Growing the Space Weather Enterprise: Requires Coordination, Cooperation - and Data

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Carmel Research Center
Santa Monica, CA

Space Weather Enterprise Forum

June 8, 2010

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Outline

1. Cutting Edge Science

2. Research to Operations and Partnering

3. Improving the Data Situation:
   Continuity of Real Time Solar Wind Data at L1 (e.g., DSCOVR), Solar, and other (e.g., neutron monitor) Data

4. Growth of the Space Weather Enterprise:
   Our 2010 SWW Roundtable Session
   The Future

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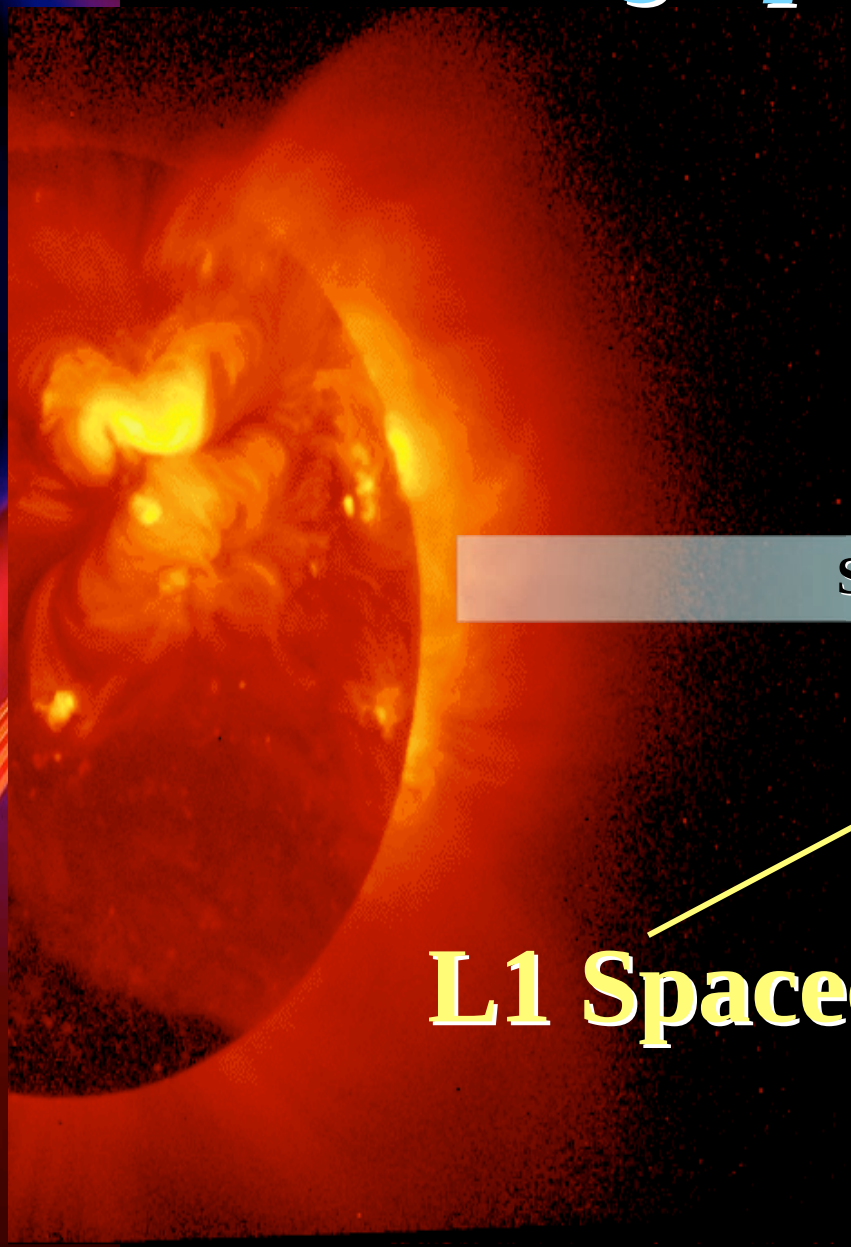
Predicting Space Weather



Solar Wind

L1

L1 Spacecraft is Our Scout

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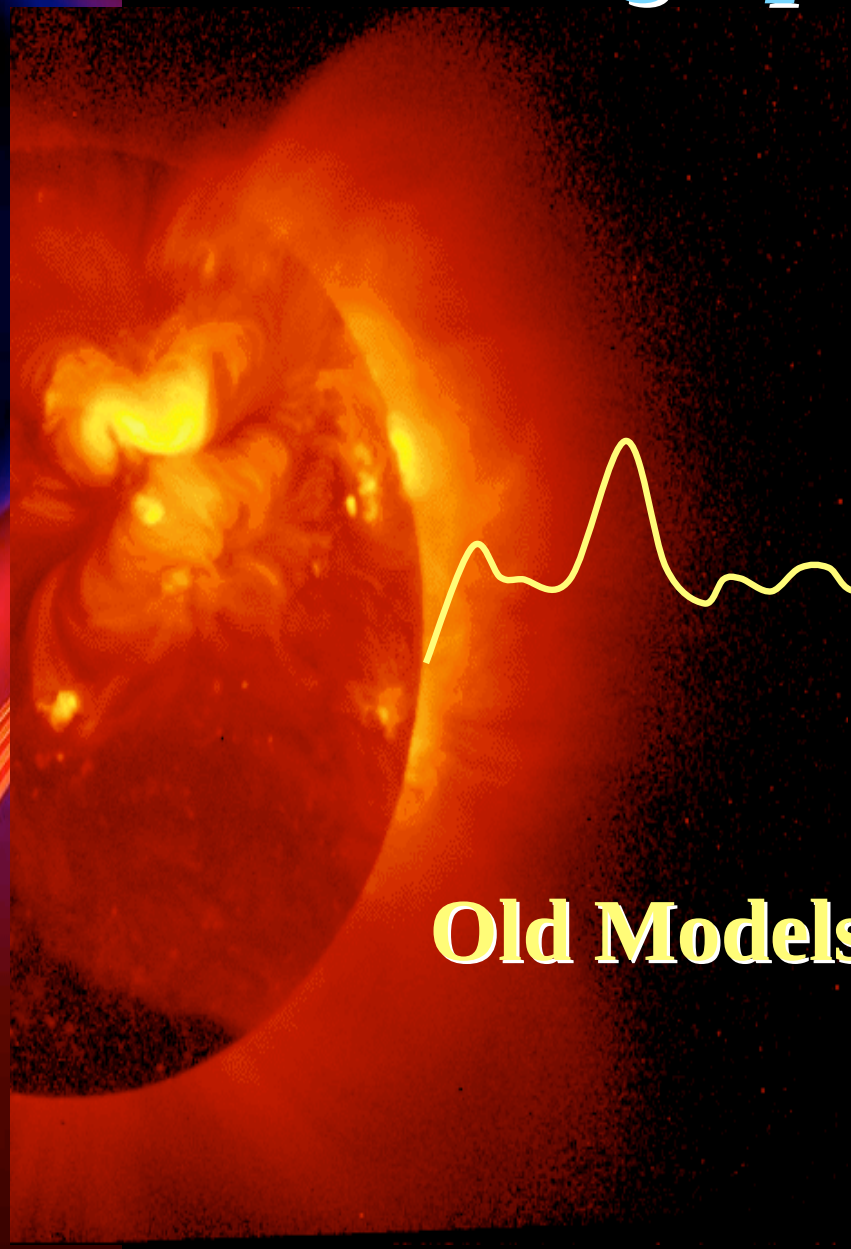
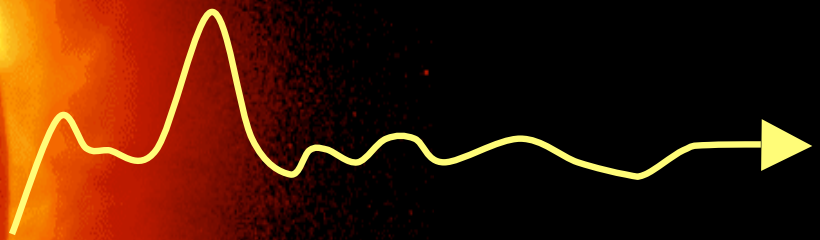
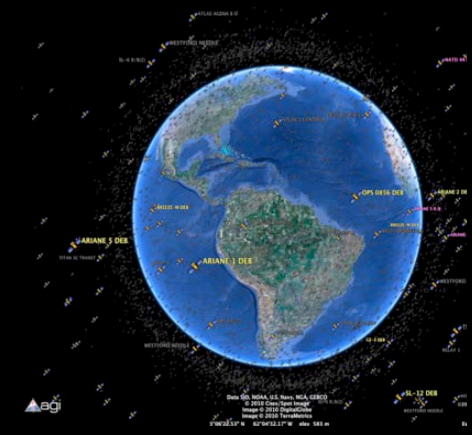
Predicting Space Weather







Old Models: Shocks move in 1D

New…

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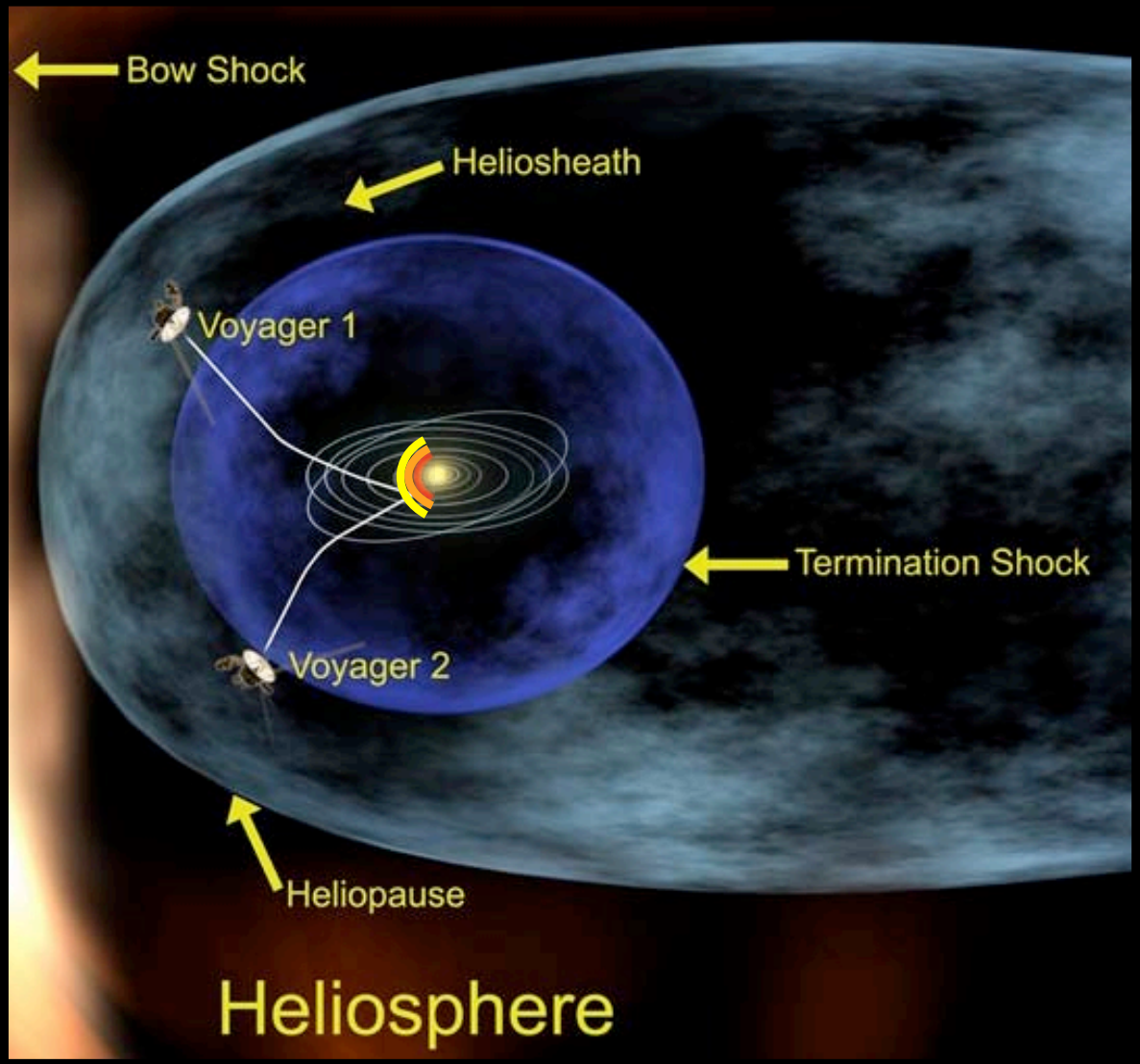
Space is more than just 1D



New models…

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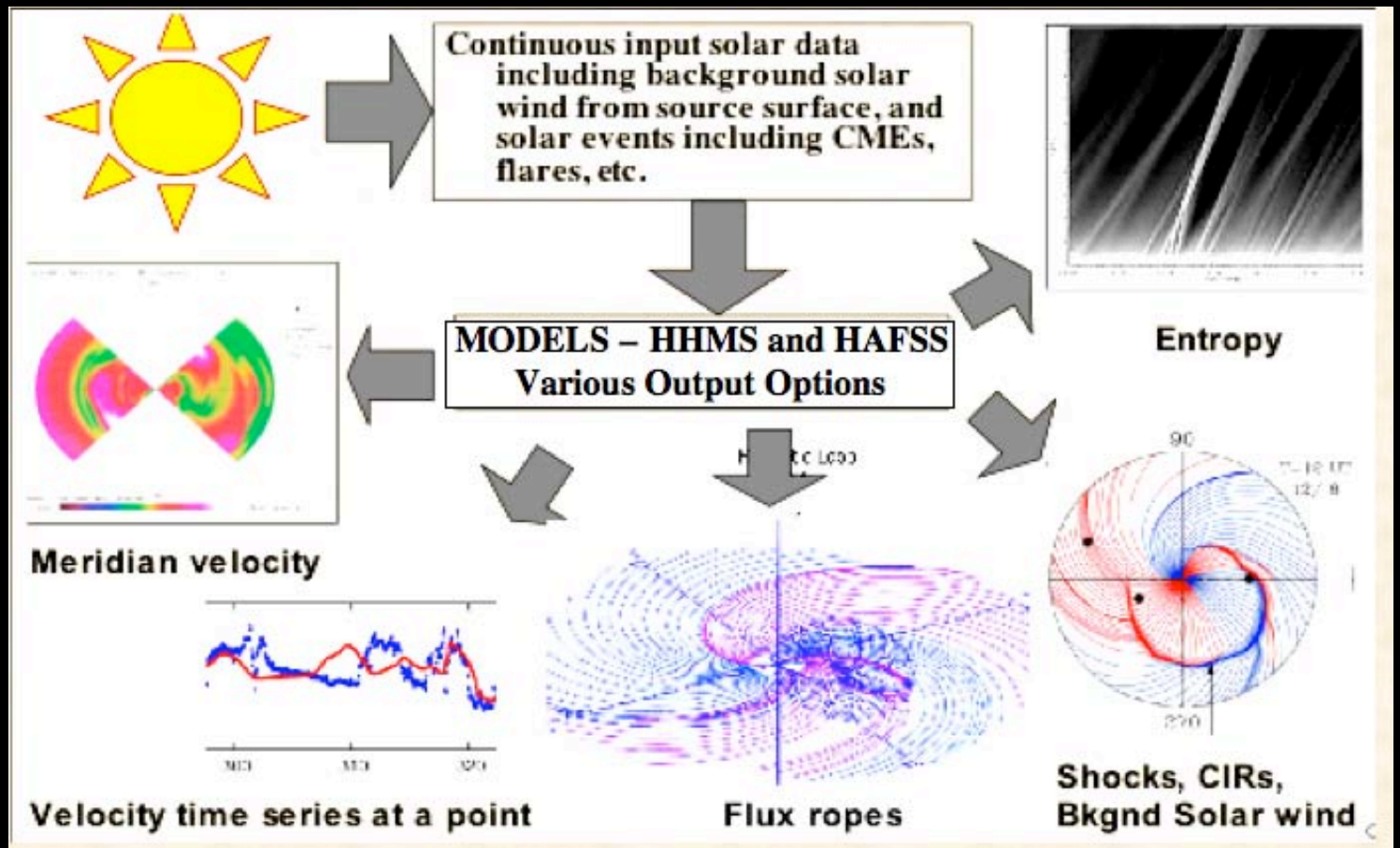
3D Magnetohydrodynamic (MHD) HHMS-PI and 3D kinematic HAFSS



Inputs for both 3D models: the full 3D MHD HHMS-PI and the kinematic HAFSS and examples of models' multiple outputs for studying 3D shock propagation throughout the heliosphere.

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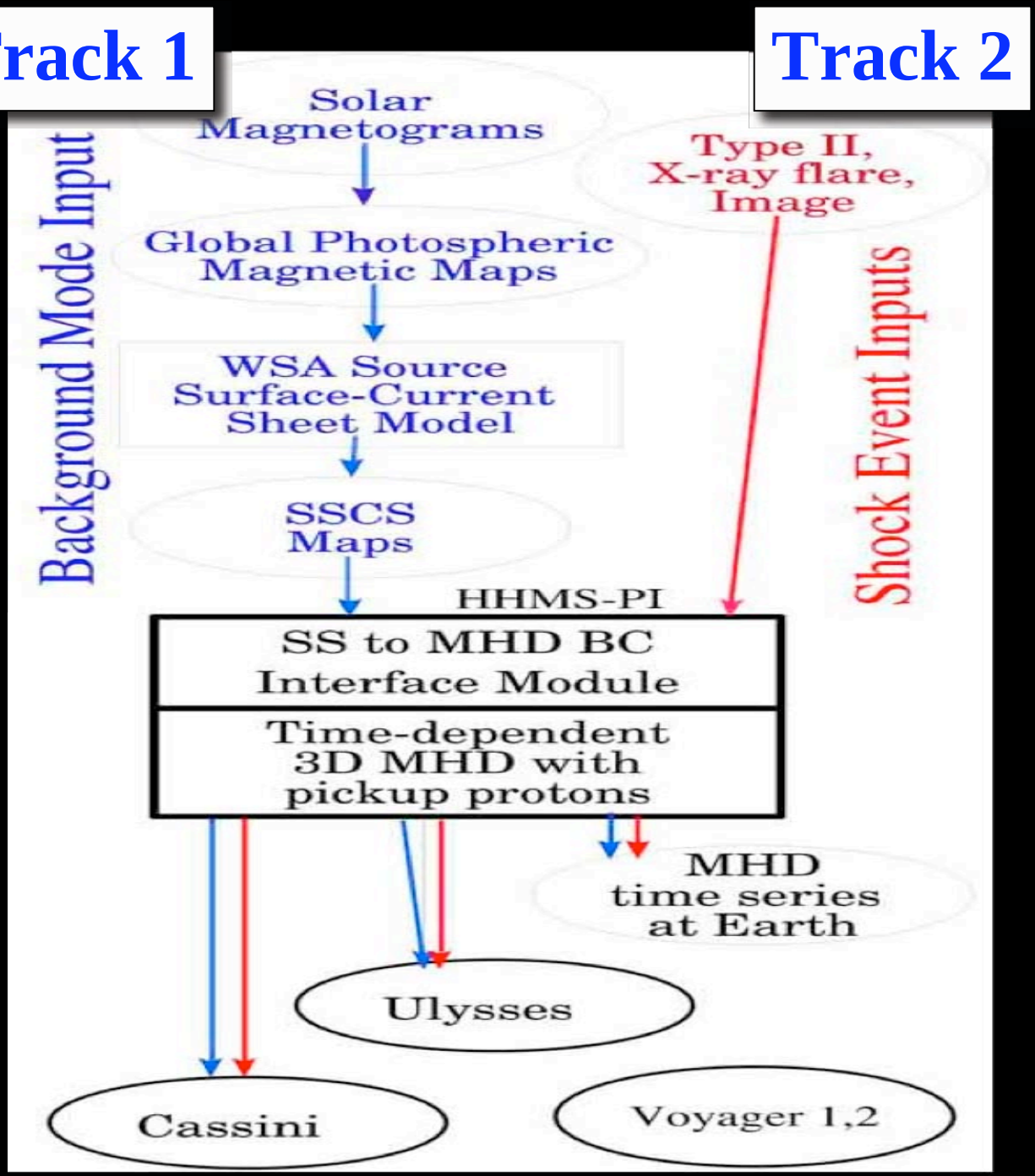
HHMS-PI

HHMS-PI = Hybrid Heliospheric Modeling System with Pickup Protons



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Carmel Research Center
HHMS-PI Team

Devrie Intriligator, Principal Investigator

Thomas Detman

Murray Dryer

Wei Sun

James Intriligator

Charles Deehr

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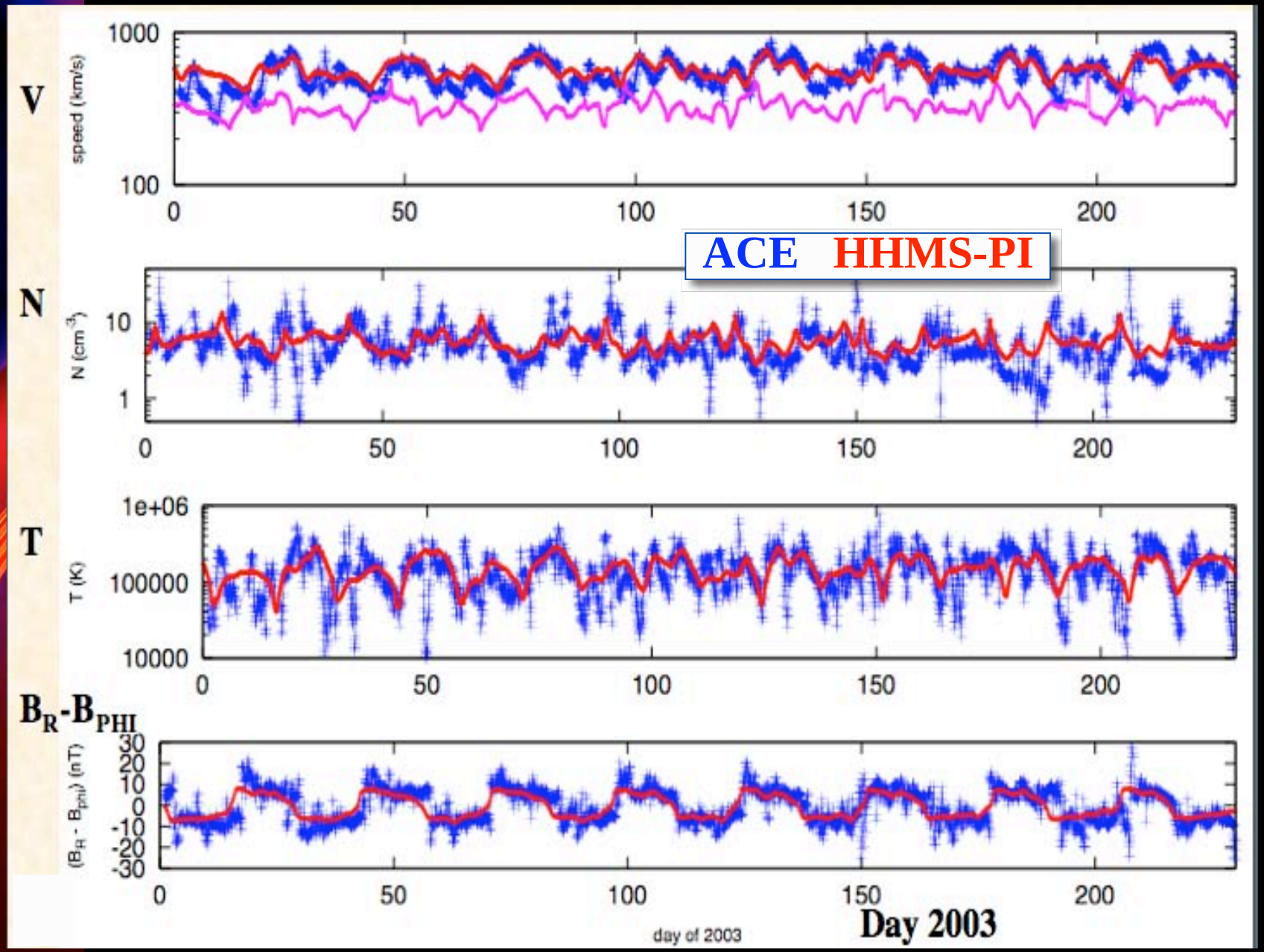
HHMS and ACE Data 2003



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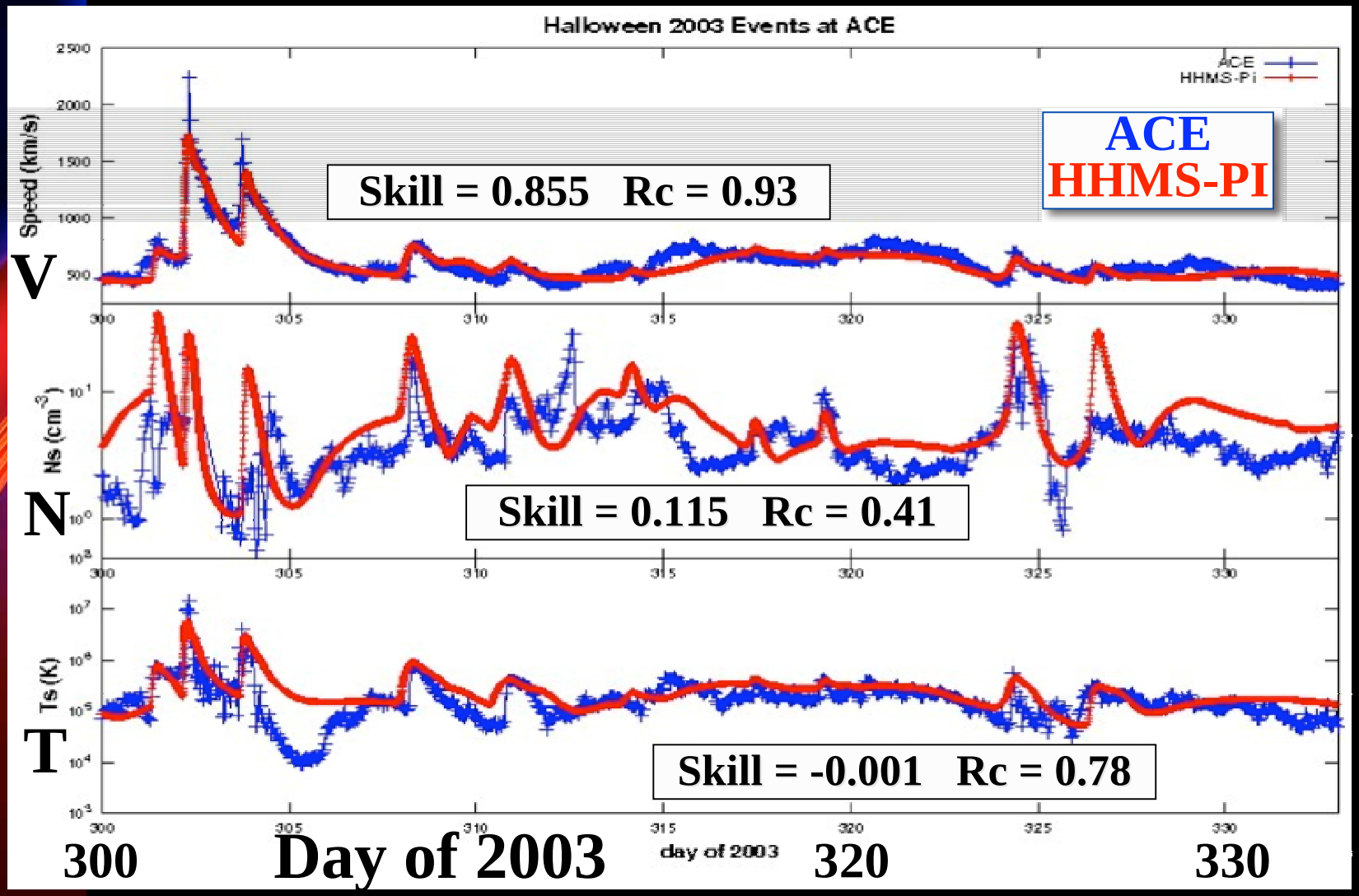
HHMS-PI and ACE Data Halloween 2003



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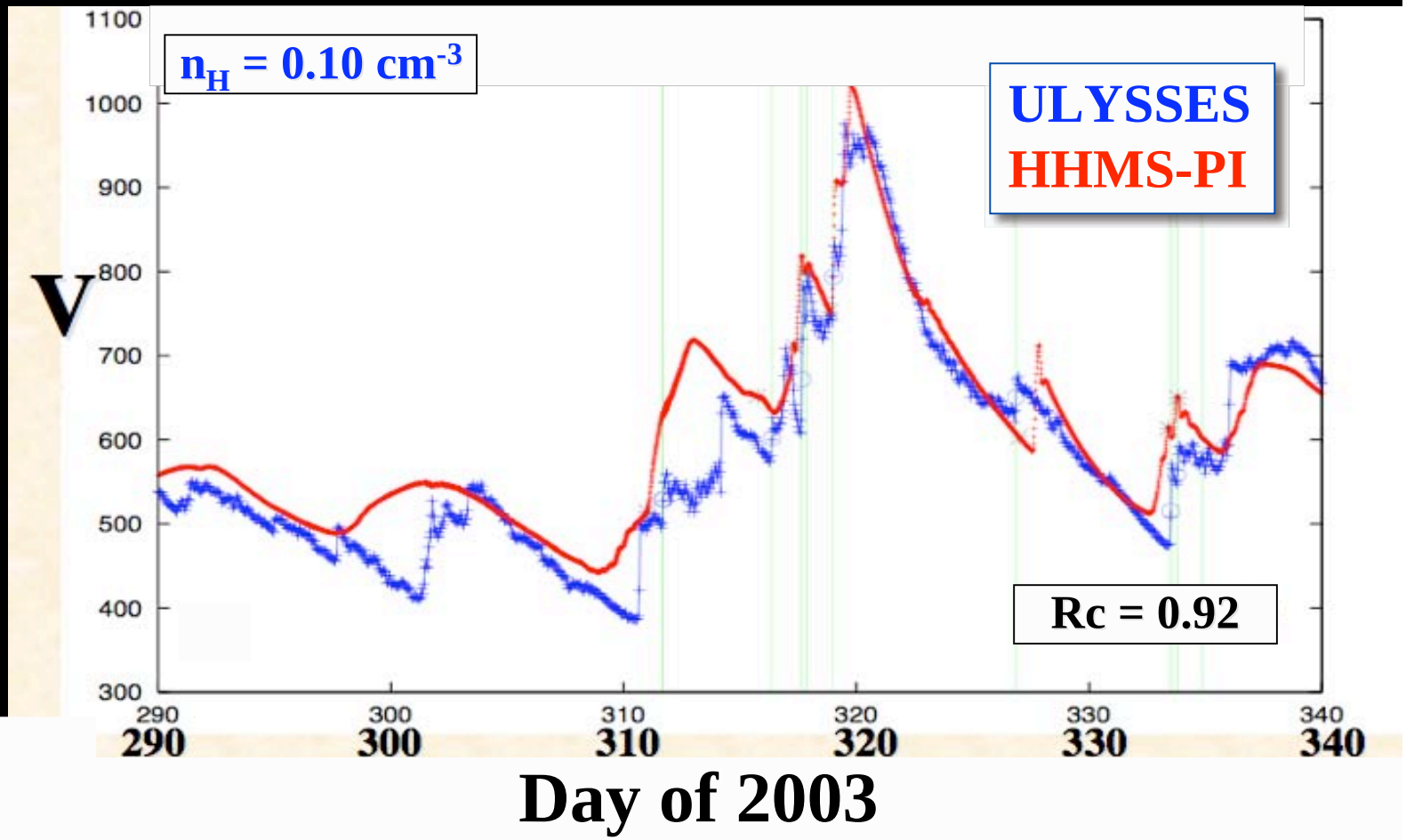
HHMS-PI and Halloween 2003 Events at Ulysses @ 5.5 AU & > 90 deg Away in Longitude from Earth



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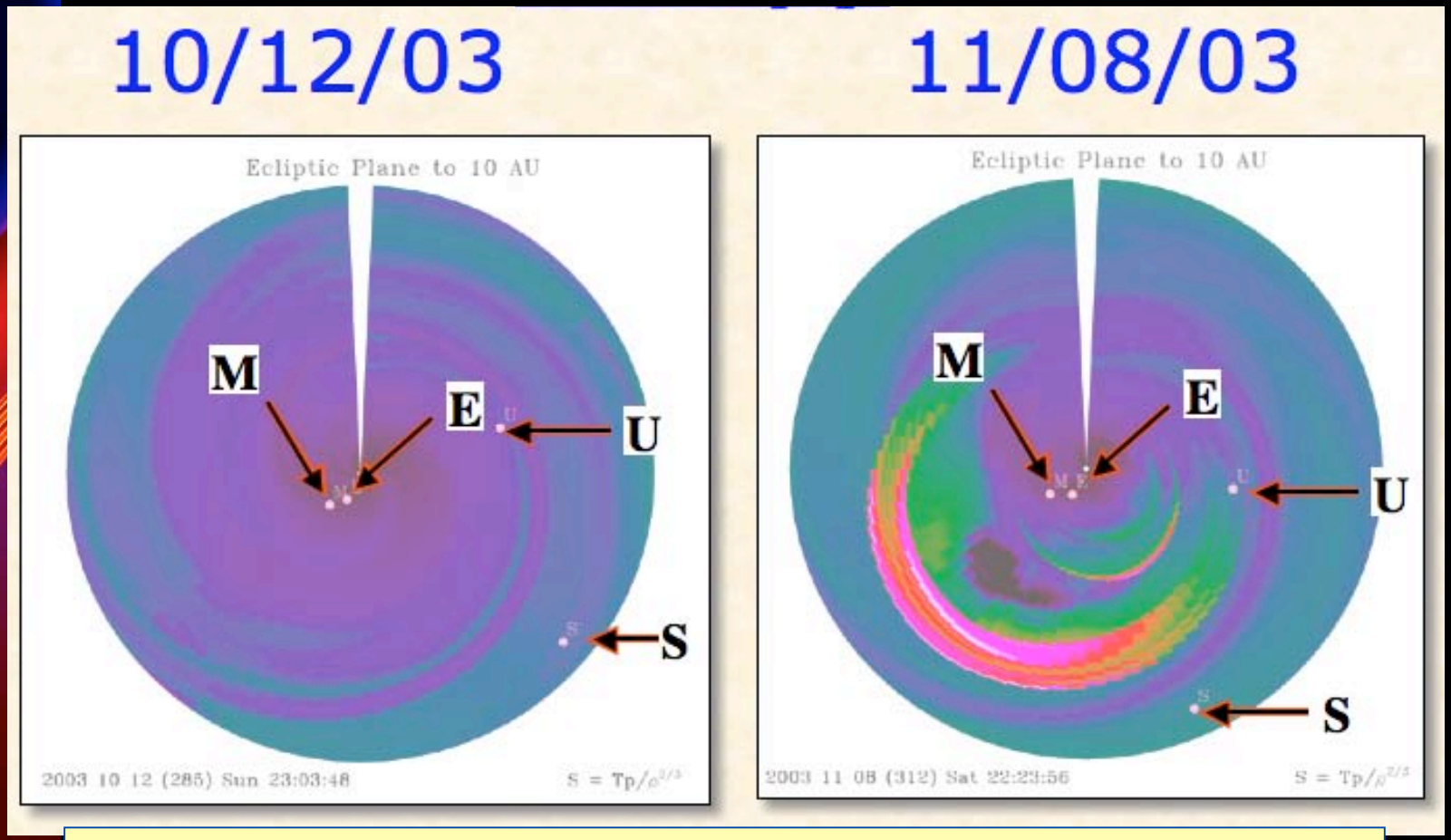
HHMS in Ecliptic Plane to 10 AU Halloween 2003: Entropy



M = Mars; E = Earth; U = Ulysses; S = Saturn

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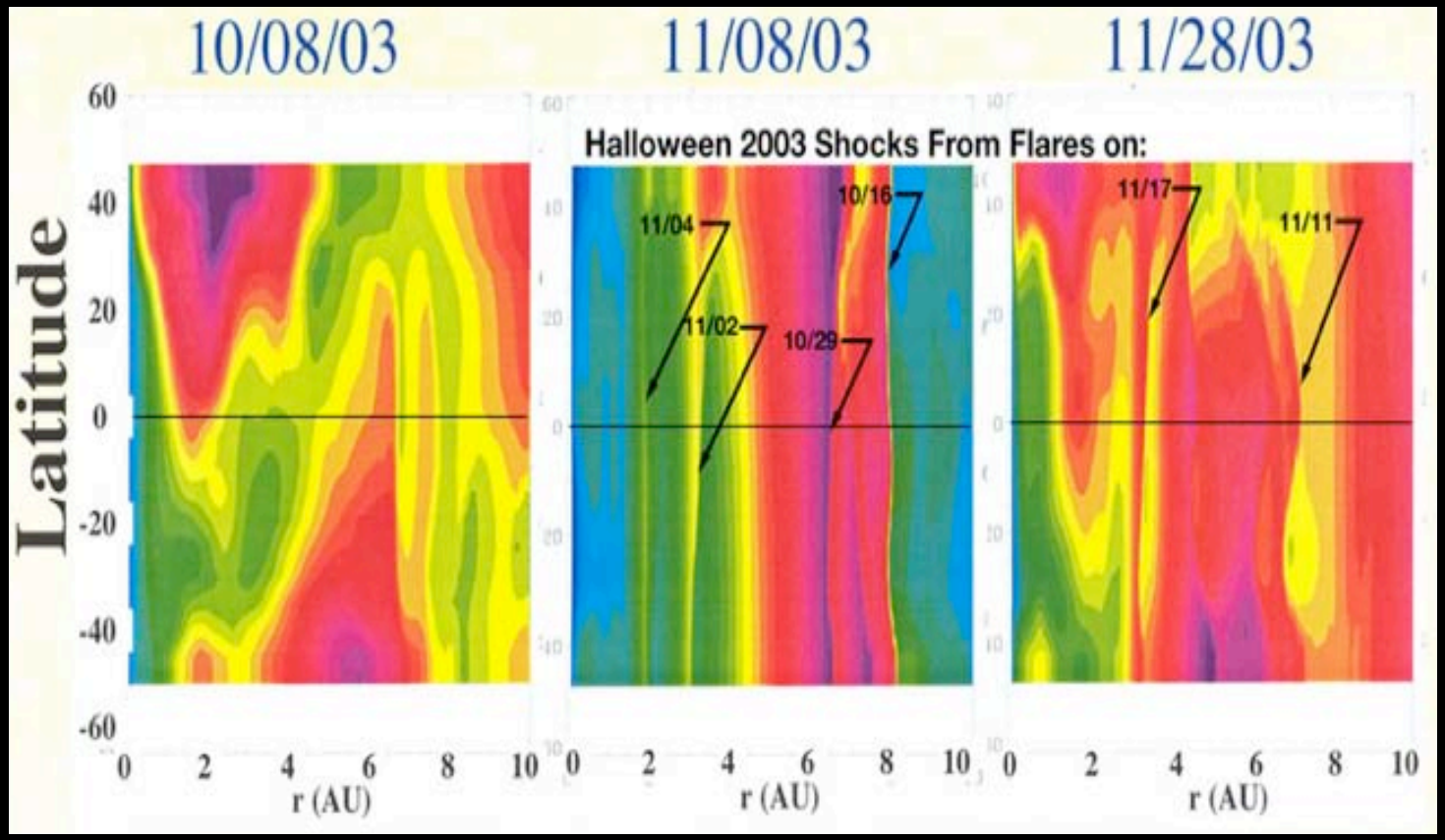
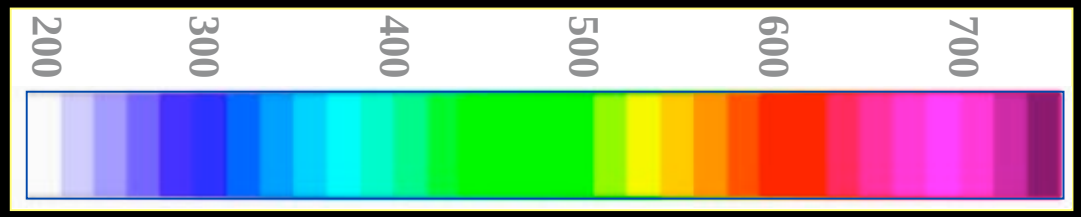
HHMS-PI Solar Wind Speed to 10 AU Halloween 2003 Latitude Variations





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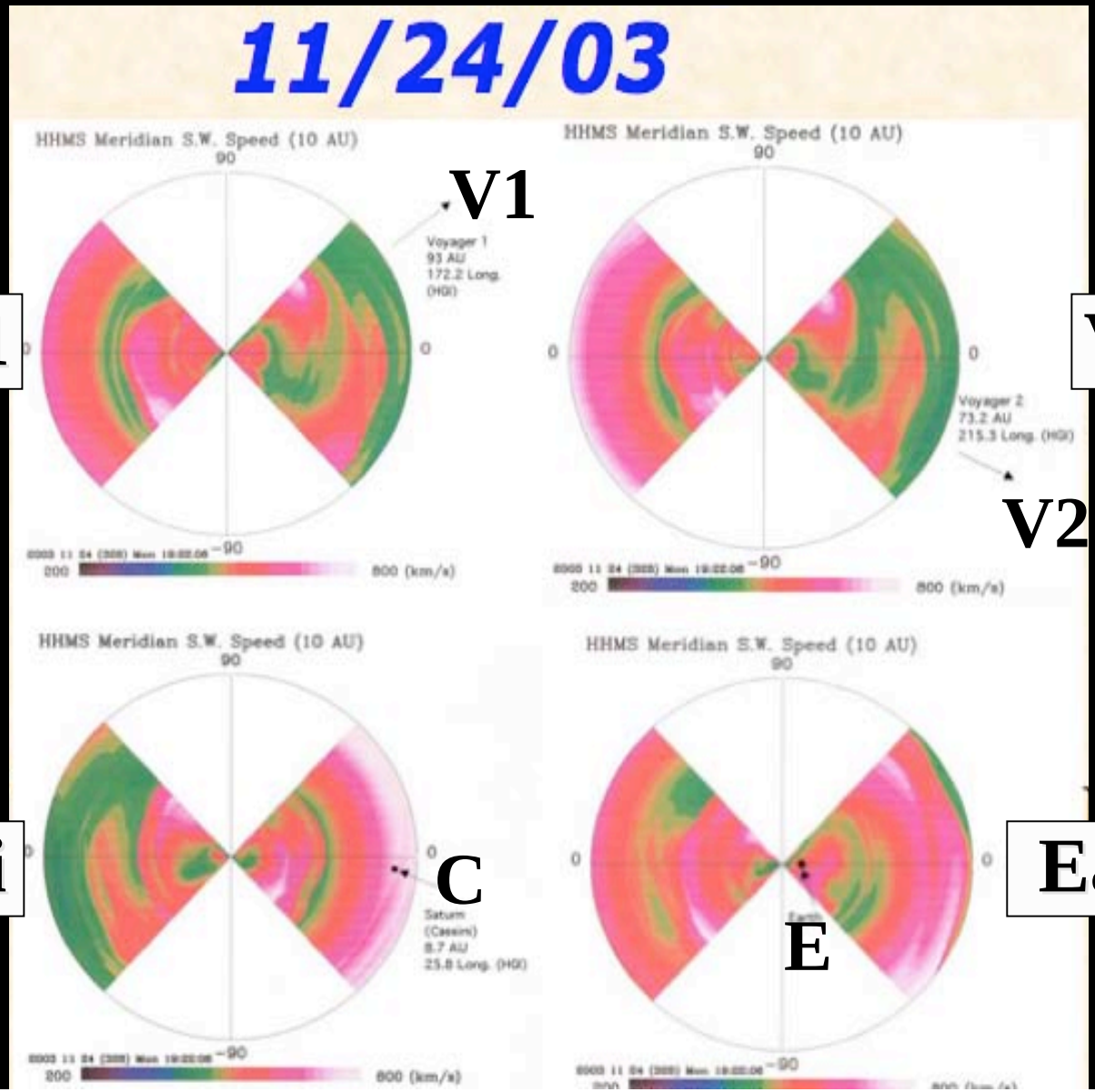
HHMS Meridian Plane to 10 AU Solar Wind Speed



V1

V2

Cassini

Earth

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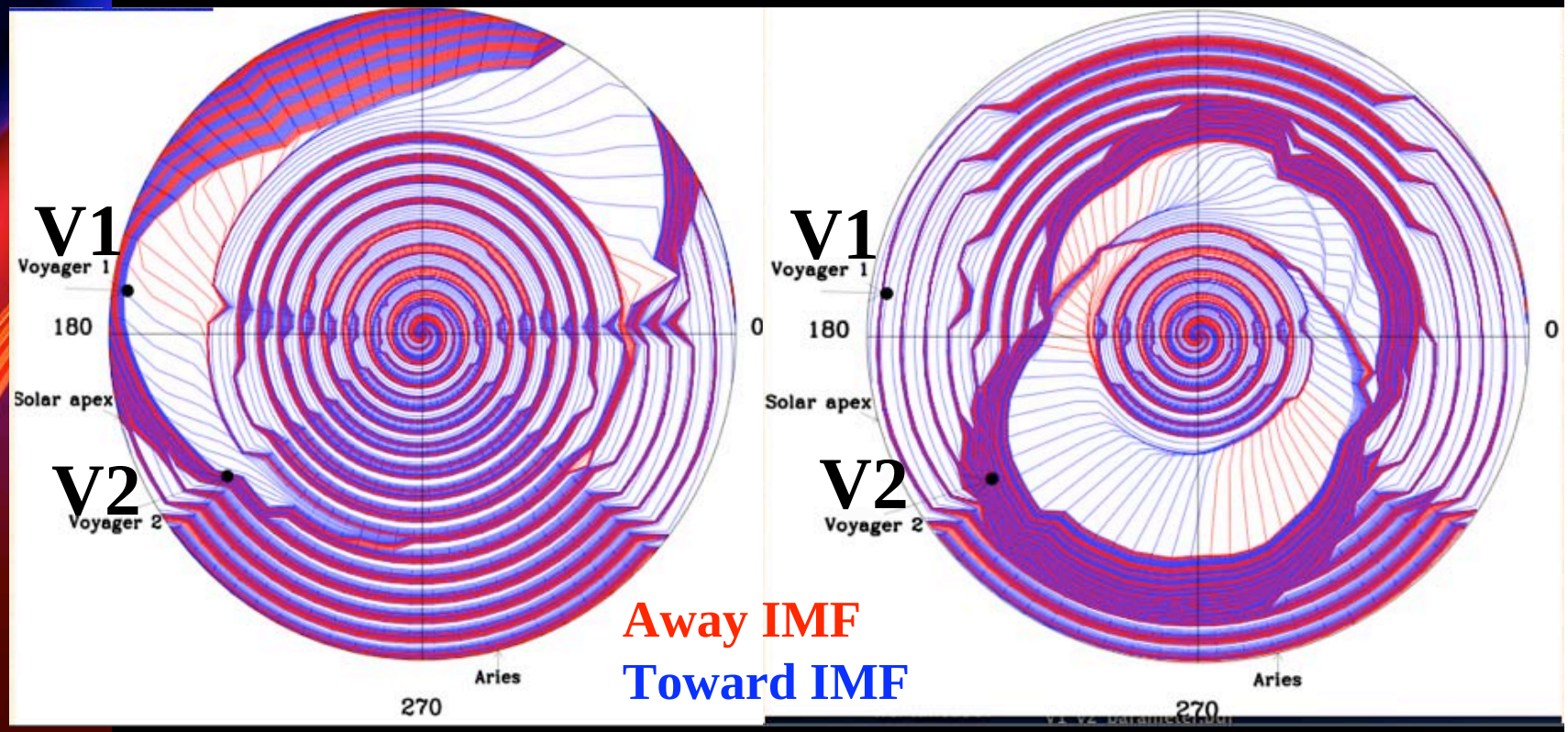
Jan. 20, 2005 Solar Event to 100 AU

Tuned to ACE Data ***VS.*** **Continuous Solar Input Data 1/15-2/1/05**



Away IMF

Toward IMF

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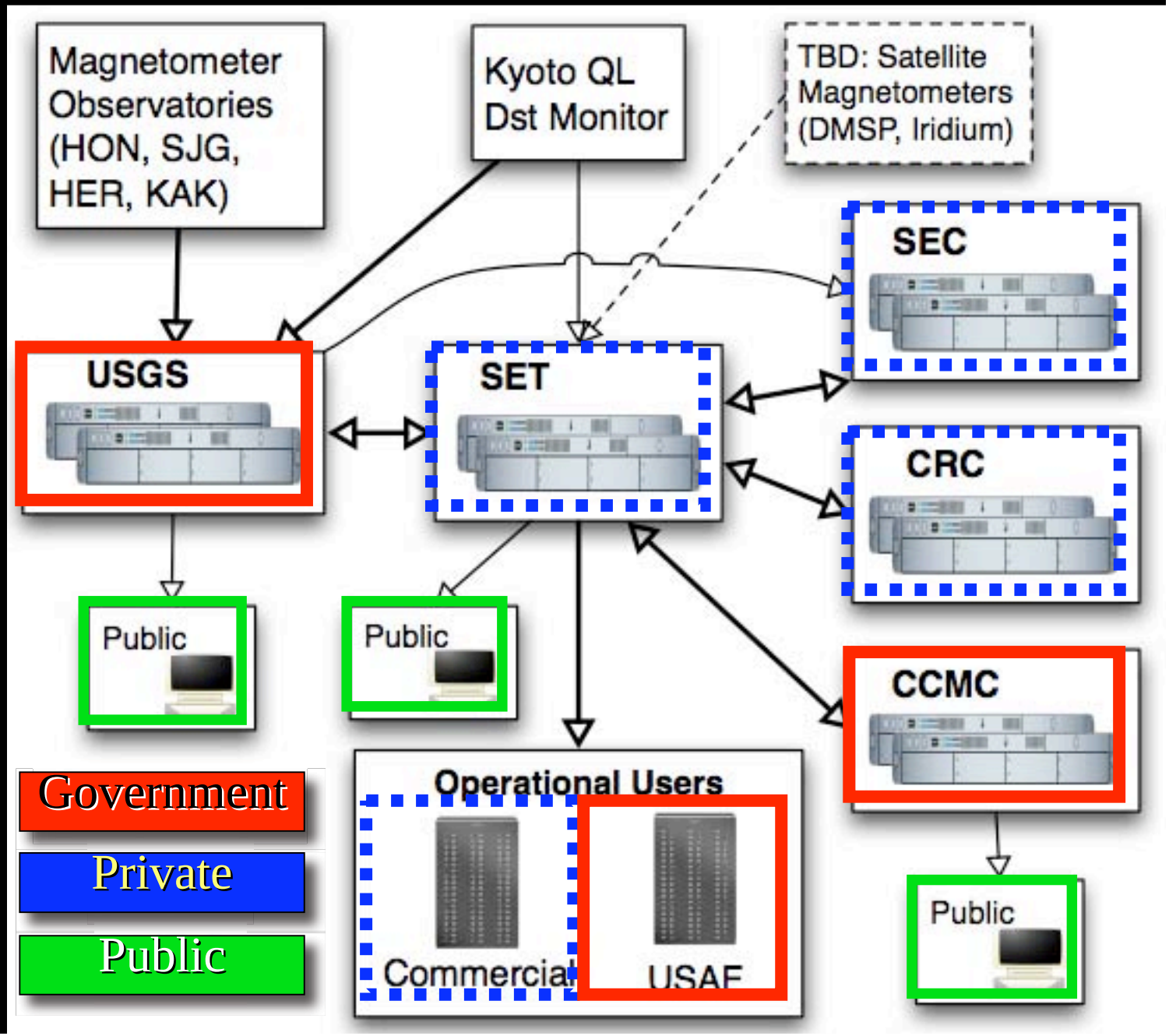
Research to Operations and Partnering

Distributed Network Overview



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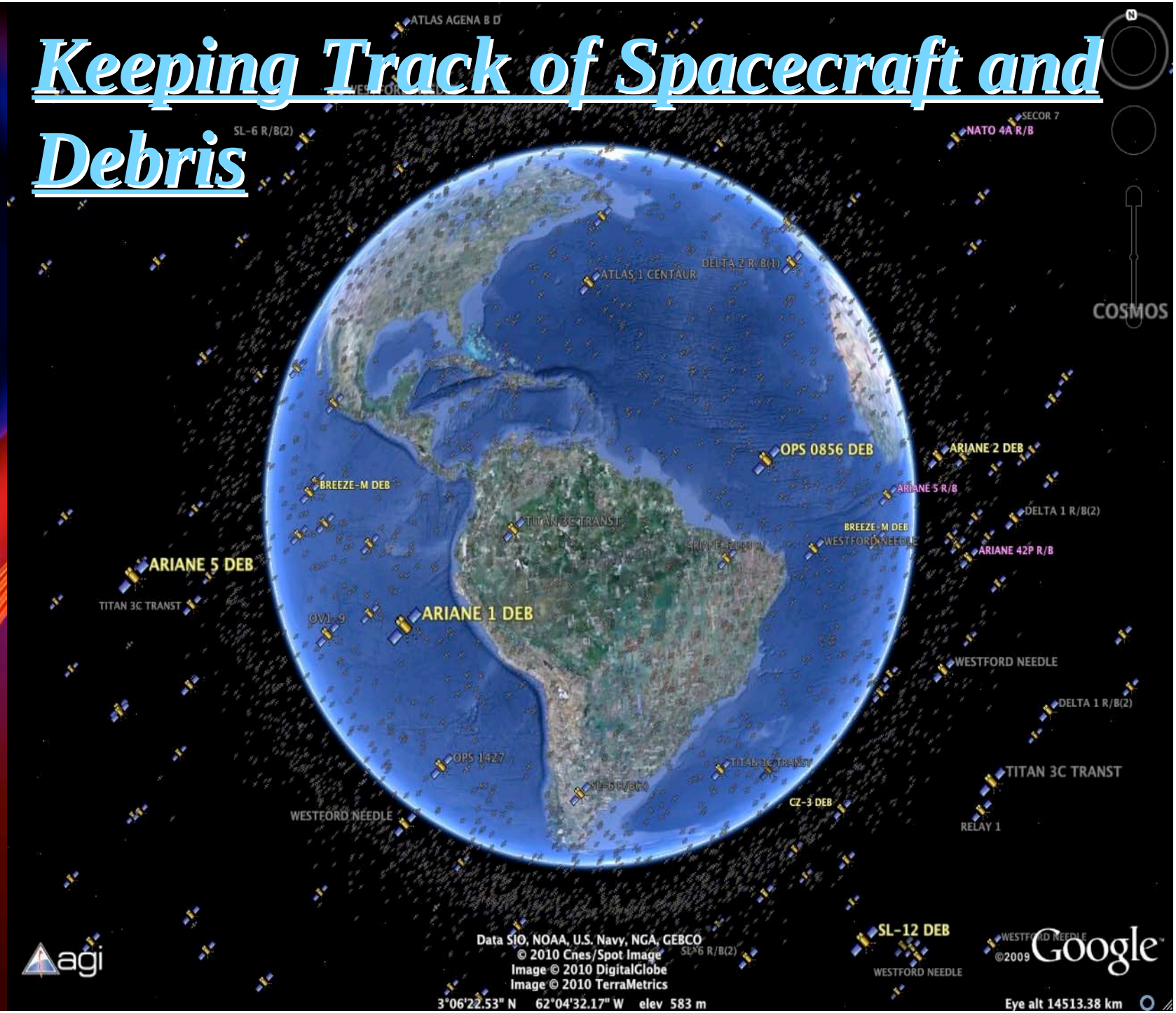
Keeping Track of Spacecraft and Debris



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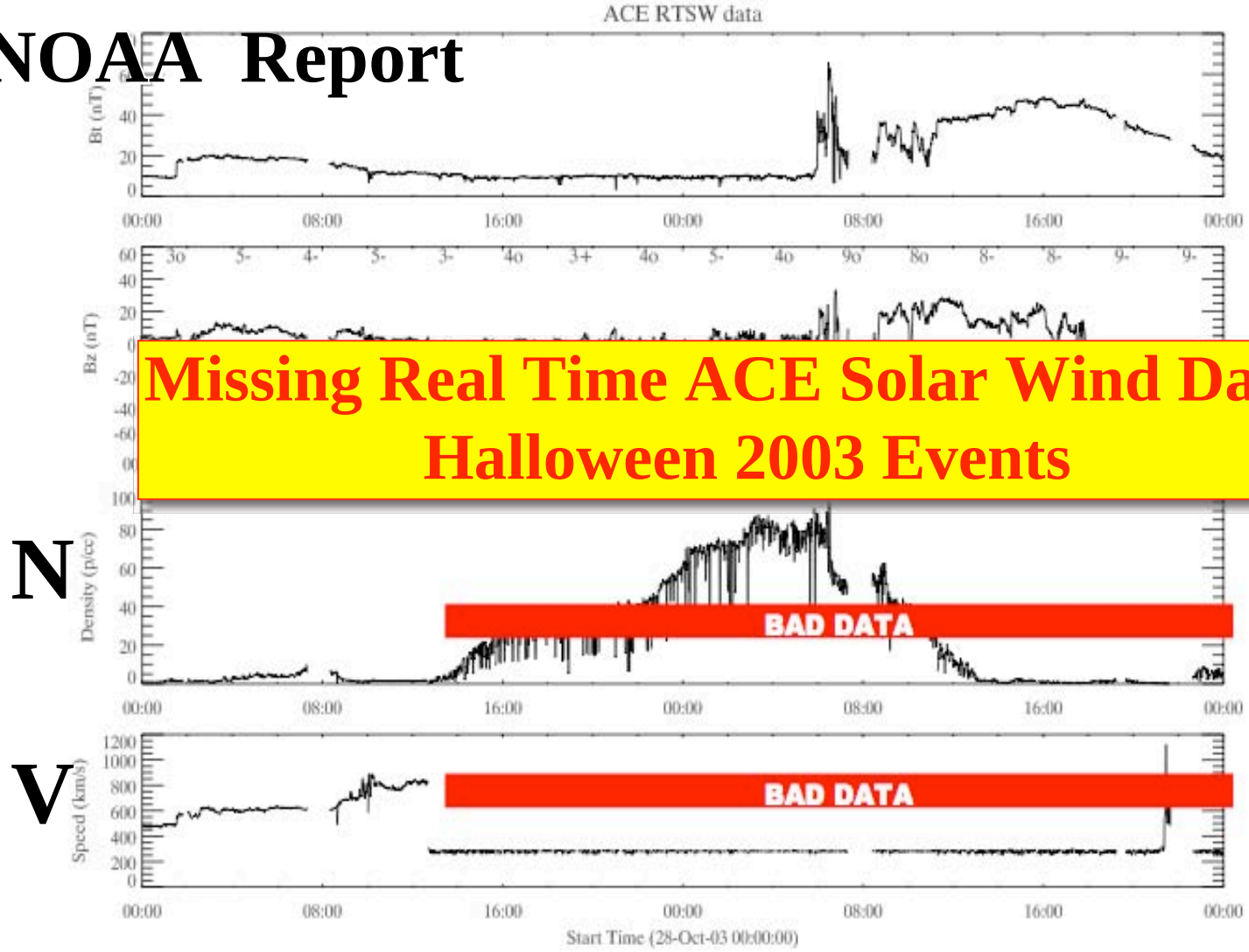
Improving the Data Situation

NOAA Report



Missing Real Time ACE Solar Wind Data: Halloween 2003 Events

N

V

Figure 15: ACE RSTW and Magnetic Field Data for 28-29 October 2003 (speed and density data are invalid after 1200 UTC on 24 October due to contamination from high fluxes of high energy particles)

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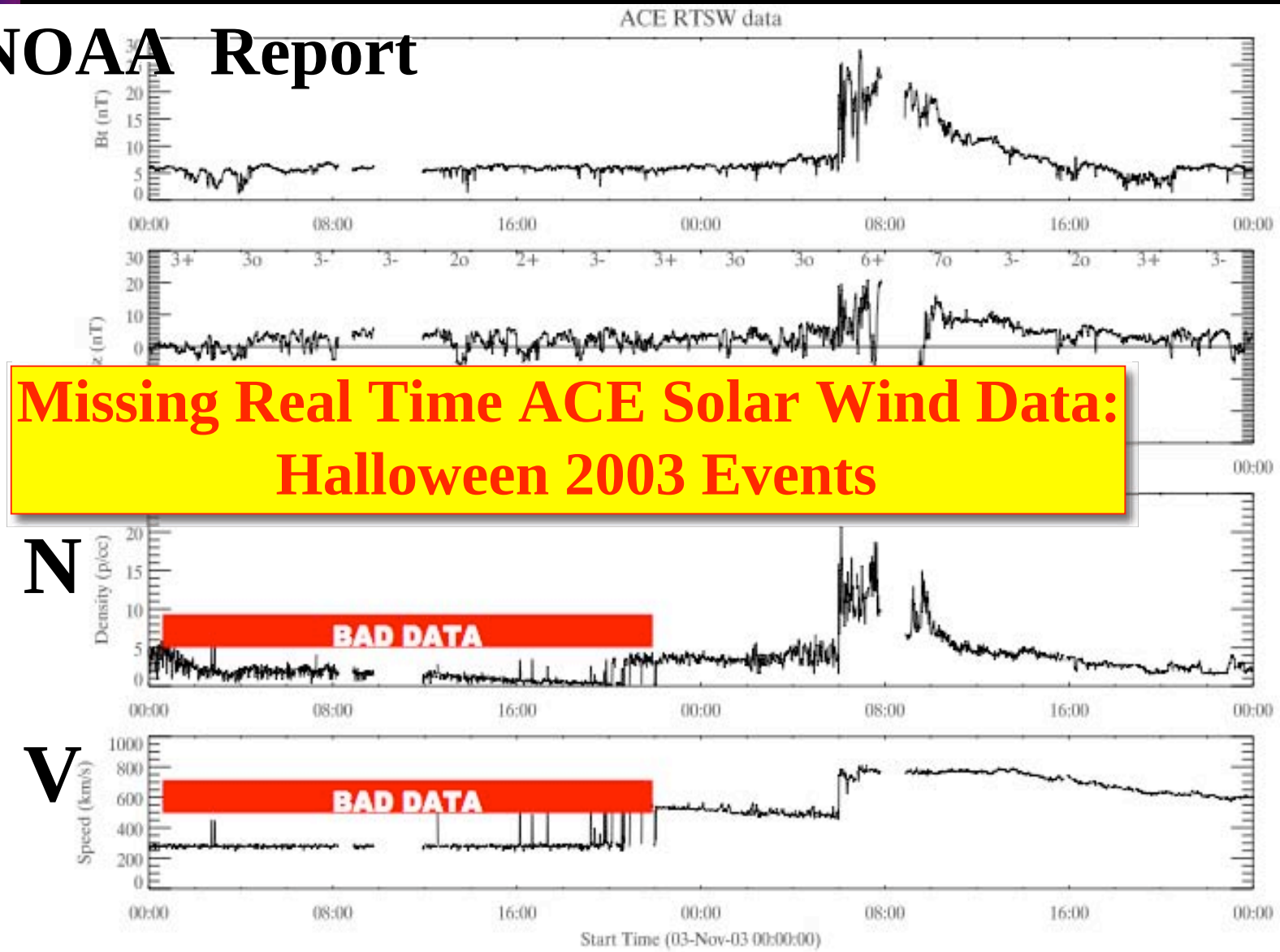
Improving the Data Situation

NOAA Report



Missing Real Time ACE Solar Wind Data: Halloween 2003 Events

N

V

Figure 17: ACE RSTW Data for 3-4 November 2003 (speed and density data are invalid until 2200 UTC on 4 November due to contamination from high fluxes of high energy particles)

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Improving the Data Situation

NOAA Report

EPAM

Missing Real Time ACE Energetic Particle Data: Halloween 2003 Events

Figure 19: ACE EPAM and Kp from 28 October to 6 November 2003
(Noise can be seen on the P3 and P5 channels due to contamination from high energy particles)

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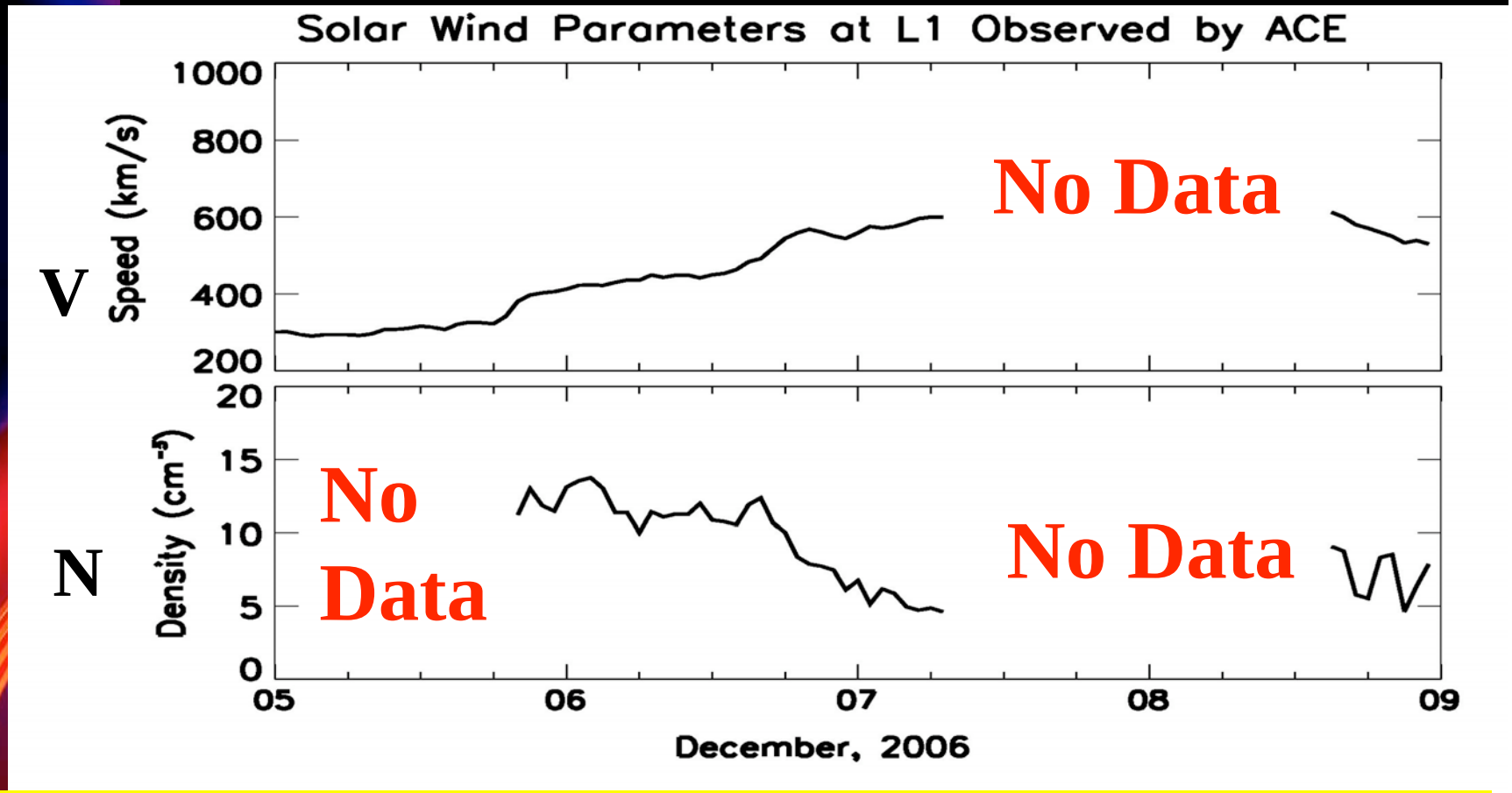
Improving the Data Situation



Missing Real Time ACE Solar Wind Data: Dec. 2006 Events

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Improving the Data Situation

National Weather Service

Space Weather Prediction Center

“ On 01 June 2010 Thule Neutron Monitor Data was discontinued in Space Weather Prediction Center products.”

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2010 SWW Roundtable Session: Growing the Space Weather Enterprise

Keynote Speaker: Conrad C. Lautenbacher, Jr.,

Vice President, Science Programs, CSC:

"The Growth of the Space Weather Enterprise"

Panelists:

Dr. Thomas Bogdan, Director, NOAA/SWPC

Robert S. Dickman, Major General, USAF (Retired), Executive Director, American Institute of Aeronautics and Astronautics

Robert Gold, AT&L/SIO, Office of the Secretary of Defense

Dr. Louis J. Lanzerotti, Distinguished Research Professor of Physics, New Jersey Institute of Technology, and Editor, Space Weather Quarterly

Dr. Keith Strong, NASA GSFC/ SP Systems

Moderator and Organizer: Dr. Devrie S. Intriligator, Director, Space Plasma Laboratory, Carmel Research Center

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Policy Recommendations:

- **Working toward the urgent launch of DSCOVR: *the sooner the better!***

- **Partnering between government agencies & the private sector**

- **Fostering a *ten-fold* increase in the size of the space weather enterprise during Solar Cycle 24**

- **Promoting the creation of a Space Weather Coordinator in OSTP.**

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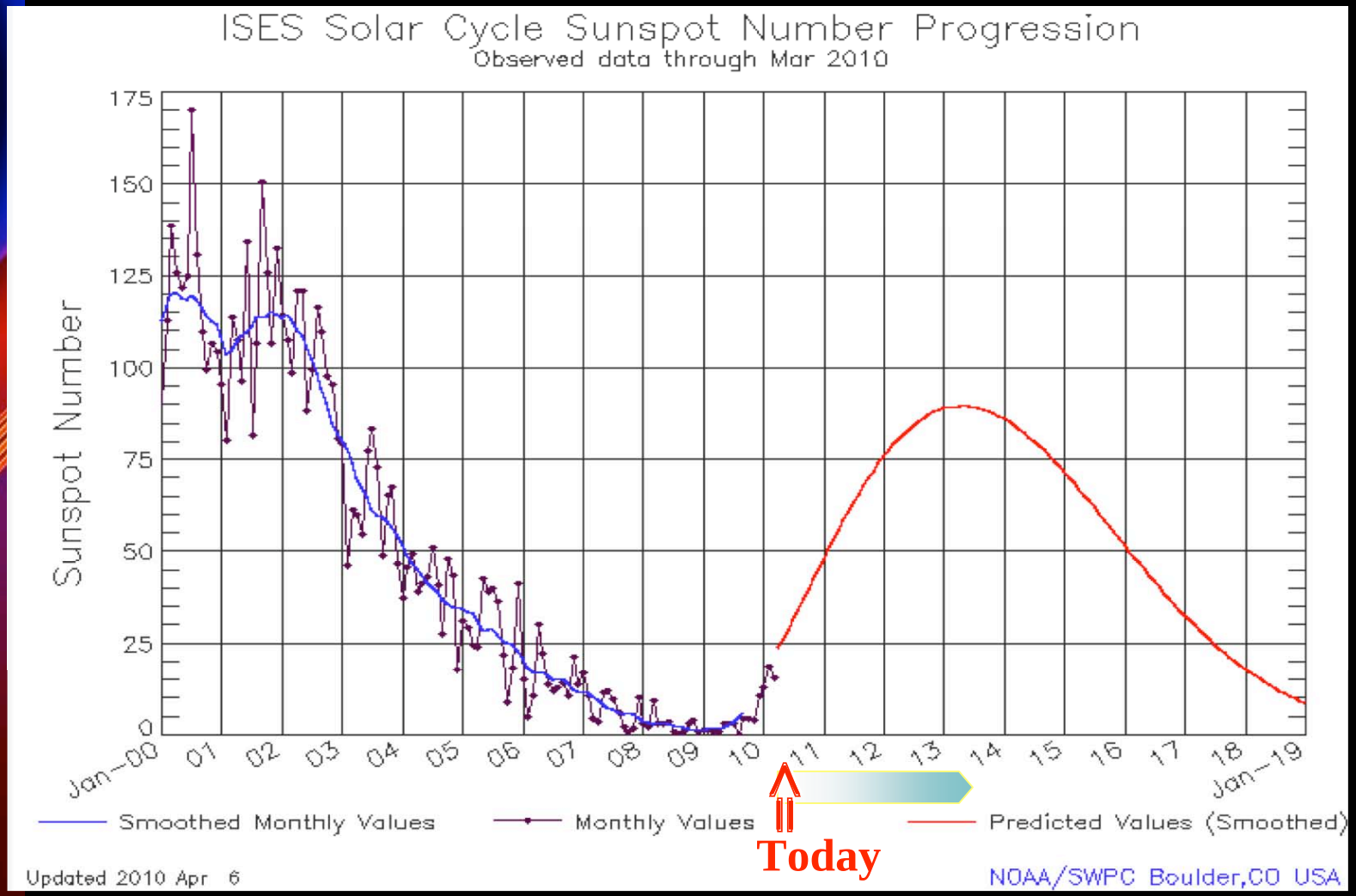
Working toward the urgent launch of DSCOVR: the sooner the better!



Devrie Intriligator - devriei@aol.com

Thank you!

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