00:30:00

Change time (relative to selected time above)

Create GIF movie (and archive of ASCII data outputs) with current plot settings

Choose **Plot Mode**:
ColorContour (2D)

Show advanced options

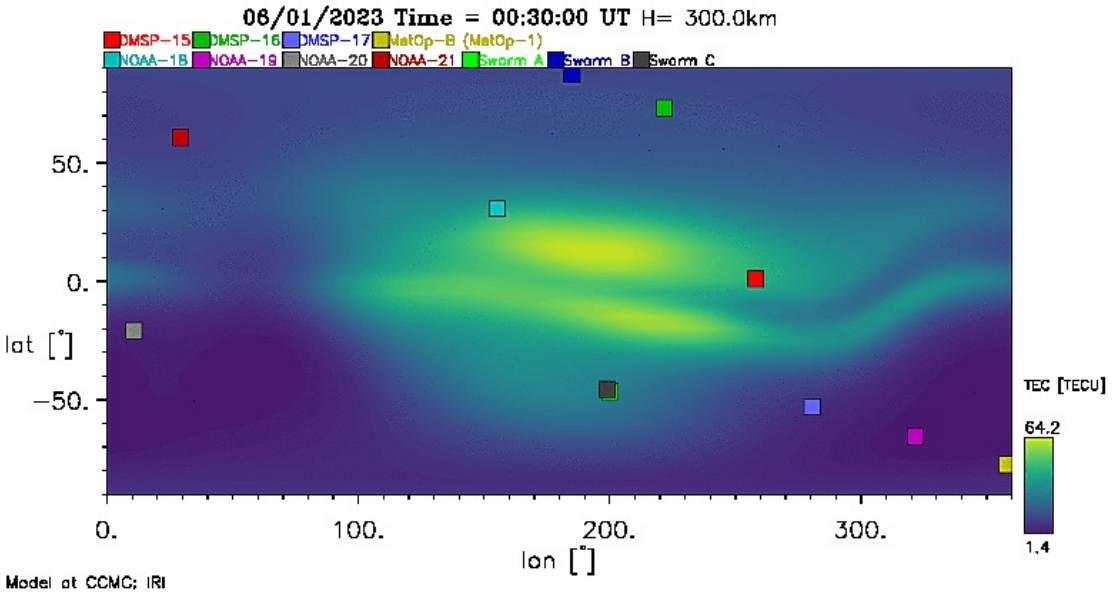
Plot Options:

Show Continents
Image magnification 1.25
(all images; use >=1.25 for 3D Flowlines)
Line thickness 1 (flow lines, arrows)
Character thickness 1 (all annotations)
Allow variable plot image size
(all 2D plots: aspect ratio dx/dy between **0.3** and **4**)
Show simulation grid
Interpolate data onto equidistant grid)
New: **Add satellite position to plot:**

AEROCUBE-6A AEROCUBE-6B AIM
Aqua Arase (ERG) Aura
CALIPSO CASSIOPE Cloudsat
DMSP-15 DMSP-16 DMSP-17
DMSP-18 FIREBIRD 3 FIREBIRD 4
GCOM-W1 GOSAT GRACE-FO1
GRACE-FO2 Hinode IRIS
ISS Landsat7 Landsat8
Landsat9 MetOp-B (MetOp-1) NOAA-15
NOAA-18 NOAA-19 NOAA-20
NOAA-21 Oersted Reimei
SPORT Suomi NPP Swarm A
Swarm B Swarm C THEMIS-A (P5)
THEMIS-D (P3) THEMIS-E (P4) TIMED

Note: Satellite positions are projected onto the selected cut plane if within the selected plot area.
Satellite positions may be far away from the selected cut plane.

Trace flow or field line from satellite positions using vector field NoVector



Timeseries plot visualization

Model: IRI
Run: YI-AN_KO_052124_IT_8

Publication Policy: Please contact the model owners before you use results for any presentation or publication (full Publication Policy).
To track usage for our government sponsors, we ask that you notify CCMC staff whenever you use CCMC results in a scientific publication or presentation. Thank you.
Go back to web page of run

Update Plot *Update Plot* will update (generate) the plot with the chosen time and plot parameters below.
This will take some time (typically 10-30s) as data are read in and processed.

Plot Options:

☐ **Use satellite track**

○ upload trajectory file: Choose File No file chosen
Text file with 10 space-separated columns of numbers headed by 'Year Month Day Hour Minute Second ms Lon Lat H' (≤100000 lines of ≤150 characters each).
◉ Use satellite name at SSCWeb (**April 9, 2020: this feature may fail with the response time from SSCWeb being unusually long. We have contacted them to resolve the issue.**):
AEROCUBE-6A
Note: Satellites may not always be in the modeled region and model data may be unavailable.

Date/Time$_1$: Date: 2023/06/01 Time: 00:00:00
Date/Time$_2$: Date: 2023/06/01 Time: 23:45:00
Time sampling rate:
model data

Image magnification 1
(all images; use >=1.25 for 3D Flowlines)

Choose **Plot Mode**: ColorContour (2D)
Choose **quantity** to be displayed (some **Plot Modes** require up to three choices):
Q 1: T_n Q 2: T_n Q 3: T_i

Plot Options for selected Plot Modes:

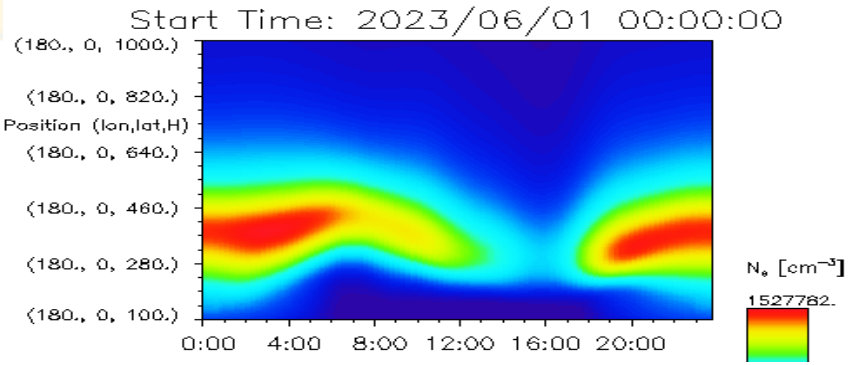
Trajectory Plots:
View angles:
AX [-90..90]: 30 AZ [-180 ... 180]: 30
Color Contour, Trajectory Scalar:
Color table: gsfc2-95
☐ **Lock color range:**
Min.: -1 Max.: 1
☐ **Log scale** (use all data>0 in non-negative fields)
Contour: ☑ **show values with contour levels**
Vector: **length of arrows**: 3.0

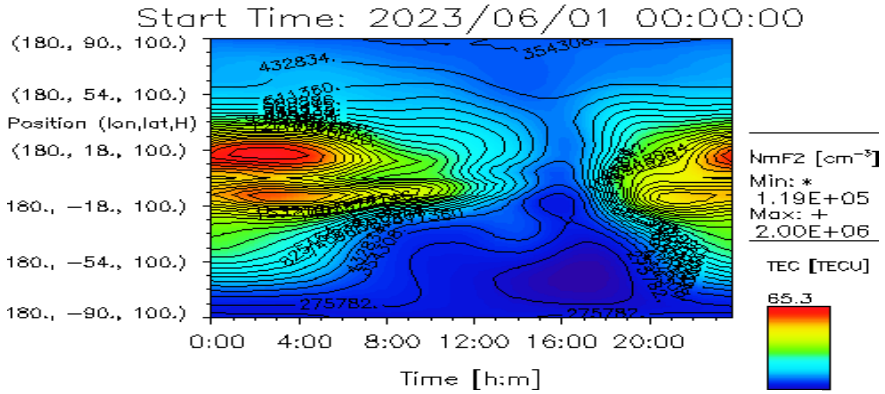
Choose Plot Area:

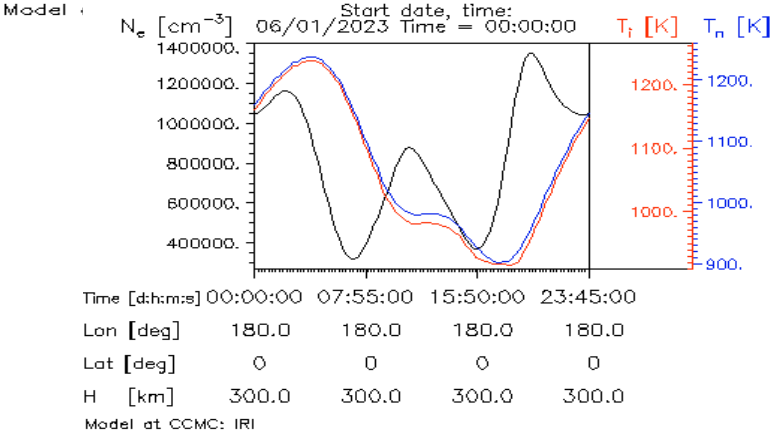
Line Plot and **Trajectory Plot:** Select start point of line on the left, the end point on the right.
(Color)Contour Plot: Select start point of spatial line on the left, the end point on the right.
A time interval of non-zero length has to be selected, too.

Lon$_1$	180	Lon$_2$	180	Range: -360 ... 360 deg.
Lat$_1$	0	Lat$_2$	0	Range: -90 ... 90 deg.
H$_1$	100	H$_2$	1000	Range: 100 ... 1000 km

Reset Form *Reset Form* will reset changes to the defaults specified by the previous run of this script.
Update Plot *Update Plot* will update (generate) the plot with the chosen time and plot parameters above.





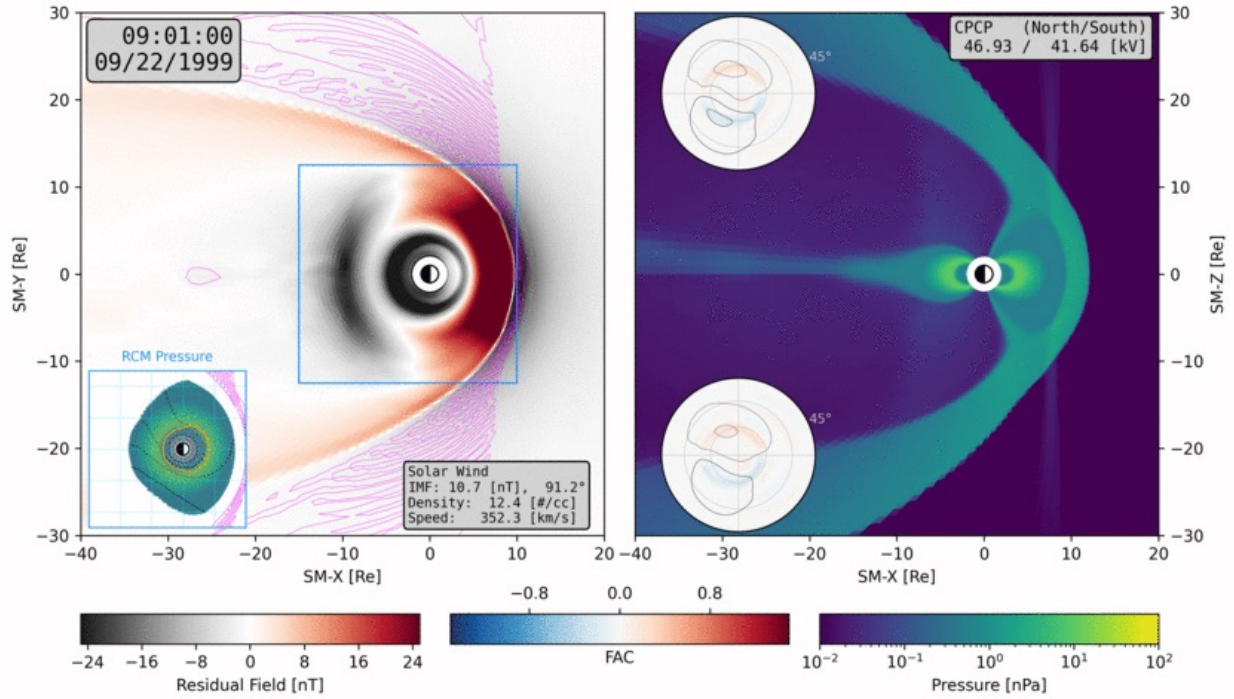


Thank you

Backup slides

MAGE (Multiscale Atmosphere Geospace Environment model suite)

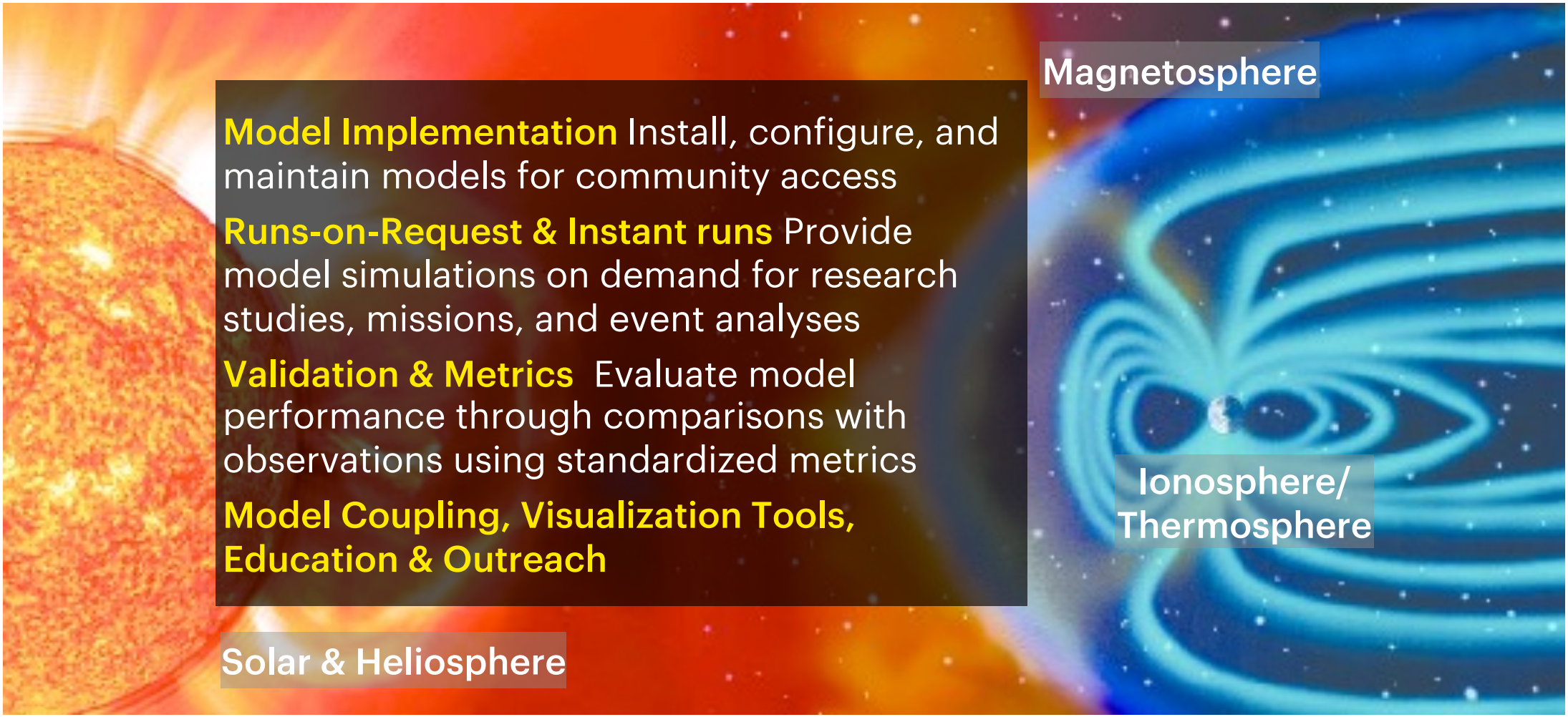
First Deliverable to CCMC from NASA DRIVE Science Center for Geospace Storms(CGS)



MAGE model is a comprehensive geospace modeling framework
- coupled GAMERA magnetosphere
- RCM ring current
- ReMIX ionosphere electrostatics solver

- **Kaipy**, visualization tools developed by CGS, is available at the CCMC
- Provides on-the-fly visualization w/o requiring dataset downloads

CCMC mission: Bridging the Gap Between Space Weather Model Development and End Users



Community Coordinated Modeling Center

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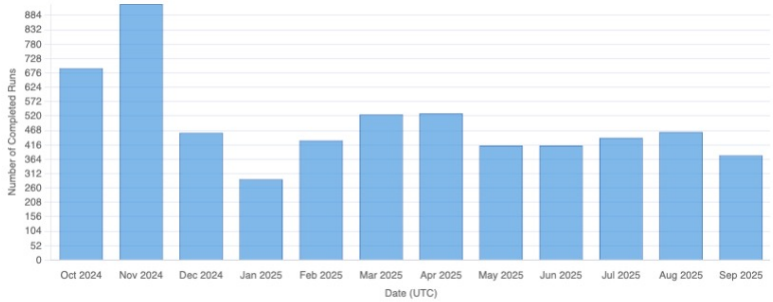
Requests Dashboard - Runs-On-Request ROR

Filter by Request ID | Show All Models | Total Requests in Pipeline: **240** | Special Requests: **40** | Hide Completed Runs Chart

Completed Runs per Month



Last 7 Days | Last 30 Days | Last 12 Months

New Requests

[SAMI3] Sneha_Vengurlekar_062625_IT_1	In Queue
[MAGE] Sydney_Kinsella_062725_GM_3	
[MAGE] Sydney_Kinsella_070325_GM_1	
[MAGE] Annmarie_Scalise_070325_GM_1	
[MAGE] Annmarie_Scalise_070325_GM_3	
[MAGE] Sydney_Kinsella_071125_GM_2	
[MAGE] Annmarie_Scalise_071125_GM_1	
[MAGE] Sydney_Kinsella_071125_GM_3	
[MAGE] Annmarie_Scalise_071125_GM_2	
[MAGE] Annmarie_Scalise_071125_GM_3	
[SWMF-AWSoM] Igor_Sokolov_071625_SH_1	
[GAMERA-Helio] SHIVAM_PARASHAR_072425_SH_1	In Queue
[SAMI3] SAMI3-WACCMX-01_2002-03-TP-01_080825_IT_1	
[SAMI3] SAMI3-HWM-01_2003-08-TP-02_081225_IT_1	
[SAMI3] SAMI3-HWM-01_2004-02-TP-01_081225_IT_1	
[SAMI3] SAMI3-TIEGCM-01_2006-11-TP-01_081225_IT_1	
[SAMI3] SAMI3-TIEGCM-01_2003-05-TP-02_081225_IT_1	
[SAMI3] SAMI3-WACCMX-01_2003-05-TP-02_081425_IT_1	
[SAMI3] SAMI3-TIEGCM-01_2004-02-TP-01_081425_IT_1	
[SAMI3] SAMI3-HWM-01_2005-01-TP-02_081425_IT_1	

coconut

Currently using 49% of 1200 cores

[LFM] Jose_Espinoza_061625_GM_1	Error
[LFM] Jose_Espinoza_061625_GM_2	Error
[ENLIL] Arik_Posner_071825_SH_1	Error
[SWMF] Amar_Deep_082225_GM_1	88%
[SWMF] X_GOU_082525_GM_1	33%
[SWMF] Michaela_Mooney_091825_GM_1	20%
[ENLIL] PreitySukla_Sahani_092425_SH_1	100%
[ENLIL] PreitySukla_Sahani_092425_SH_2	90%

dream

Currently using 35% of 800 cores

[CORHEL] NITIN_VASHISHTHA_090725_SH_1	1%
[CORHEL] Peter_MacNeice_092425_SH_1	1%

lahaina

Currently using 14% of 960 cores

[SAMI3] shadow_Junior_082225_IT_9	Post Processing

peanut

Currently using 50% of 1456 cores

[OpenGGCM] SHERINANN_ABRAHAM_070825_GM_1	Post Processing
[OpenGGCM] SHERINANN_ABRAHAM_070825_GM_3	Post Processing
[OpenGGCM] SHERINANN_ABRAHAM_070825_GM_7	Post Processing
[SWMF] yu_gan_091525_GM_2	Post Processing
[SWMF] he_shen_091625_GM_2	Post Processing
[SWMF] Christopher_Ramos_091925_GM_1	

pecan

Currently using 0% of 2112 cores

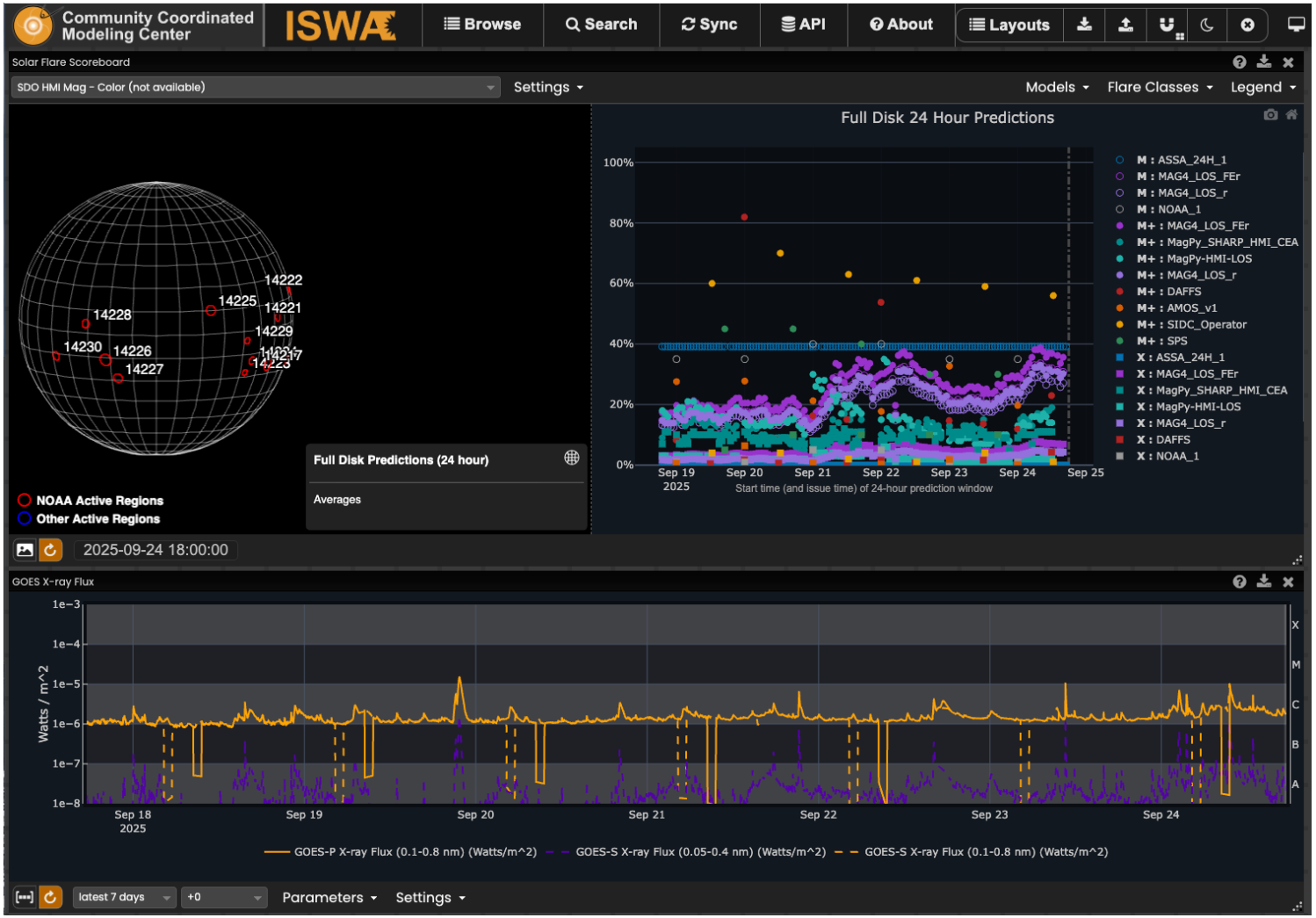
[TIE-GCM] aibin_zhang_090325_IT_5	Error

ror

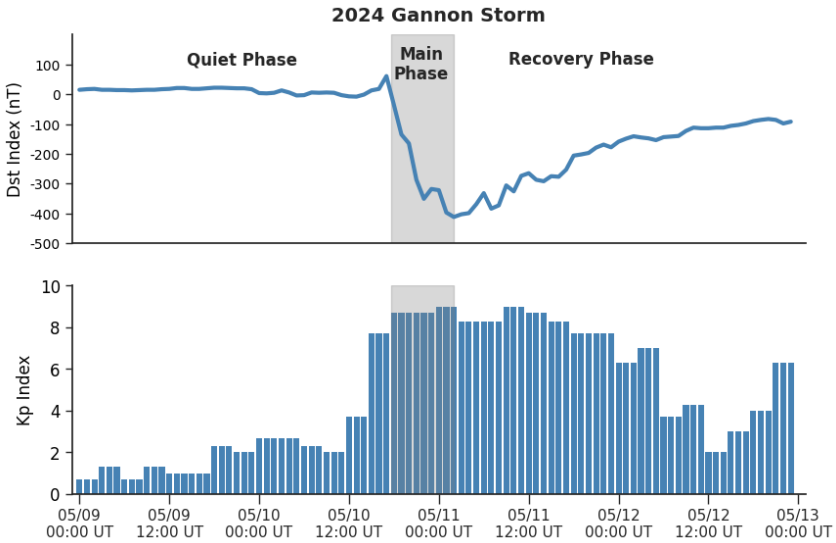
[EUHFORIA] Maksym_Petrenko_053025_SH_1	
[NLFF] Manju_Sudhakar_060525_SH_2	
[AMGEO] SHERIN_ABRAHAM_082425_IT_1	
[AMGEO] SHERIN_ABRAHAM_082425_IT_2	
[AMGEO] SHERIN_ABRAHAM_082525_IT_1	
[AMGEO] SHERIN_ABRAHAM_082525_IT_2	

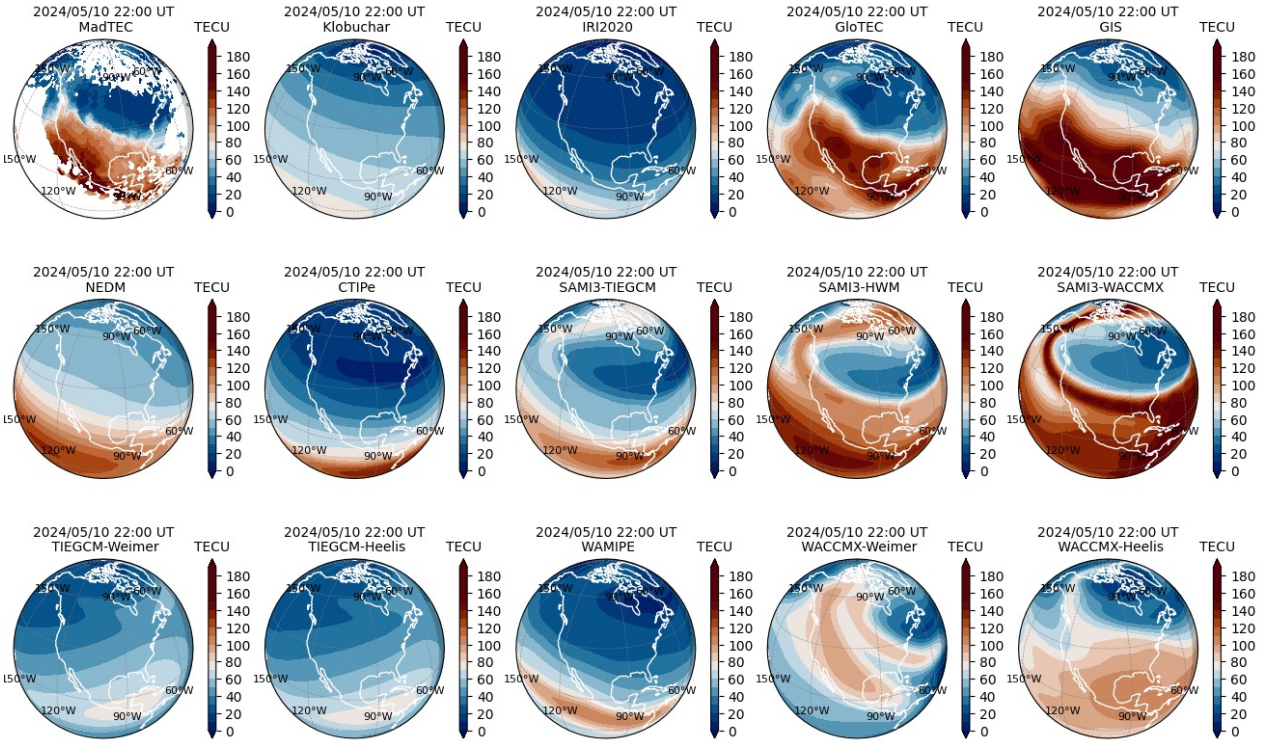
Flare Scoreboard

Real-time forecasting methods validation for predicting solar flare events

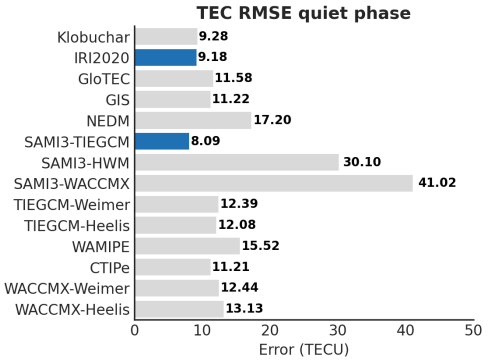


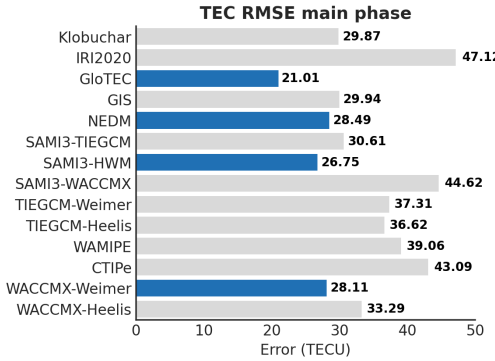
Ionospheric Model Validation during the 2024 Gannon Storm

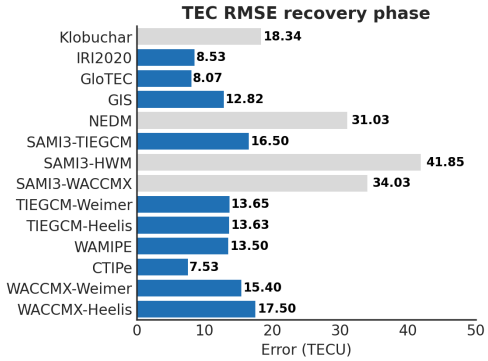


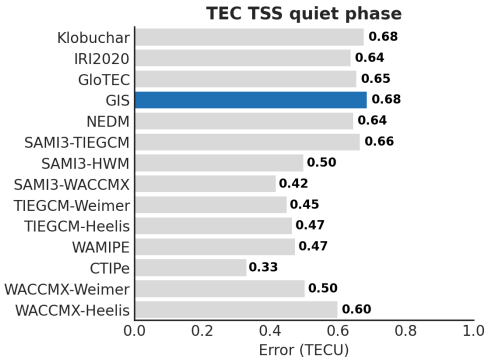


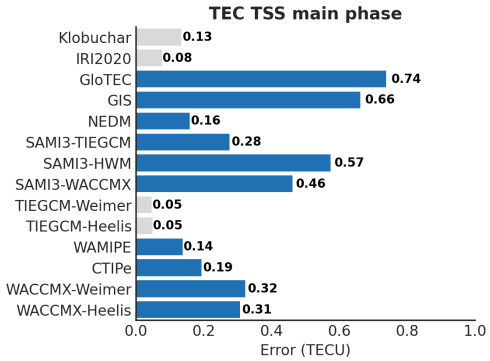
Performance Metric and Skill Score

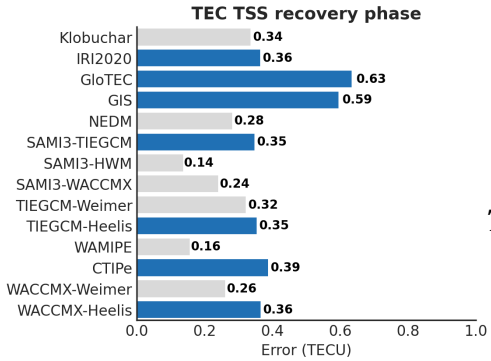












- RMSE evaluates the model accuracy

- Taylor Skill Score (Taylor, 2001) evaluates skills in simulating ionosphere TEC spatial and temporal variations

$$TSS = \frac{4(1+R)^4}{(\sigma_{mod}/\sigma_{obs} + \sigma_{obs}/\sigma_{mod})^2(1+R_0)^4}$$

TSS=1 perfect
TSS=0 worst

Space weather societal impact

- Ionosphere variability (navigation, communications)
- Atmosphere variability (satellite/debris drag)
- Geomagnetically induced currents - GICs (electric power systems)
- Near-earth radiation and plasma environment (aerospace assets functionality)
- Solar energetic particles - SEPs (human exploration, aviation safety, aerospace assets functionality)
- Galactic cosmic rays - GCRs (human exploration, aviation safety, aerospace assets functionality)