

STEREO/WAVES

Interplanetary Radio Burst Tracker

Jean-Louis Bougeret, PI

Observatoire de Paris - Meudon

Science Working Group Meeting

University of California - Berkeley

11 December 2006

Observatoire de Paris

University of Minnesota

University of California - Berkeley

Goddard Space Flight Center

STEREO/WAVES

Science Working Group - 11 December 2005 - AGU

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History

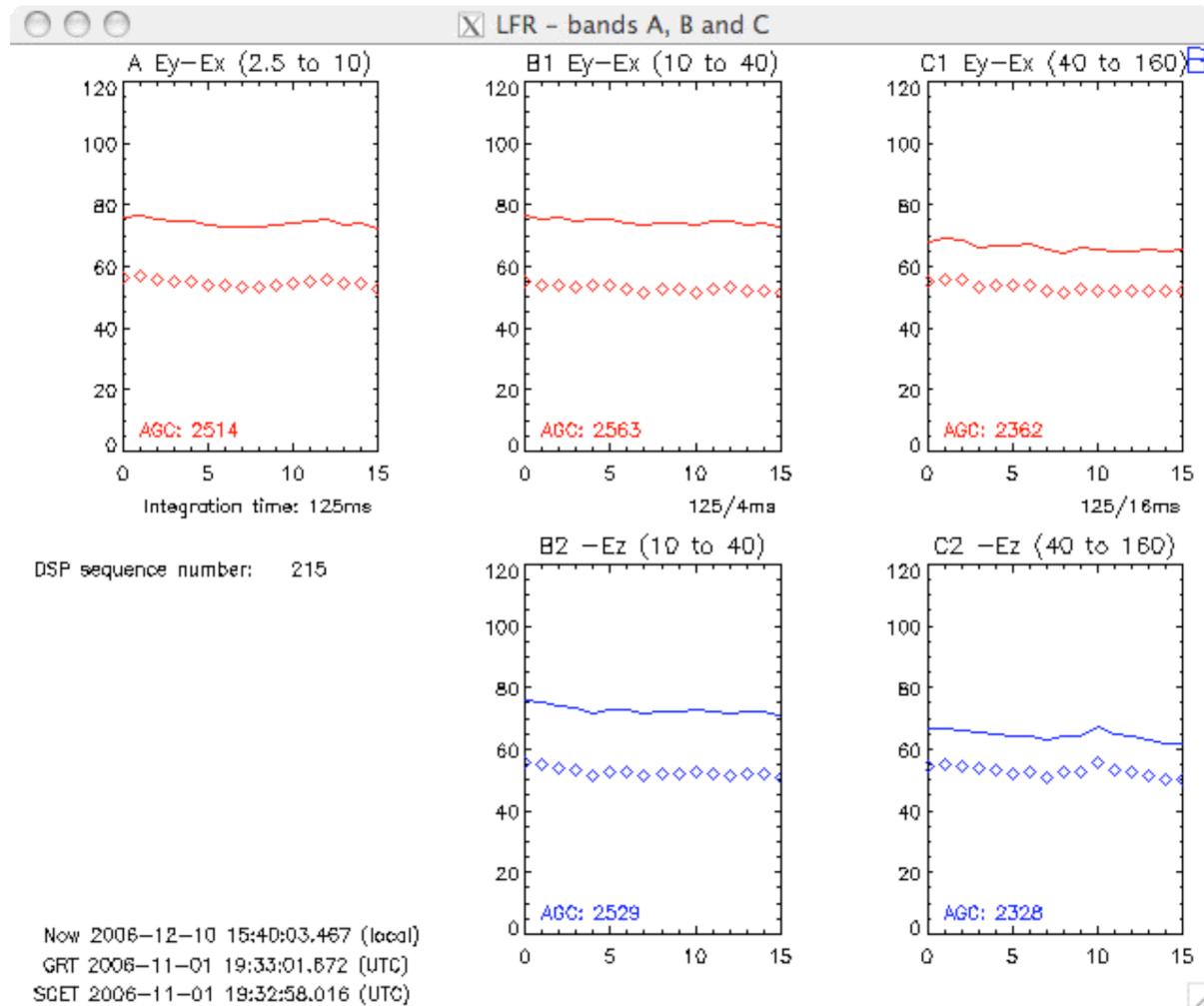
- Launch was 25 October - nominal
- S/Waves activation was 27 October - nominal
- S/Waves antennas deployed on Ahead shortly thereafter
 - Induced a small spacecraft wobble
 - Control system tweaked
- S/Waves antenna deployed on Behind on 29 October - nominal
- Since then, everything has been ... nominal
 - With one exception...
- We have been running and collecting good data from the start
- Instrument has 40+ days of continuous operation
 - Ahead was powered off briefly as part of EA test
- Things were quiet at first
 - we got our first **stereo** STEREO TypeIII on 30 October
- During past IMPACT rolls we tried a little Direction Finding
- We've been enjoying this orbit with all its shocks
- We had one session with SURA radar - another is planned in 2007
- Next week we'll have the first S/Waves S/C rolls (at 100Re)

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IMPACT impact on S/Waves (Day 305, 1 November 2006 at 19:43:55)

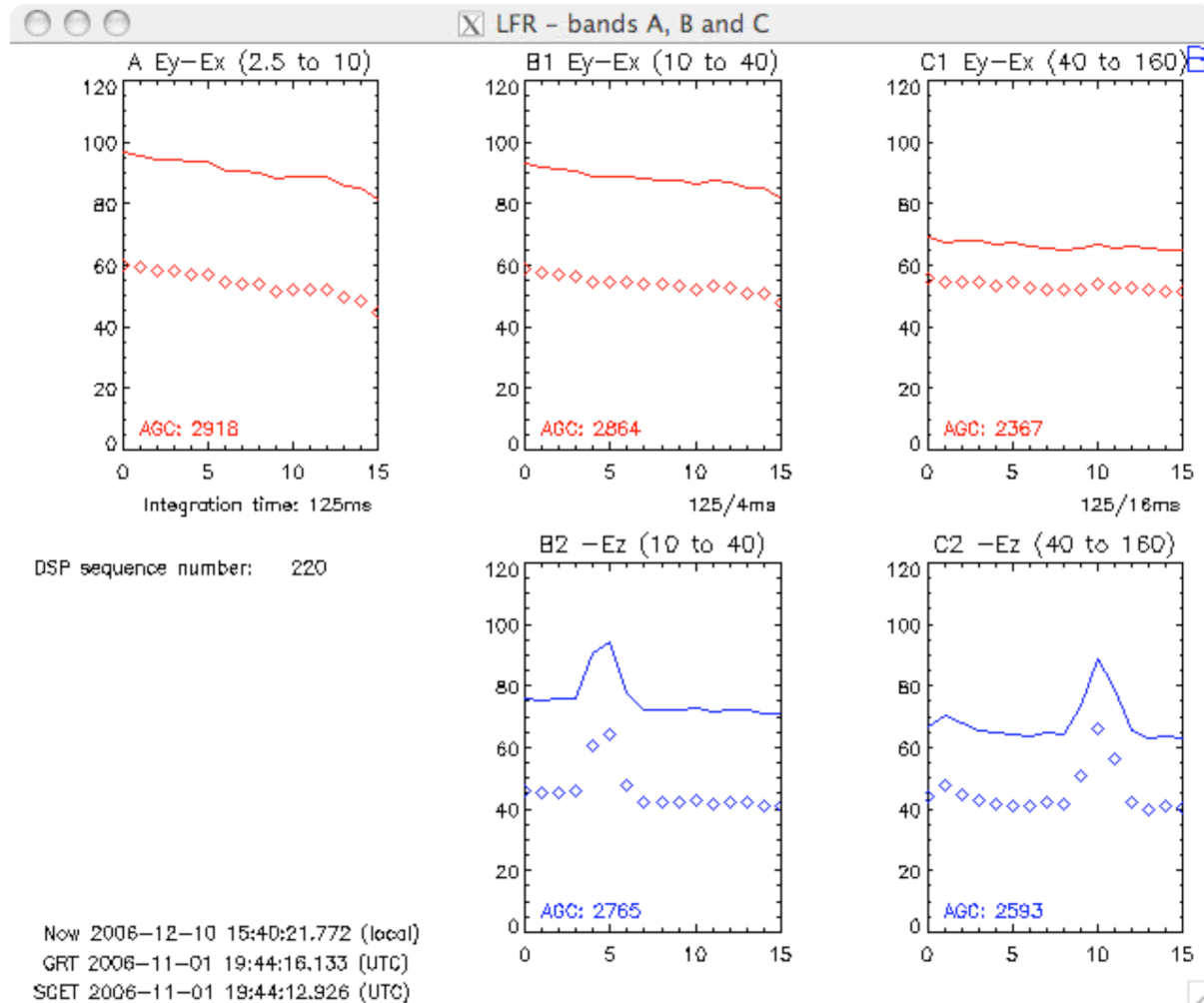


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After the boom (with a pseudo-dipole)

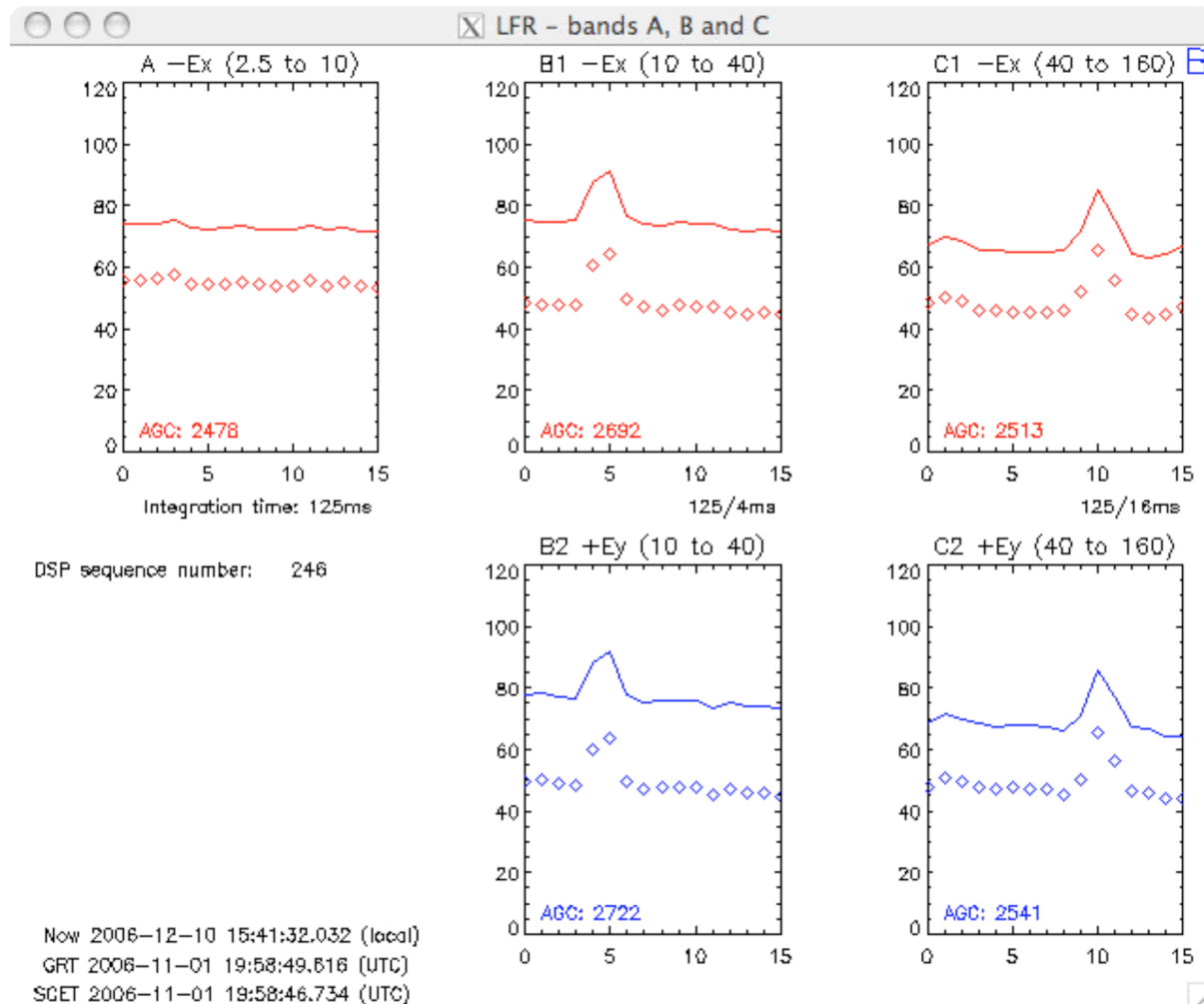


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After the boom (with monopoles)

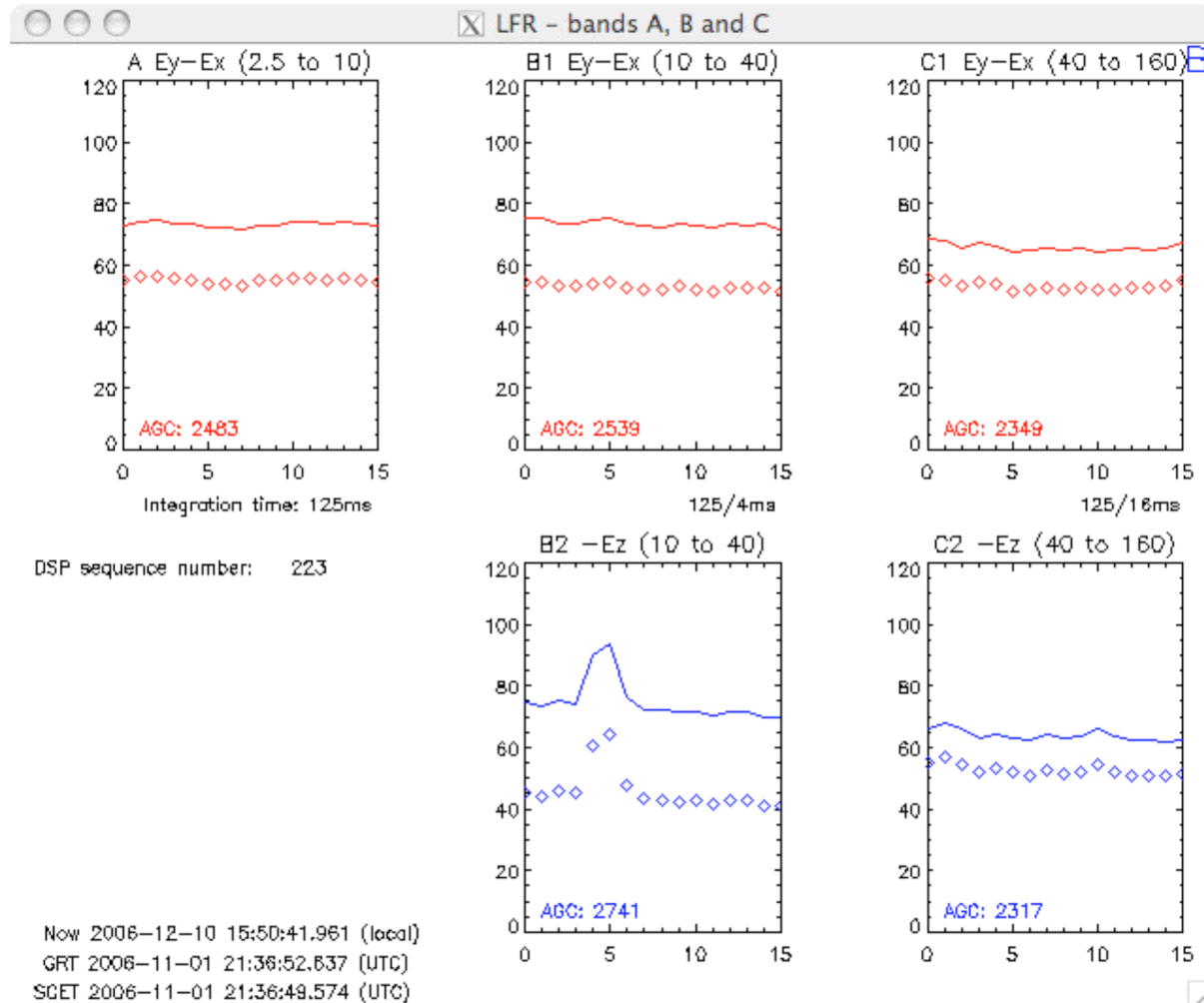


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SWEA off

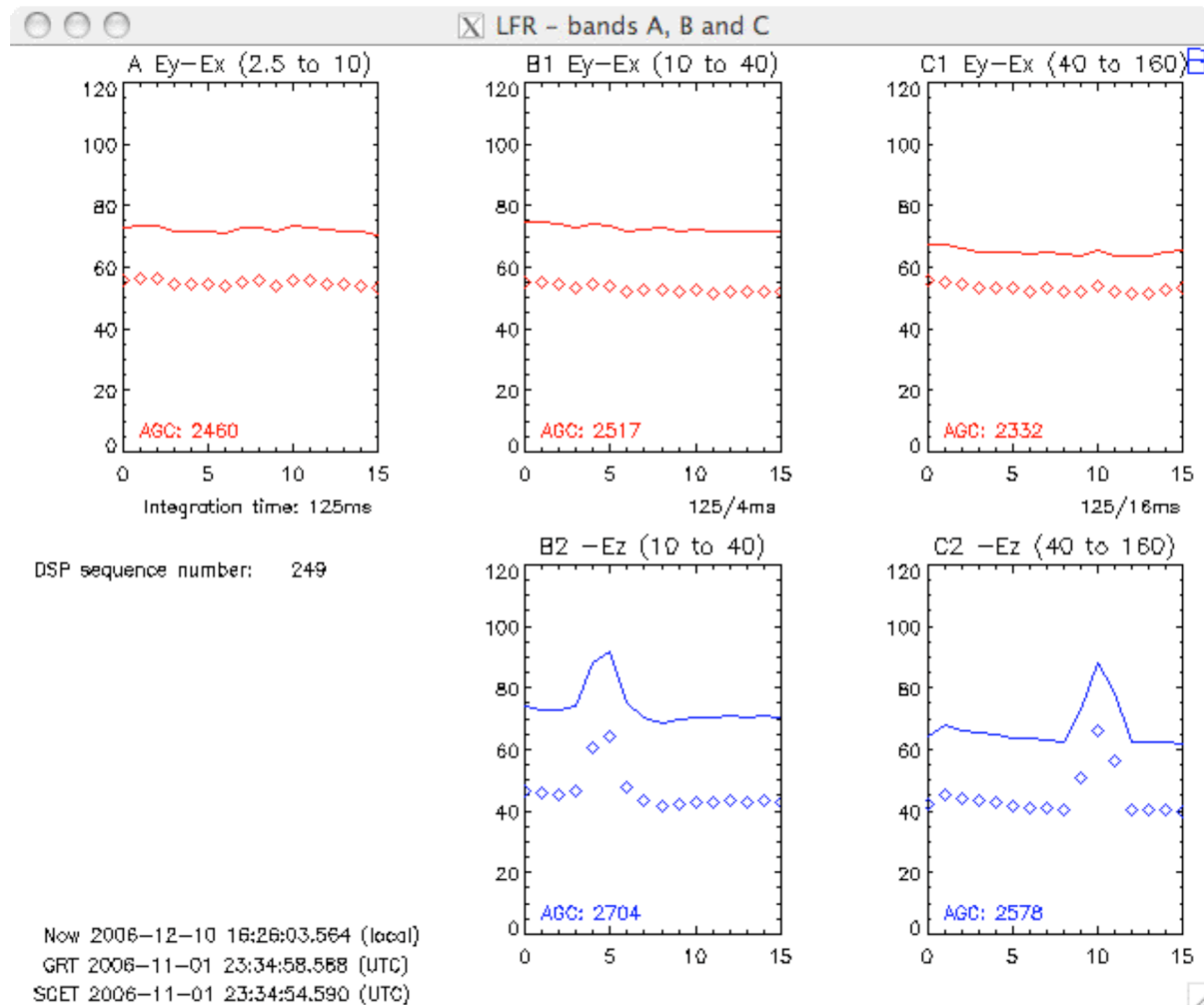


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At the end of the day...



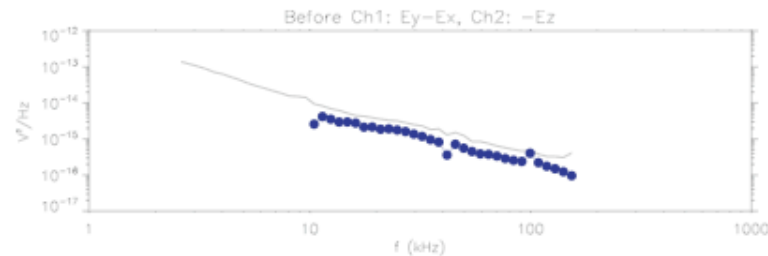
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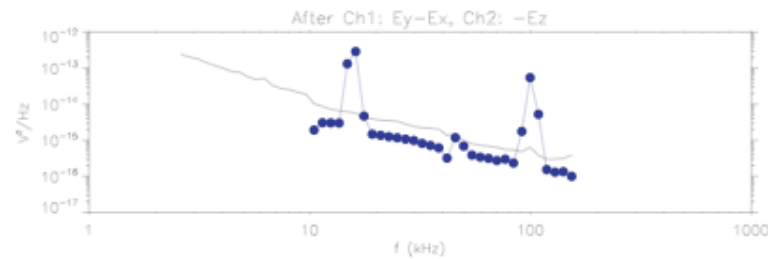
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A calibrated view

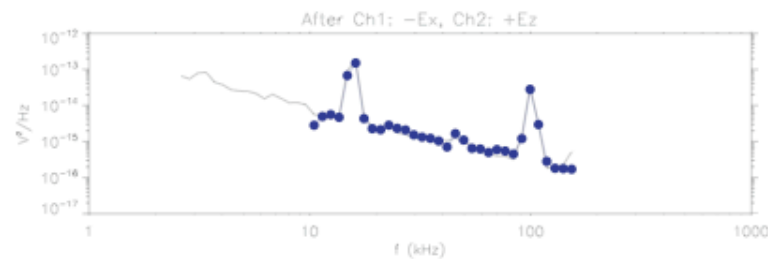
Before



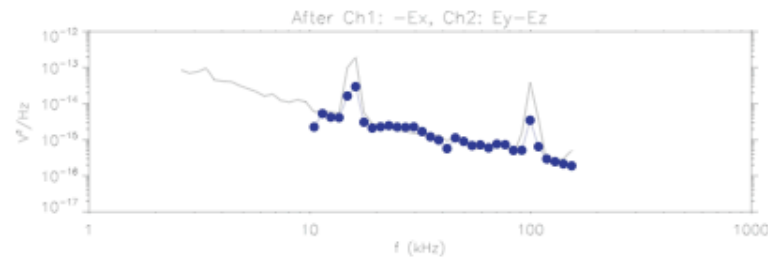
After
Ey-Ex, -Ez



After
-Ex, +Ez



After
-Ex, Ey-Ez

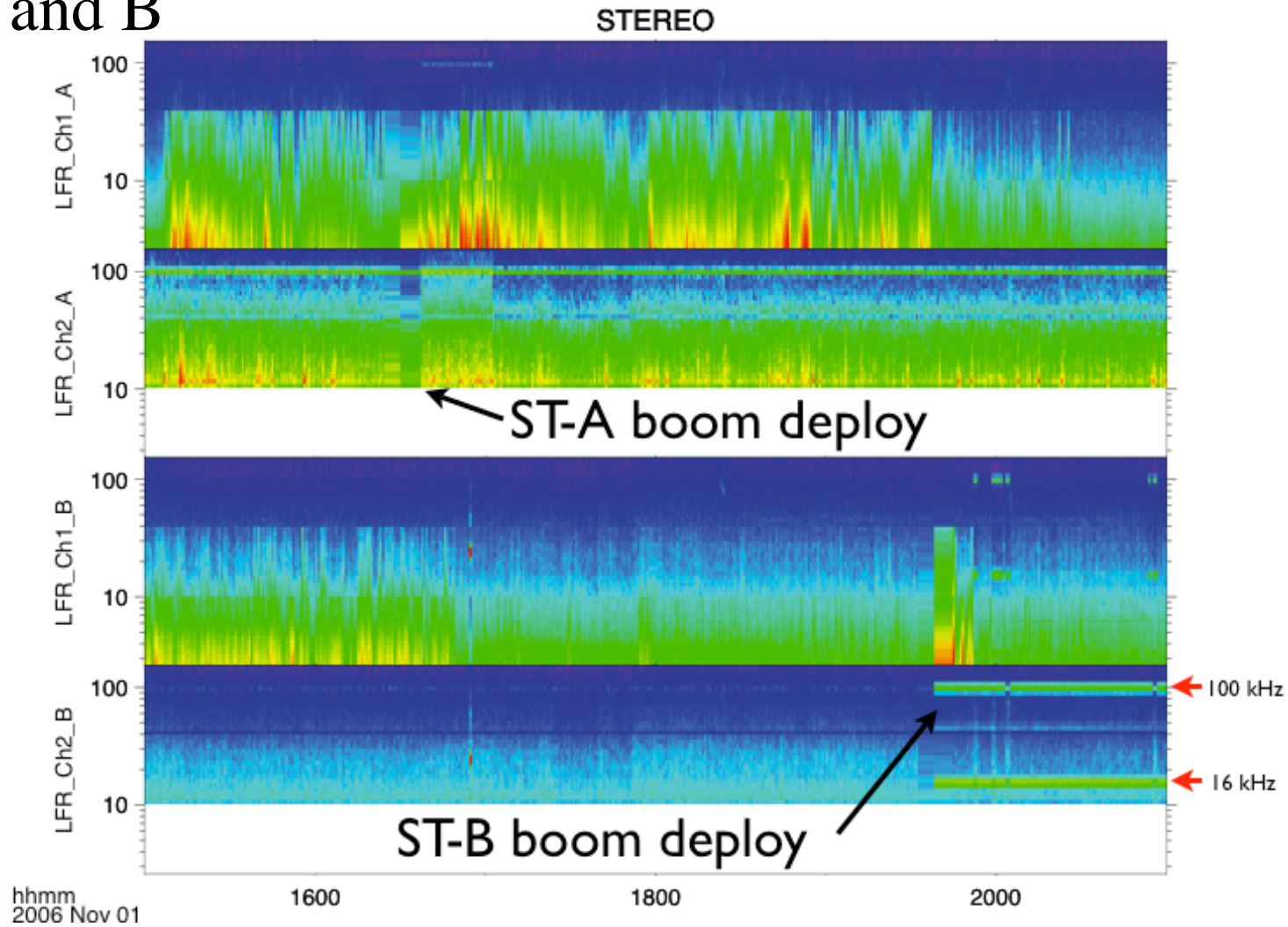


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A and B

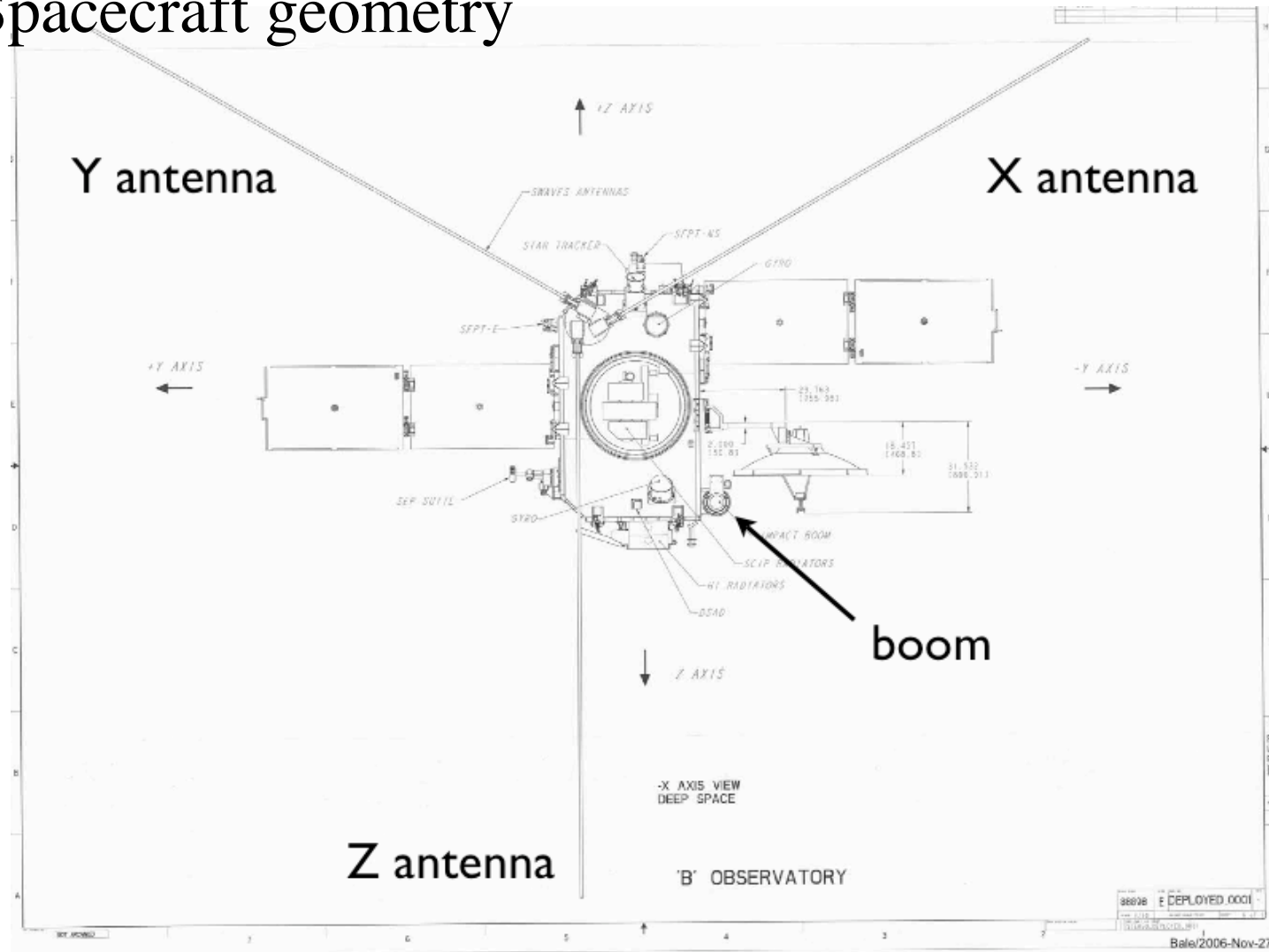


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Spacecraft geometry



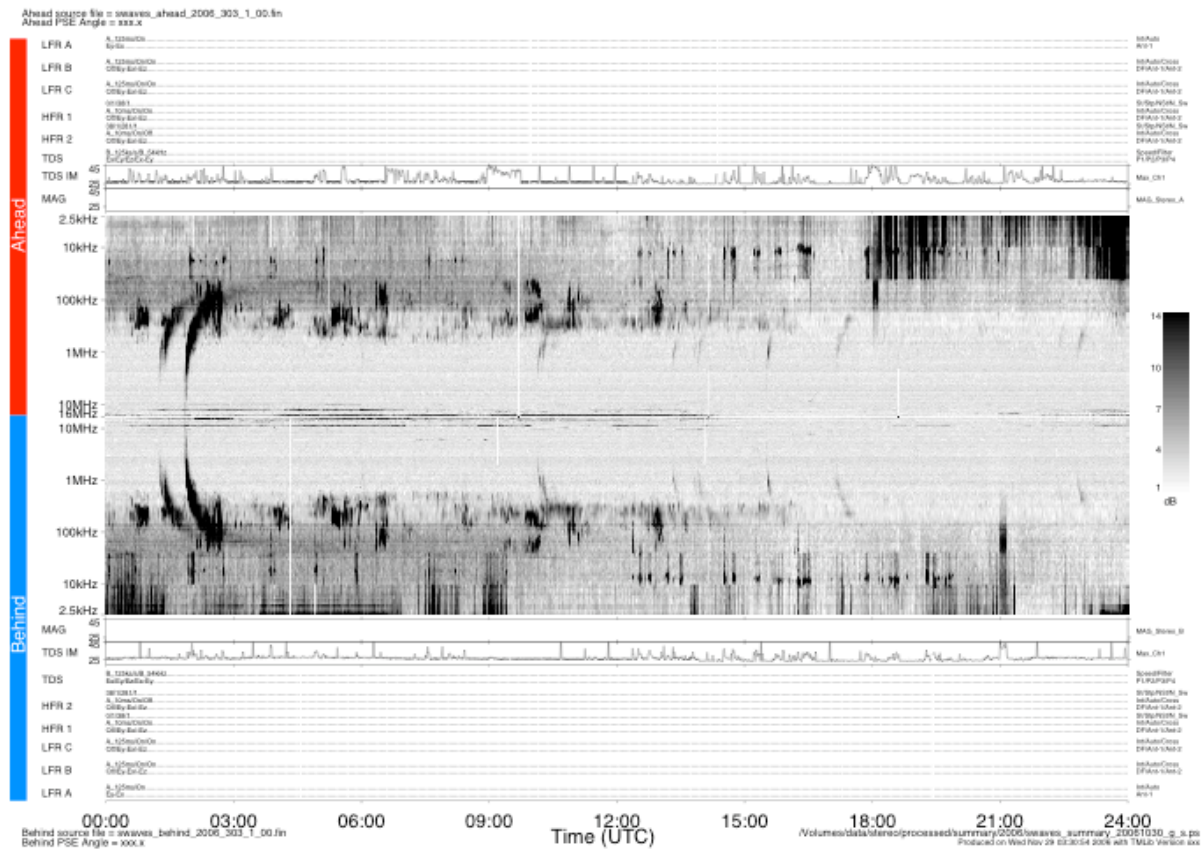
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Daily summary plots available now (<http://swaves.gsfc.nasa.gov>)

STEREO/Waves Daily Summary - 30-Oct-2006 (303)



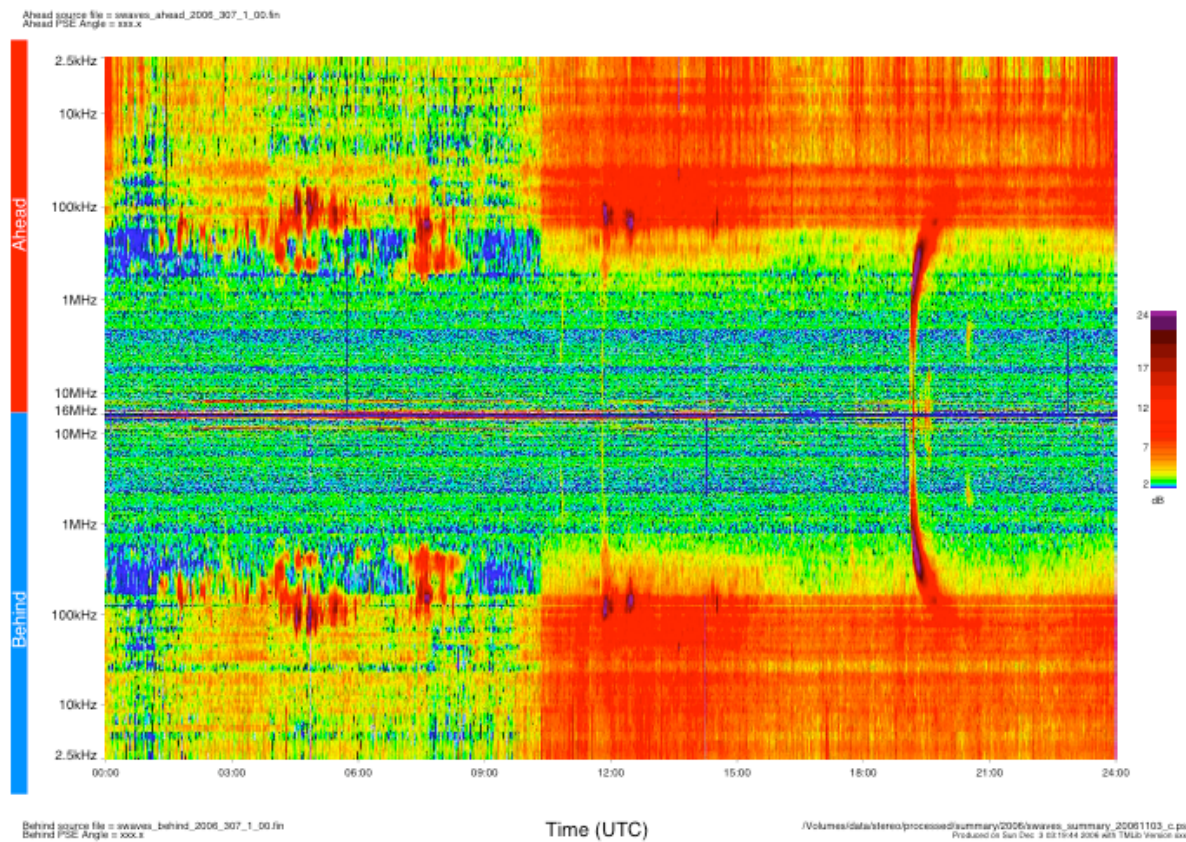
STEREO/WAVES

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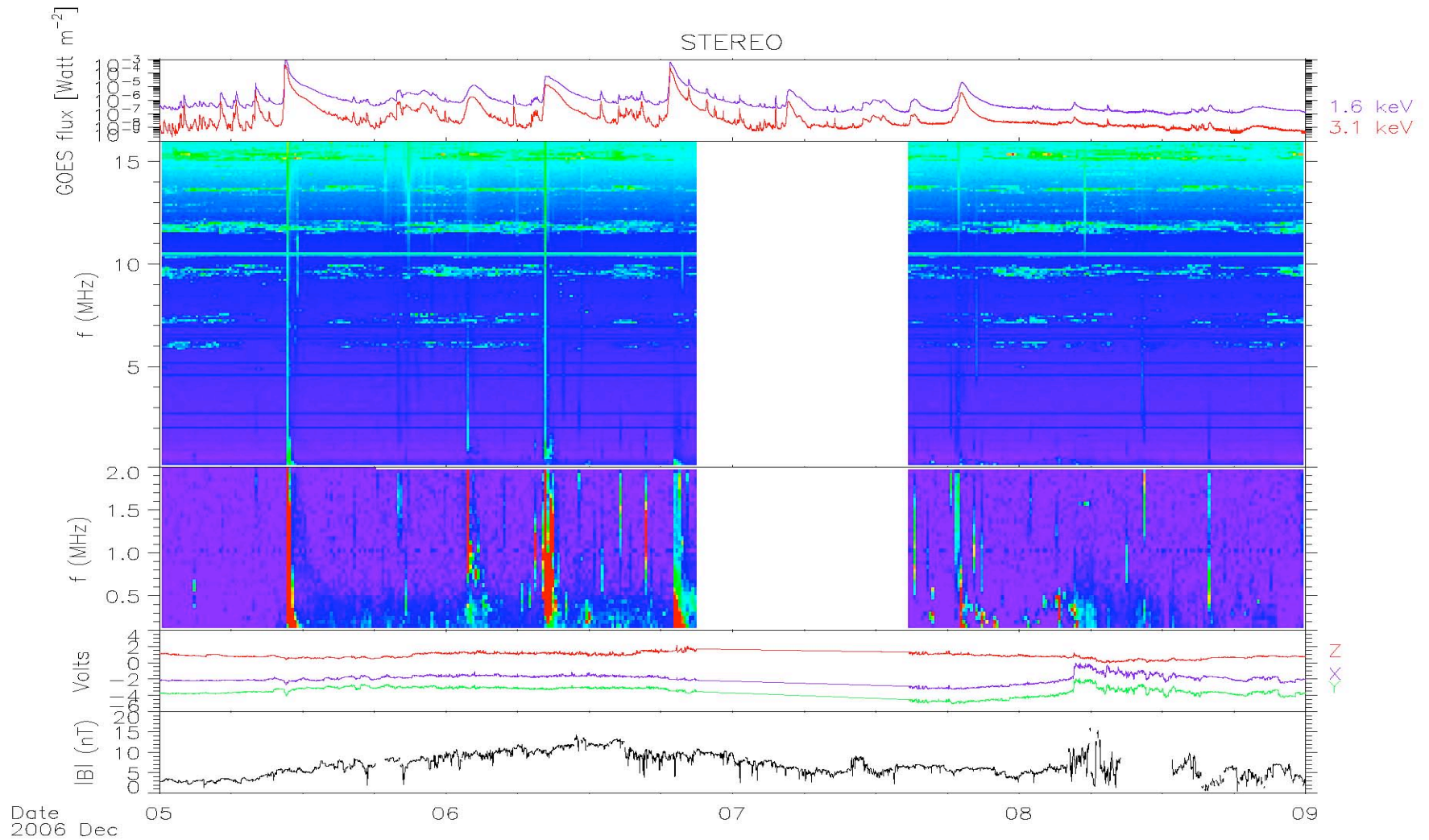
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...available in a variety of sizes and dazzling colors

STEREO/Waves Daily Summary - 03-Nov-2006 (307)

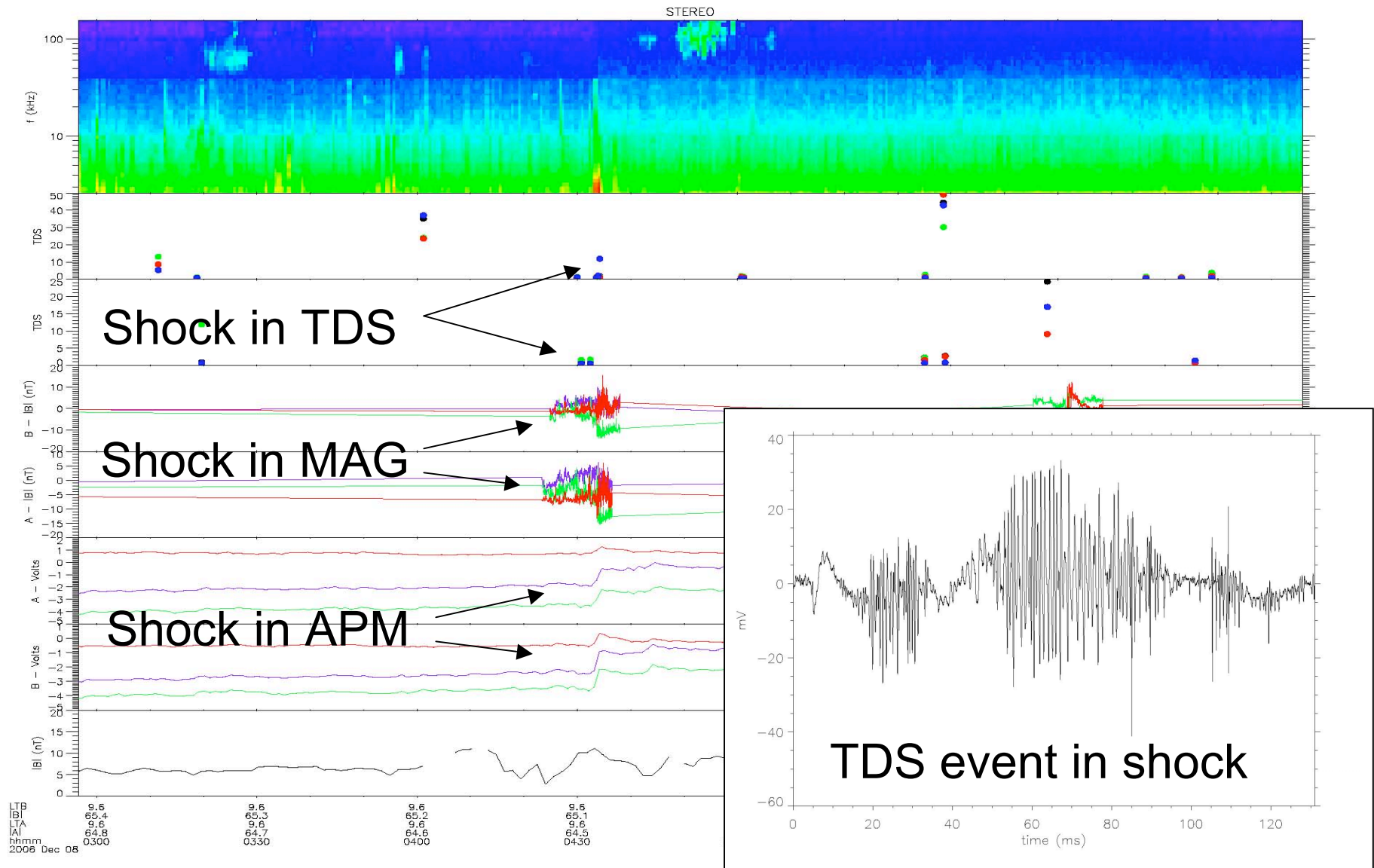


1. Dec 5 - 8 Event

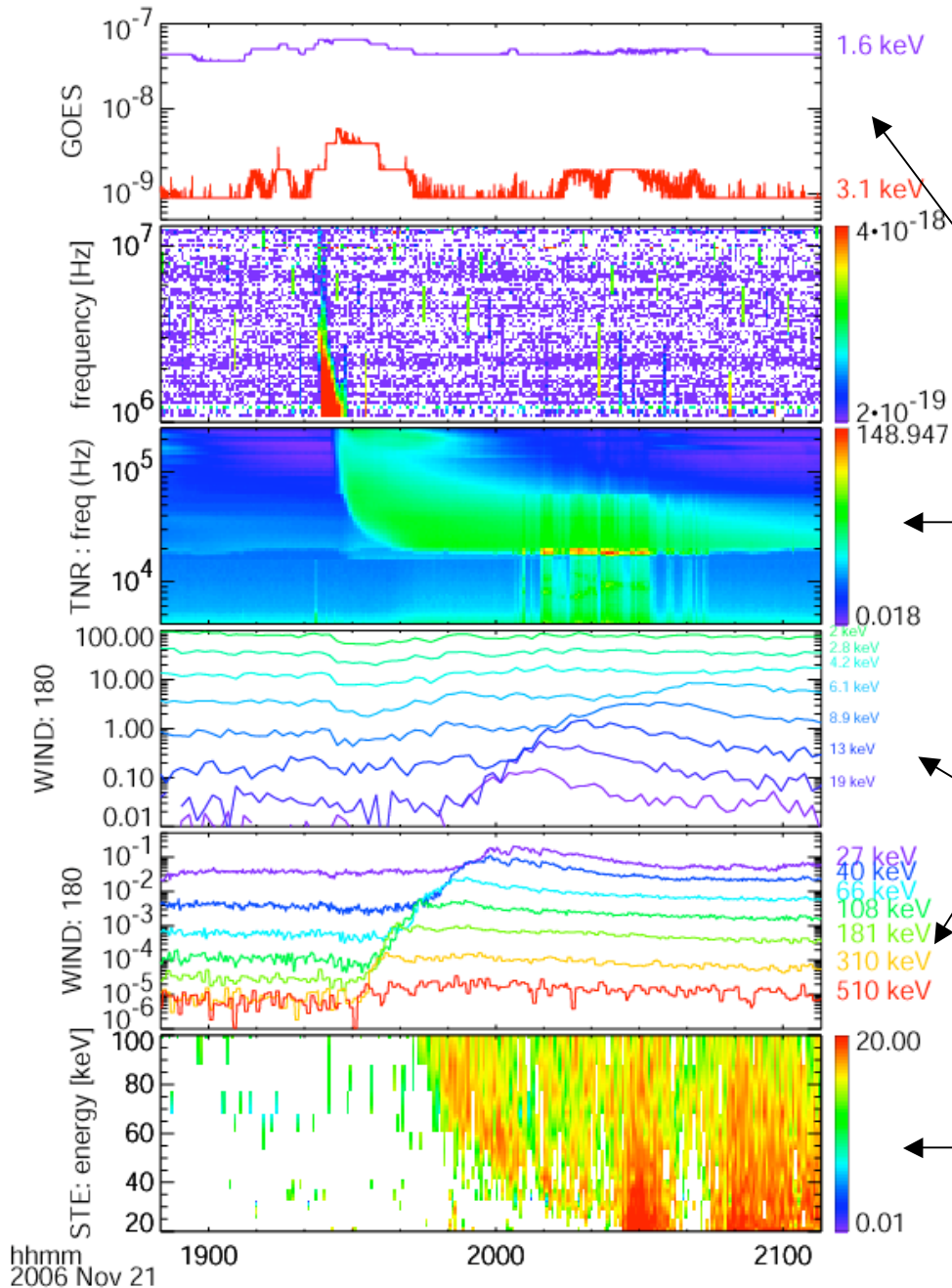


X-class flares, S/WAVES radio bursts, IP shock

IP Shock at STEREO+Wind



2. *in situ* IP type III bursts



GOES: flare is behind limb

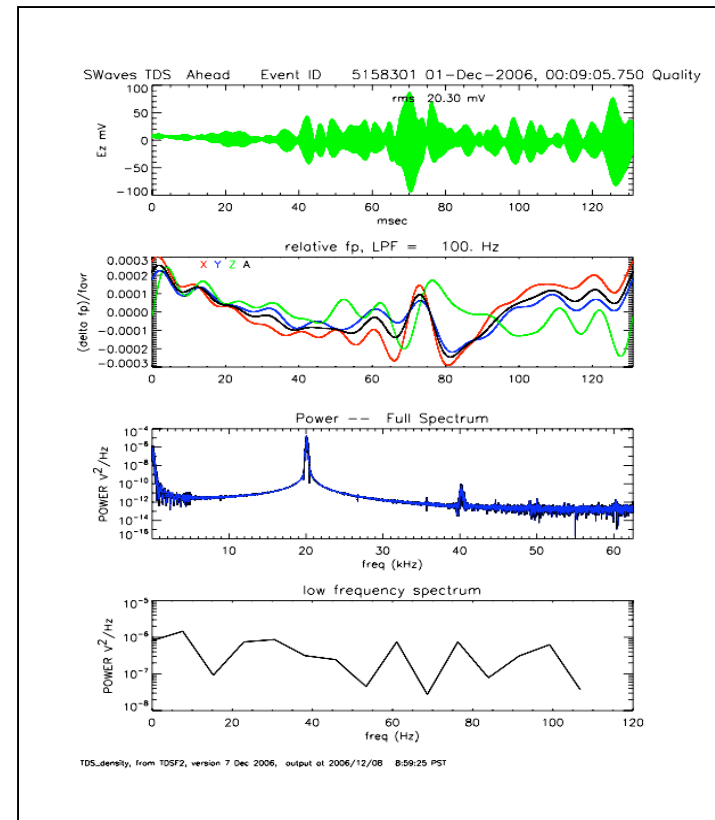
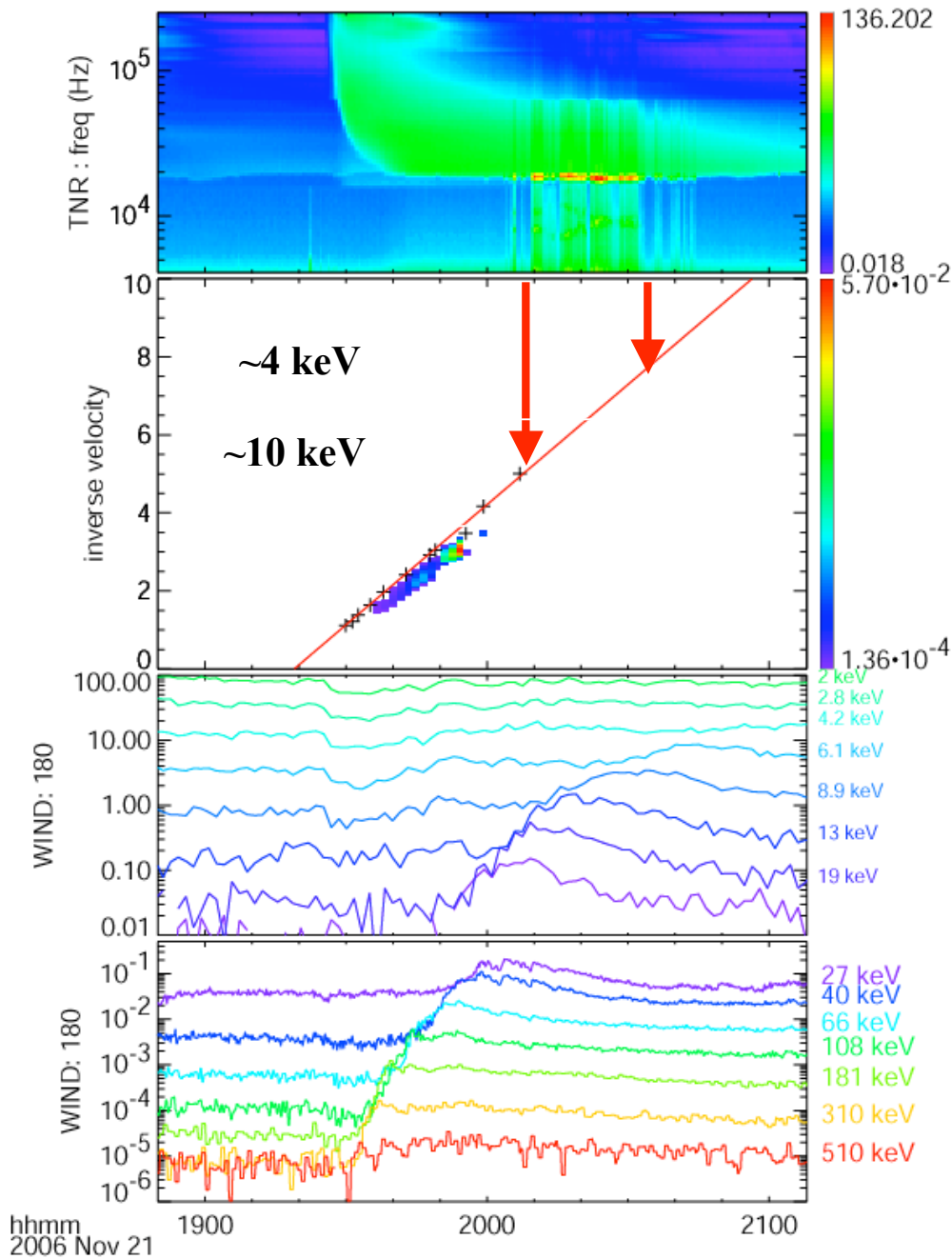
WIND/WAVES
LANGMUIR waves

WIND/3DP electrons
from the Sun

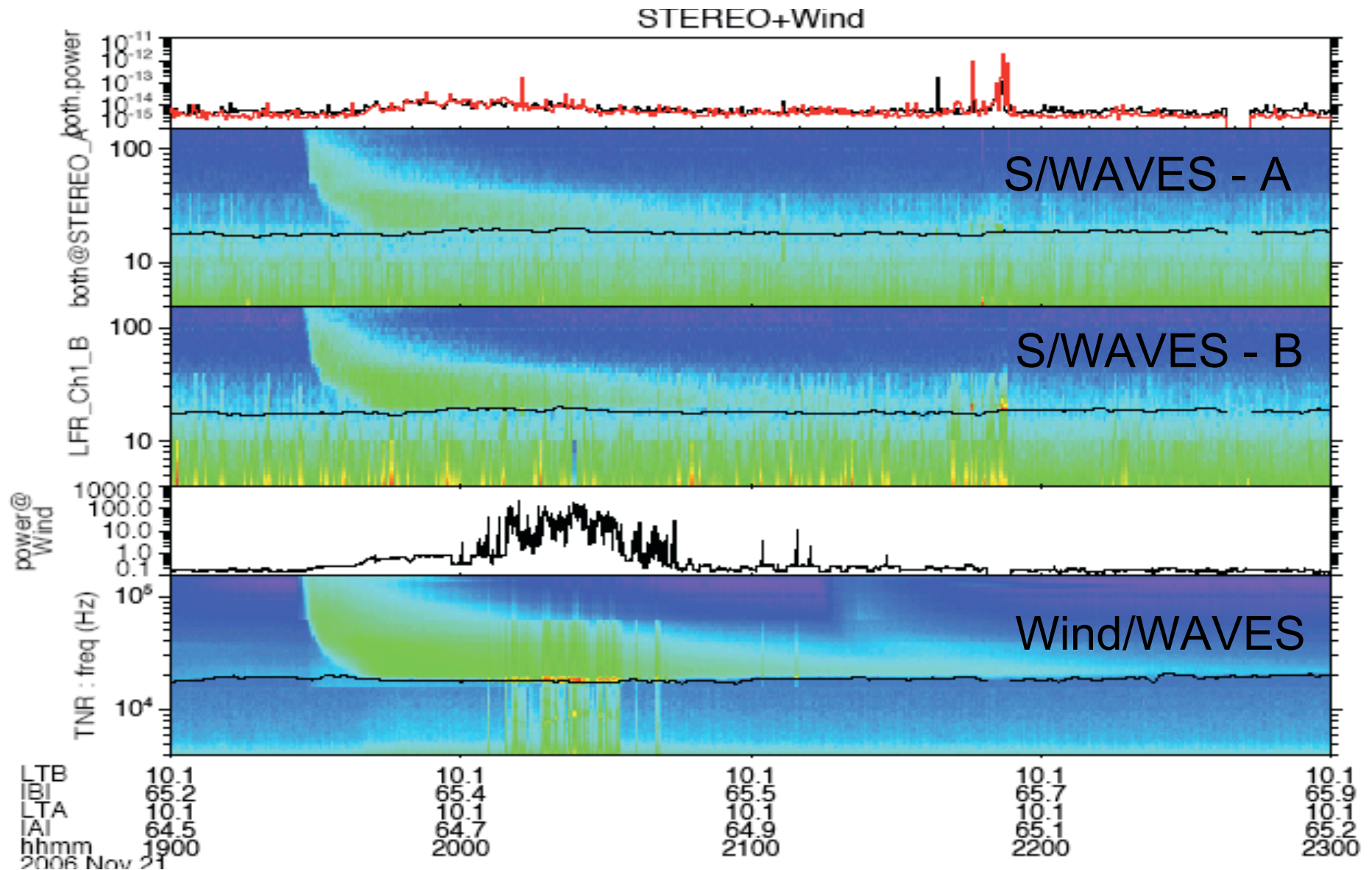
STEREO STE electrons
anti-sun direction

Wind spacecraft electron beams

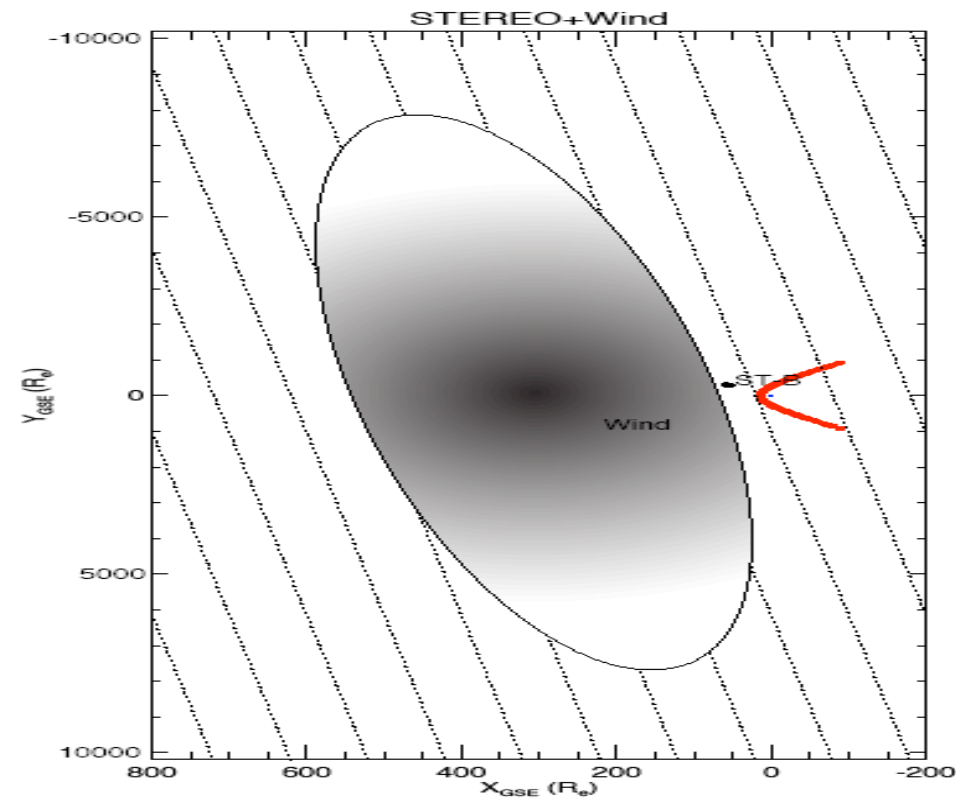
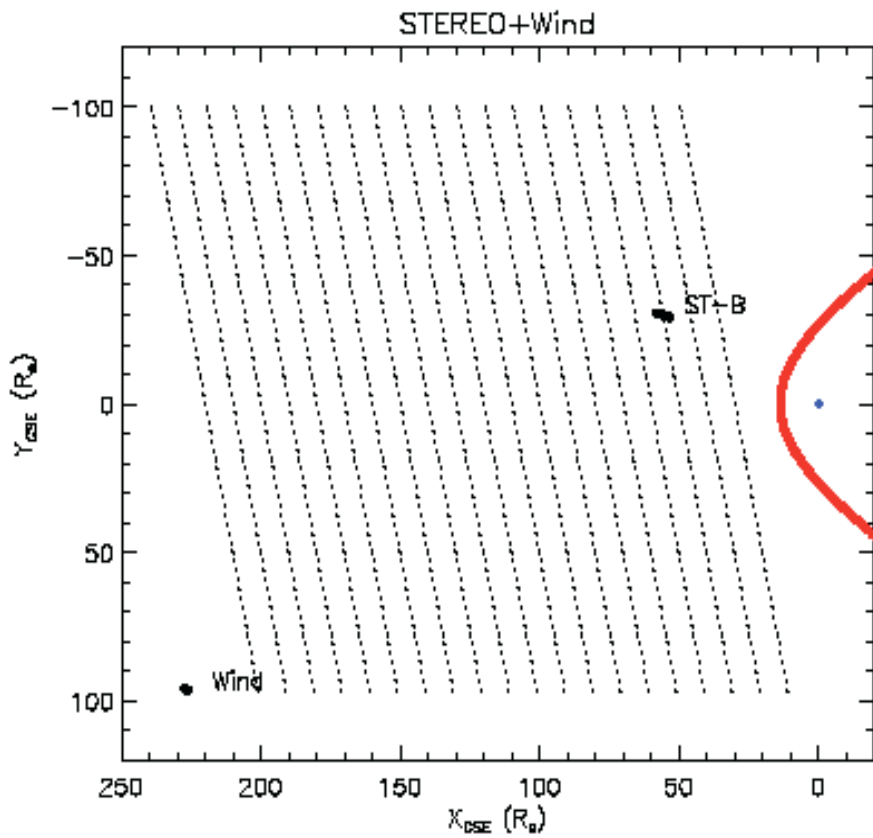
Most intense Langmuir waves are seen when ~ 10 to ~ 4 keV electrons arrive.



S/WAVES+Wind type III



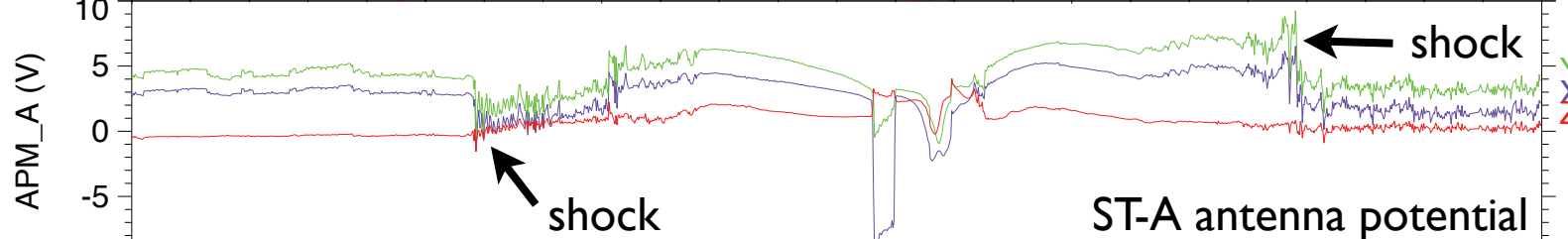
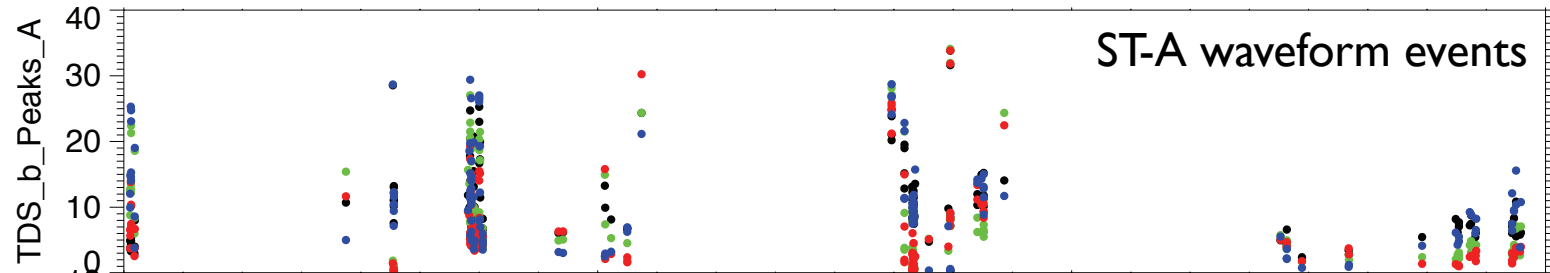
Type III source size?



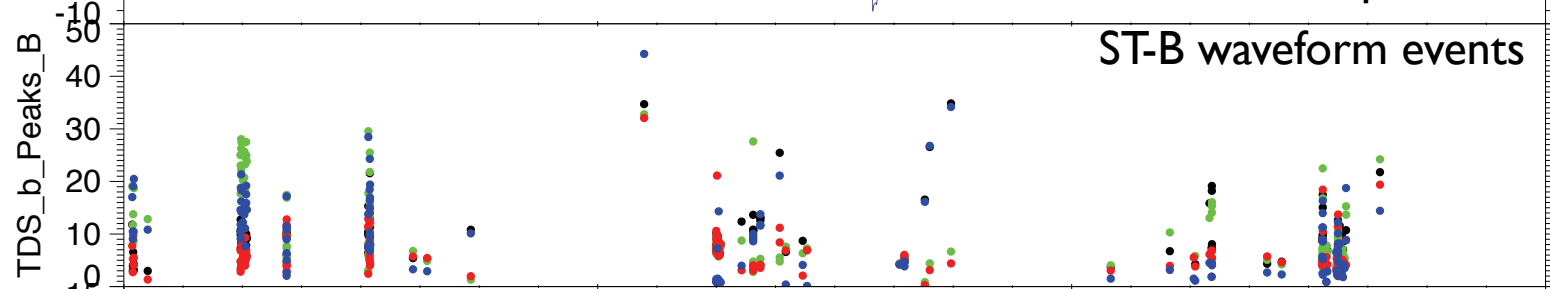
bow shocks

STEREO

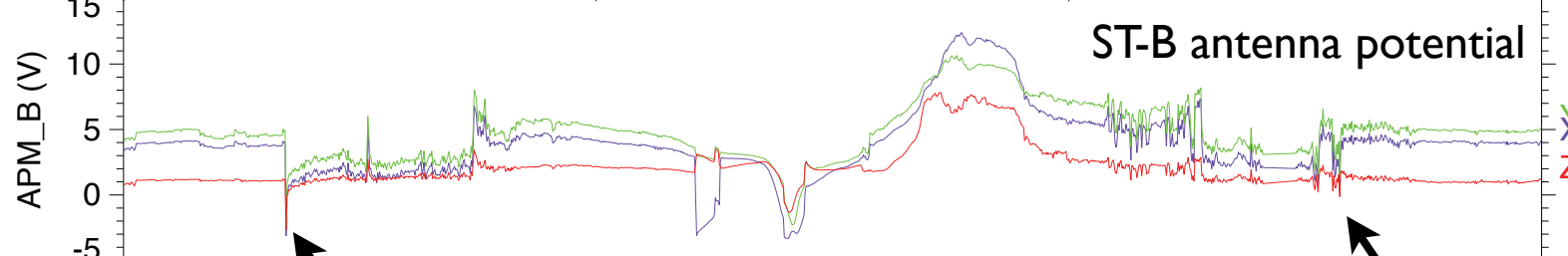
ST-A waveform events



ST-A antenna potential



ST-B waveform events



ST-B antenna potential

LTB 11.7
|B| 20.0
LTA 11.5
|A| 22.7
hhmm 0000
2006 Nov 17

shock

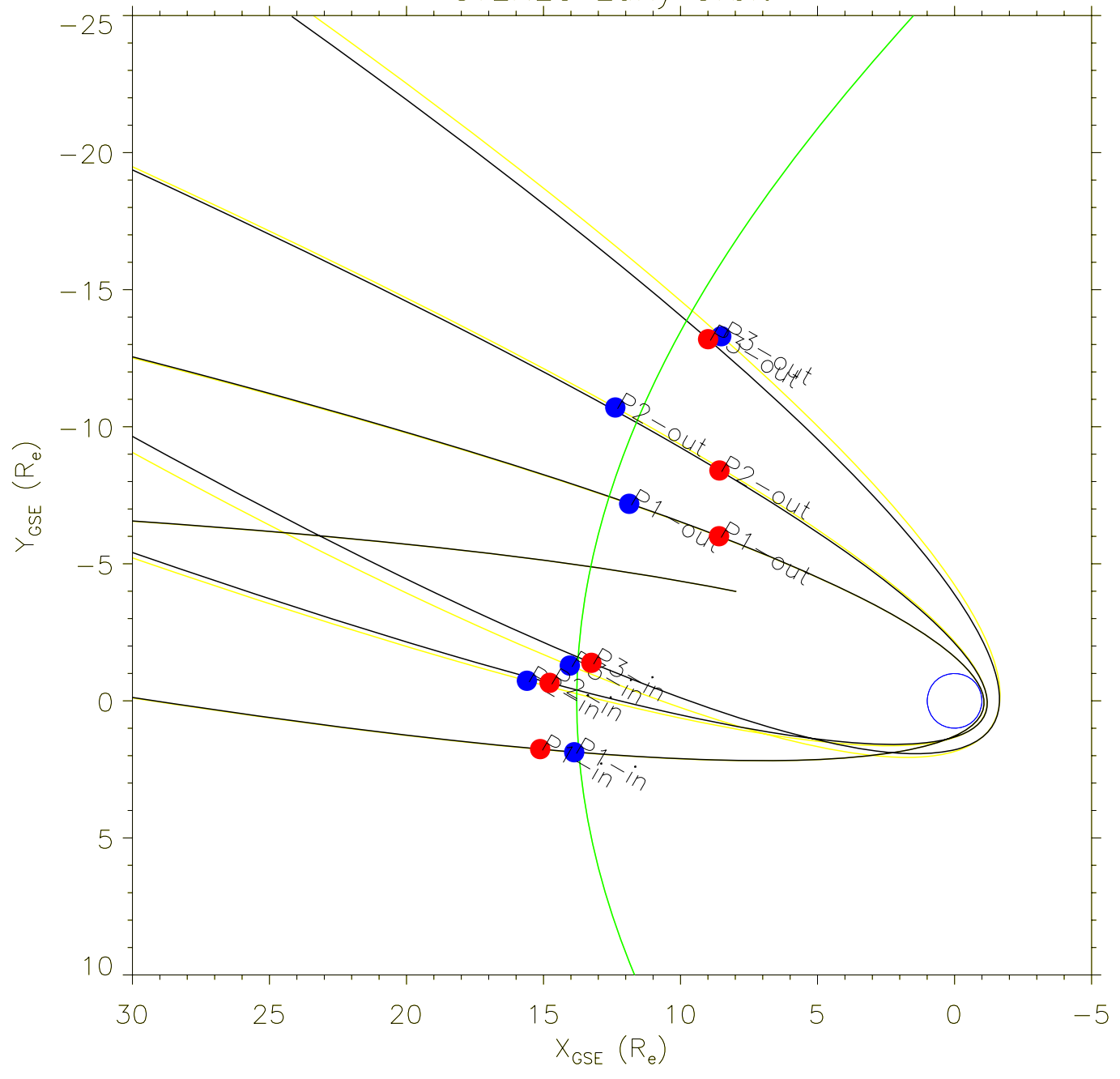
12.5
8.9
12.0
13.0
0800

8.8
10.7
7.9
5.9
1600

shock

9.4
21.2
9.4
18.3
0000
Nov 18

STEREO Early Orbit



Radio Burst Tracking capabilities with S/Waves

On a spinning spacecraft (WIND)

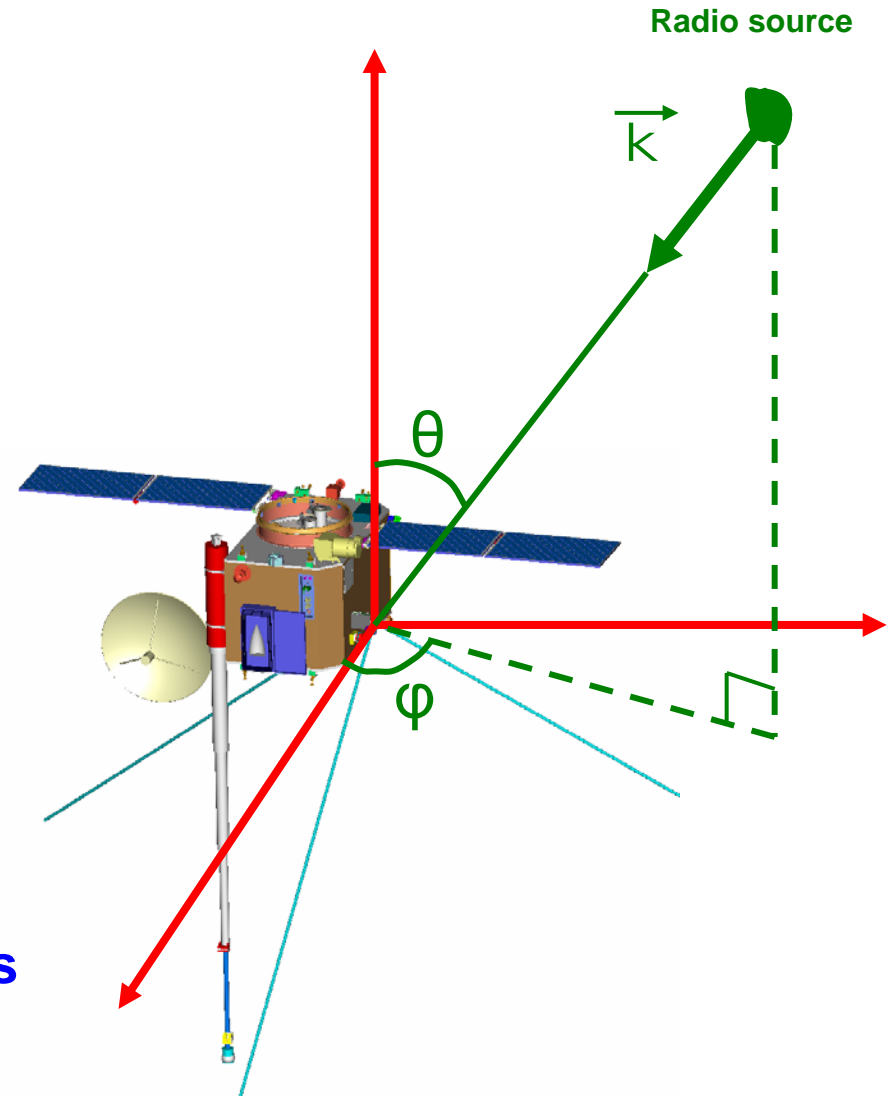
→ Modulation of the signal gives

- θ , φ
- Size of the source
- polarization parameters S , Q , U V

On a 3-axis stabilized spacecraft one measures directly

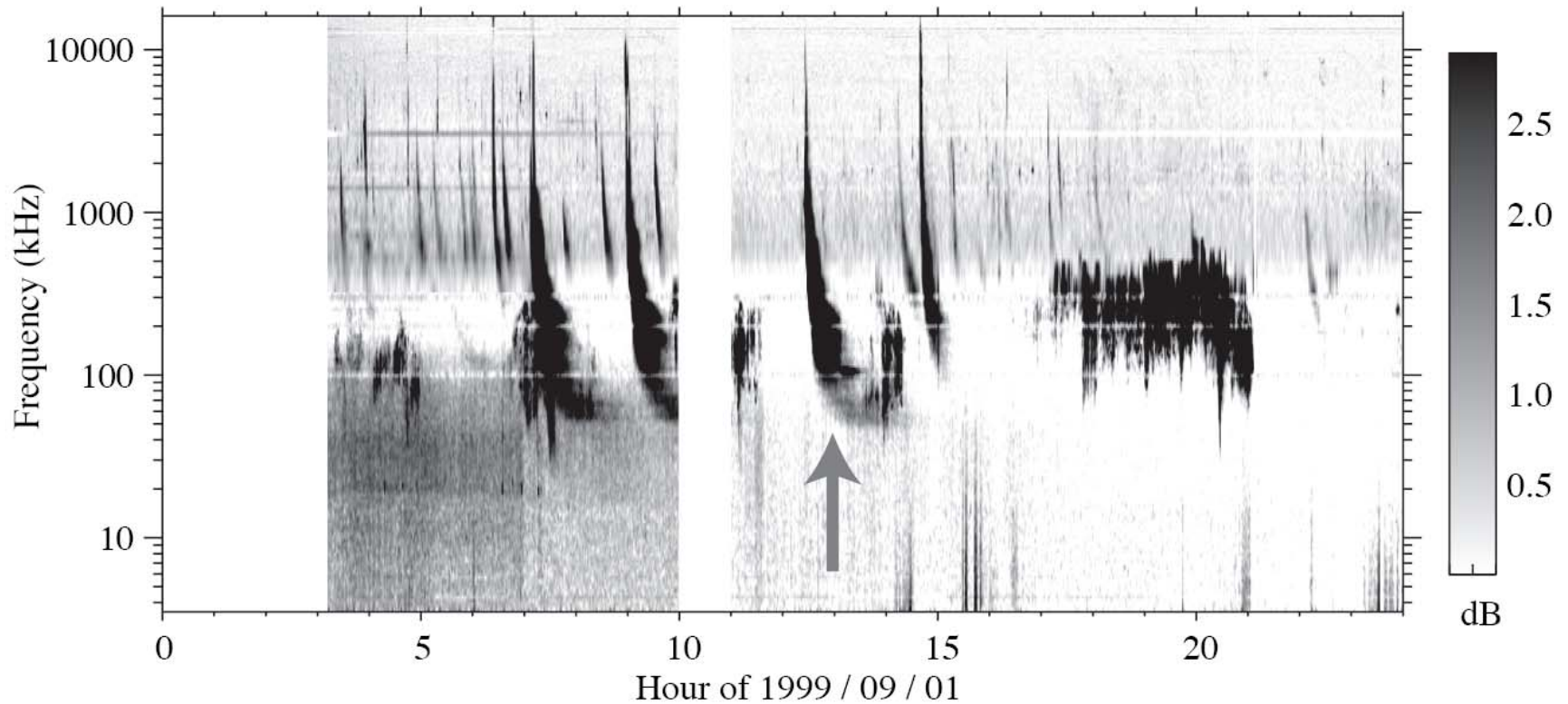
- Auto-correlations (E_x , E_y & E_x)
- Cross-correlations

→ Never used for solar radio bursts

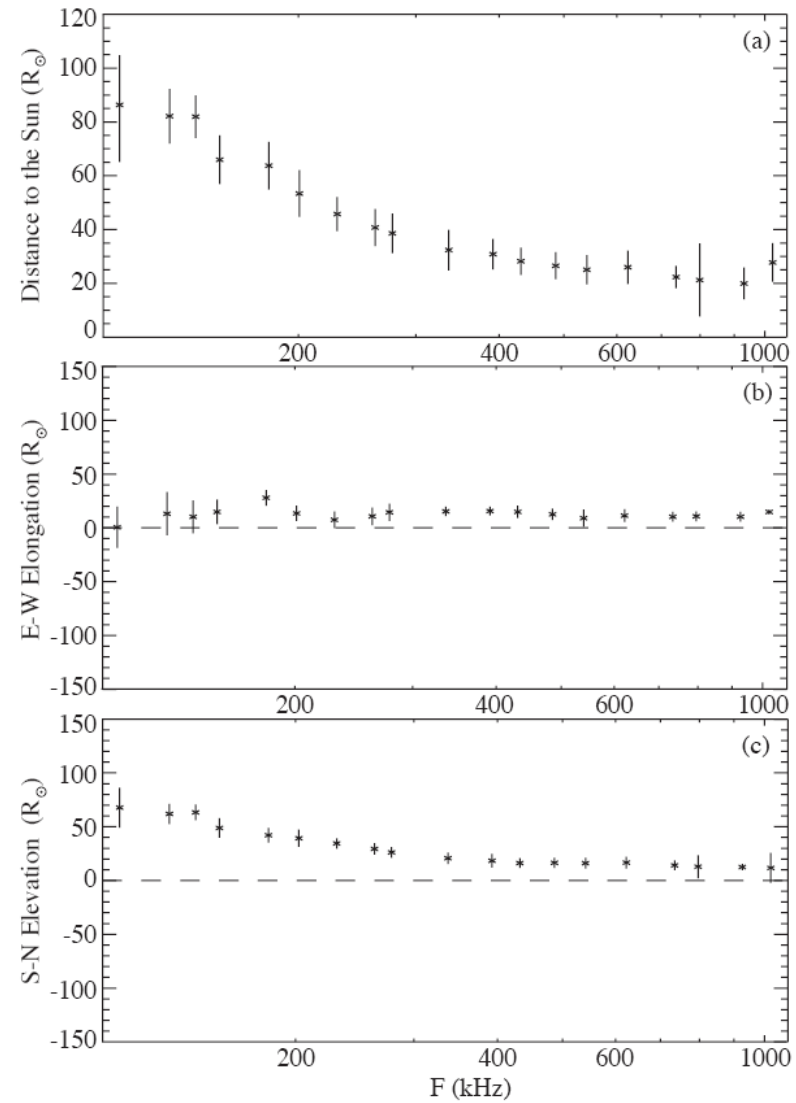
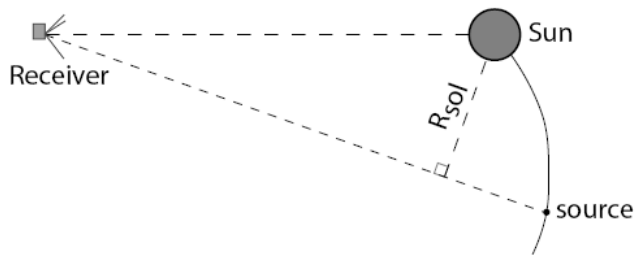


STEREO/Waves Goniopolarimetry

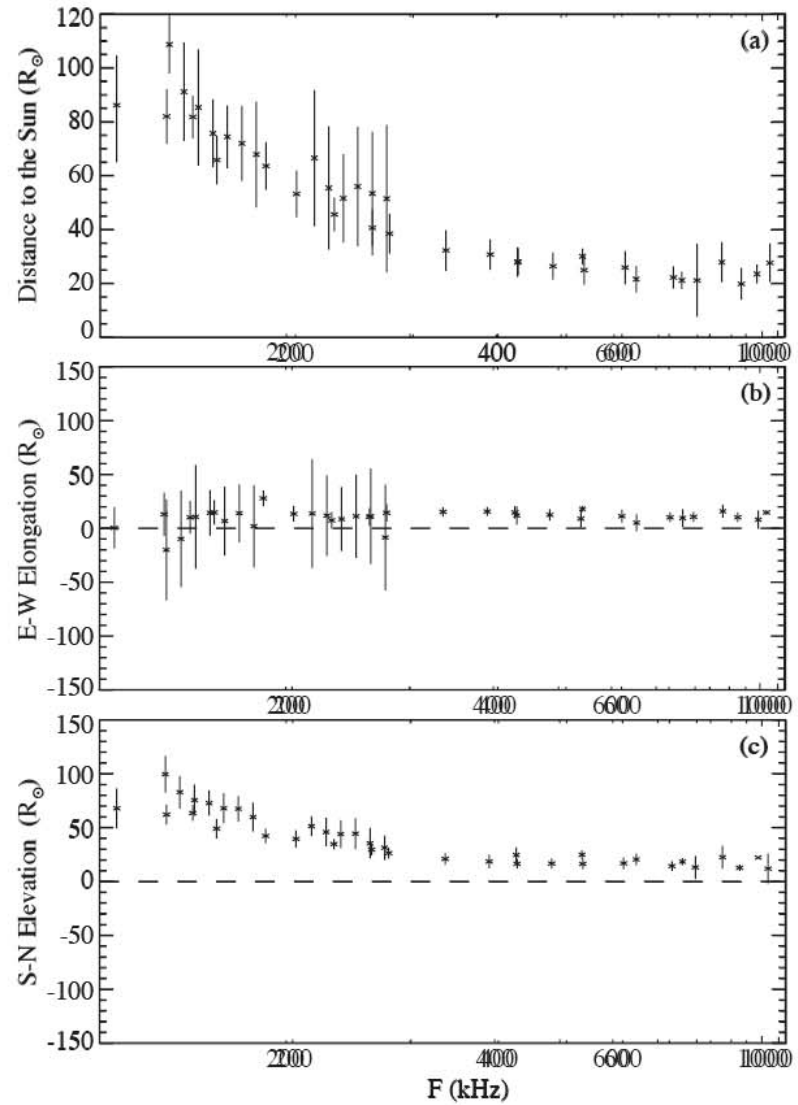
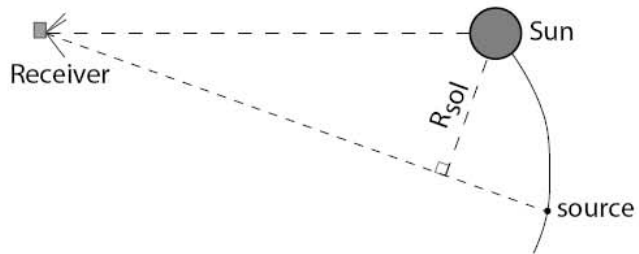
Cecconi et al.
Submitted to the Stereo book



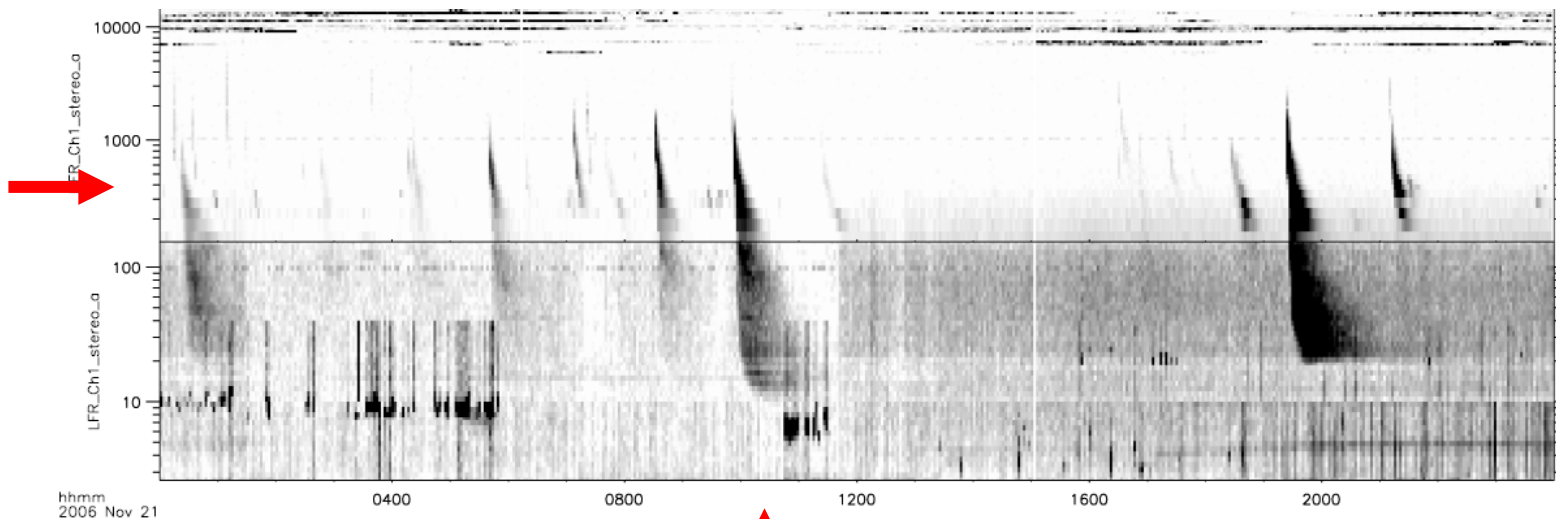
Wind/RADI type III GP analysis



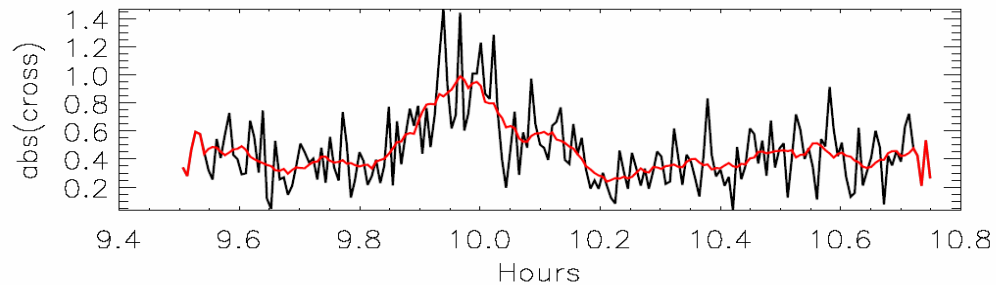
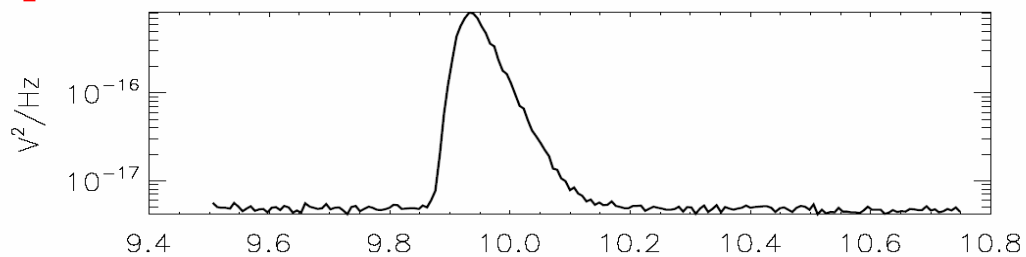
Both....
superimposed



First attempt on S/Waves – Nov 21 2006



@ 425 kHz



<http://secchirh.obspm.fr/>

(M. Pick in collaboration with R. Howard & A. Vourlidas)



RADIO MONITORING

Welcome

This radio survey project is a joint effort of the Paris Observatory, the University of Athens, the University of Ioannina and the Solar Physics Branch of the Naval Research Laboratory. The present web site is brought to you by the LESIA, UMR 8109, Observatoire de Paris-Meudon and is made possible thanks to a grant from the french Space Agency CNES.

The primary goal of the project is to support multi-wavelength data analysis and space missions dedicated to research on solar activity and solar-terrestrial relationships and more particularly the SOHO and STEREO missions.

This site provides a daily survey (08-16 UT) which includes :

- Radio spectra covering the 600 Mhz -30 KHz frequency range. These spectra are obtained by combining data sets from different radio spectrographs.
- Radio imaging at 164 MHz and access to multi-frequency data (450-150 MHz, 10 or 120sec integration), providing files readable by Solar Soft.
- The CMEs which occurred during the 08-16 UT are also reported.

For a complete description go to [data products/characteristics](#).

To have access to the surveys : go to [Data products/products](#).

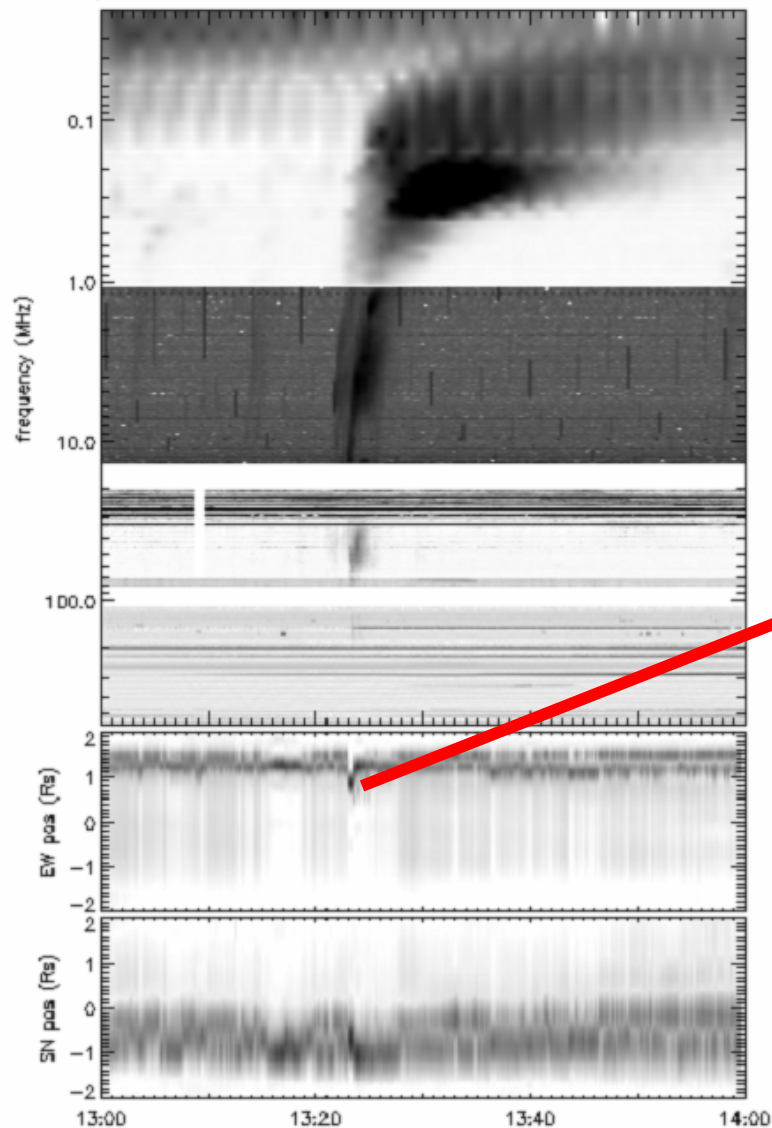
- Home
- Data products
 - Characteristics
 - Products
 - Download NRH data
 - Download Artemis data
- NRH Real Time display
- Radio Instruments
 - Wind/Waves
 - DAM
 - Artemis
 - NRH
- Coronal Mass Ejections
- Gallery
- Publications
- Related links
- Survey team

Contacts :
A. Bouteille
M. Pick
R. Romagnan

2006 Nov 20

Two noise storm centers. Type III burst at a distinct location

WIND/WAVES, DAM, ARTEMIS, NRH, CME, 20NOV2006



WAVES

DAM

ARTEMIS

NRH EW

NRH SN

13:22:53



Storm

13:23:13



Type III

13:23:52



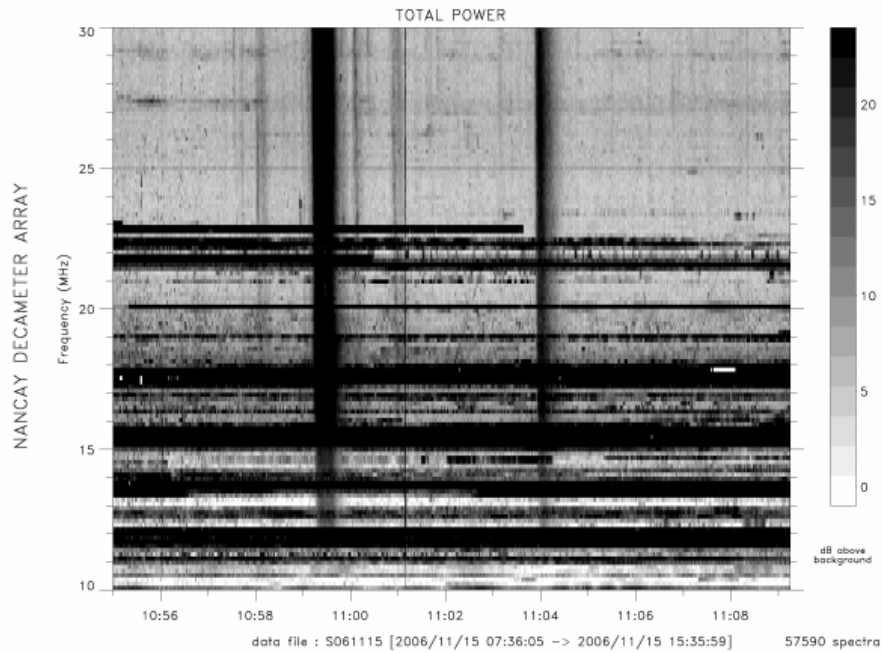
Storm

13:28:10



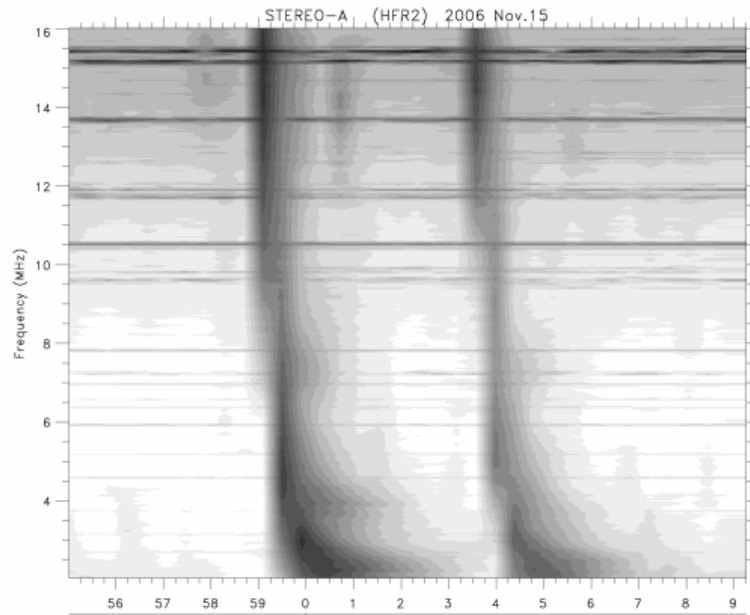
Storm

NRH 164 MHz



Nançay DAM

From A. Lecacheux



S/Waves