STEREO Beacon

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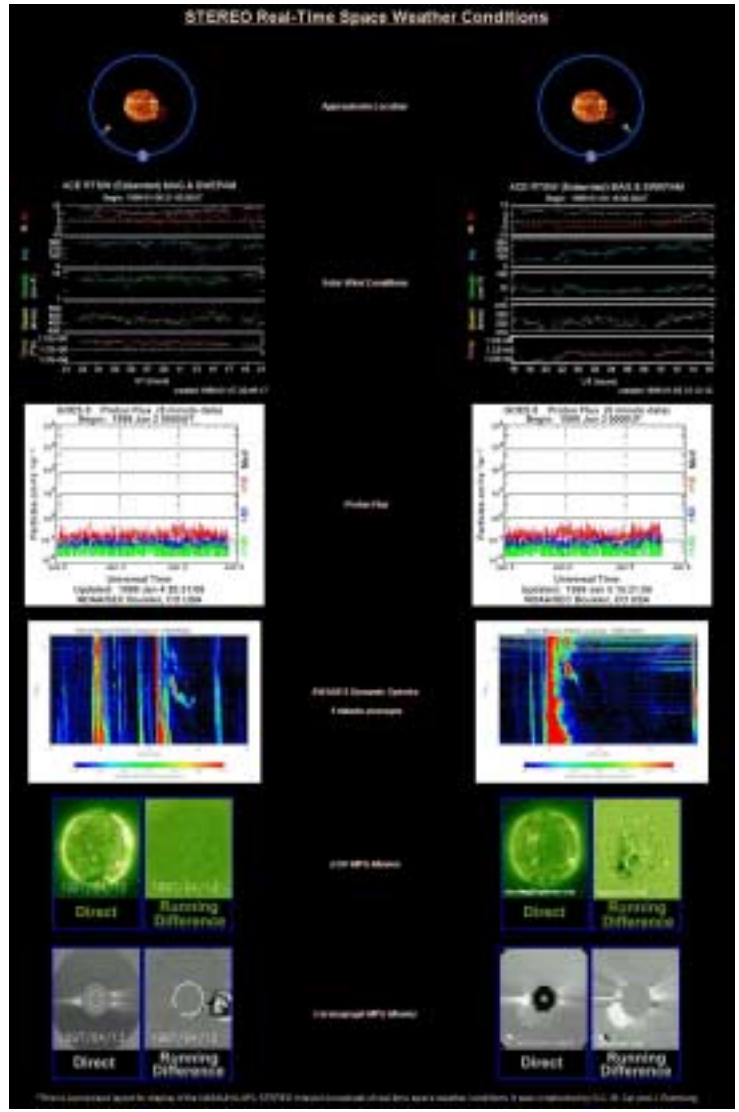
STEREO Beacon

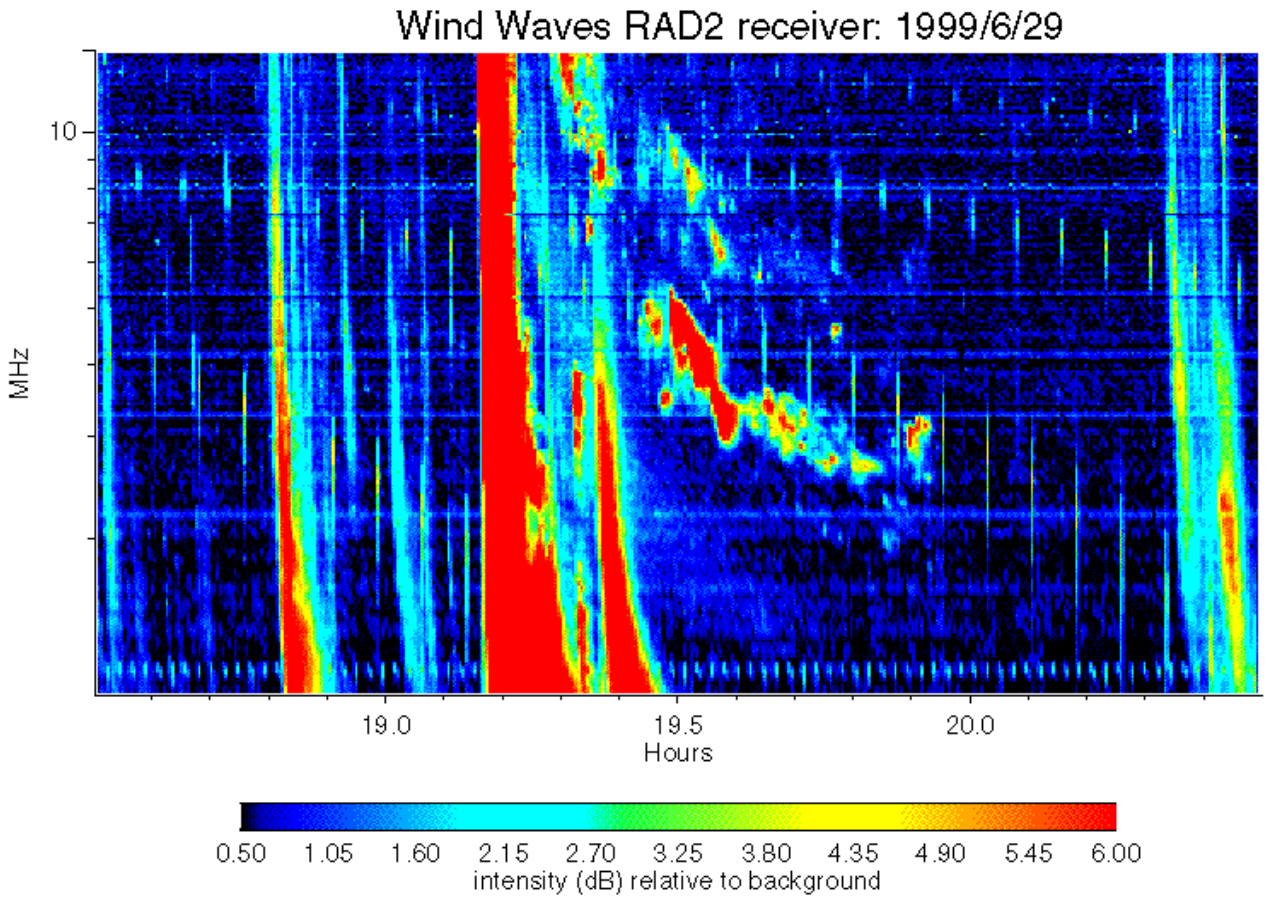
- Each STEREO spacecraft will broadcast highly compressed SWx images and *in situ* data continuously.
- During the daily 3-hour DSN contacts, the SWx stream will be captured, processed, and put online in near-real-time at the STEREO Science Center (SSC) located at NASA-GSFC.
- As soon as the recorder dumps are available, the SSC will fill in the previous 24 hours' SWx data as a browse archive.

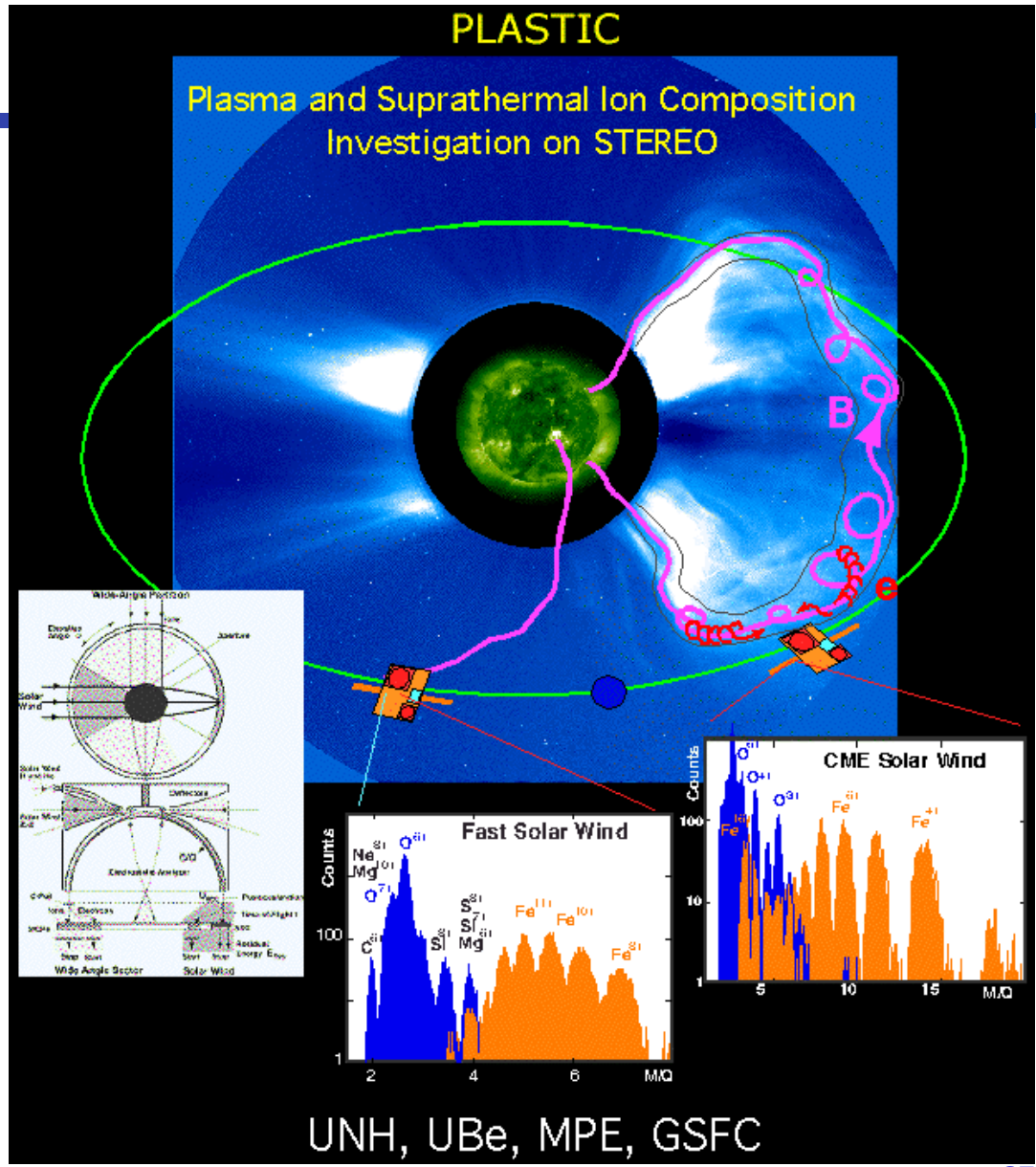


STEREO Payload

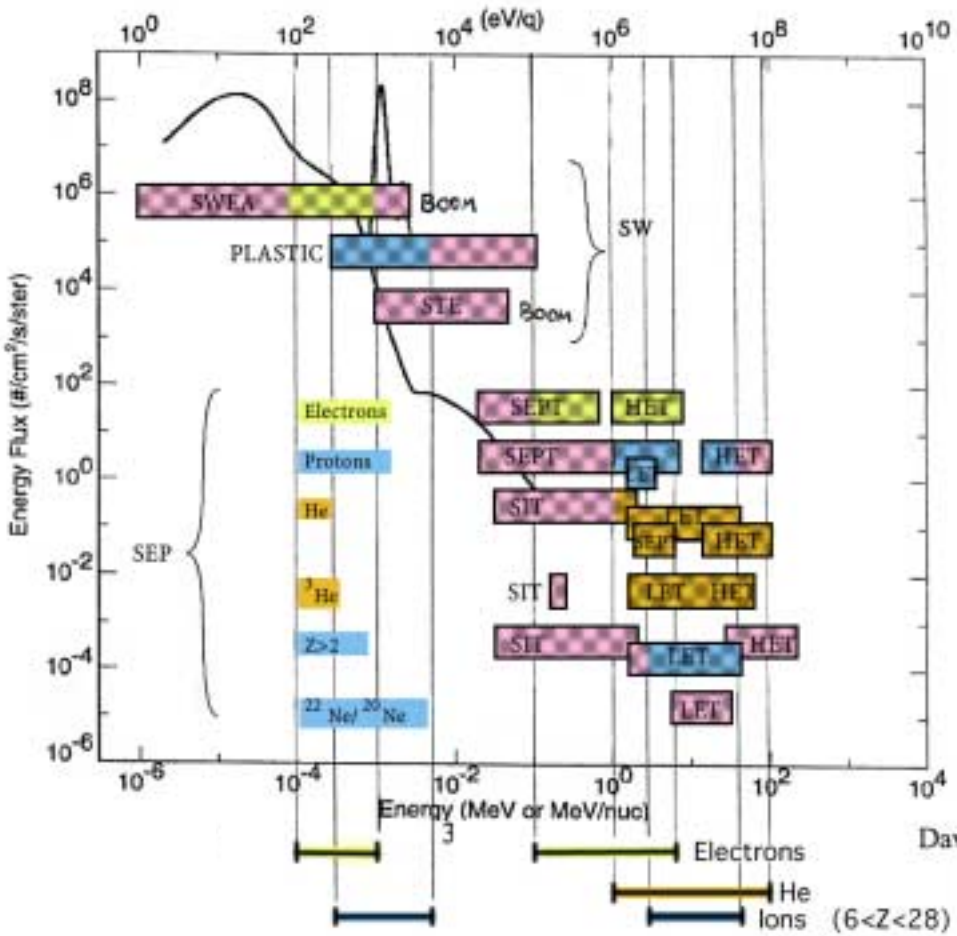
Instrument Name and Collaborating Institutions	Primary Measurement Space Weather Beacon Content [Number of 272 byte packets per minute]
IMPACT (*In situ* Measurement of Particles and CME Transients) *Principal Investigator: Dr. J. G. Luhmann,* *University of California, Berkeley*, NASA-GSFC, Caltech, U. Md, U. Kiel,CESR, MPAe, JPL, ESTEC, UCLA, NOAA, LANL, et al.	Solar wind plasma characteristics; magnetic field parameters; solar energetic particles One minute average solar wind electron fluxes (6 energy bands); magnetic field strength and direction; energetic electron, proton, ion (He,CNO,Fe) fluxes (multiple bands) [1]
PLASTIC **(PLAsma and SupraThermal Ion and Composition)** *Principal Investigator: Dr. A. B. Galvin* *University of New Hampshire* University of Bern, MPE-Garching, et al.	Ions in the energy-per-charge range of 0.2 to 100 keV/e One minute average solar wind proton density, bulk speed, thermal speed, and direction; alpha density; representative charge (or abundance) state distributions; suprathermal rates [1]
SECCHI **(Sun-Earth Connection Coronal and Heliospheric Investigation)** *Principal Investigator: Dr. R. A. Howard* *Naval Research Laboratory, Washington, D.C.* Lockheed-Martin Solar and Astrophysics,, NASA-GSFC, University of Birmingham (U.K.), IAS, RAL, MPAe, U. Kiel, CSL, et al.	EUV imager, two coronagraphs with overlapping fields of view; two heliospheric imagers with overlapping fields of view 256x256 pixel highly compressed images from EUVI, COR1, COR2, HI1, HI2 [14]
S/WAVES (STEREO/WAVES) *Principal Investigator: Dr. J.-L. Bougeret* *CNRS, Observatoire de Paris*, University of Minnesota, UC Berkeley, NASA-GSFC	Interplanetary radio bursts from 40 kHz to 16 MHz One minute average radio dynamic spectrum (Intensity, frequency, time) [1]

S/WAVES


Wind Waves RAD2 receiver: 1999/6/29
10
MHz
19.0
19.5
20.0
Hours
0.50 1.05 1.60 2.15 2.70 3.25 3.80 4.35 4.90 5.45 6.00
intensity (dB) relative to background

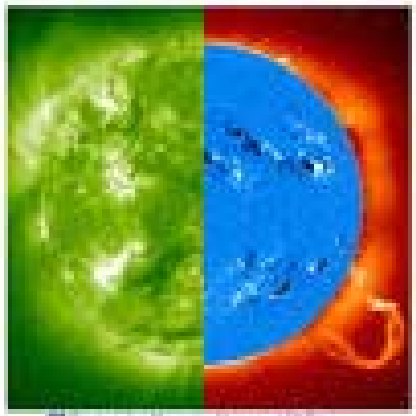

PLASTIC
Plasma and Suprathermal Ion Composition Investigation on STEREO
B
e
Fast Solar Wind
CME Solar Wind
Counts
M/Q
UNH, UBe, MPE, GSFC

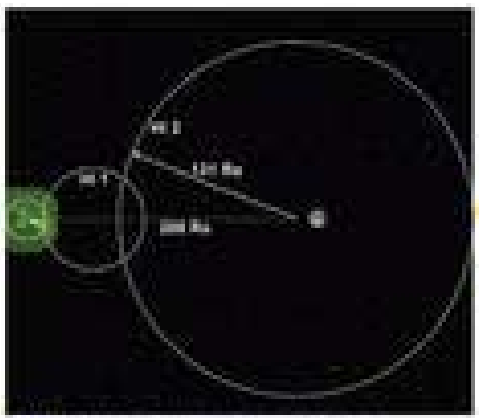
IMPACT / PLASTIC Energy Coverage

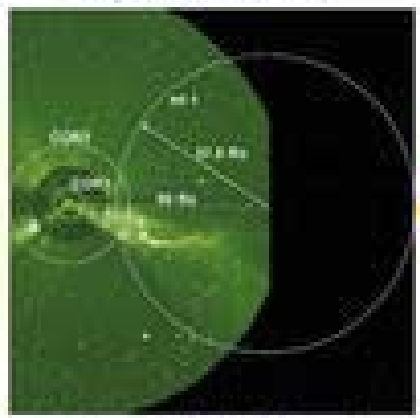


SECCHI Exploration of CMEs and the Heliosphere on STEREO

- *What Configurations of the Corona Lead to a CME?*
- *What Initiates a CME?*
- *What Accelerates CMEs?*
- *How Does a CME Interact With the Heliosphere?*
- *How do CMEs Cause Space Weather Disturbances?*

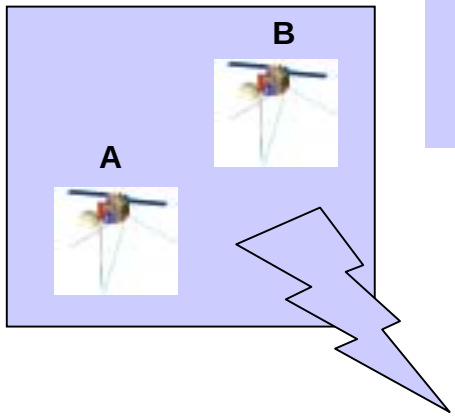






STEREO as ILWS Test-bed?

NASA will provide two spacecraft that continuously transmit space weather measurements to a ground processing facility



DSN

3 hours per day

STEREO Science Center

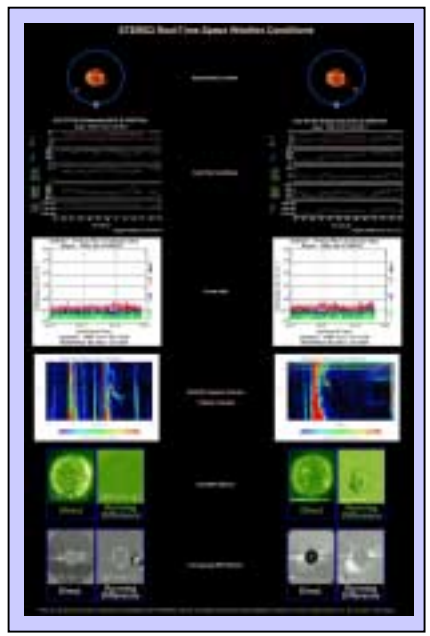
NASA-GSFC

Internet

21 hours per day

Antenna Partners

In Search Of: Antenna Partners



Real-time Space Weather Display and Archive

universal space network inc. access your world

11m X-band antenna

$575 per hour

20 hours per day X 2 spacecraft = $8.4M/year

Potential Antenna Partners

- Rutherford Appleton Labs (U.K.) ACE antenna
  - Upgrade to X-band underway
- NOAA Space Environment Center

- U.C. Berkeley (STEREO PI team)
  - RHESSI antenna requires upgrade to X-band
- CRL (Japan)
  - Budget and technical feasibility studies are underway
- Germany (GSOC request through University of Kiel)
- Brazil (W. Gonzales)
- ESOC/ESA has a network of 15m X-band antennas with significant spare capacity (estimated ~200 hours per week)

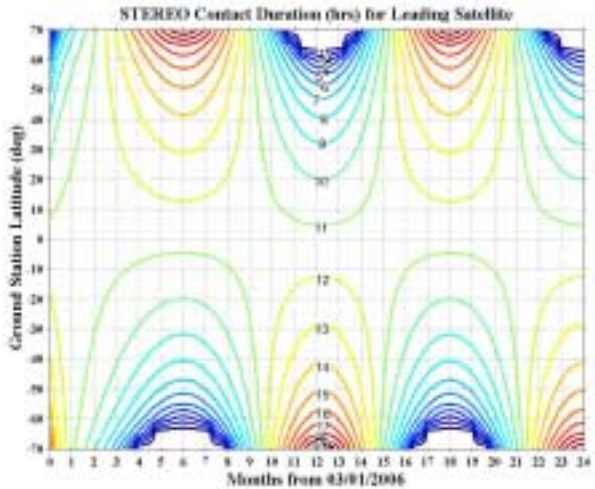
What Do Antenna Partners Need?

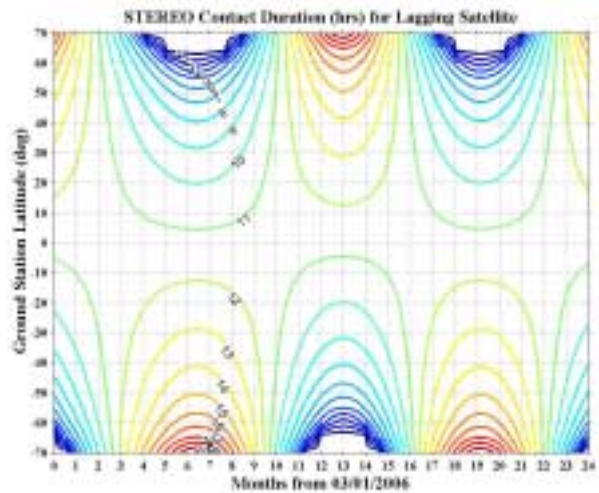
- **X-band dish and receiver**
  - 7 meter dish covers 2-year nominal mission
  - 15 meter dish covers 5-year extended mission
- **Low data rate Internet connection during telemetry reception periods**
  - TCP/IP socket, email, ftp, etc.
- **Beacon description reprints available**
- **ftp://stereo.gsfc.nasa.gov/pub/cstcyr/STEREO/**

Antenna Contact Duration

(latitude versus time)

For a single mid-latitude location on Earth, the two STEREO spacecraft will be seasonally out-of-phase





Example using RAL, U.K. (lat. +51º)

	STEREO-A	STEREO-B
March 2006	6 hours/day	15 hours/day
Sept 2006	15 hours/day	6 hours/day
March 2007	6 hours/day	15 hours/day