



Overview of CCMC and SWRC Capabilities/Resources/Tools

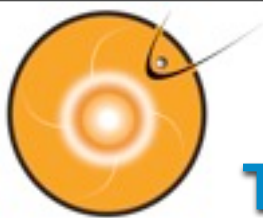
Yihua Zheng

NASA Goddard Space Flight Center

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

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



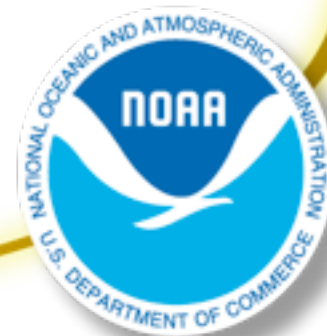


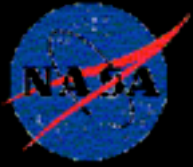
About The CCMC

The Community Coordinated Modeling Center

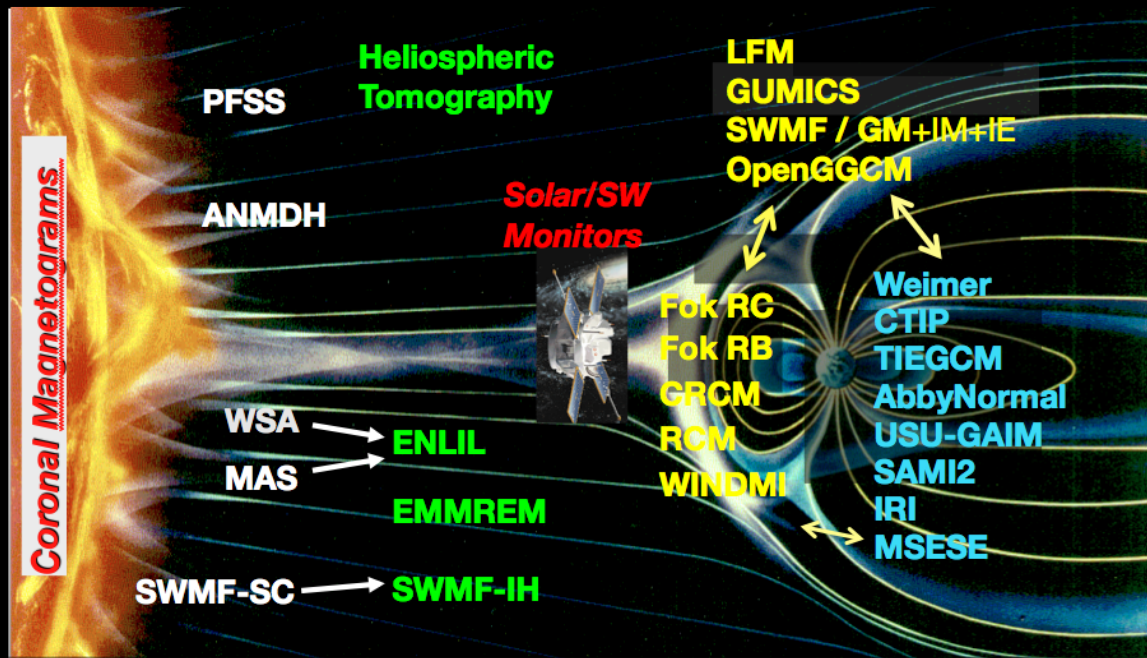


“A US multi-agency partnership to enable, support and perform the research and development for next generation space science and space weather models.”





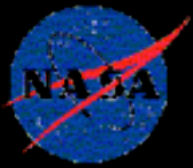
Community Coordinated Modeling Center



Facilitate
Community
Research

Support Research
to Ops Transition

Unique collection of state-of-the-art models



CCMC Functions

- ✓ Hosts unique collection of state-of-the-art models.
- ✓ Serves models to the research community through web-based interactive interface.
- ✓ Develops advanced on-line visualization and analysis tools.
- ✓ Tests models. Performs metrics and validation studies. Develops automated model validation tools. Facilitates improvements.
- ✓ Supports/leads community-wide projects.
- ✓ Develops innovative space weather analysis & prediction tools & systems ready to be used by space weather forecasters, decision makers and space weather research community.
- ✓ Provides opportunities for education.
- ✓ Holds biennial community workshops for updates, feedback, guidance.

Evolution of R20 Transition

Prior to CCMC

Models accessed and used by developers only

CCMC RoR

Models used and validated by entire community (digest broad range of inputs)



CCMC RT

Models continuously running in real-time (robust, real-time data drivers). RT data flow monitoring and controlling systems



CCMC SW Displays

SW displays customized for specific applications/missions, ready to be used by forecasters (combine model output and data).



CCMC iSWA

Flexible collection & dissemination system of SW information. Tools for forecasters. World-wide access, Mobil apps.

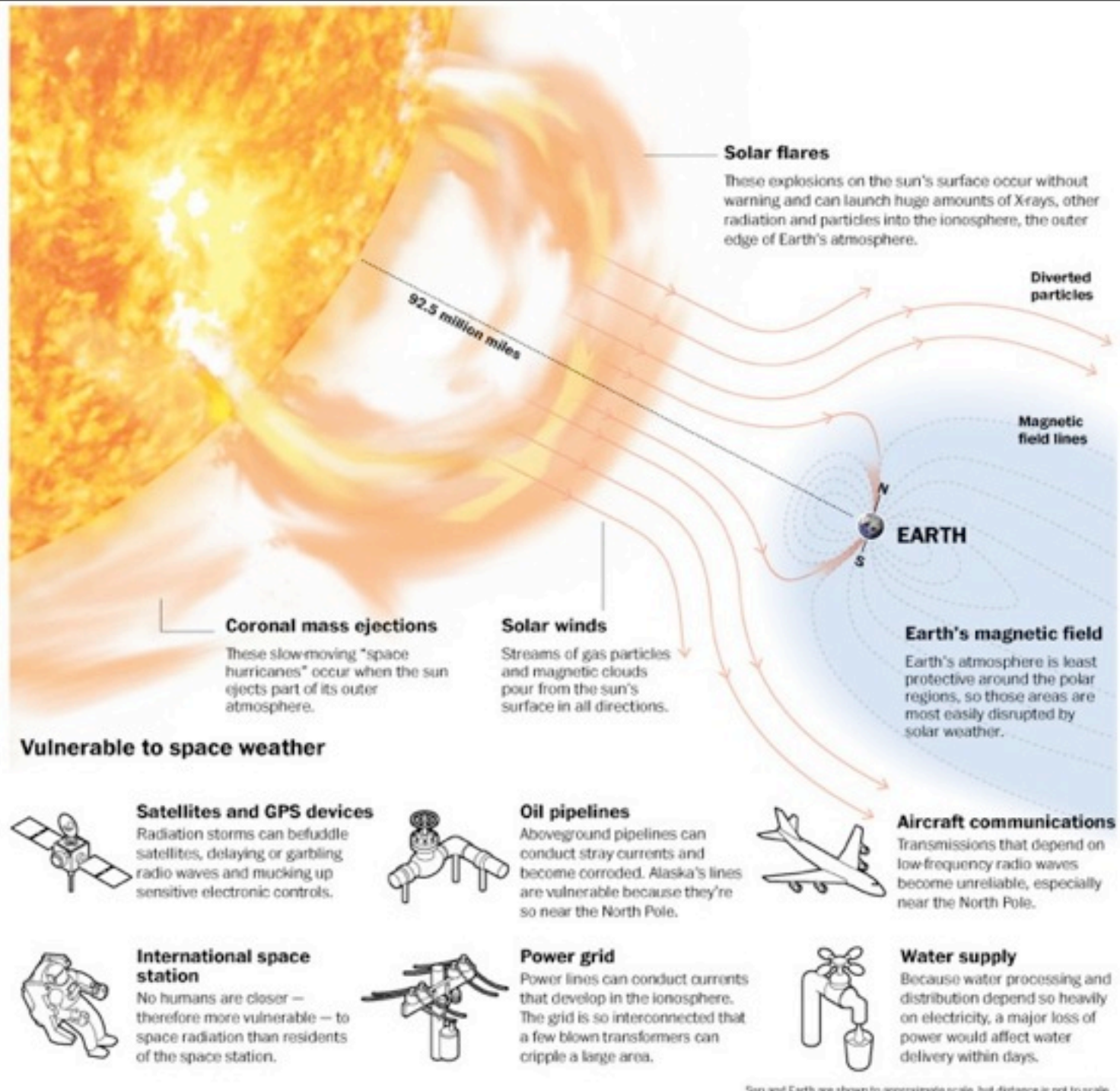


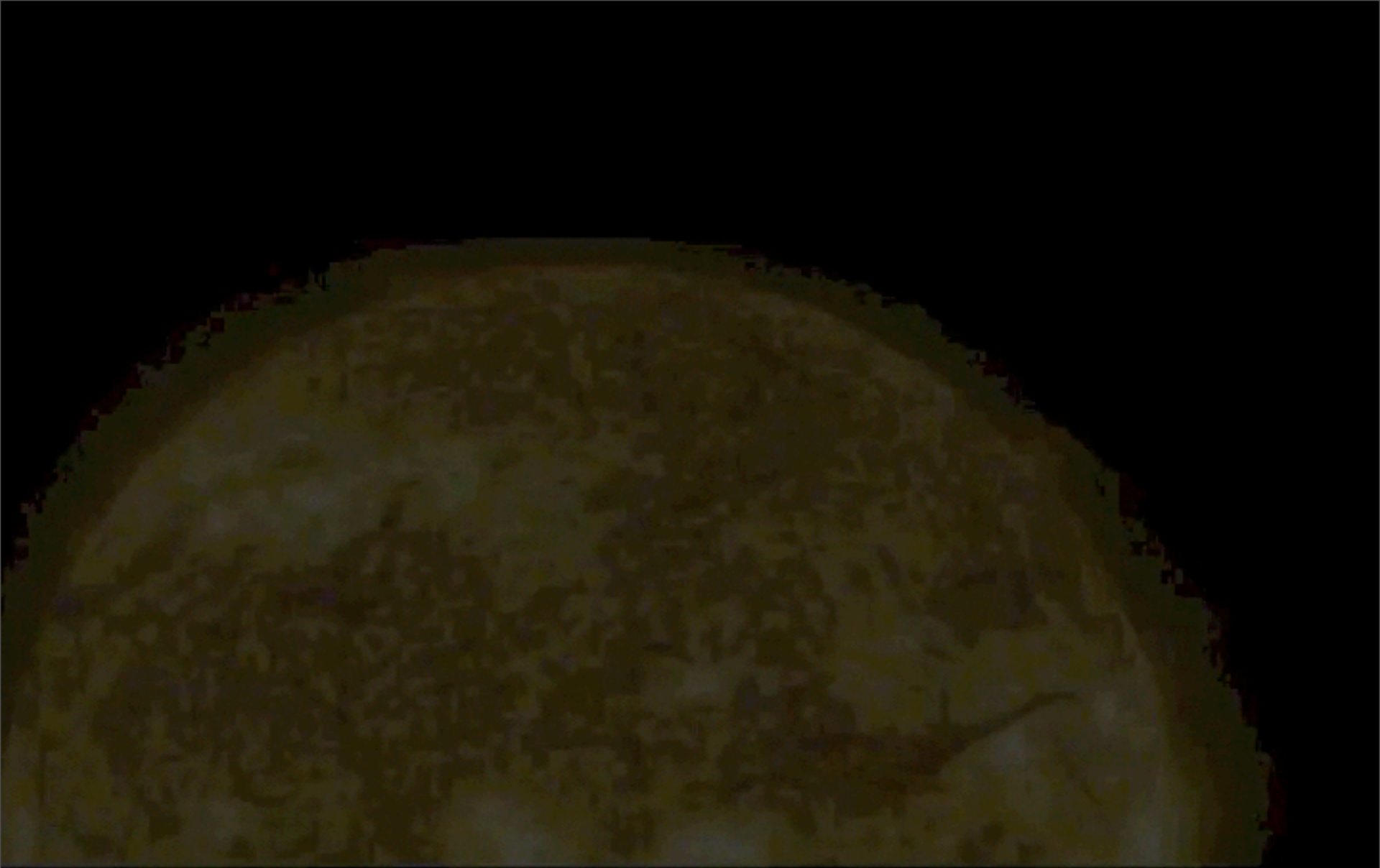
CCMC/SWRC

Prototyping of research-based innovative SW analysis & forecasting. **SWx services for NASA user.**



Space Weather Illustrated





NASA GSFC Space Weather Research Center



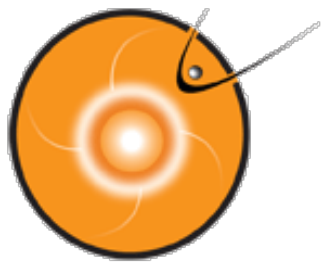
Primary Objective:

Provide the latest space weather information to NASA's robotic mission operators and be the innovative research-based SWx analysis and forecasting prototyping center at NASA.

since March 2010

Space Weather Forecasting @ NASA/SWRC

Community
Coordinated Modeling
Center



Space
Weather
Research Center



Partnering



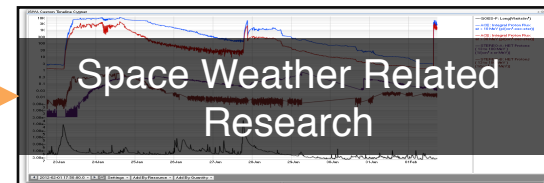
Protecting NASA's
Missions



Tools for Citizen Scientists



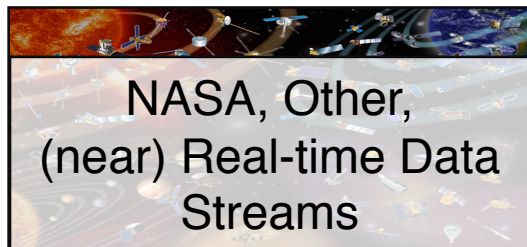
Space Weather Related
Research



Education & Training



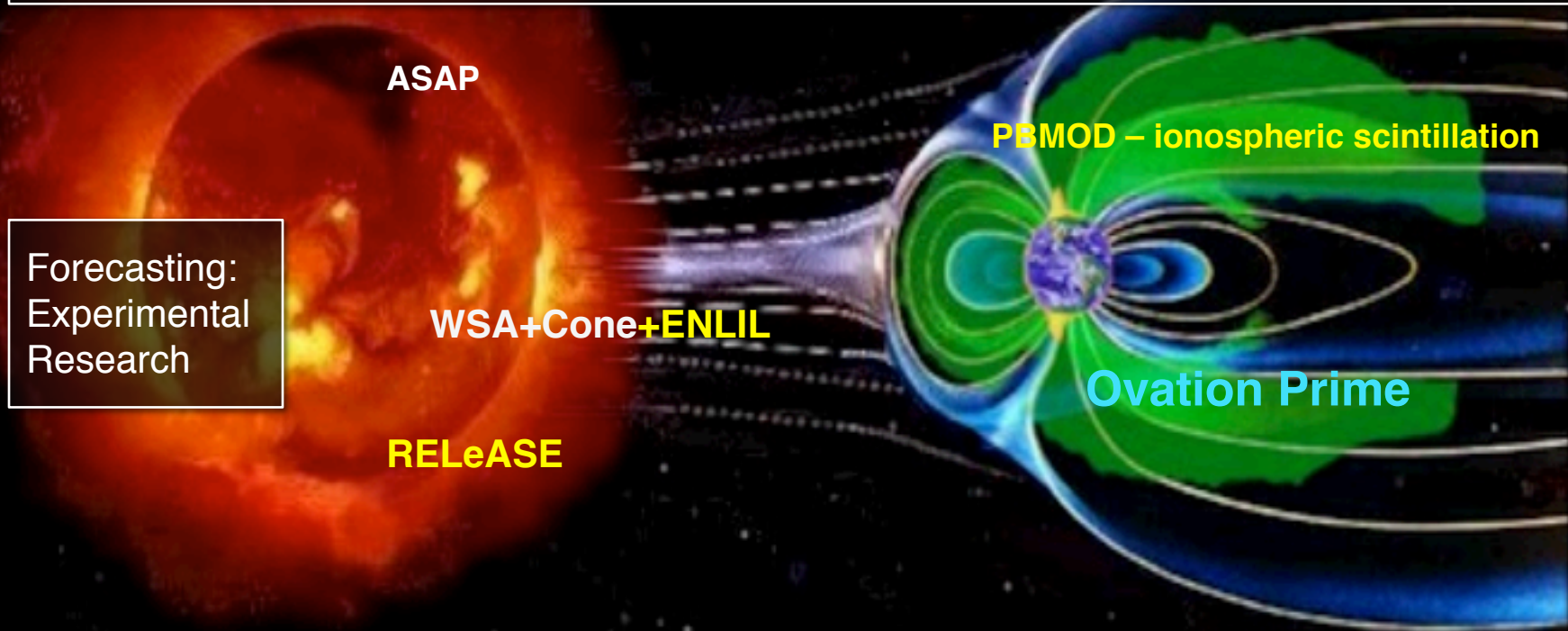
NASA, Other,
(near) Real-time Data
Streams



Leveraging CCMC Modeling Capabilities

Comprehensive Collection Of Models Running In Real-time

- ✓ CME & ambient solar wind forecasting (WSA+ENLIL+Cone, WSA+ENLIL, HELTOMO)
- ✓ Flare forecasting/monitoring (ASAP)
- ✓ Radiation (ions and e-) forecasting/now casting (RELeASE, RBE)
- ✓ 3-D States of the magnetosphere and ionosphere (SWMF, CTIPe, Fok RC, RBE)
- ✓ Scintillation, HF absorption, drag effects, Aurora, etc (PBMOD, AbbyNormal, CTIPe, OP).
- ✓ Forecasting GICs (SWMF and its coupling with other models).

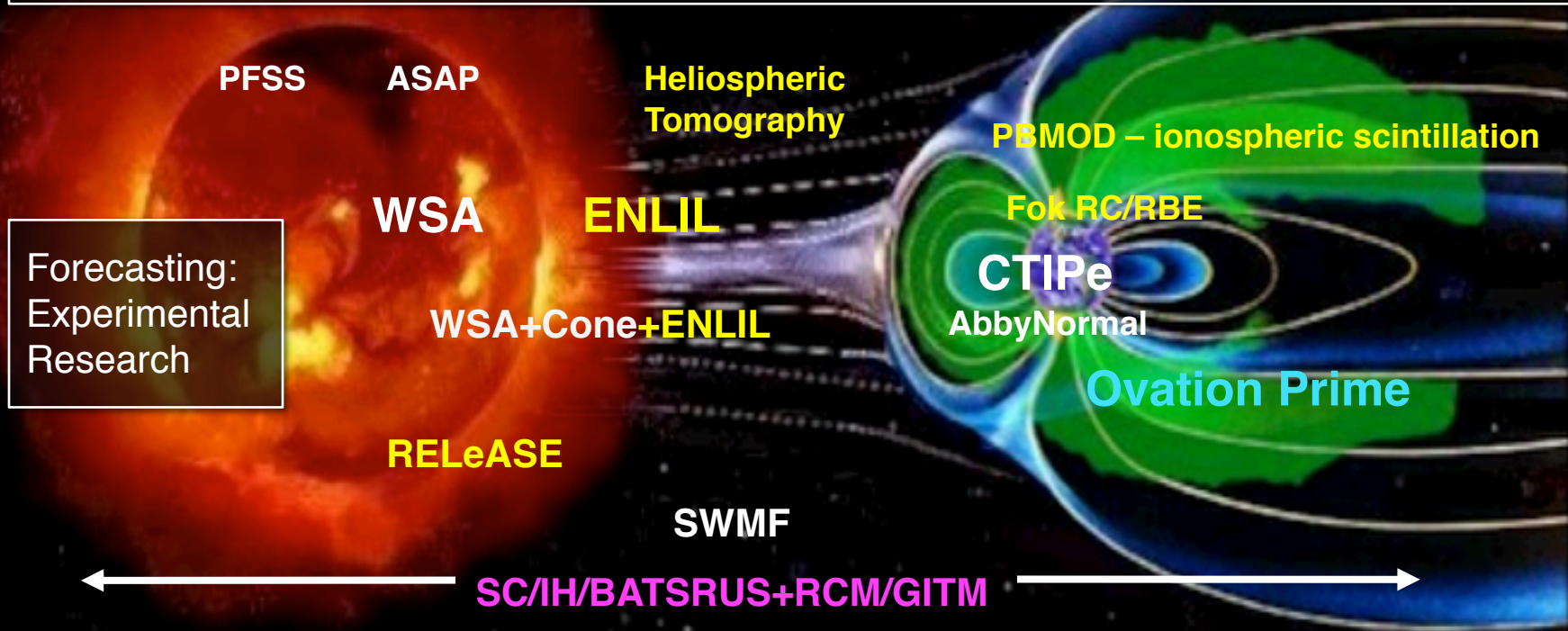


...enabling testing/prototyping next generation prediction systems

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...enabling testing/prototyping next generation prediction systems

Space Weather Research Center Collaborators

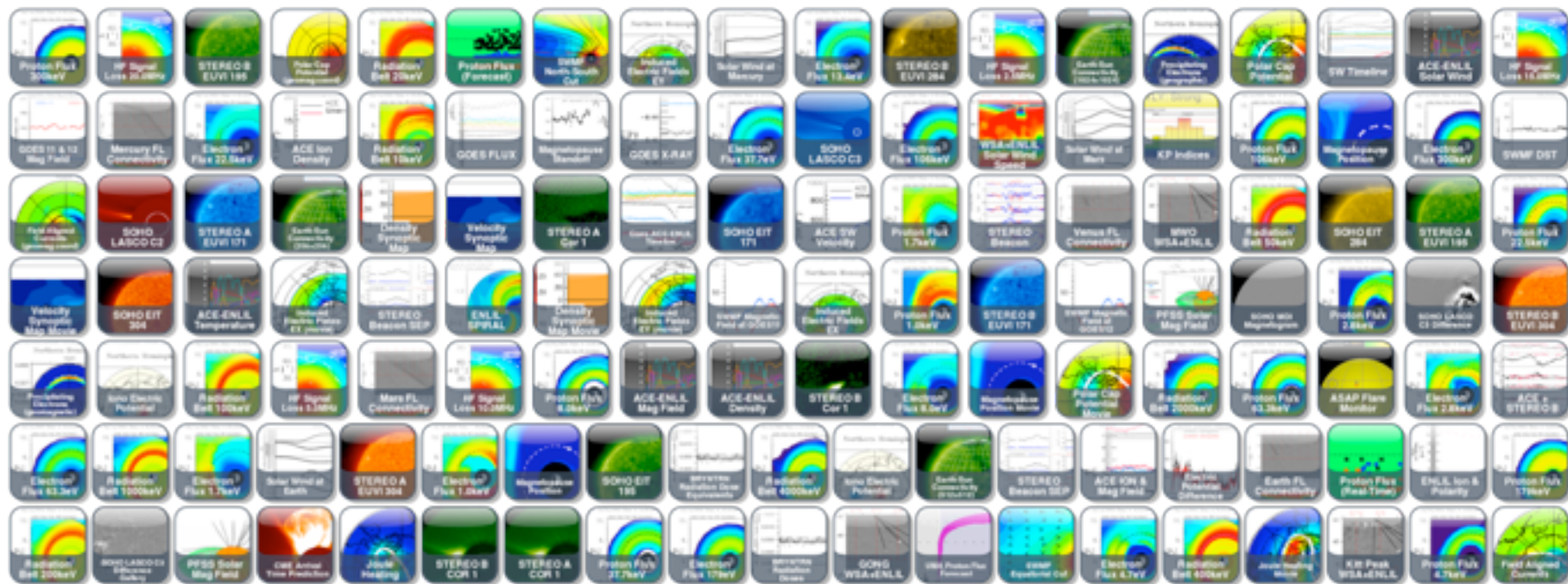




Innovative Dissemination: iSWA



iSWA has ~300 products including modeling results and comprehensive sets of observational data.



Web-based. User configurable. Available world-wide.
One-stop shop for state-of-the-art information!
<http://iswa.gsfc.nasa.gov>

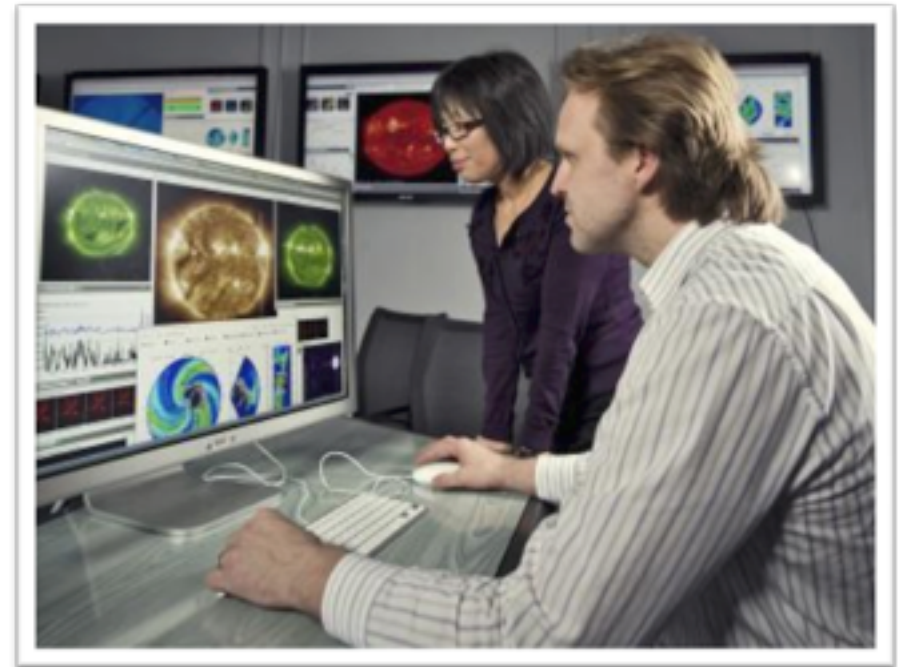


SWx Services

(robotic missions, science, mission campaigns)



1. Providing assistance in spacecraft anomaly resolution by assessing whether space weather has any role in causing the observed anomaly/anomalies.
2. Sending out weekly space weather reports/summaries to NASA mission operators, NASA officials and involved personnel.





SWx Services



3. Sending out timely space weather info/forecasts regarding adverse conditions throughout the solar system, such as significant CME events, elevated radiation levels, etc.
4. Providing general space weather support for NASA customers.





Education



- ✓ High School and College Interns
- ✓ Young Scientists/Postdocs
- ✓ Teachers
- ✓ Interested public
- ✓ SW REDI new initiative (2 wk boot camp and semester-long course)



Training Young Scientists and Educating the Public



YouTube



Browse Movies Upload

Sign In

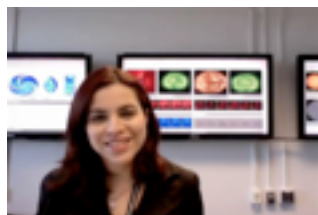


NASA Goddard Space Weather Research Center

Subscribe

225
subscribers

24,699
video views



Reporte Semanal del 11-17 Abril 2012 ...
NASA/SpaceWeather 129 views · 3 days ago

<http://www.gsf.nasa.gov> - Esta semana experimentamos un poco más de actividad que en las pasadas dos semanas. Hubo un destello clase-M, dos CME's clase-O y cuatro



Weekly Report for April 4-10, 2012 - N...
NASA/SpaceWeather 805 views · 1 week ago

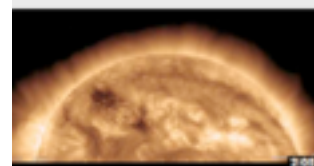
<http://www.gsf.nasa.gov> - The calm and quiet conditions we've seen recently continued throughout this week. None of the CMEs or flares from this week resulted in strong sp...

X1.4 Solar Flare, SEP, and Earth-directed CME (July 12, 2012) - NASA Goddard Space Weather Research Center



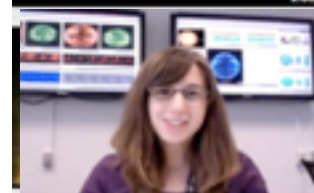
CME SCORE Scale: Typification Syste...
NASA/SpaceWeather 420 views · 2 weeks ago

<http://www.gsf.nasa.gov> - We introduce our new coronal mass ejection (CME) classification/typification system called SCORE. SCORE indicates the type of the detected CME.



Weekly Report for March 28, 2012 - Ap...
NASA/SpaceWeather 504 views · 2 weeks ago

<http://www.gsf.nasa.gov> - The sun as a whole was pretty quiet this week. The active region previously referred to as Active Region 1429, which was responsible for almost ...

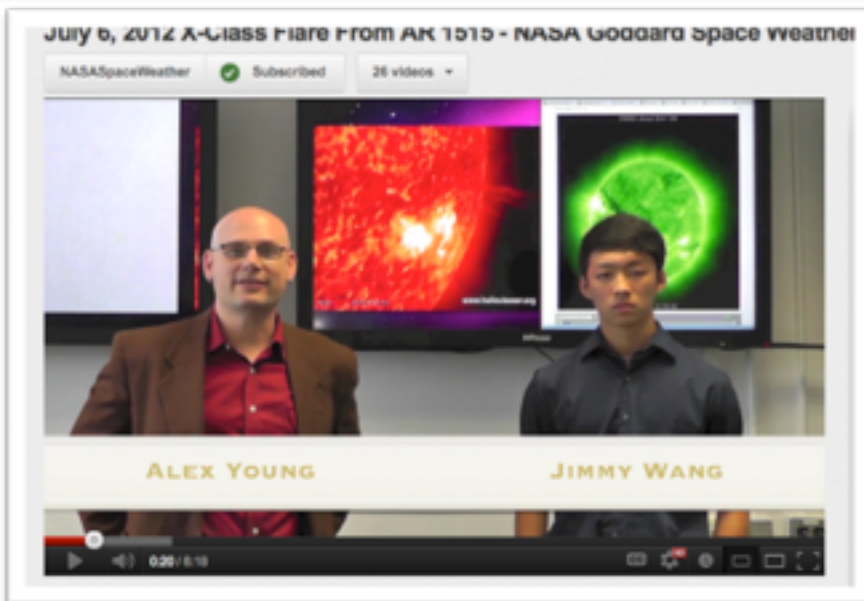


Incredible Active Region 1429: One fo...
NASA/SpaceWeather 356 views · 3 weeks ago

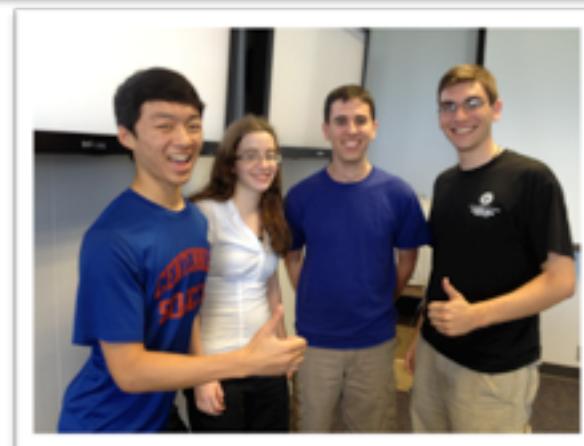
<http://www.gsf.nasa.gov> - On March 2nd, 2012, active region 1429 rotated onto the Earth-facing solar disk. This region has dominated space weather conditions throughout ...



Summer Interns Learning Space Weather Science

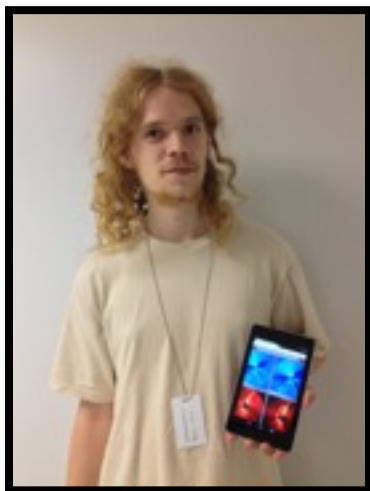


- Impressed with their progress
- Space weather excites them
 - ✓ Real time
 - ✓ Creative experimental research forecasts
 - ✓ Help NASA robotic missions
 - ✓ Responsibilities





Undergraduate Interns



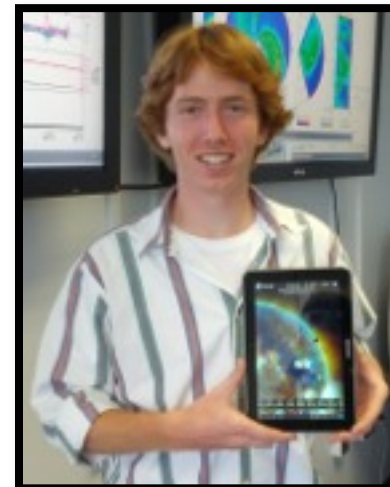
SW Research Analysis Tool Development

Jack LaSota

Web-based CME Analysis Tool

Justin Boblitt

Android iSWA App



Career Paths in Space Weather Research

Andrea Karelitz

examined CME speed –
SEP relationship

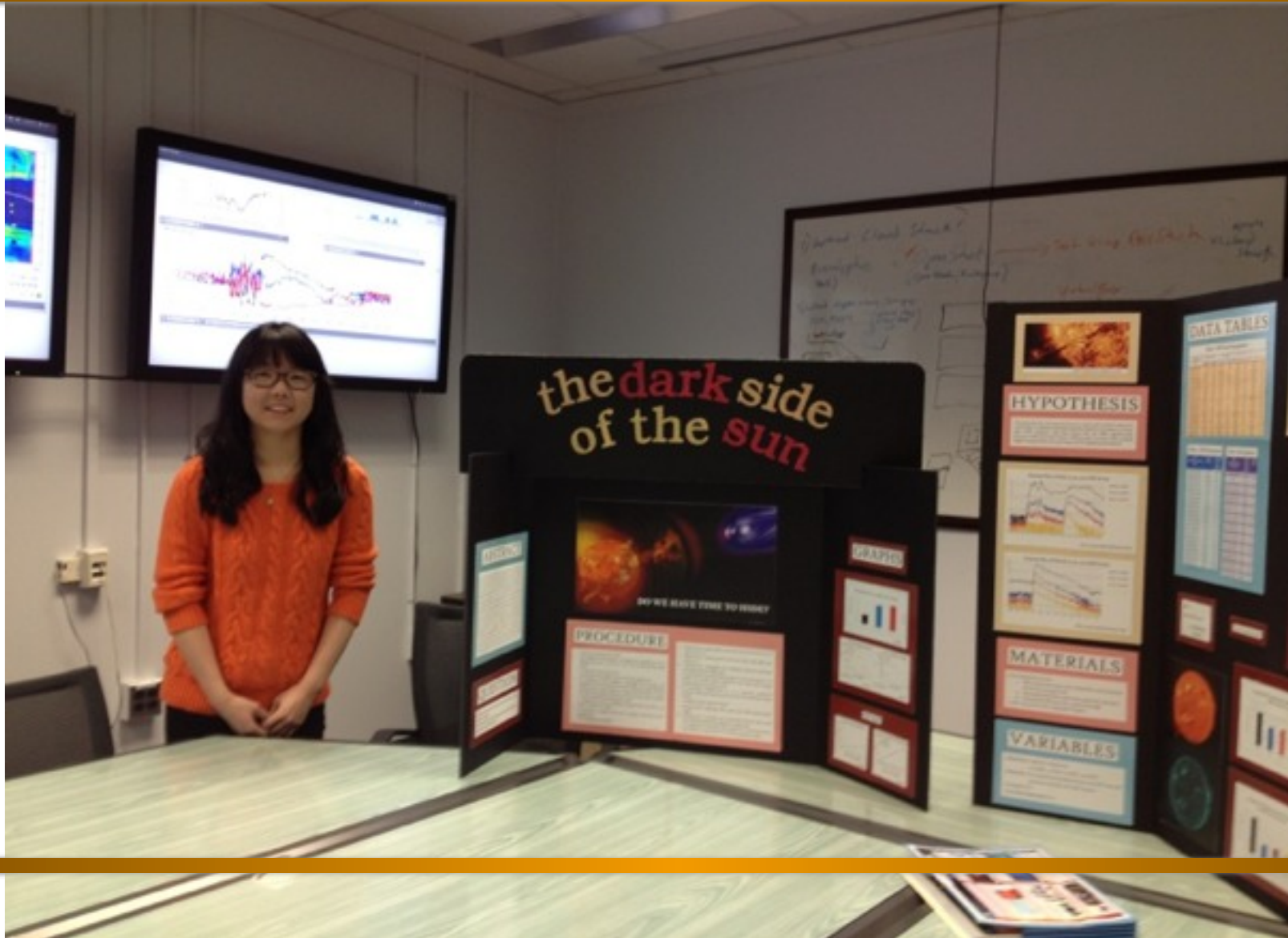
Axel Burgos

examined CME structure –
arrival time relationship





High School Students' Research Projects





Research



- ✓ Next generation space weather capabilities (e.g. ensemble forecasting)
- ✓ Catalog space weather events (DONKI)
- ✓ Near real-time space weather event research (rapid analysis and report/paper generation)
- ✓ Valuable and highly utilized resource for domestic and international space weather research community



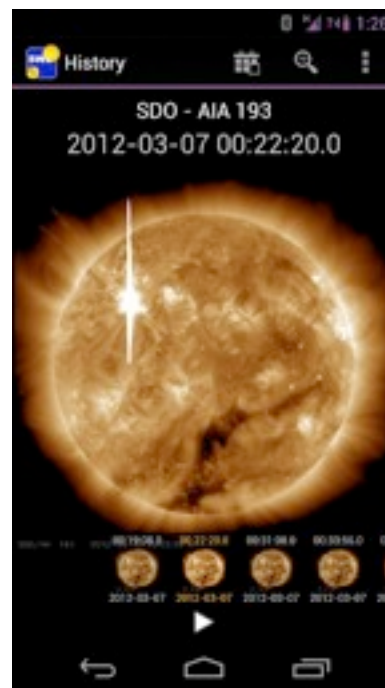
iSWA on mobile apps



ISWA - Android



- Android Front-End to iSWA
- History Mode
- Movie Mode
- Over 30,000 Downloads
- Available in Google Play Store

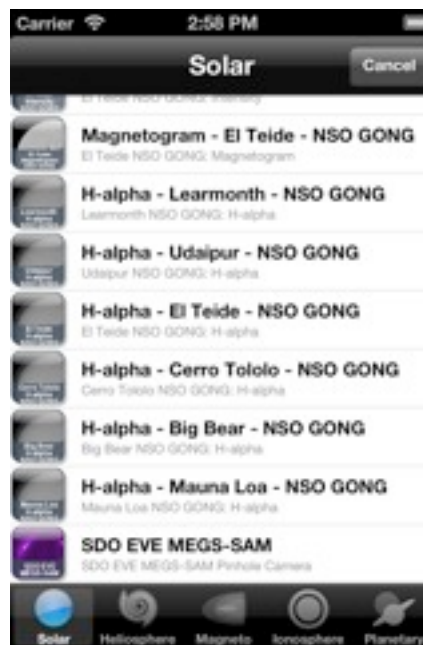


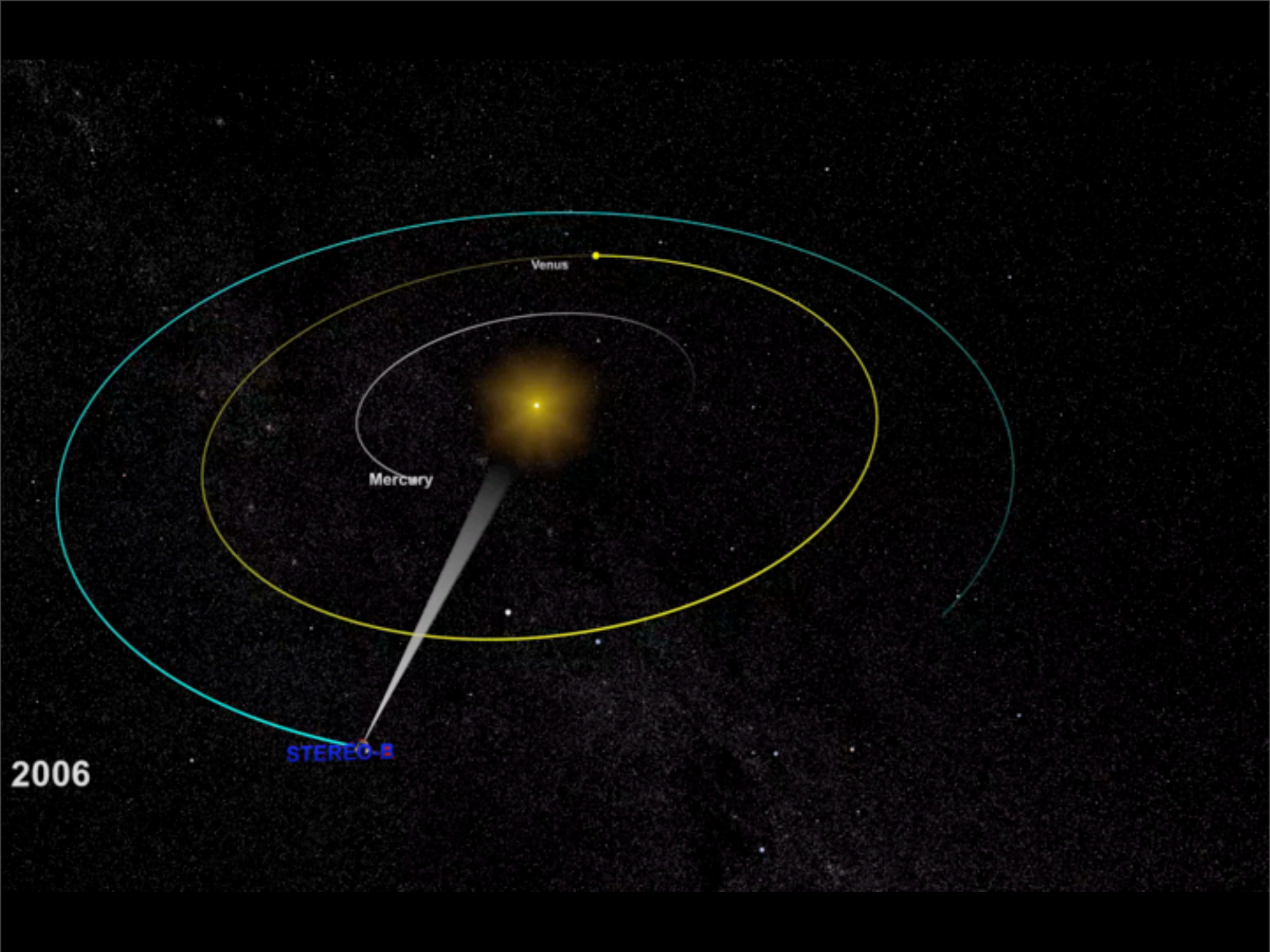


ISWA - iPHONE



- IOS Front-End to iSWA
- History Mode (next update)
- Movie Mode (next update)
- Over 70,000 Downloads
- Available in App Store





CCMC/SWRC New Initiatives



Space Weather
Score Board

Ensemble of CME
forecasting
worldwide



Space Weather
D.O.N.K.I.

(available soon)

Database of SWx
Events/
forecasting



Enlil Cone Model
1-Click

Tool for launching
the CME model

iSWA Demo

CME STEREO Analysis Tool

Scoreboard, One-Click, etc

One-click

DONKI