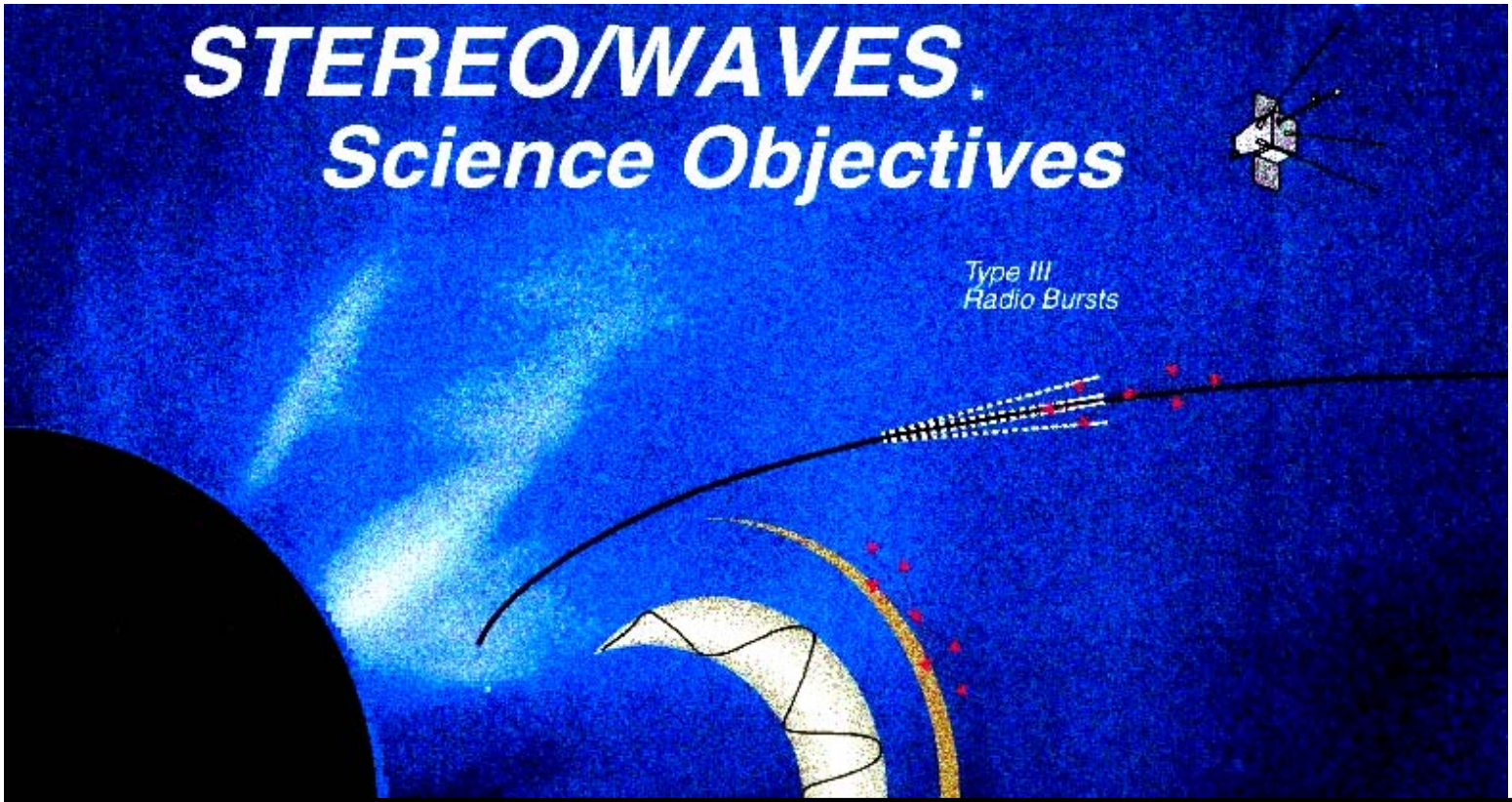
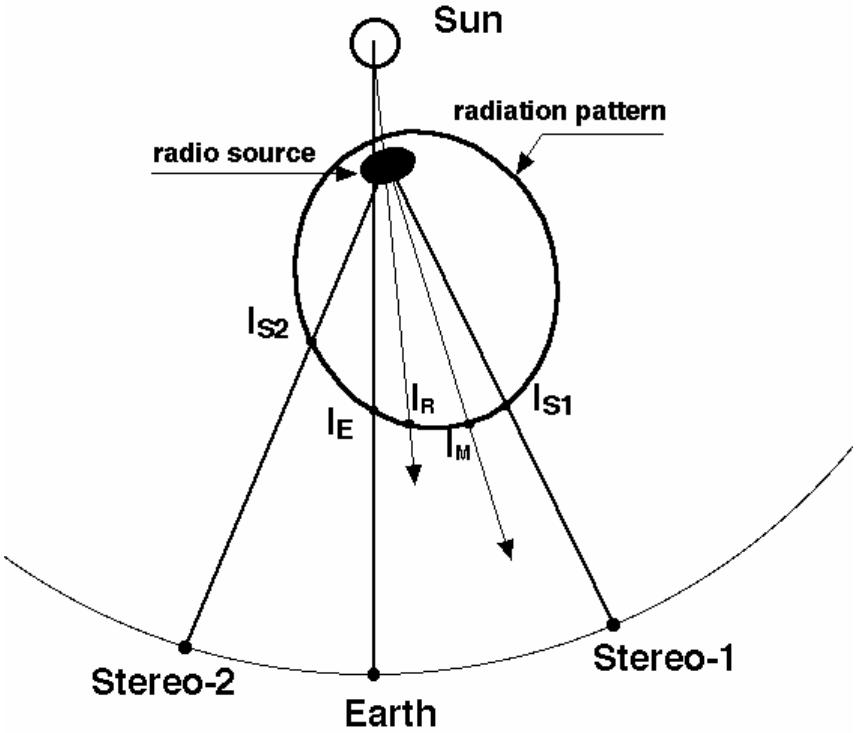
STEREO/WAVES.
Science Objectives

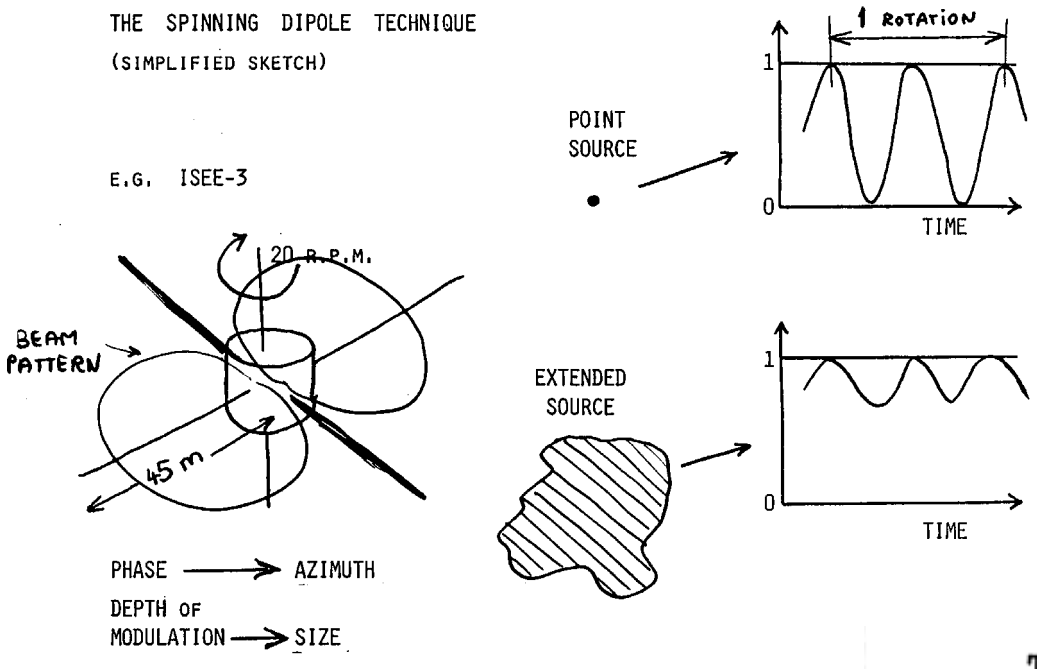


- Track and probe CME-driven shocks from the corona to 1 AU - model free
- Map in-situ structure of CME-driven shocks and flare electron beams
- Probe density and IMF structure of the heliosphere before and after CMEs
- Understand the radio emission process and beam pattern of radio bursts
- Measure electron density and temperature of filament material in clouds
- Receivers in frequency domain and time domain
- SWAVES is two instruments in one - remote sensing and in-situ



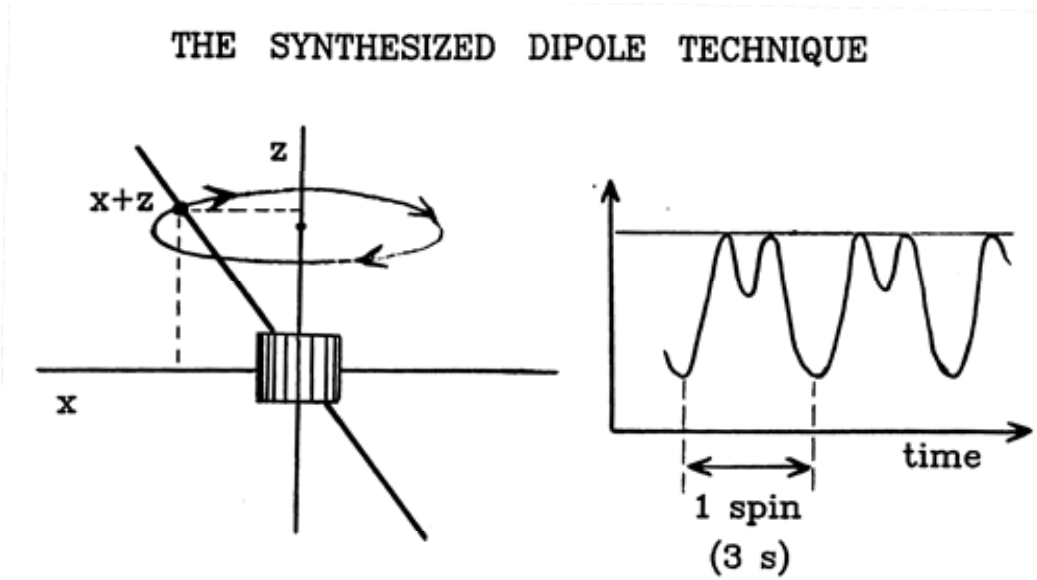
Radio stereoscopy

- **measured parameters:**
  - radio intensity ----> directivity
  - polarization ----> directivity of modes, propagation
  - time-of-flight ----> localization, anomolous propagation
  - dynamic spectrum ----> overview
  - source direction ---- localization
  - source diameter ----> source structure, scattering



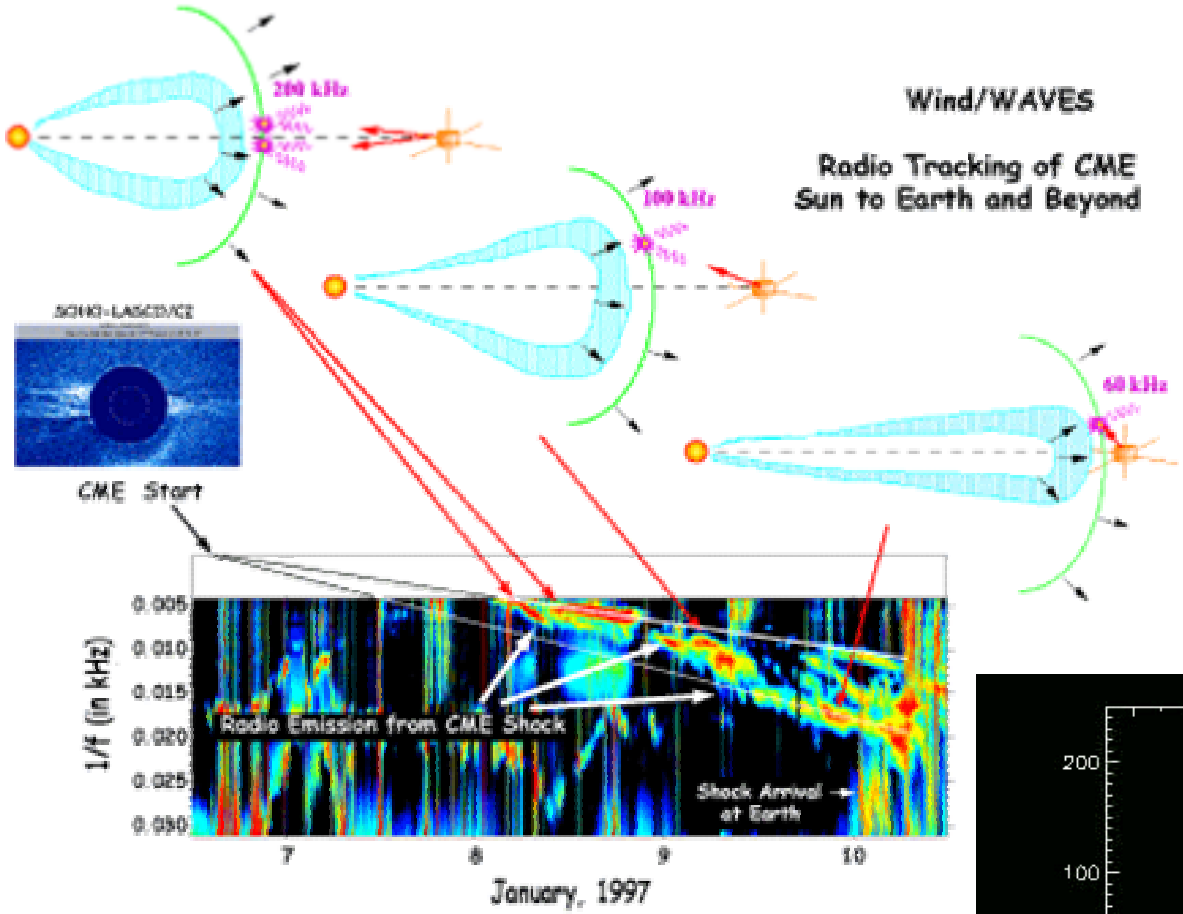
e.g. IMP-6, ISEE-3

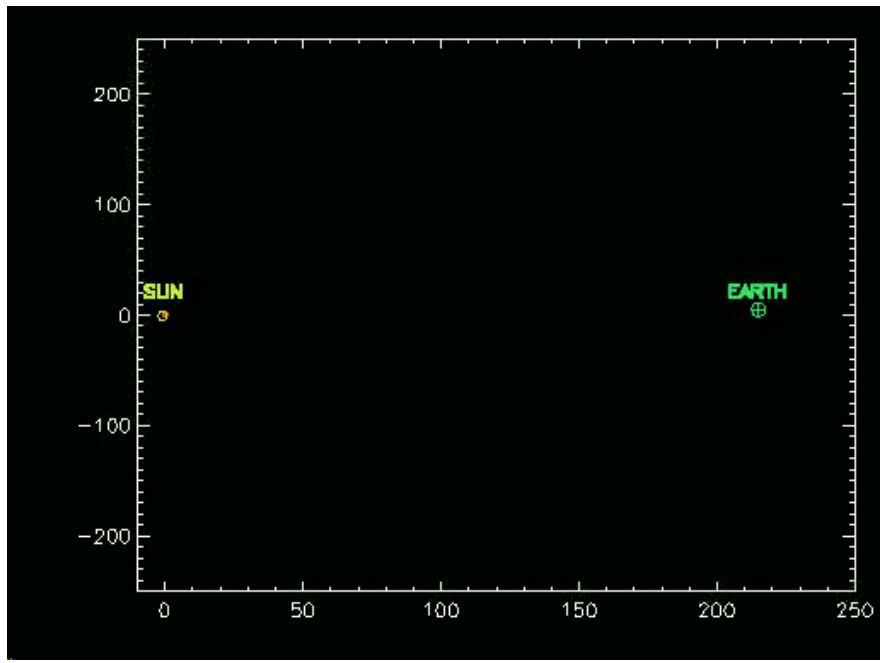
e.g. Ulysses, Wind



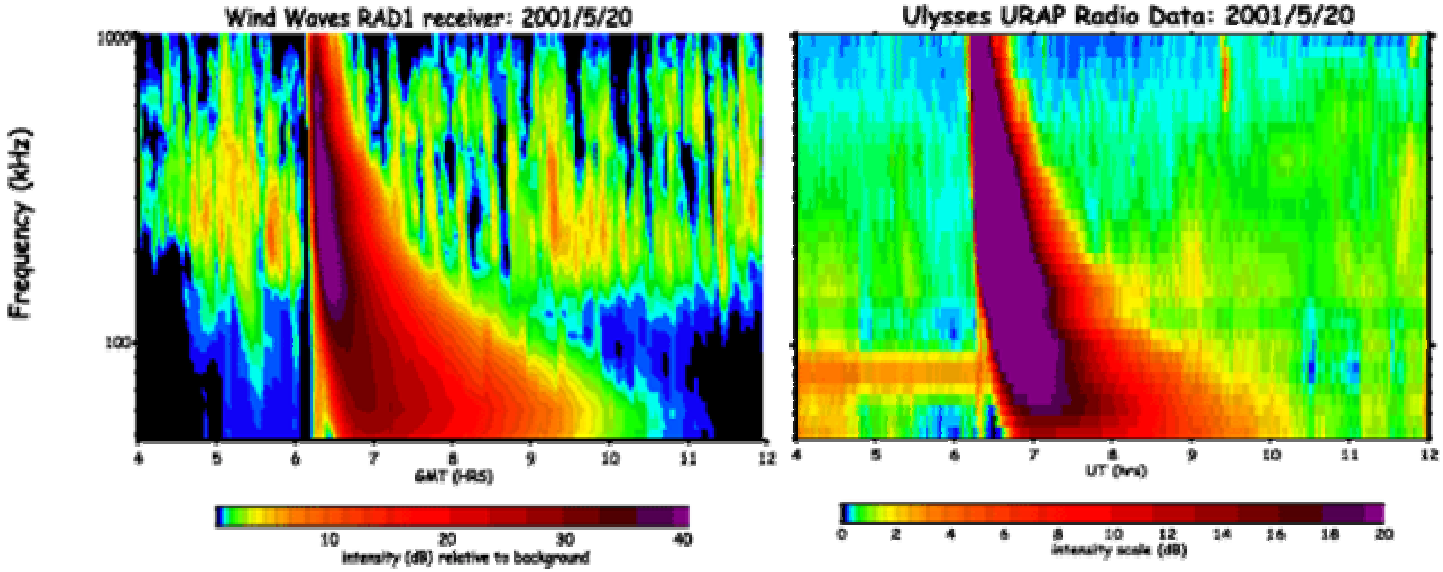
equivalent to cross–correlation:

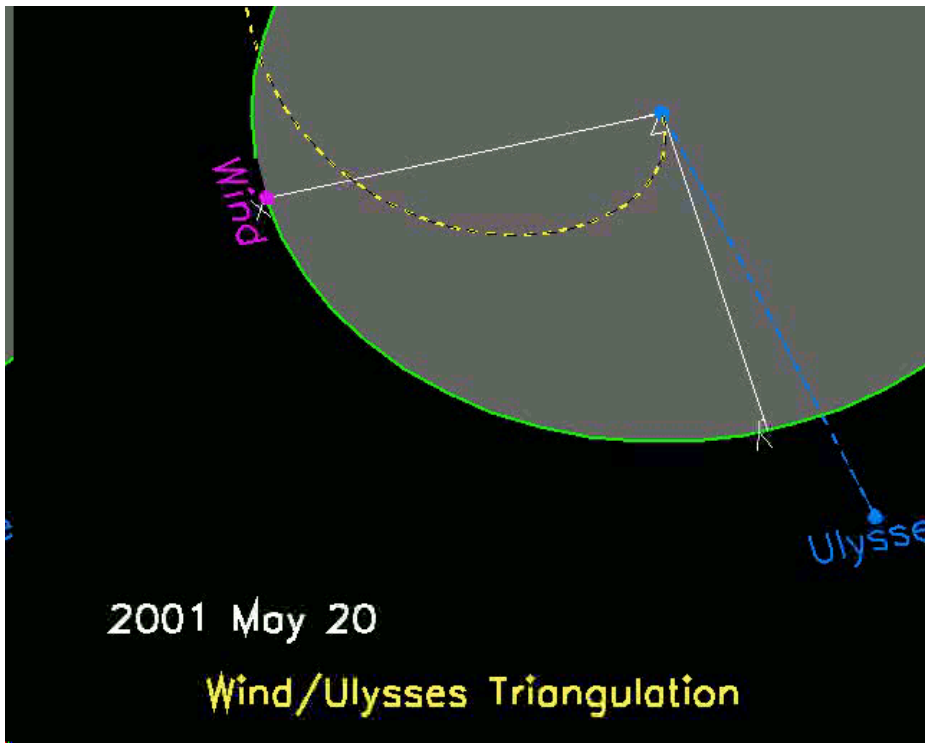
– Real part	direction linear polarization
– Imaginary part	circular polarization

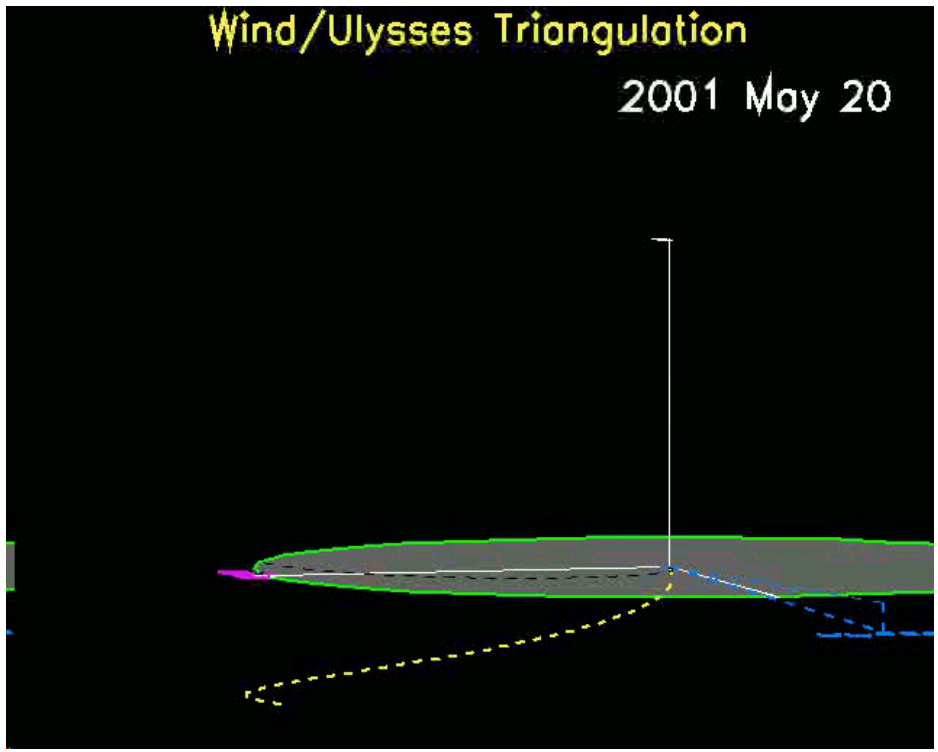




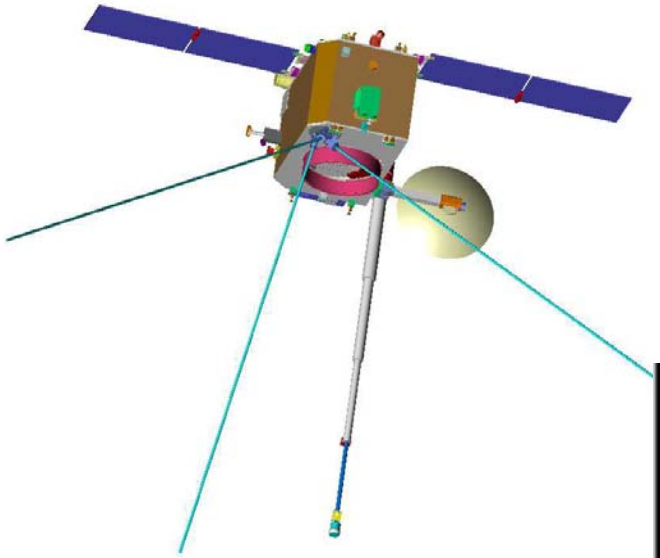
Must have density model to get distance


Wind Waves RAD1 receiver: 2001/5/20
Ulysses URAP Radio Data: 2001/5/20
Frequency (kHz)
1000
100
4
5
6
7
8
9
10
11
12
GMT (HRS)
UT (hrs)
10
20
30
40
Intensity (dB) relative to background
0
2
4
6
8
10
12
14
16
18
20
Intensity scale (dB)

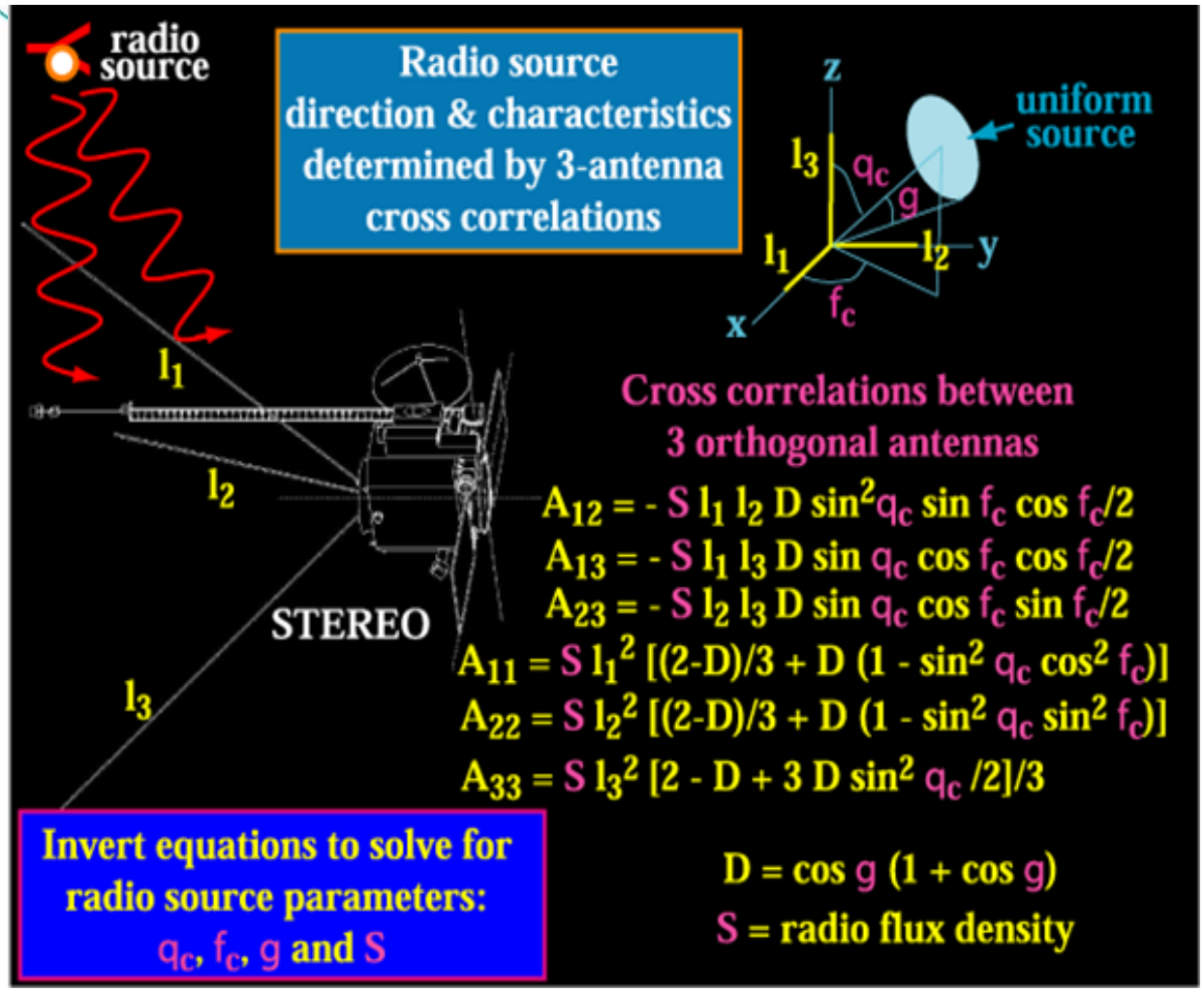

Wind
Ulysse
2001 May 20
Wind/Ulysses Triangulation

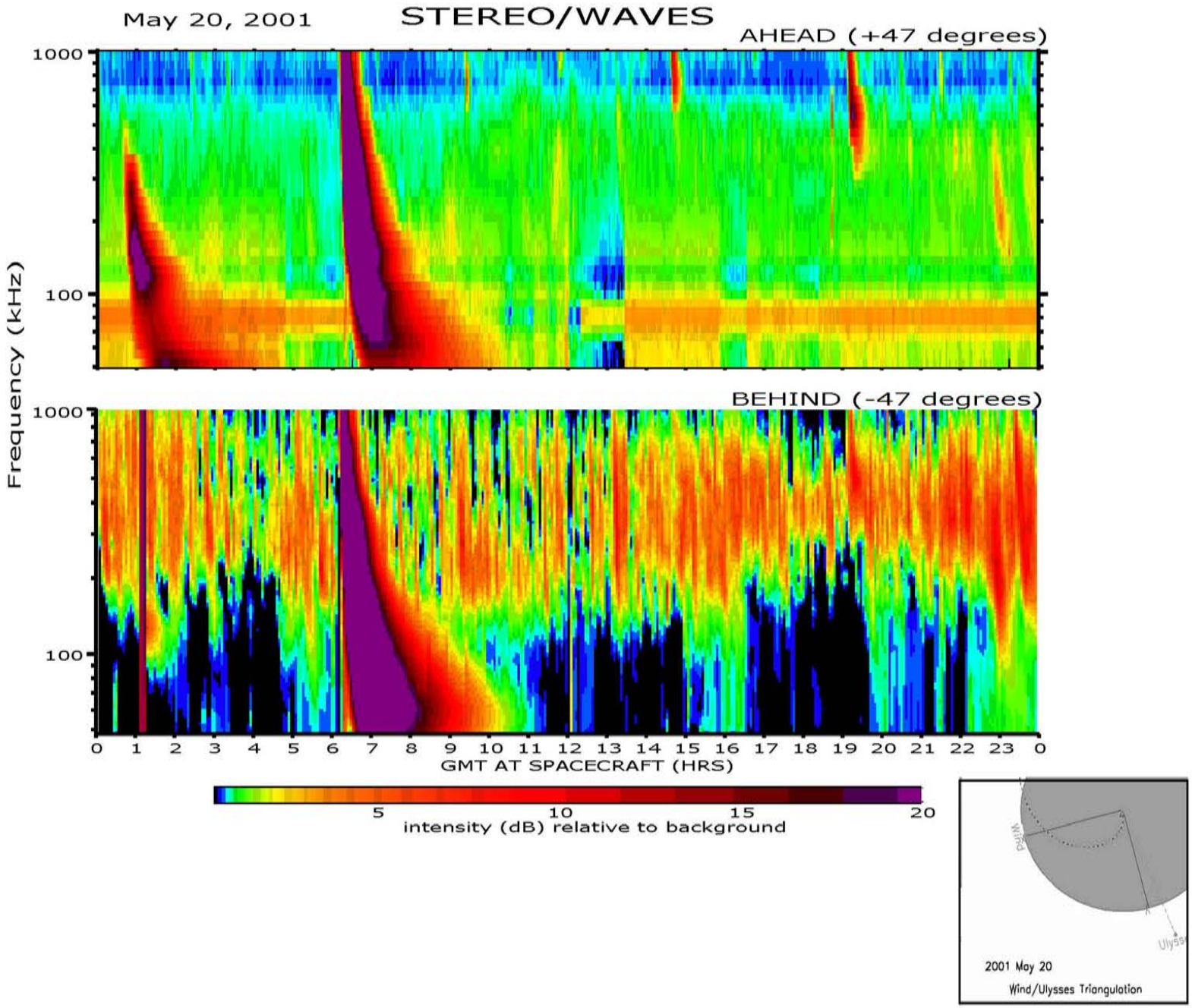

Wind/Ulysses Triangulation
2001 May 20

But STEREO is 3-axis stabilized!

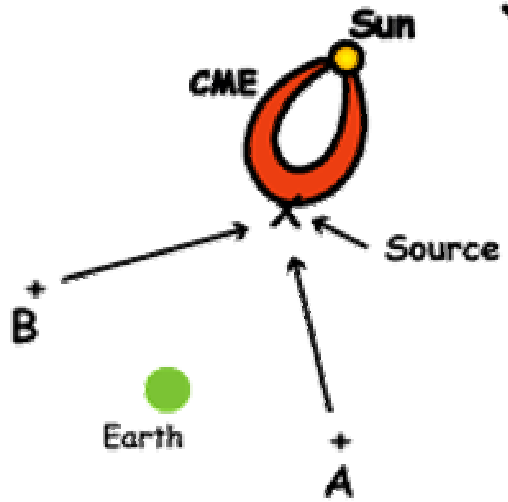


Cassini

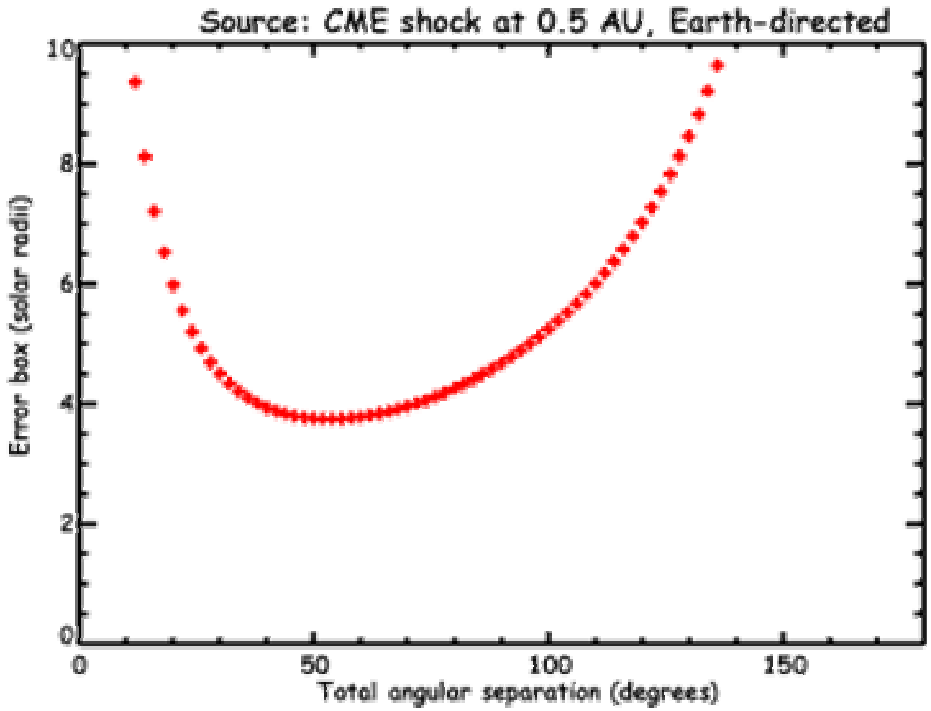



May 20, 2001
STEREO/WAVES
AHEAD (+47 degrees)
BEHIND (-47 degrees)
Frequency (kHz)
1000
100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0
GMT AT SPACECRAFT (HRS)
5
10
15
20
intensity (dB) relative to background
Wind
Ulysses
2001 May 20
Wind/Ulysses Triangulation

SWAVES Stereoscopic Capabilites versus Spacecraft Separation Angle



SWAVES Measures Source Location to 1º from both s/c



Instantaneous accuracy