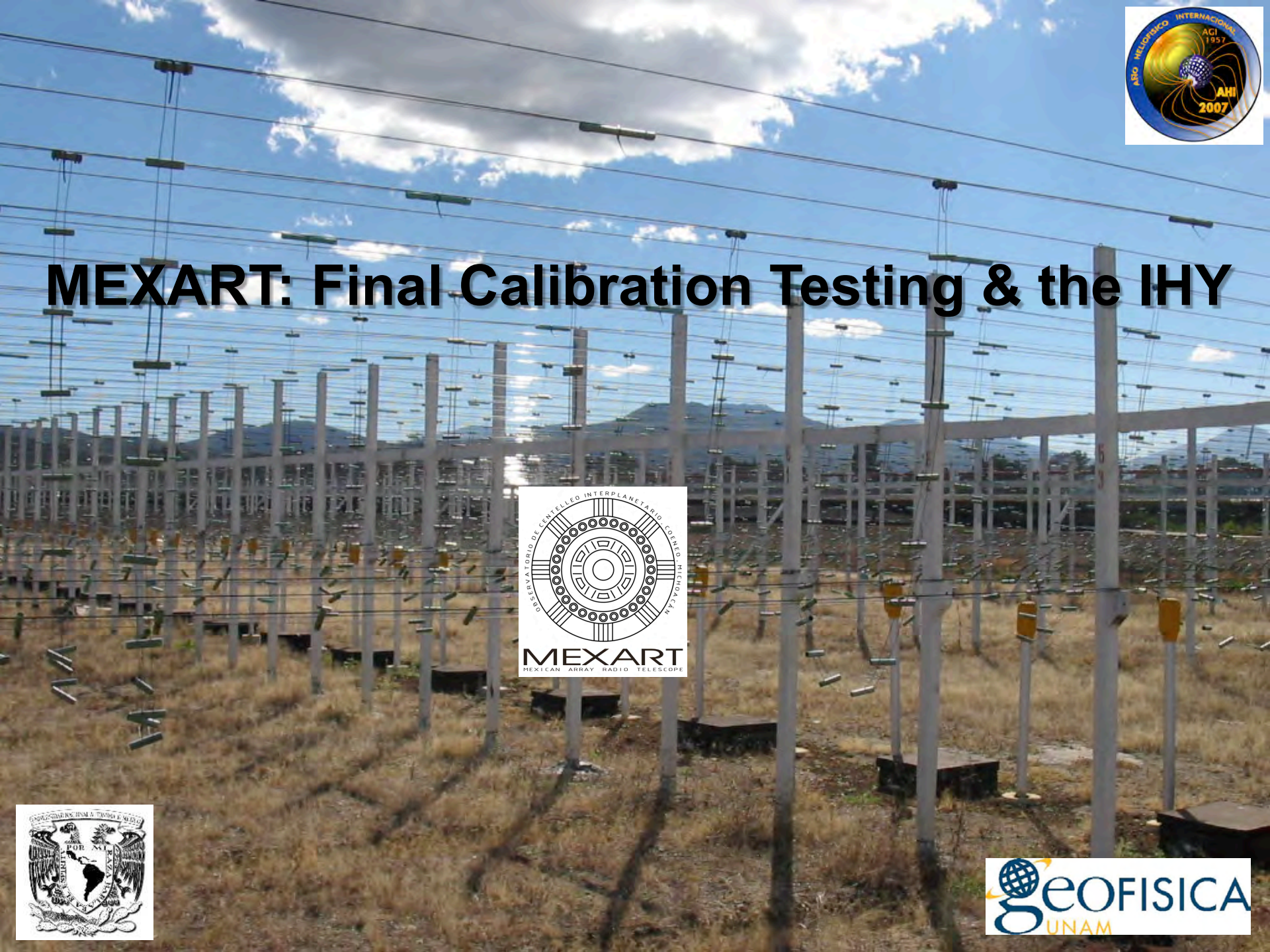


MEXART: Final Calibration Testing & the IHY

A. González-Esparza, A. Carrillo, E. Andrade,
S. Jeyakumar, R. Pérez-Enríquez, S. Kurtz
Universidad Nacional Autonoma de Mexico.

S. Ananthakrishnan, P.K. Manoharan
NCRA, TIFR, India

P. Sierra, S. Vazquez
IGA, CITMA, Cuba

Motivation

IPS network (Kojima, Manoharan, Jackson)

STEREO (J. Lumann, R. Howard, A. Vourlidas)

SMEI (D. Webb, B. Jackson)

IHY (J. Valdes, C. Briand, C. Mandrini & J.P. Raulin)

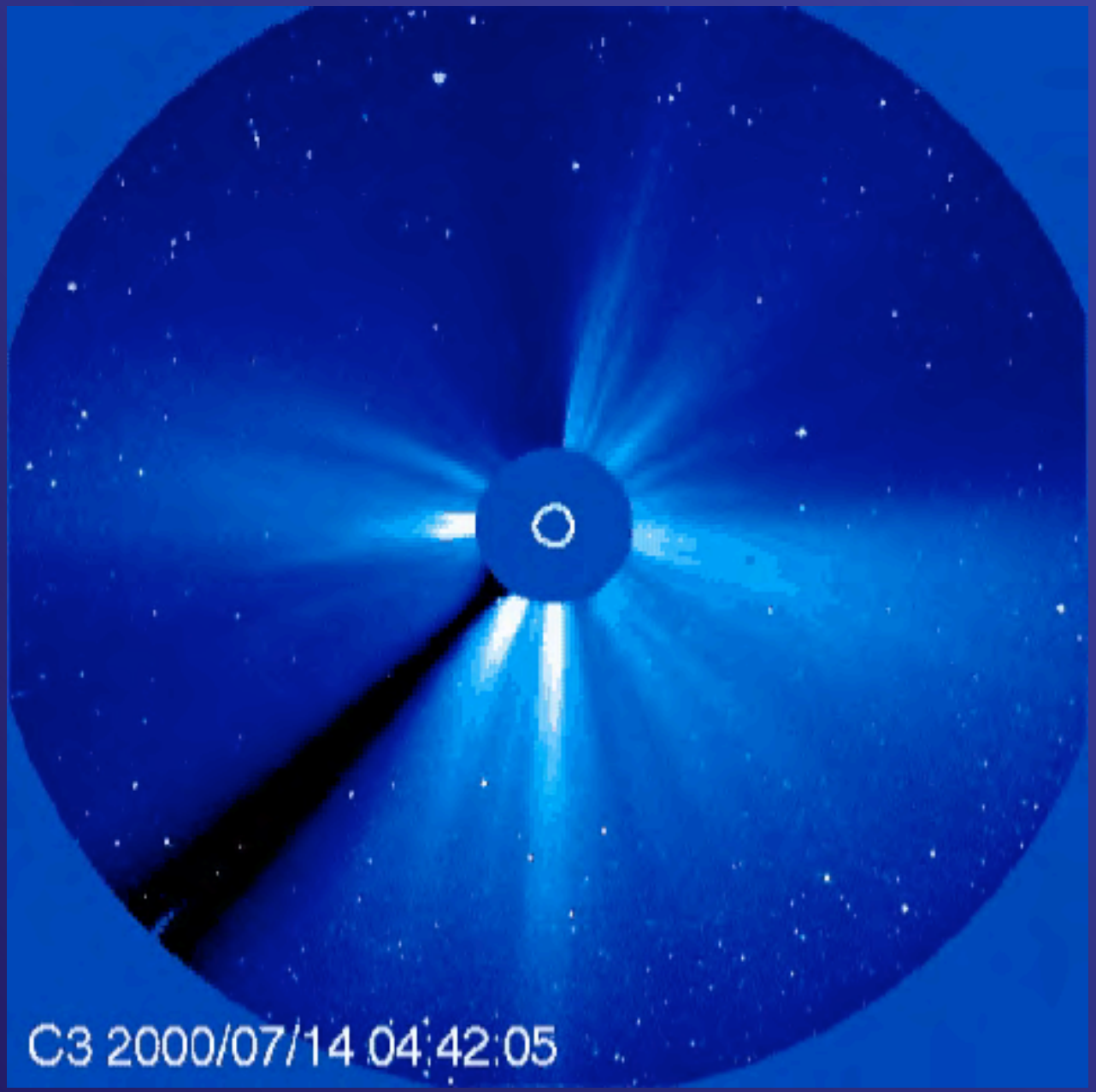
Upcoming meetings (AGU joint meeting, ICR, COLAGE)

Potential UNBSS Instruments

objective	Instrument	Lead Scientist	Status	Geographic Req
IPS	IPS and SMEI network	Masayoshi Kojima (STE Lab) Americo Gonzalez (UNAM) P. K. Manoharan (Ooty) Andy Breen (University of Wales) Xizhen Zhang (NAO, Chinese Academy of Sciences) Bernie Jackson (CASS, UCSD)	The NAO 50m dish antenna will be completed in 2006. Mexican IPS array is now under test operation. The STE Lab and CASS already has a real time data network. CASS is submitting a NASA proposal to the Applied Information Systems Research (AISR) Program. STELab has commenced to build a new IPS array.	Japan, China, India, Europe, Mexico and space

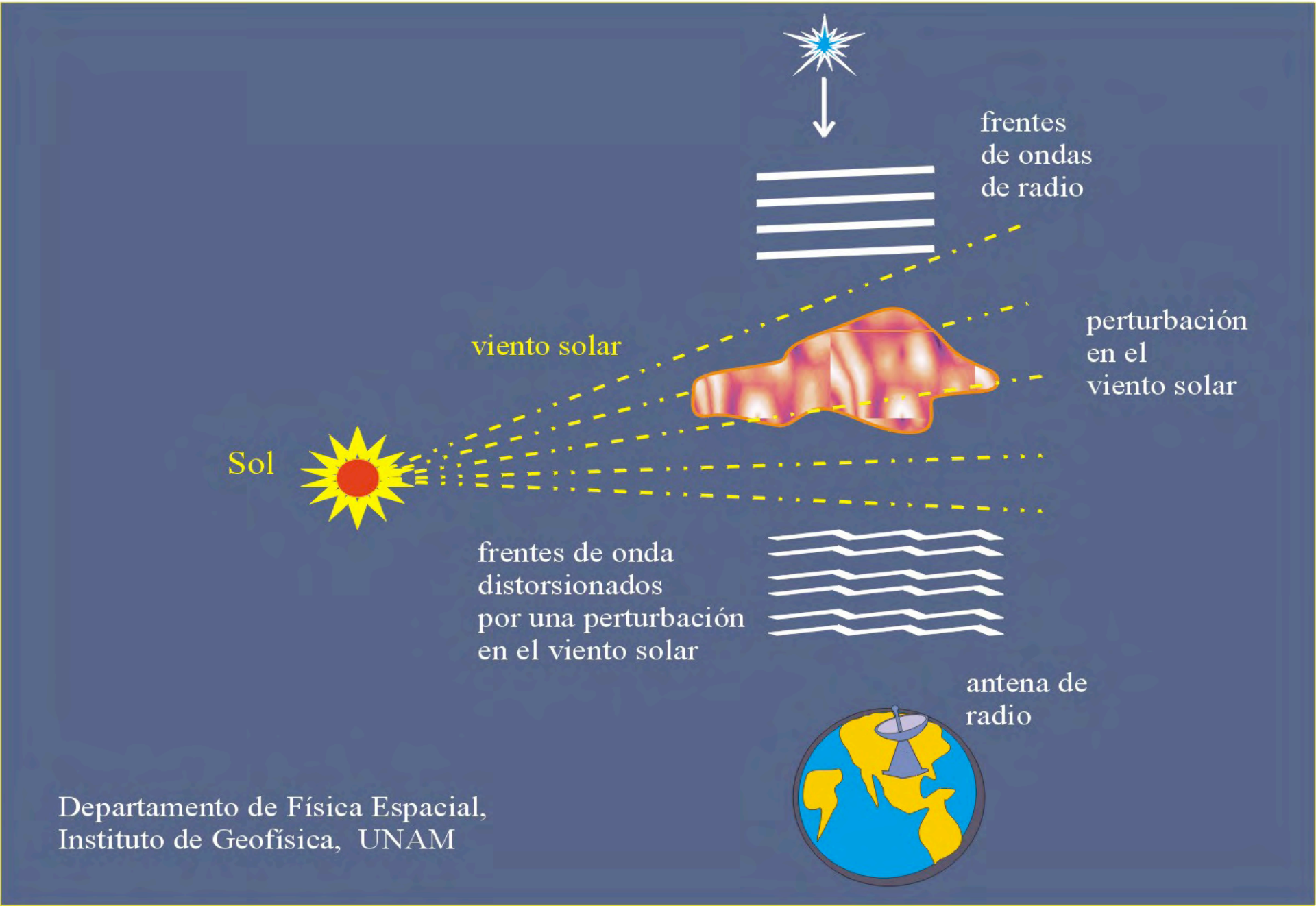
United Nations
Basic Space Science Initiative (UNBSSI)

Coronal Mass Ejection 14/ July / 2000

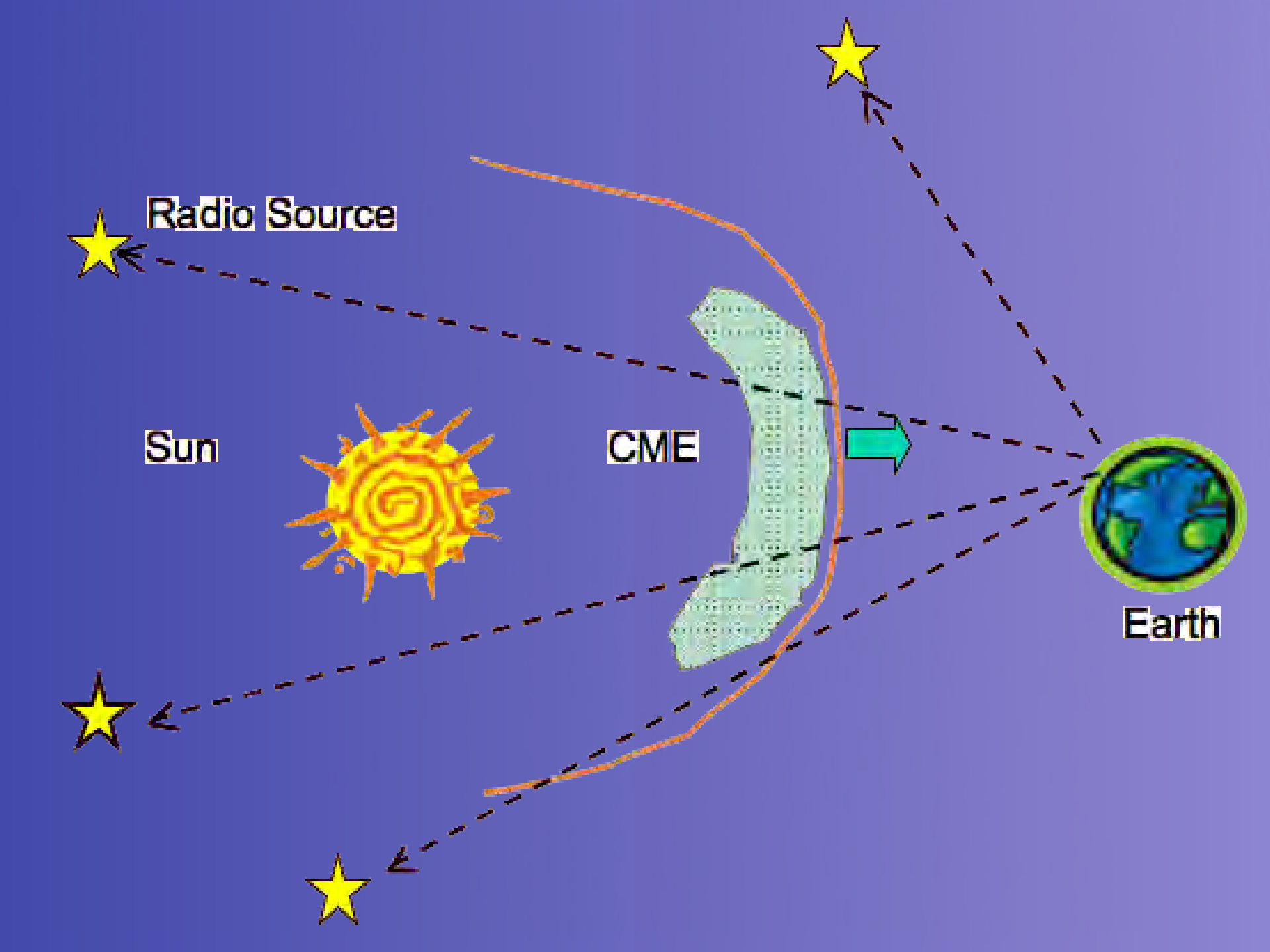


LASCO / SOHO

INTERPLANETARY SCINTILLATION

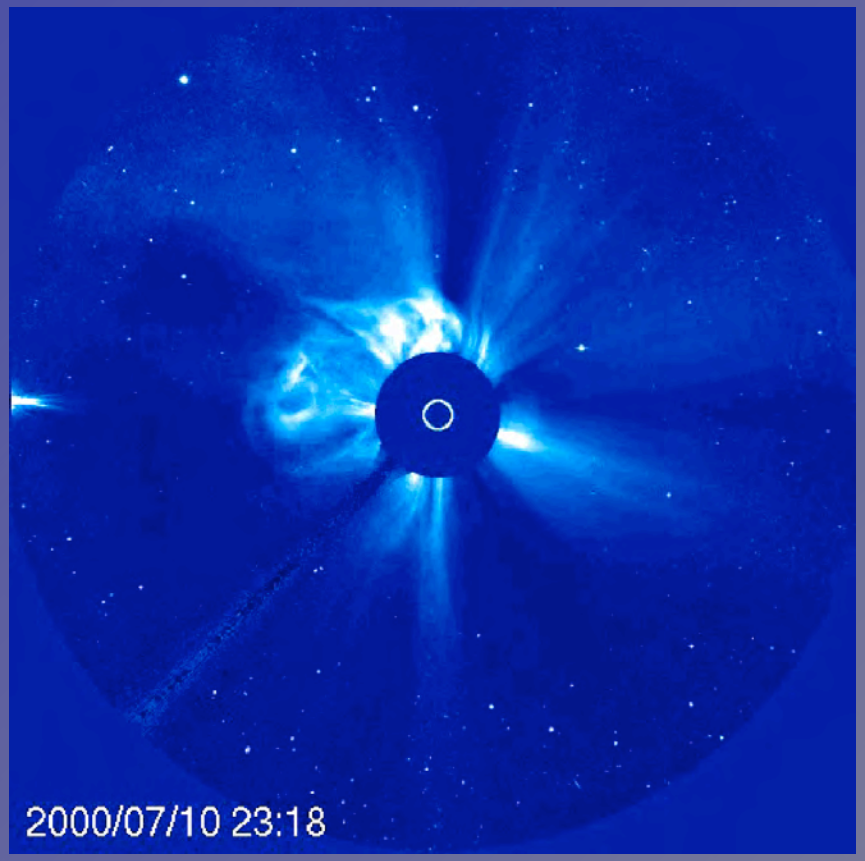


Departamento de Física Espacial,
Instituto de Geofísica, UNAM


Radio Source
Sun
CME
Earth

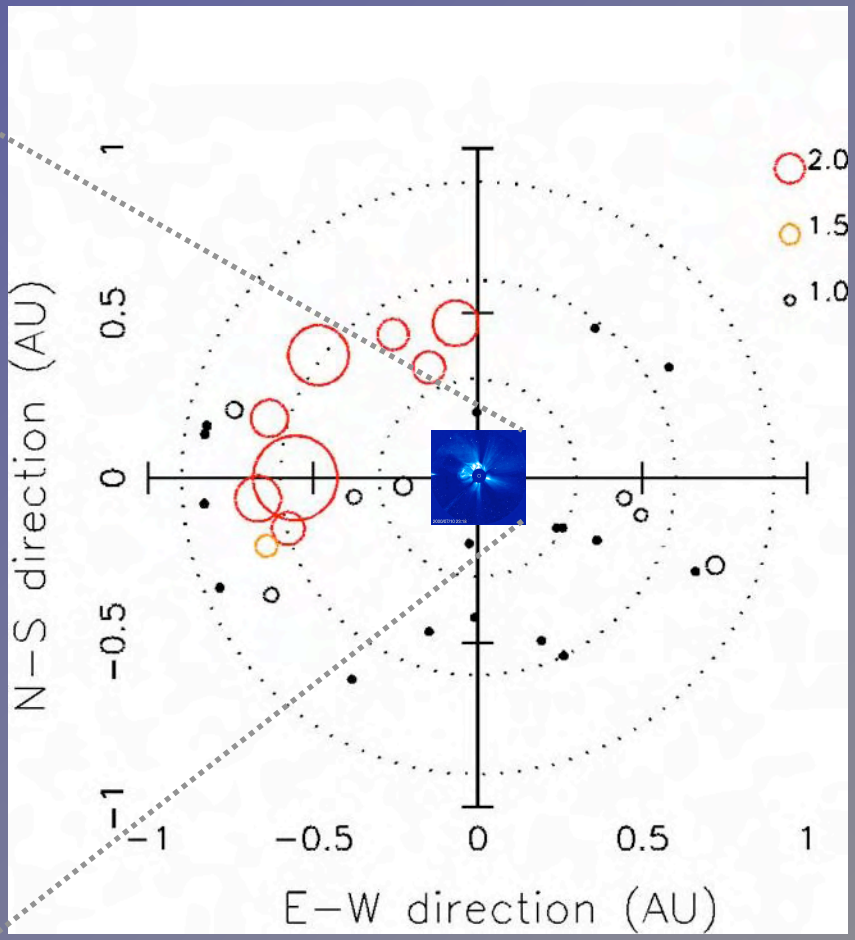
Interplanetary CME identified from IPS Measurements

CME Observations
Near the Sun (<30Rs)



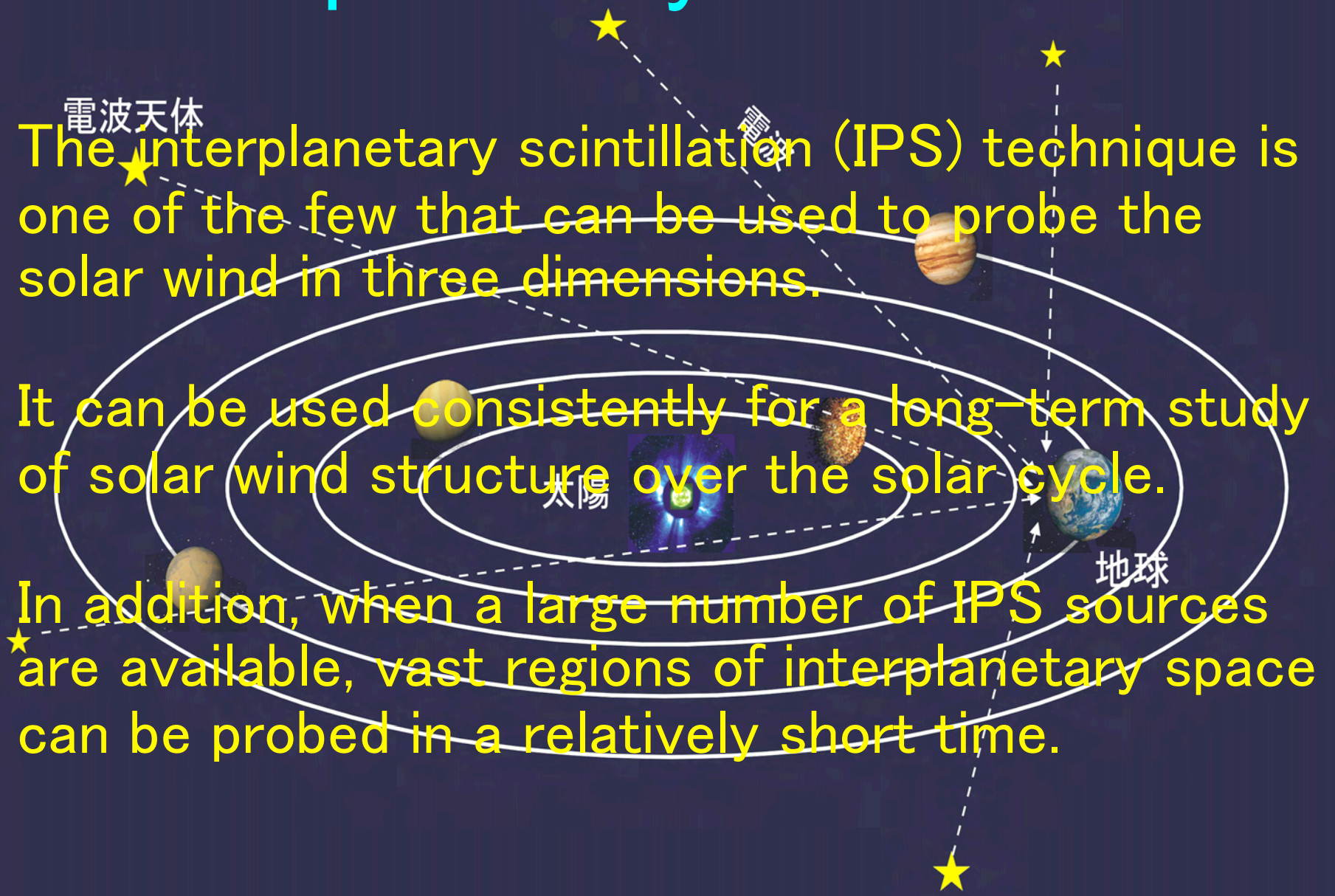
LASCO/SOHO

IPS Observations for 0.2-1AU
2000/7/11:22h UT-7/12:7h UT



STEL/IPS

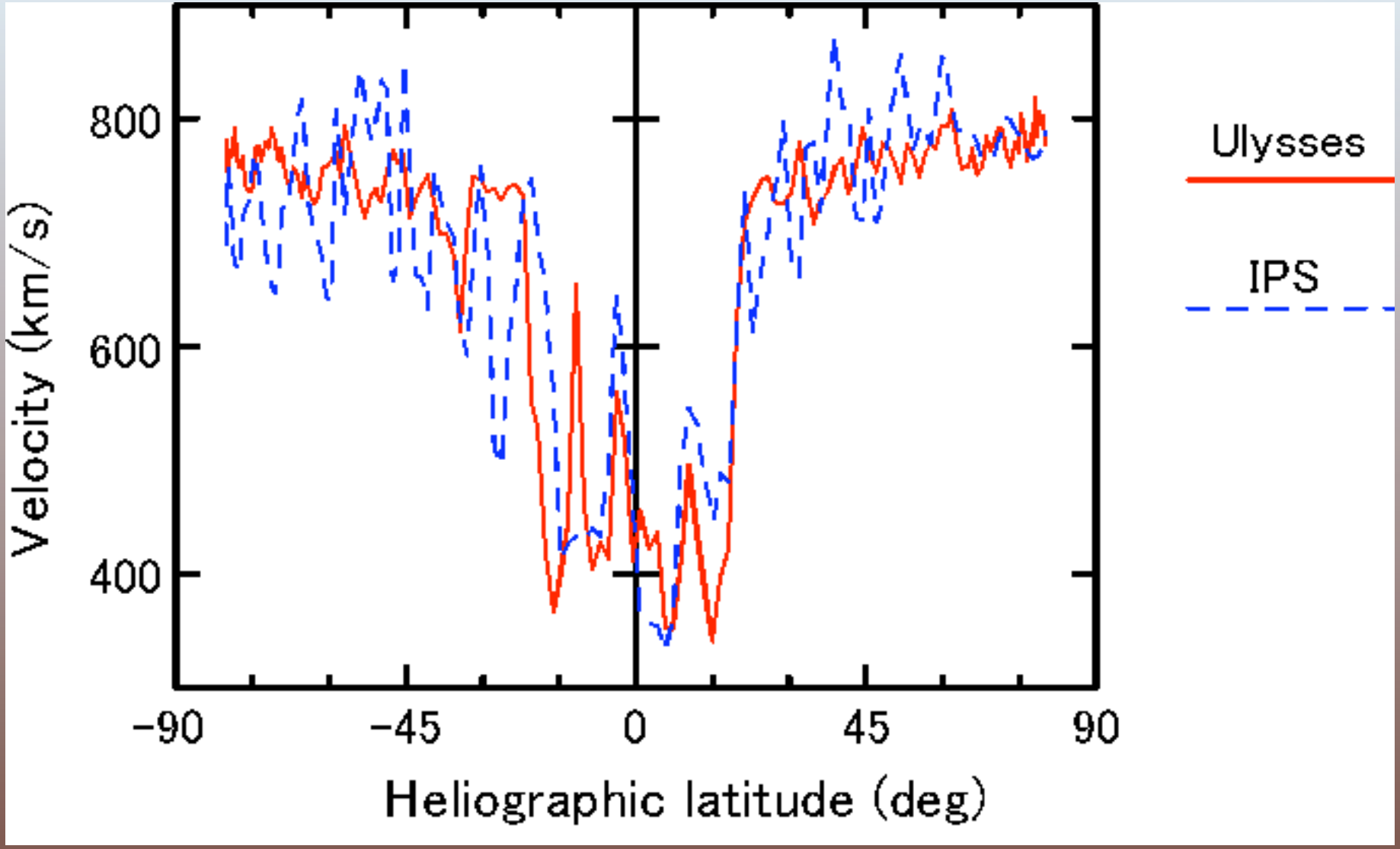
Interplanetary Scintillation



The interplanetary scintillation (IPS) technique is one of the few that can be used to probe the solar wind in three dimensions.

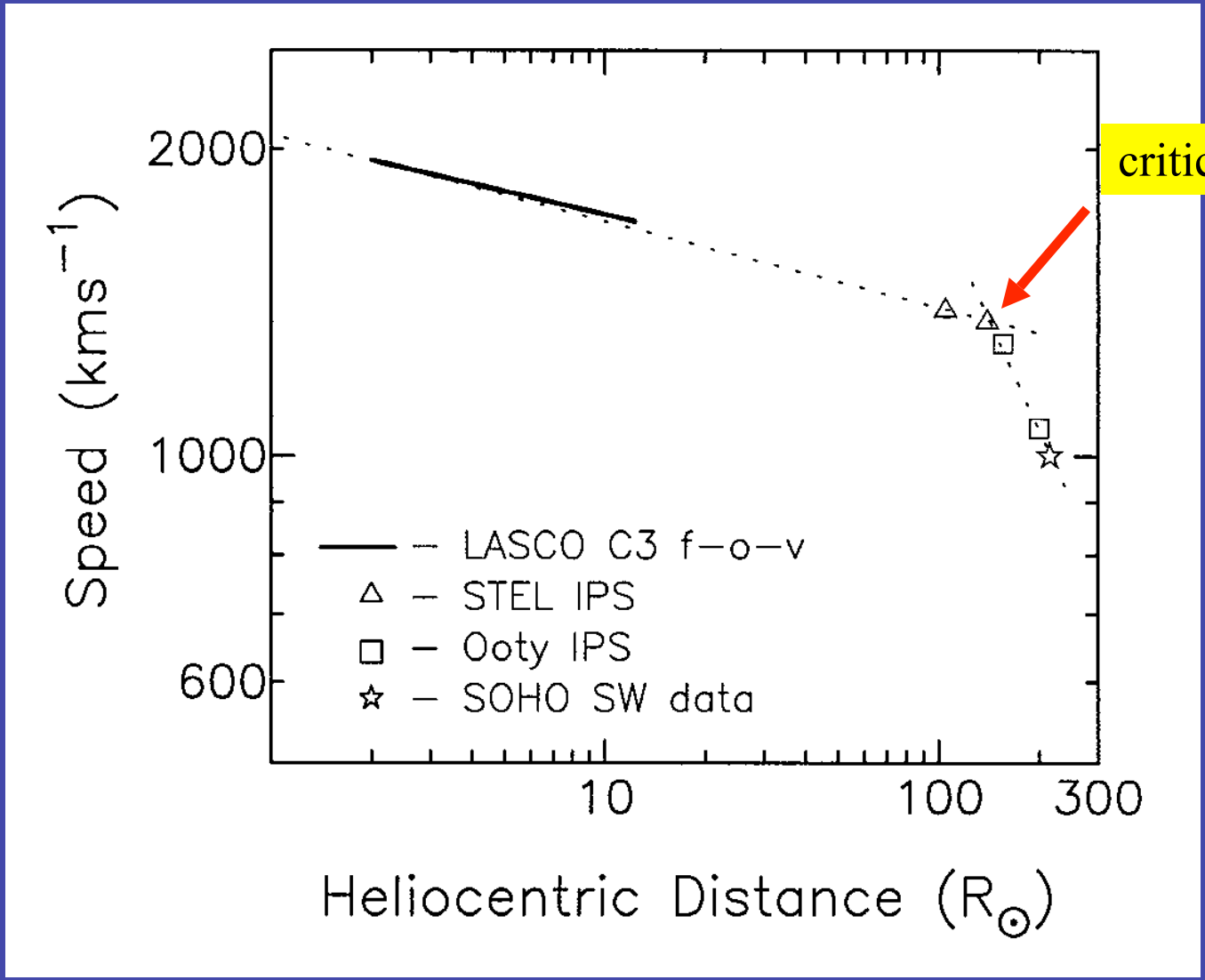
It can be used consistently for a long-term study of solar wind structure over the solar cycle.

In addition, when a large number of IPS sources are available, vast regions of interplanetary space can be probed in a relatively short time.



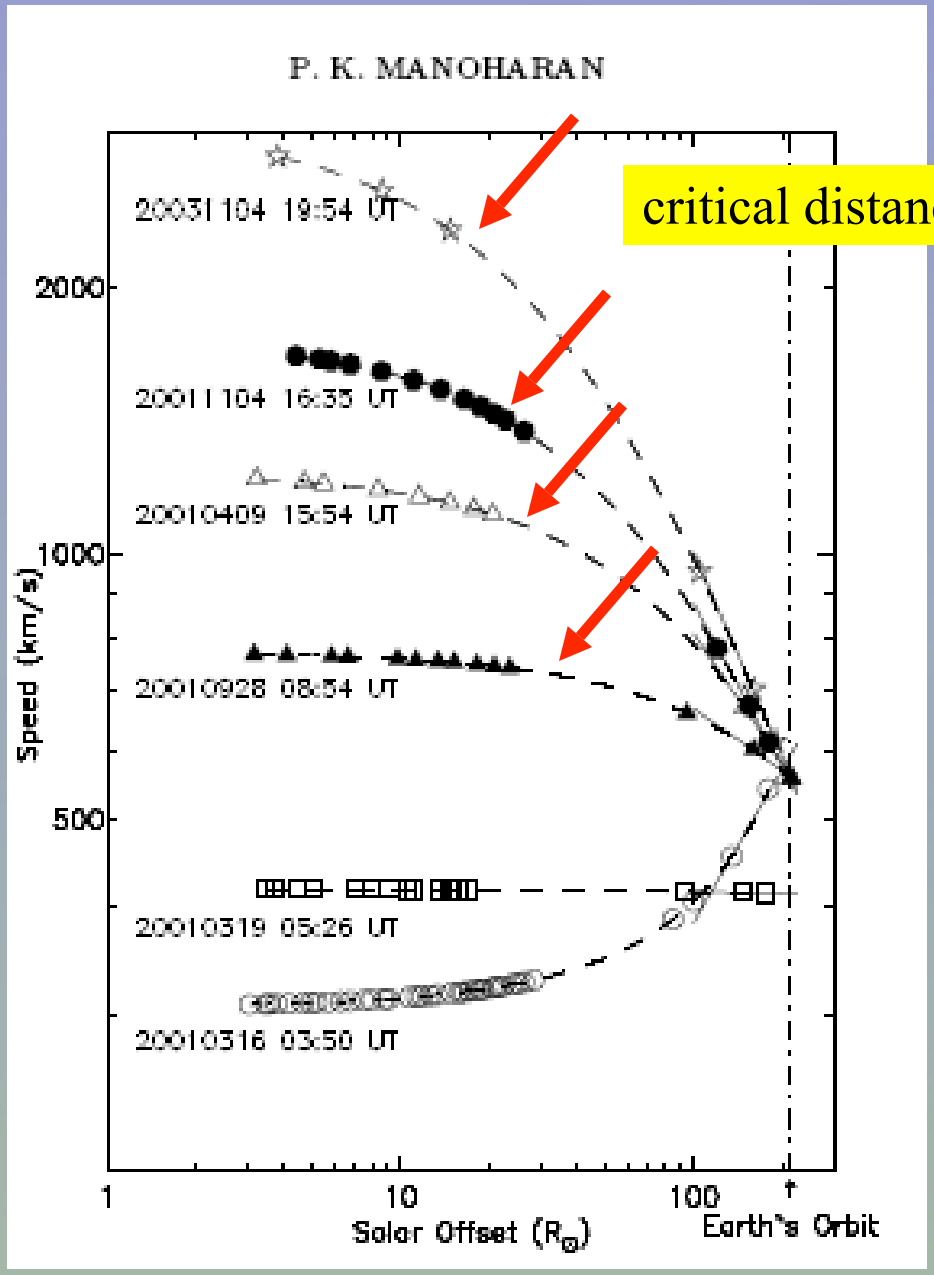
STEL IPS DATA VELOCITY / ULYSSES IN-SITU OBSERVATIONS

CME of July 14,2000 Flare Event: Imaging from Near-Sun to Earth Environment

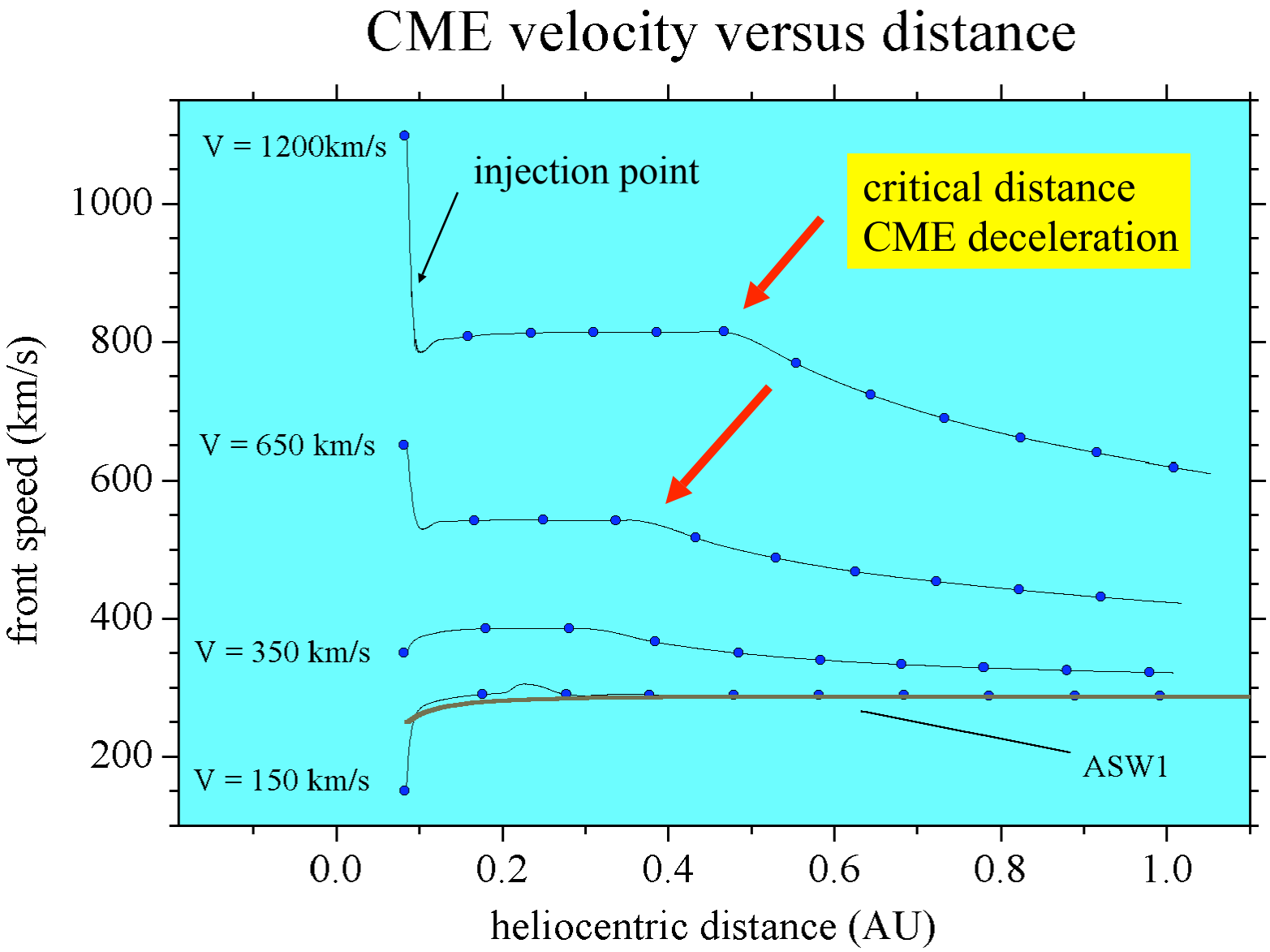


(Manoharan et al., Ap.J.,2001)

Tracking of ICME speeds combining SOHO/IPS/in-situ measurements



(Manoharan, Solar Physics, 2005)



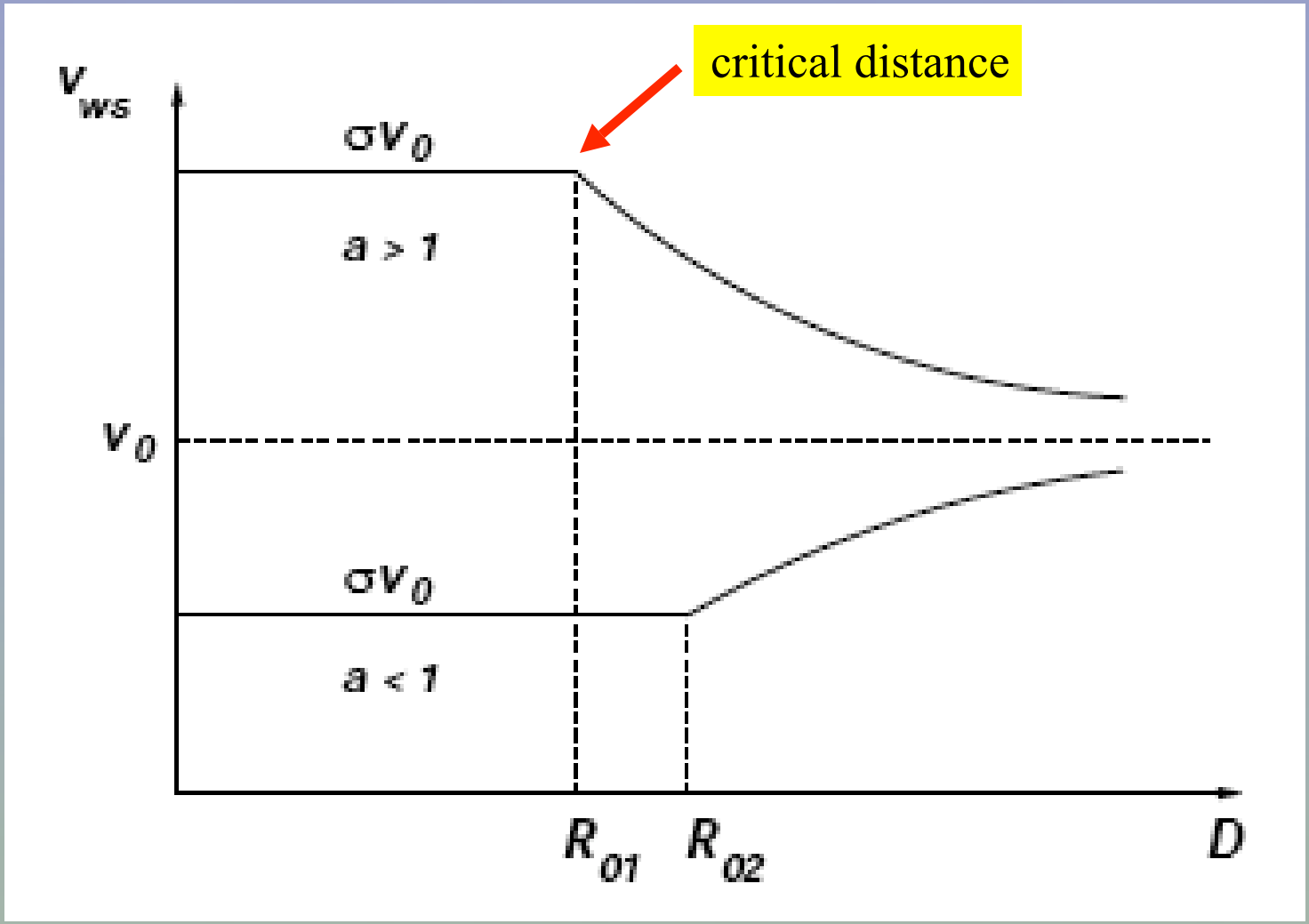
1-D HD simulation

(Gonzalez-Esparza et al., JGR, 2003)

hydrodynamic analytic model : CME velocity heliocentric evolution

fast CMEs deceleration

slow CMEs acceleration



(Canto et al., MNRAS, 2005)

International collaborative studies of the solar wind with IPS and SMEI

China Astronomical Observatories, CAS(NAOC)

India Radio Astronomy Centre, NCRA, TIFR, Ooty

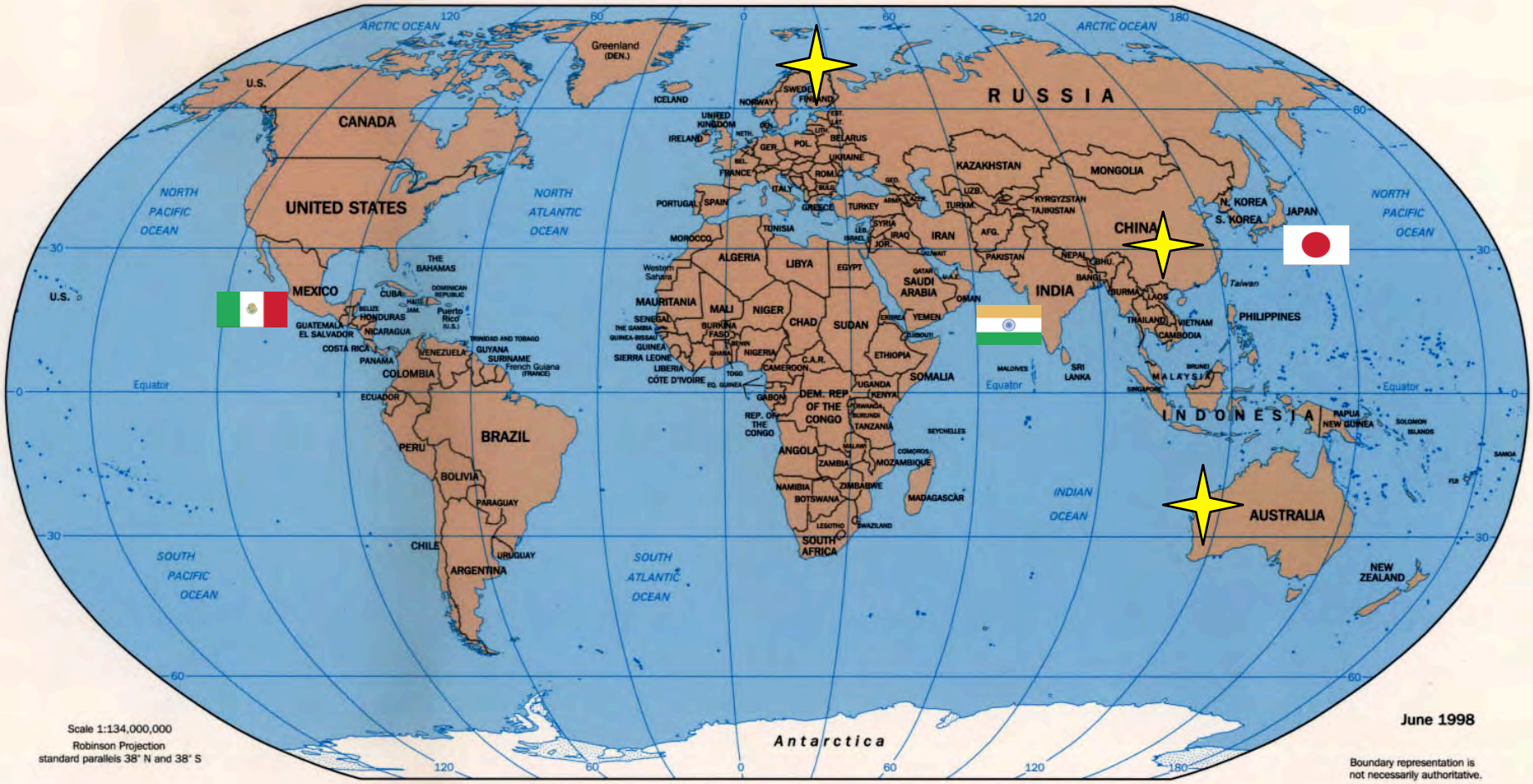
Japan STE Lab., Nagoya University

Mexico Instituto de Geofisica,UNAM

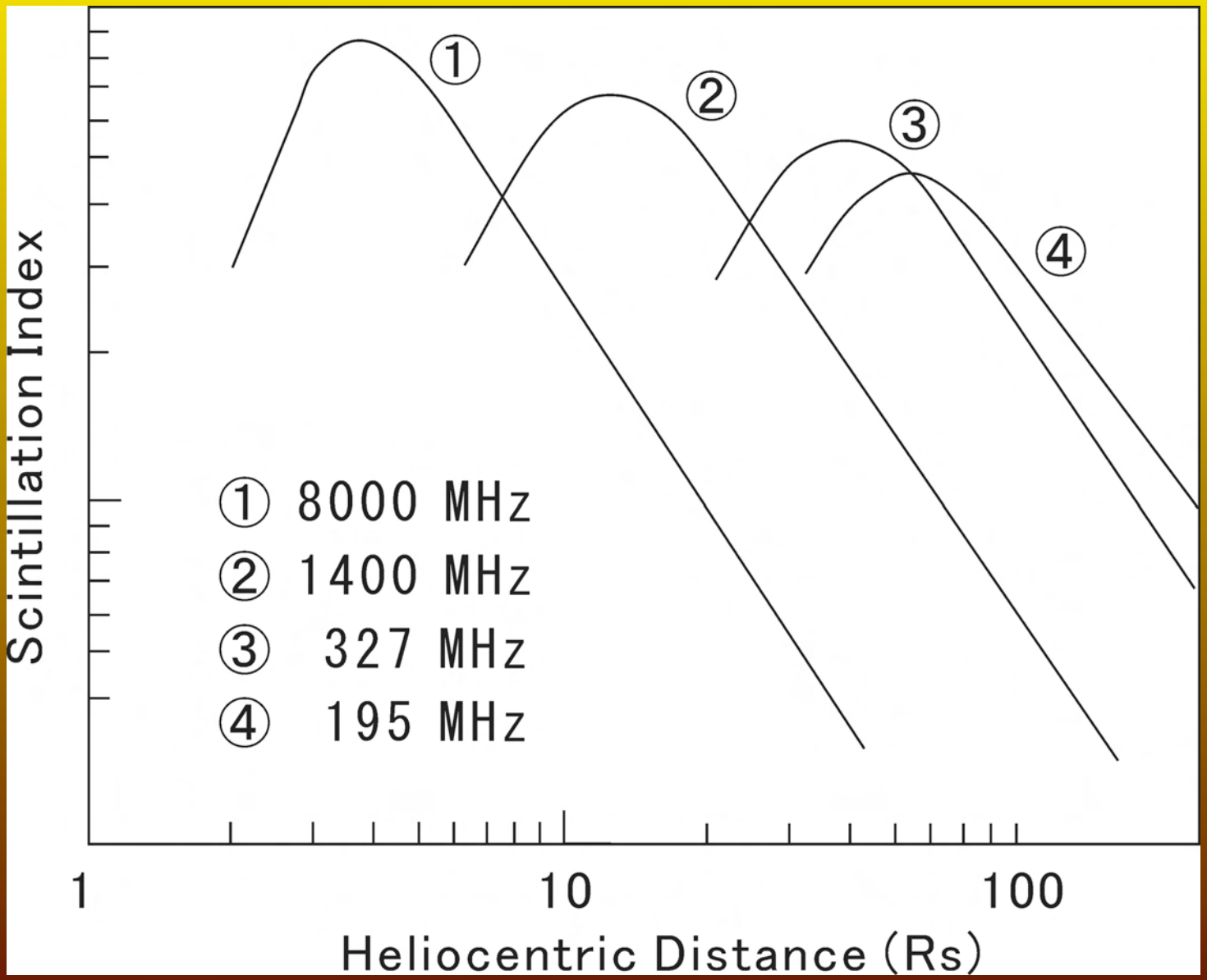
U.K. Institute of Mathematical and Physical Sciences, University of Wales.

U.S.A. CASS, University of California at San Diego

GLOBAL NETWORK OF IPS OBSERVATORIES



ELONGATION ANGLE AND FREQUENCY



The IPS at a single frequency cannot observe solar wind in the full range of distances from the sun to the earth

The IPS at a single site cannot monitor the solar wind for 24 hours a day

Therefore the IPS facilities operated at different frequencies and sites collaborate in the IHY

OBSERVATORIO DE CENTELLEO INTERPLANETARIO, COENEO, MICHOACÁN

MEXART

MEXICAN ARRAY RADIO TELESCOPE

INAUGURATION

GEOFISICA UNAM

1 / December / 2005

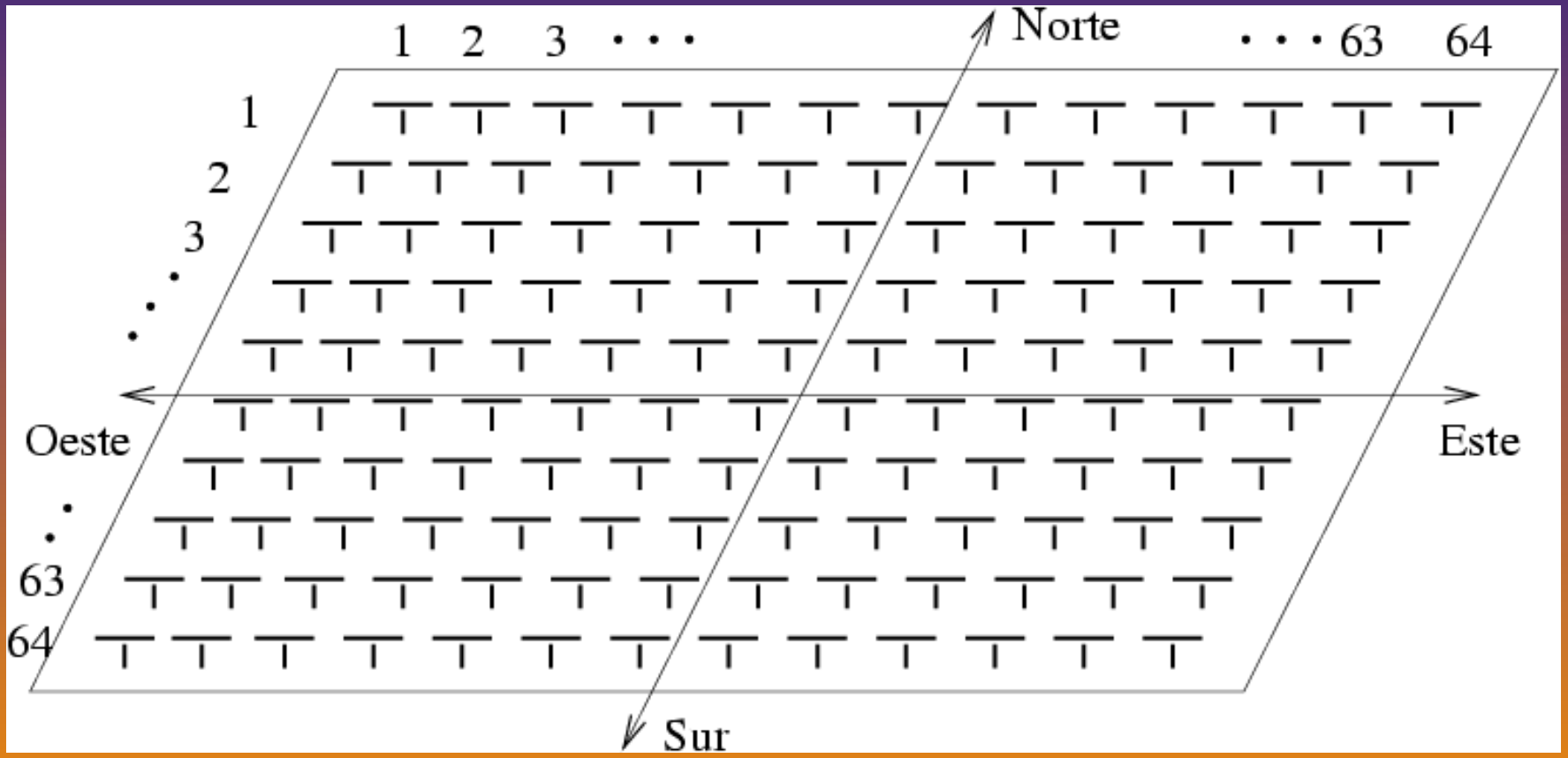
360 km north-west from Mexico City

19°48' north and 101°41' west, 1964 m above sea level

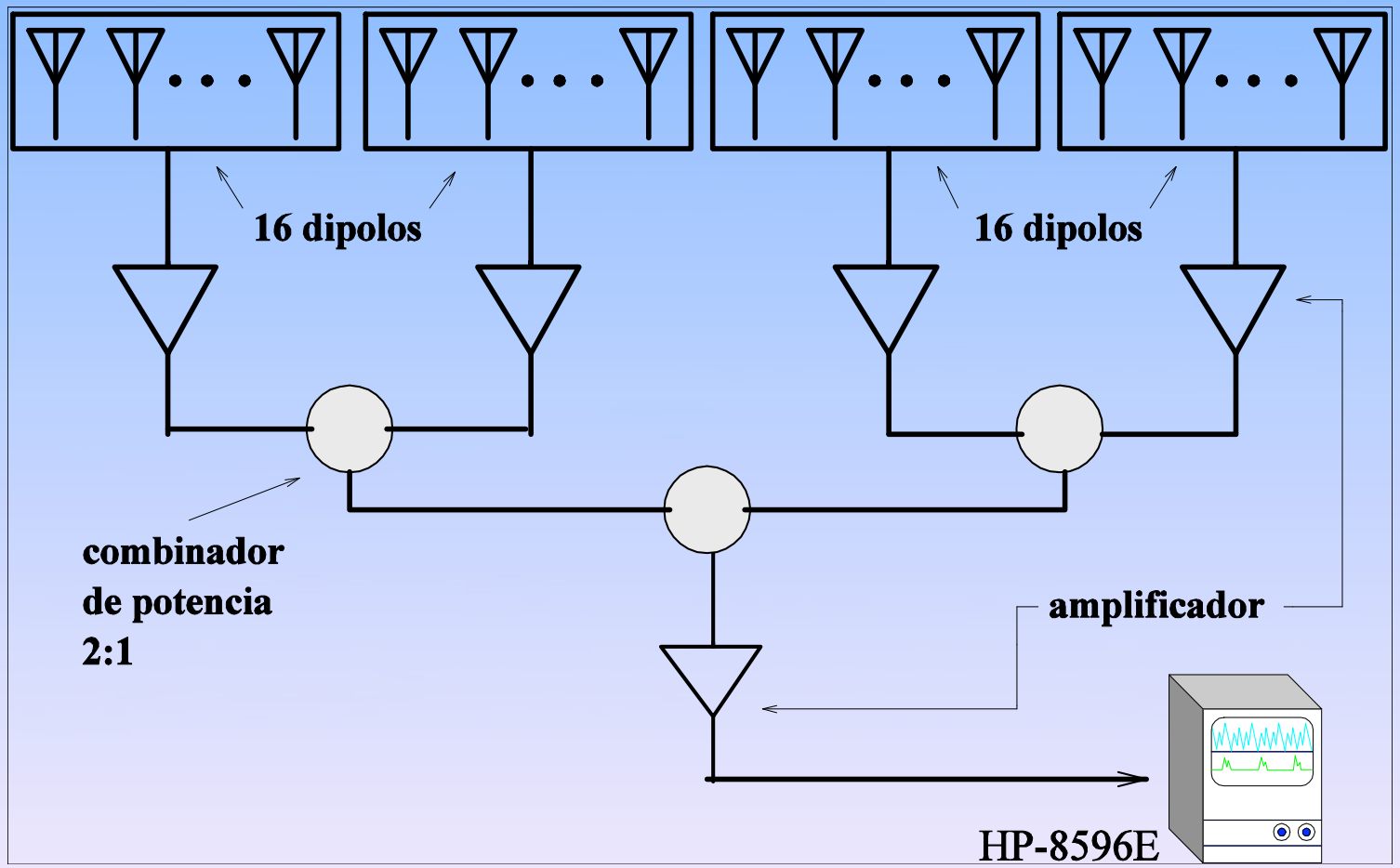
MEXART TECHNICAL CHARACTERISTICS

Operation frequency	139.65 MHz
Enlogation angle from the Sun	20 degrees
Band width	4 MHz.
Basic element	full wavelenght dipole
Number of elements	4096
Number of East-West rows	64, each row has 64 full wavelength dipoles
Expected sensitivity	2.5 K/Jy
Physical area	9,600 square meters (70m x 138m)

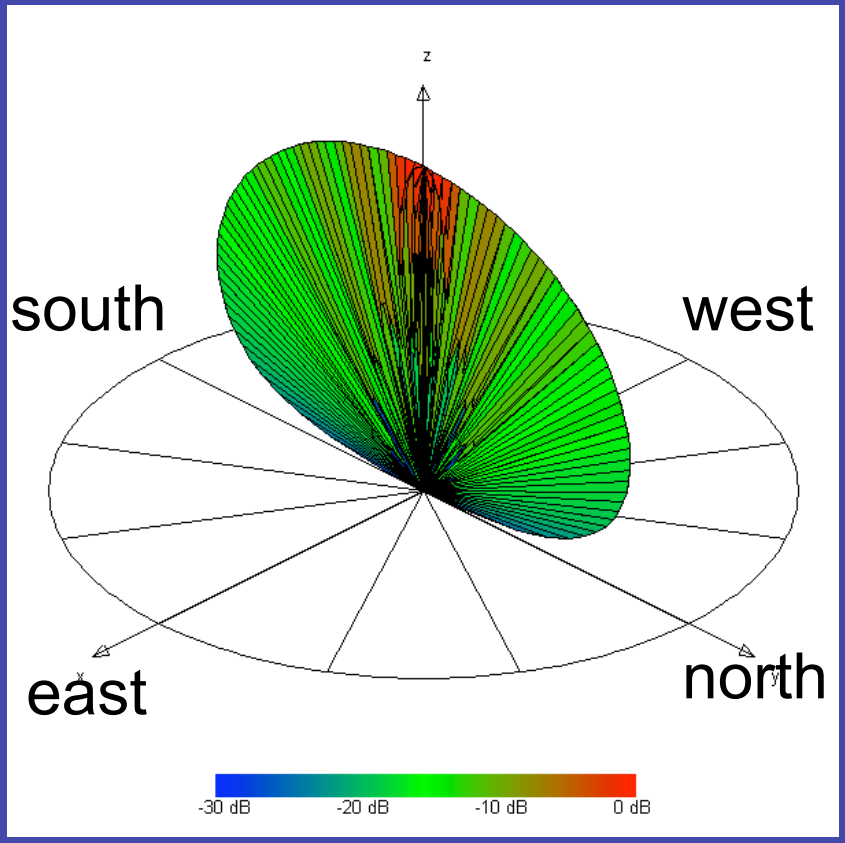
64x64 planar dipole array

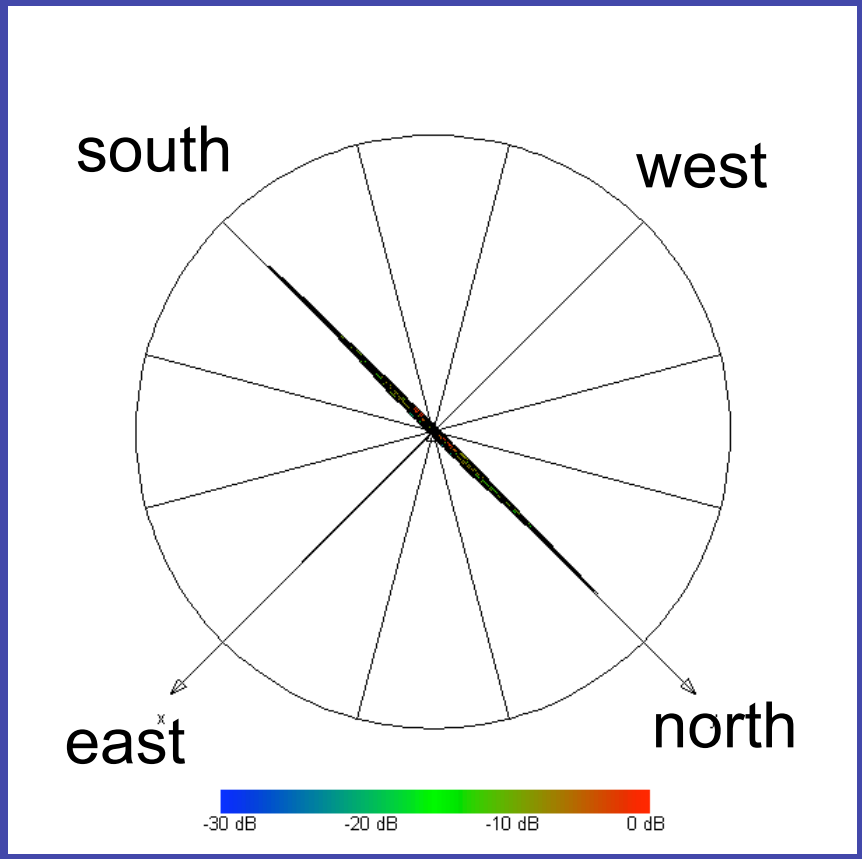


AMPLIFICATION AND COMBINATION SYSTEMS

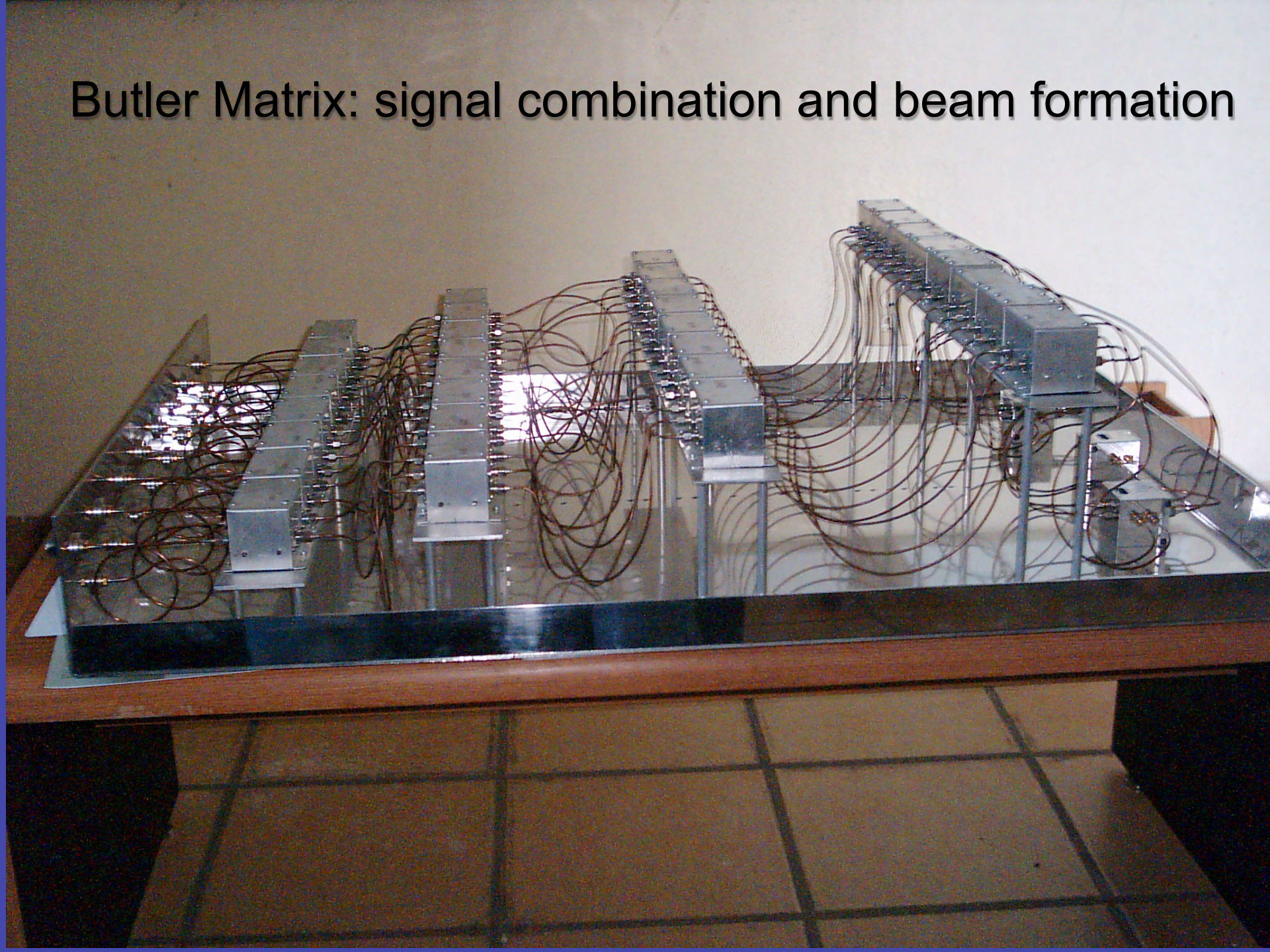


radiation pattern: 1 east-west row of 64 dipoles

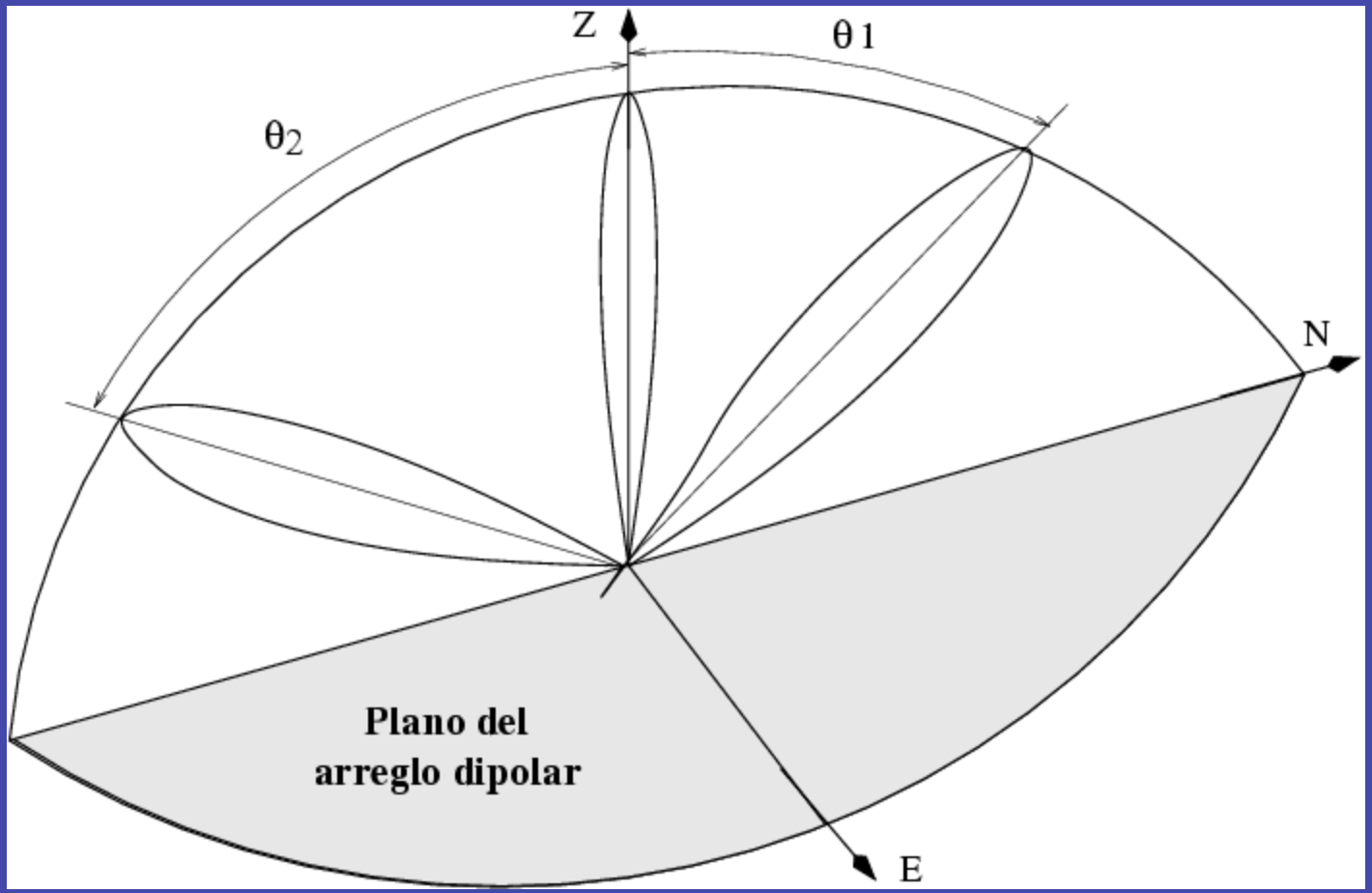




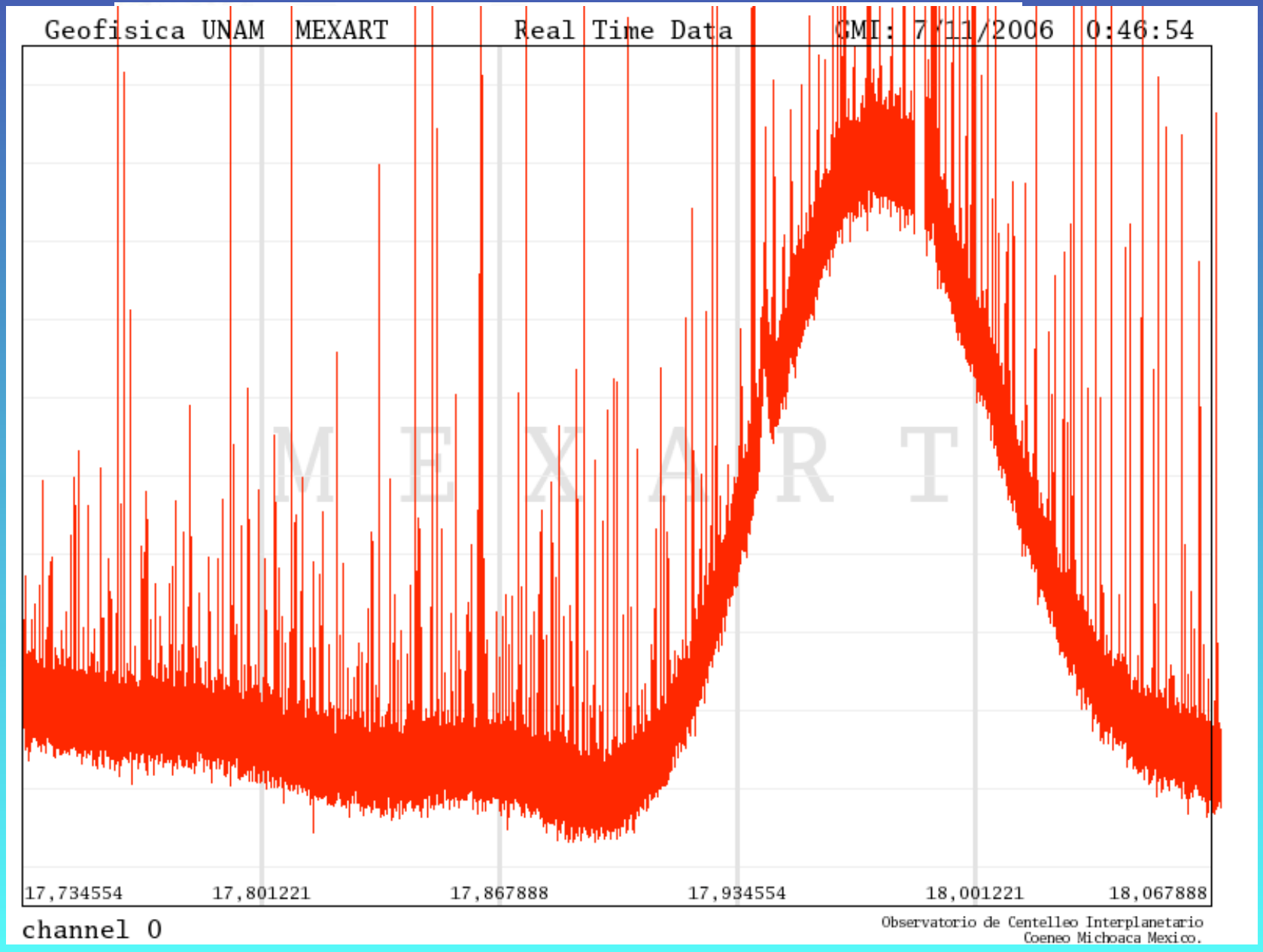
Butler Matrix: signal combination and beam formation

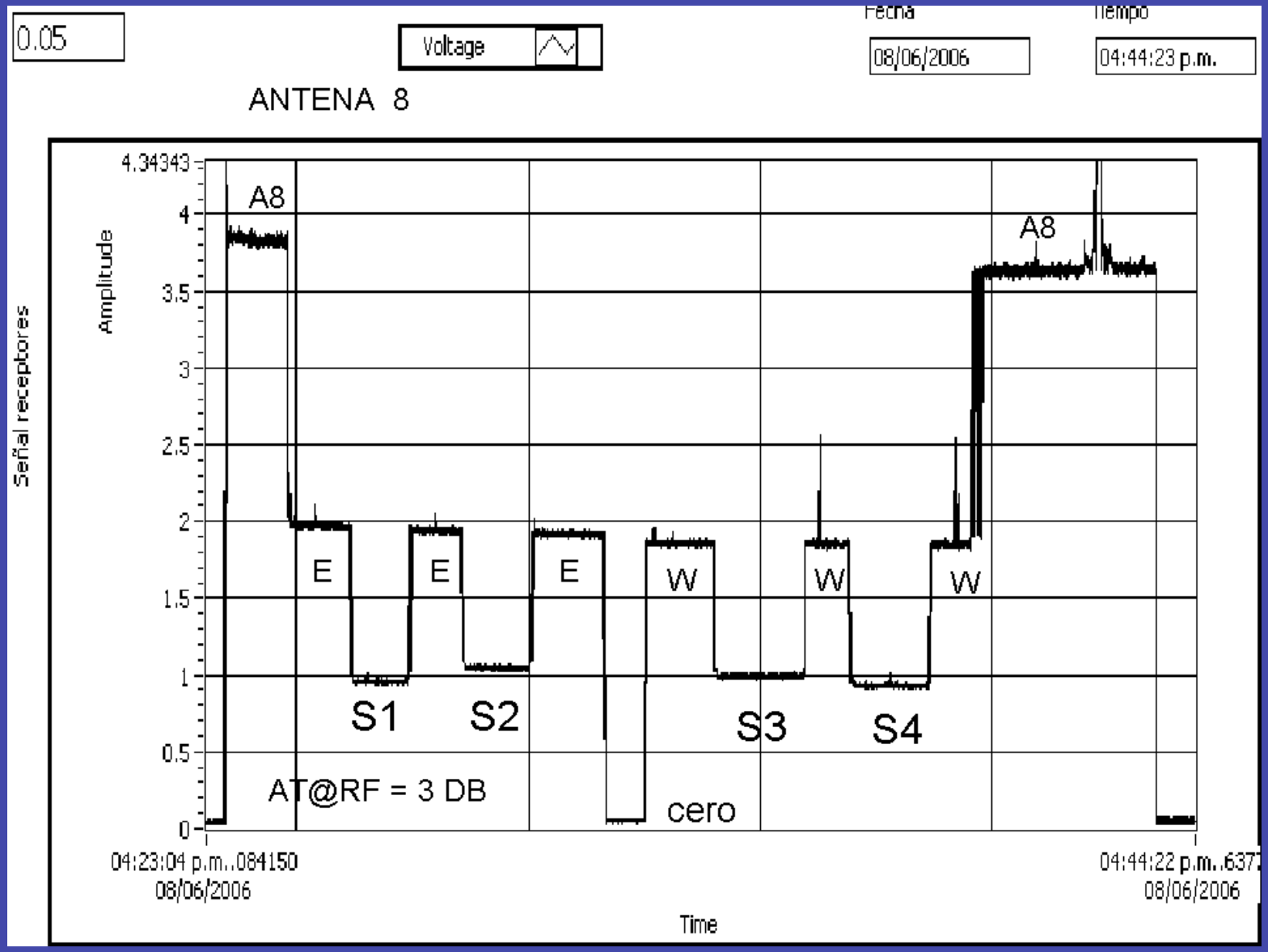


LATITUDINAL BEAM FORMATION



http://132.248.208.38:8080/mxonline/tiemporeal/index.jsp




0.05
Voltage
Fecha
08/06/2006
Tiempo
04:44:23 p.m.
ANTENA 8
Señal receptores
Amplitude
4.34343
4
3.5
3
2.5
2
1.5
1
0.5
0
A8
A8
E
E
E
W
W
W
S1
S2
S3
S4
AT@RF = 3 DB
cero
04:23:04 p.m..084150
08/06/2006
04:44:22 p.m..6377
08/06/2006
Time

Expected Sensitivity @ Different Array Configurations

Configuration	Sensitivity K/Jy	ΔSrms, Jy B=4MHz	Δ Srms, Jy B=2MHz
1 section (16 dipoles)	0.0051	465	660
1 row (64 dipoles)	0.0204	116	165
2 rows (128 dipoles)	0.0408	58.2	82.5
4 rows (256 dipoles)	0.0817	29.1	41.3
16 rows (1024 dipoles)	0.3267	7.27	10.3
Full array (4096 dipoles)	1.3066	1.82	2.58

$T_{r\text{-}c}$=275K, $T_{r\text{-}o}$=360K

T_{sys}= 540 K

T_{sky}(hr)=200K,

http://www.agu.org/meetings/ja07/

JOINT ASSEMBLY
Acapulco, Mexico
22-25 May, 2007

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- Asociación Latinoamericana de Geofísica Espacial (**ALAGE**)
- Associacion Latinoamericana de Ciencias de la Tierra (**ALACIT**)
- Brazilian Society of Geophysics (**SBGF**)
- Centro Regional de Sismologia para America del Sur (**CERESIS**)
- Colegio de Ingenieros Geofisicos de Mexico (**CIGMEX**)
- Geochemical Society of America (**GS**)
- Mineralogical Society of America (**MSA**)
- Society of Exploration Geophysicists (**SEG**)
- Union Geofisica Mexicana (**UMG**)
- Union Mexicana para Estudios del Cuaternario (**UMEC**)

http://www.alage.org/colage.html