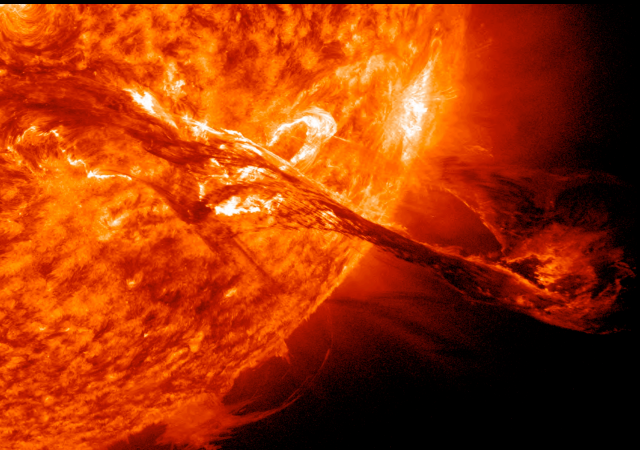


# Space Weather REDI:

Using space weather analysis and forecasting tools and simulations in heliophysics education



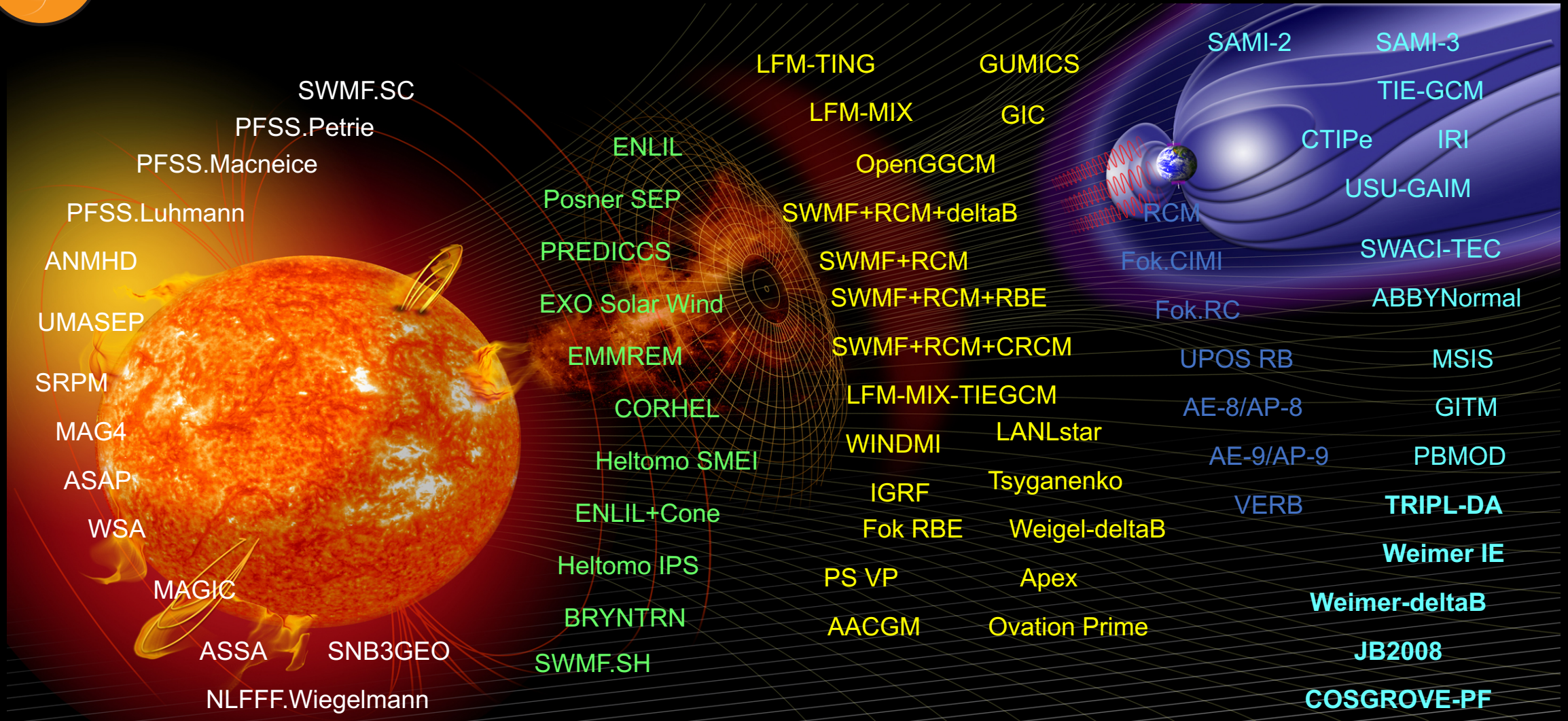
**Anna Chulaki**

**[Anna.Chulaki@nasa.gov](mailto:Anna.Chulaki@nasa.gov)**

*Education Lead & Space Weather Forecaster, Community Coordinated Modeling Center*



# Community Coordinated Modeling Center (CCMC)



Corona

Heliosphere

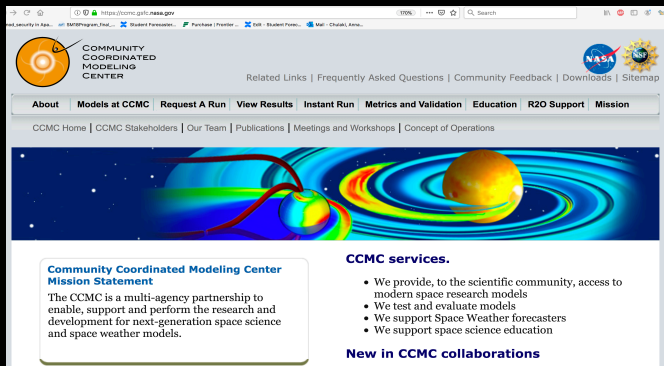
Magnetosphere

Inner  
Magnetosphere

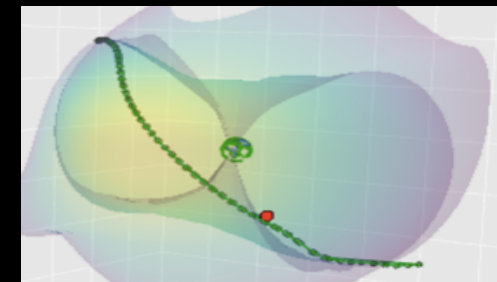
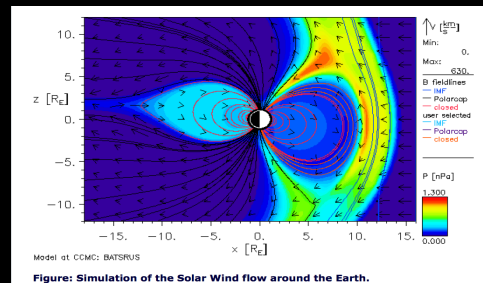
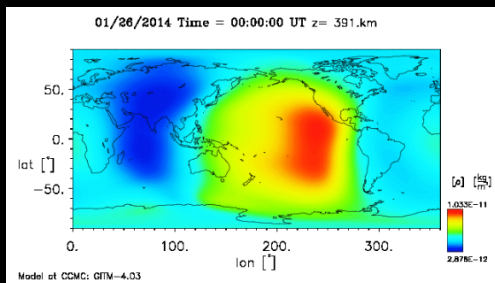
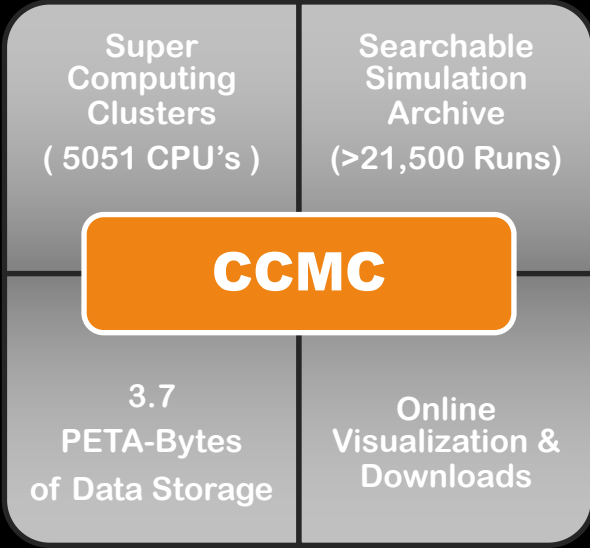
Ionosphere/Therm  
osphere



# Simulations on demand: Runs on Request system



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





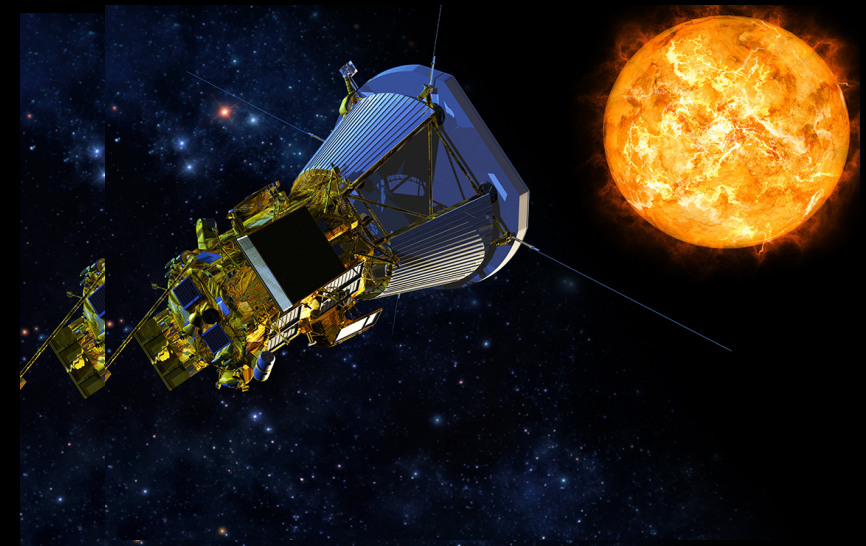
# Space weather research to operations support



CCMC partners with model developers, impacts experts and users of space weather products and services to bring the latest advances in research to operations.

NASA in-house users of CCMC's space weather services:

- NASA Robotic Missions
- Flight Dynamics Facility
- Space Radiation Analysis Group (SRAG)





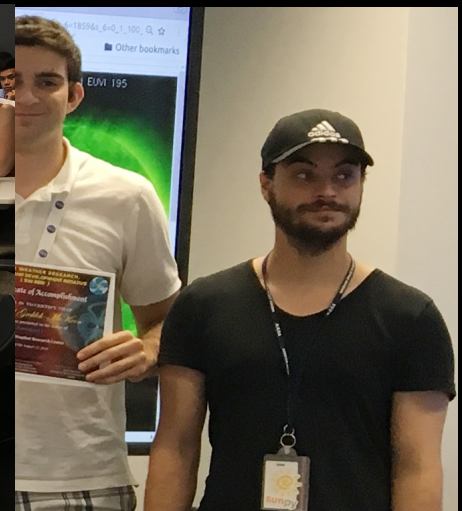
# CCMC space weather forecasting team



- Monitors space environment 12/7
- Sends event notifications and weekly reports to mission operators
- Maintains near-real-time database of space weather events
- Provides support for mission planning and space environment analysis services
- Develops applications for space weather monitoring and forecasting
- Delivers training in space weather basics and analysis tools to audiences worldwide

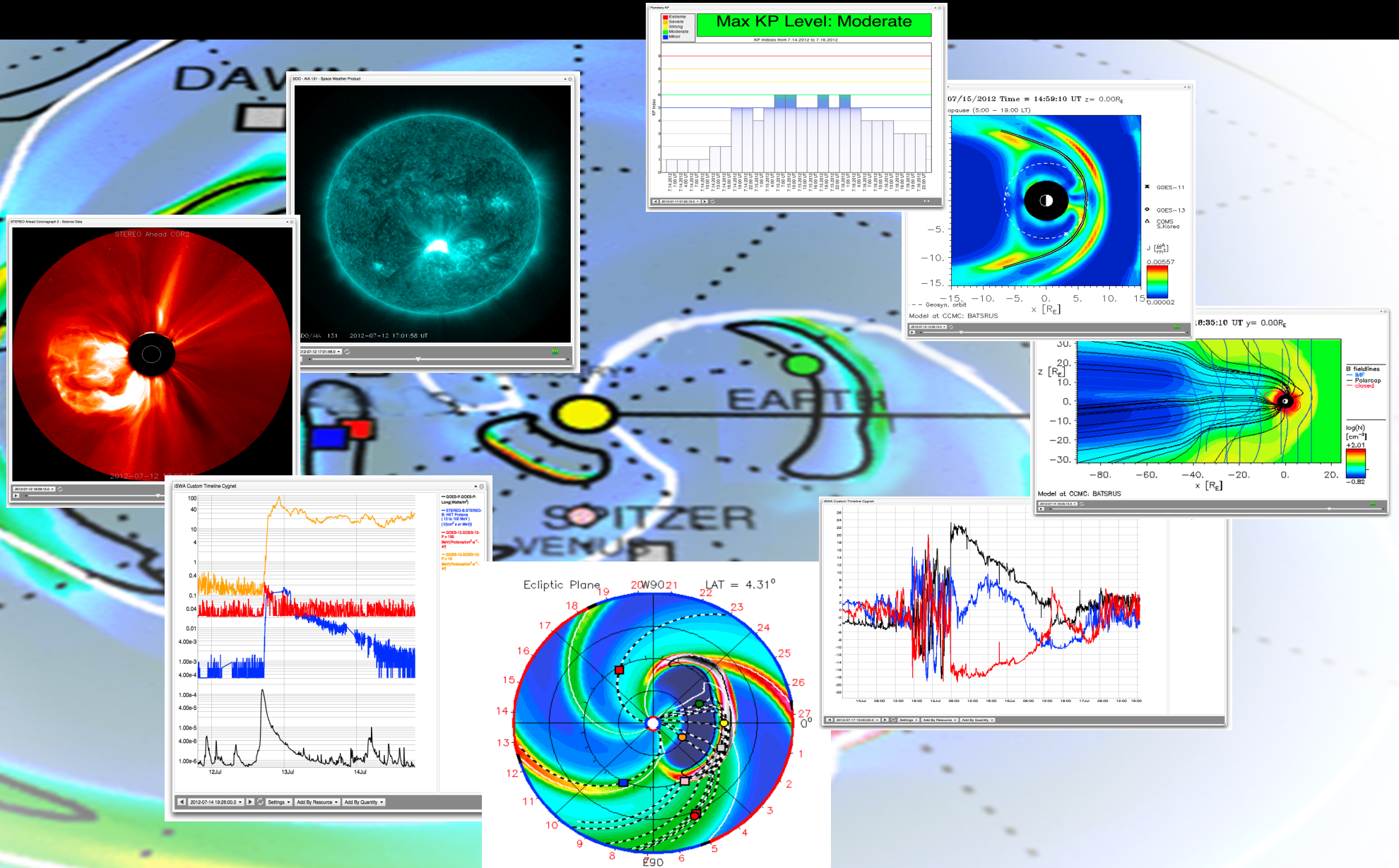


Research  
Education and  
Development  
Initiative





# What do student forecasters do?





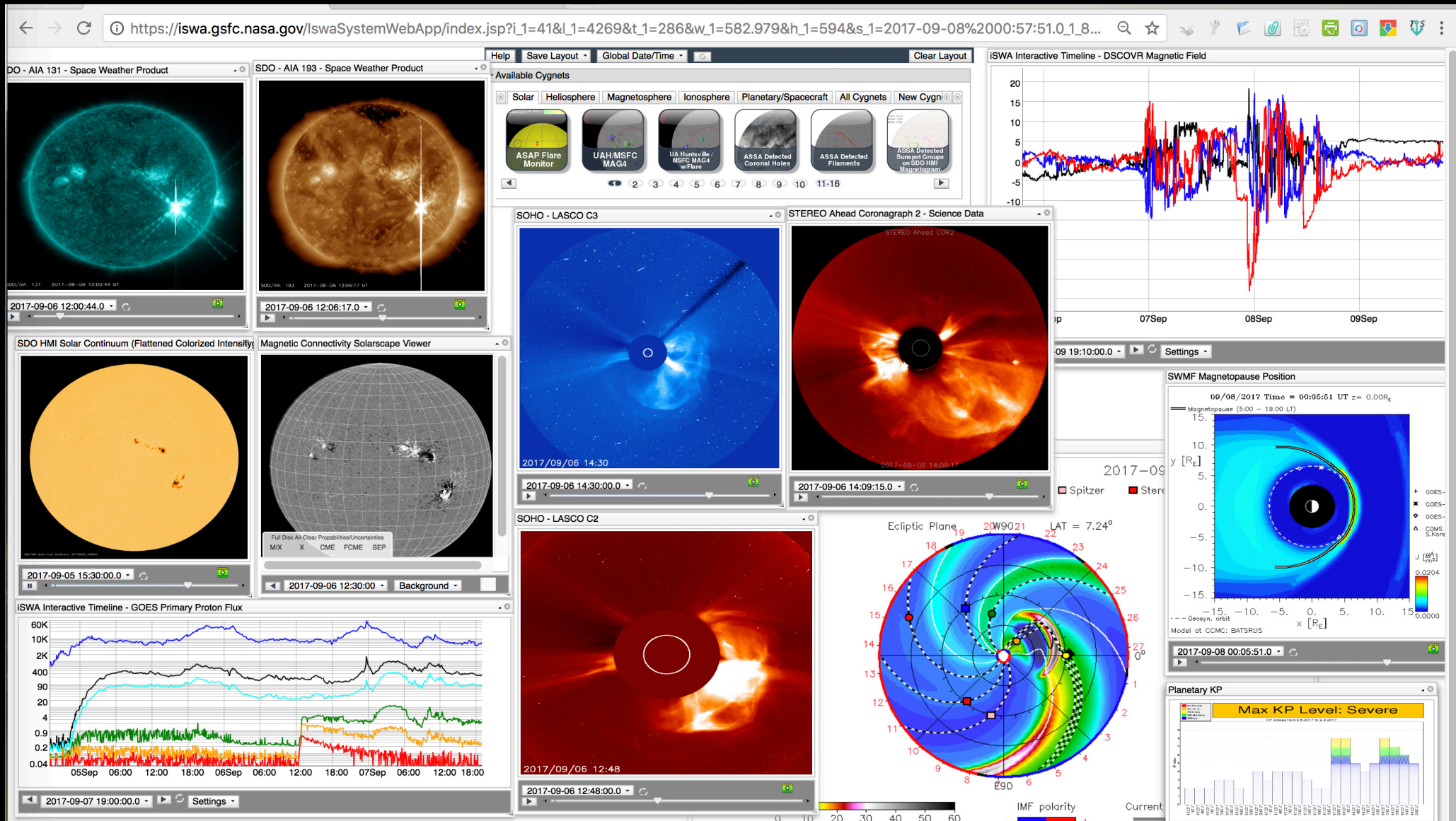
## The online tools forecasters use:

- Integrated Space Weather Analysis System (iSWA)
- CME analysis tools
- ENLIL + cone model simulations
- DONKI database of space weather phenomena

Available for use in classrooms and summer schools!



# iSWA - space environment analysis tool



<https://iswa.gsfc.nasa.gov>

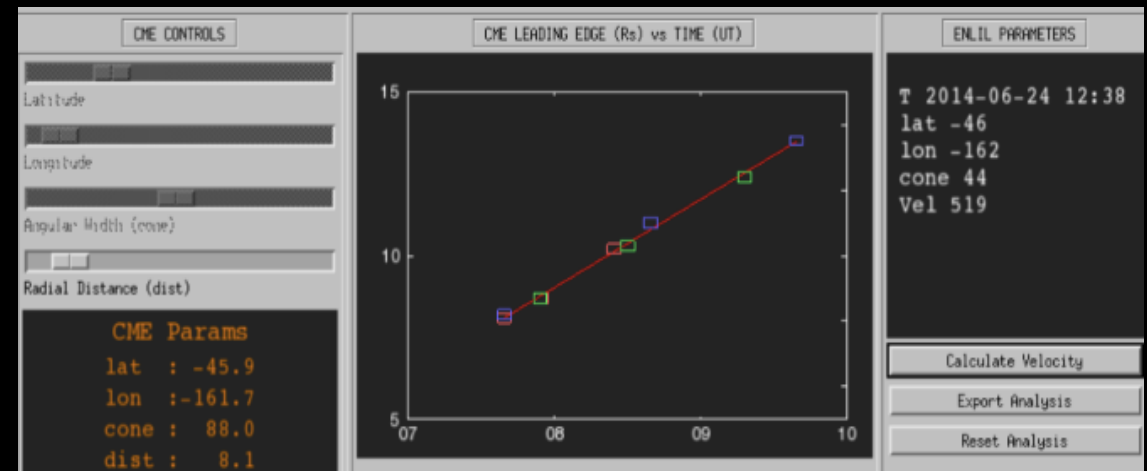
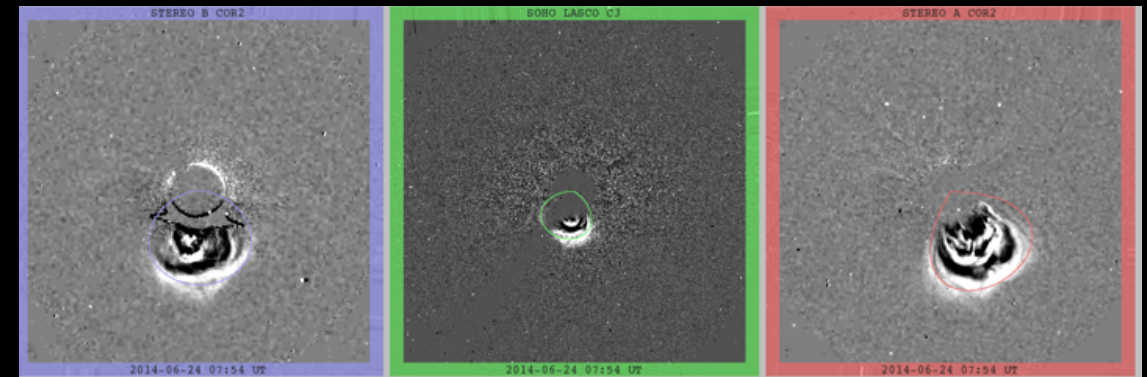
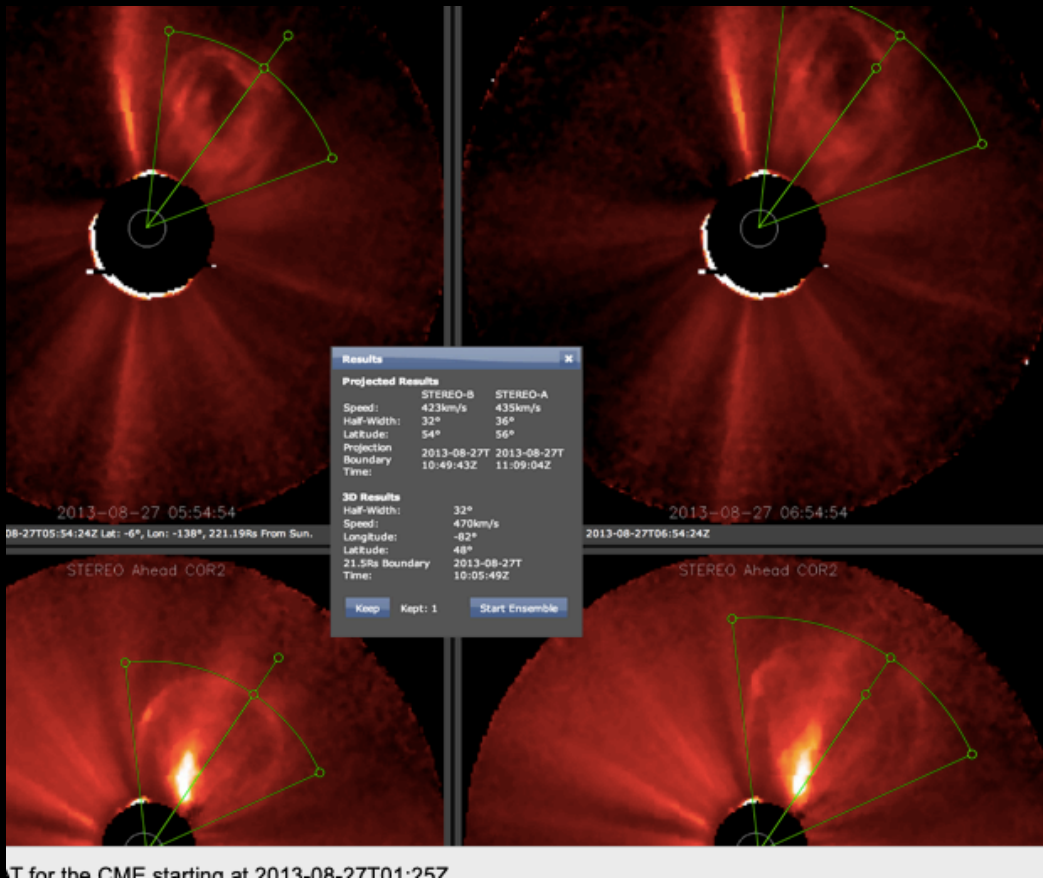




# Online CME analysis tools

- Stereo CAT and SWPC CAT

<https://ccmc.gsfc.nasa.gov/tools>

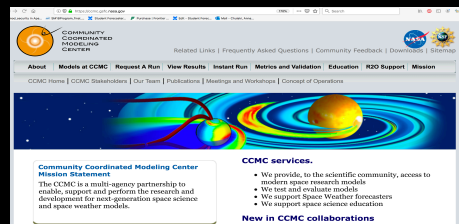




# ENLIL simulation for a CME event

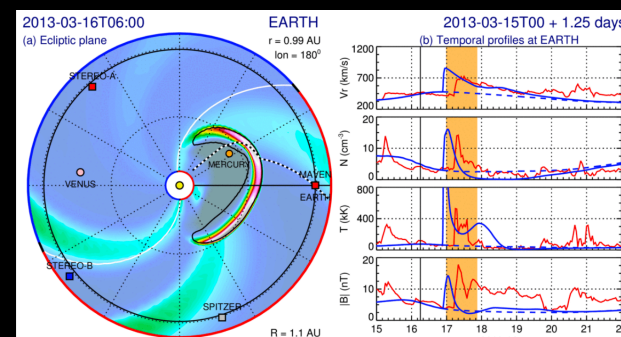
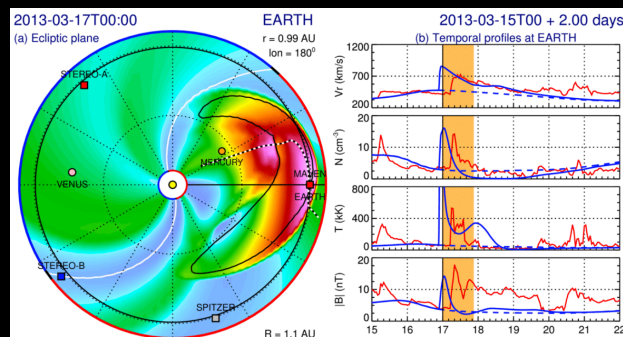
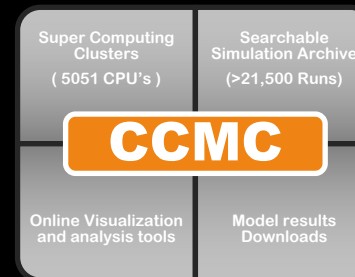
- Runs on Request system

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



request

results





# DONKI database of space weather events

- DONKI database of space weather phenomena

<https://kauai.ccmc.gsfc.nasa.gov/DONKI>

## Solar Energetic Particle

Event Time: 2012-07-12T17:50Z ( SOHO: COSTEP  
Activity ID: 2012-07-12T17:50:00-SEP-001 (version  
Note:

*Submitted on 2013-07-11T21:22Z by Leila Mays*

### Go to:

- [DONKI Home](#)
- [Search Space Weather Activity](#)
- [Search Notification Archive](#)
- [Login](#)
- [New User Registration](#)

A Notification with ID [20120712-AL-002](#) was sent o

hive

### All directly linked activities:

[2012-07-12T15:37:00-FLR-001](#)

FLR Type: X1.4

[2012-07-12T16:54:00-CME-001](#)

[2012-07-12T18:18:00-SEP-001](#)

STEREO B: IMPACT 13-100 MeV

[2012-07-12T18:35:00-SEP-001](#)

GOES13: SEM/EPS >10 MeV

--- ALL ---

Solar Flare

Solar Energetic Particle

Coronal Mass Ejection

Interplanetary Shock

Magnetopause Crossing

Geomagnetic Storm

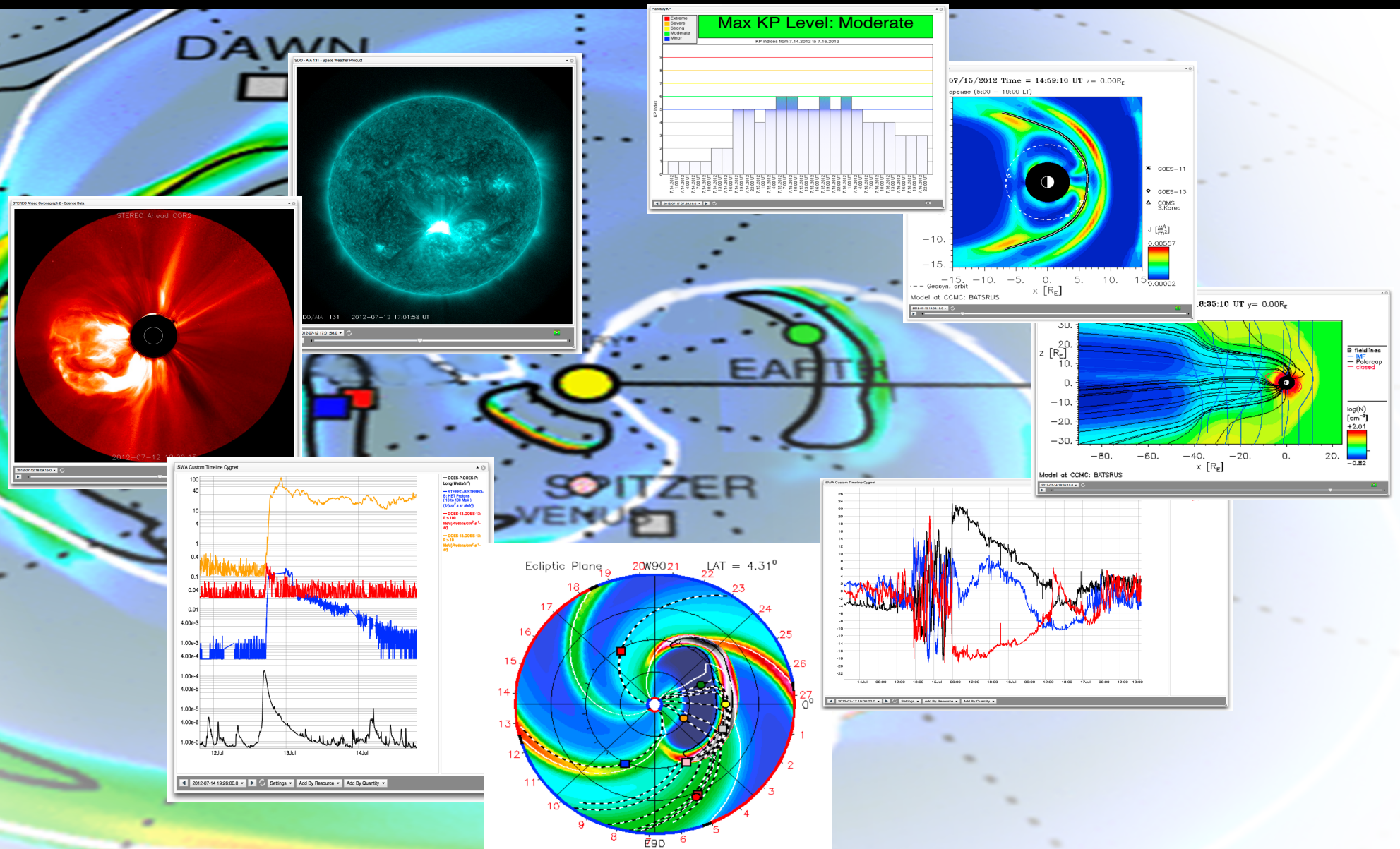
Radiation Belt Enhancement

High Speed Stream

WSA-ENLIL+Cone Model

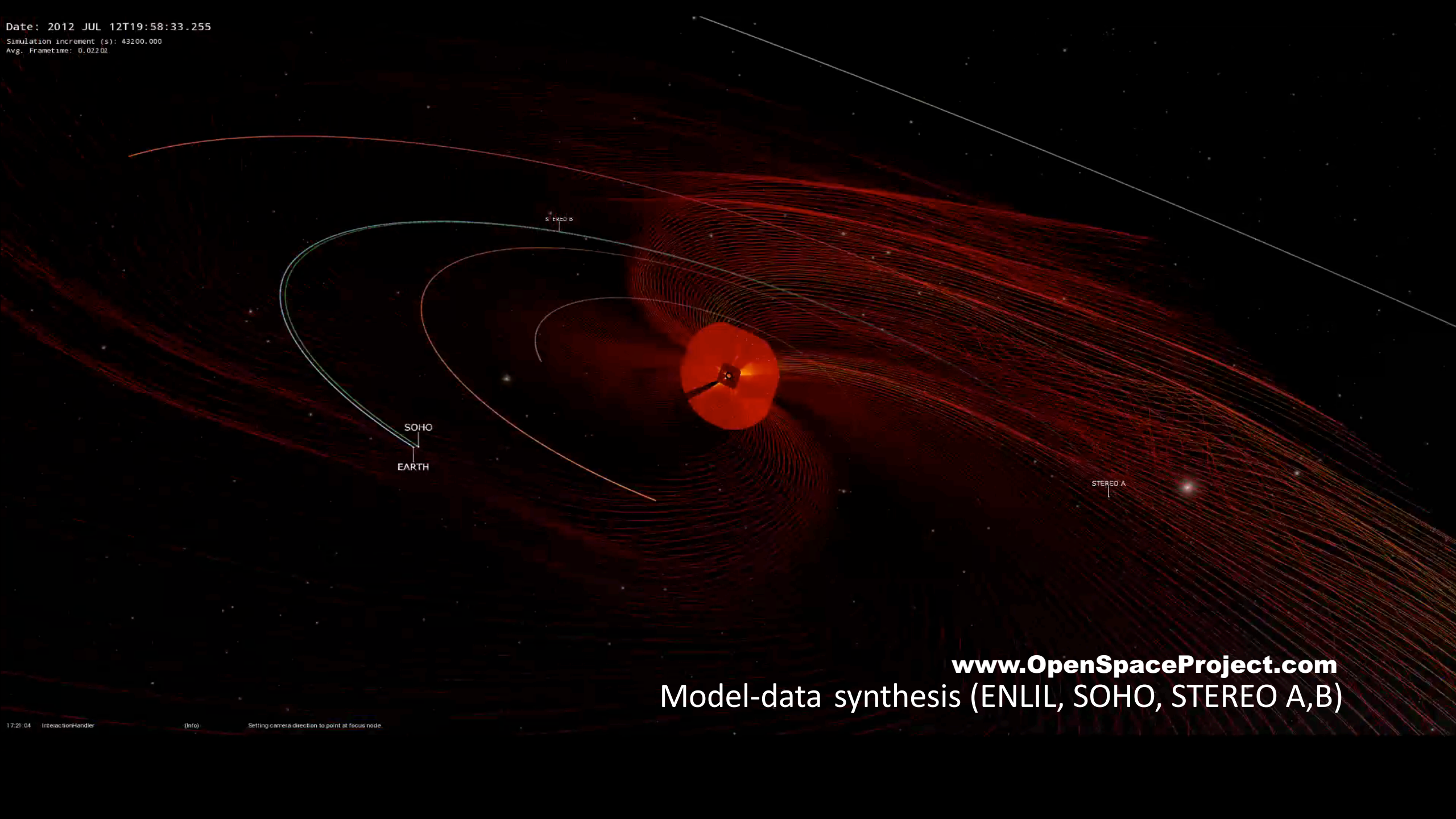


# Space weather analysis and forecasting tools:



Date: 2012 JUL 12T19:58:33.255

Simulation increment (s): 43200.000  
Avg. Frametime: 0.02202



SOHO  
EARTH

STEREO B

STEREO A

[www.OpenSpaceProject.com](http://www.OpenSpaceProject.com)  
Model-data synthesis (ENLIL, SOHO, STEREO A,B)



# Links to Space Weather REDI training & forecaster tools

- **Space weather REDI forecaster training:**  
<https://ccmc.gsfc.nasa.gov/support/SWREDI/bootcamp/>
- **All CCMC forecasting tools:**  
<https://ccmc.gsfc.nasa.gov/tools>
- **Community Coordinated Modeling Center:**  
<https://ccmc.gsfc.nasa.gov/>
- **Open Space software:**  
[www.OpenSpaceProject.com](http://www.OpenSpaceProject.com)

[Anna.Chulaki@nasa.gov](mailto:Anna.Chulaki@nasa.gov)



**R**esearch  
**E**ducation and  
**D**evelopment  
**I**nitiative

