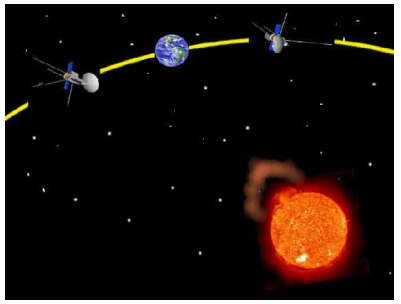
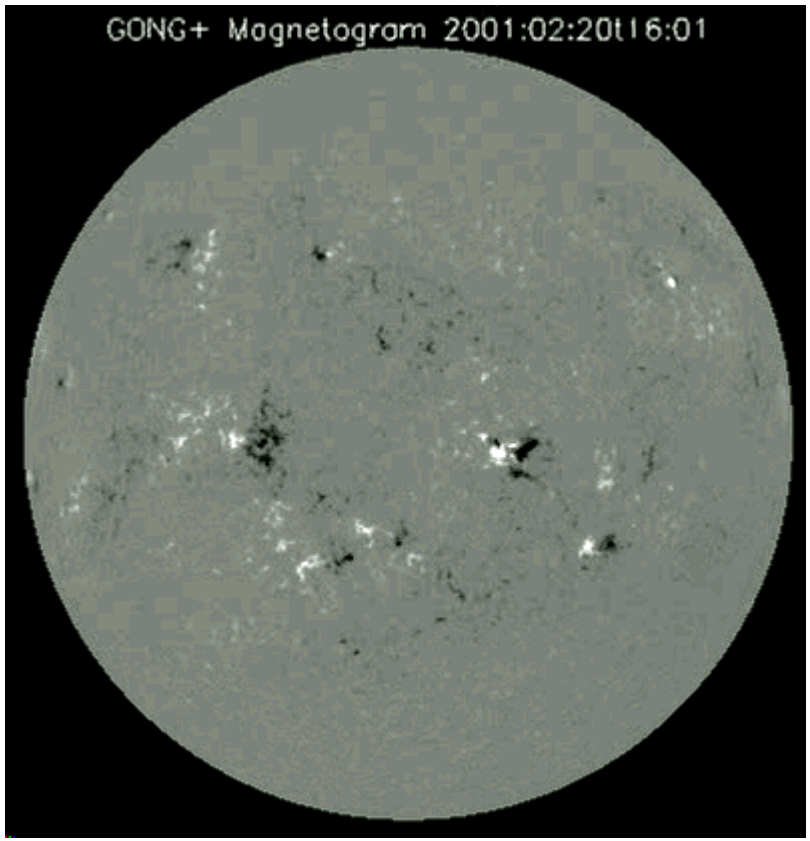
GONG & STEREO

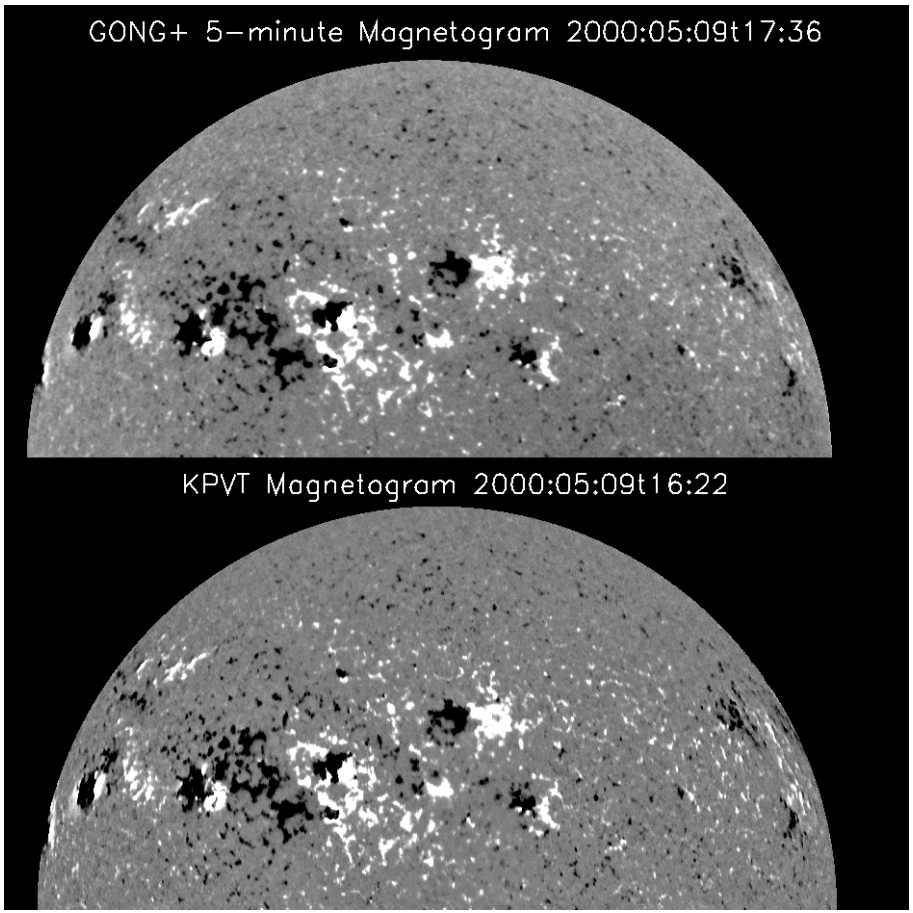


- **What is this helioseismologist doing here??**
  - "We all study phenomena that are driven or strongly influenced by magnetic activity."
  - GONG produces continuous magnetograms
  - Sub-surface and farside solar structure
- **What is GONG?**
  - Six-station ground-based helioseismic network
  - NSO "Flagship", along with Kitt Peak and Sac Peak
- **Sub-surface to heliosphere**

GONG Magnetogram



Kitt Peak Vacuum Telescope



GONG Magnetograms

Resolution

Pixel size = 2.5” [800^2 image]

Typical ≈ 8”

Cadence

60-second sample rate [30 & 16 available]

≈ 90% duty cycle

Sensitivity

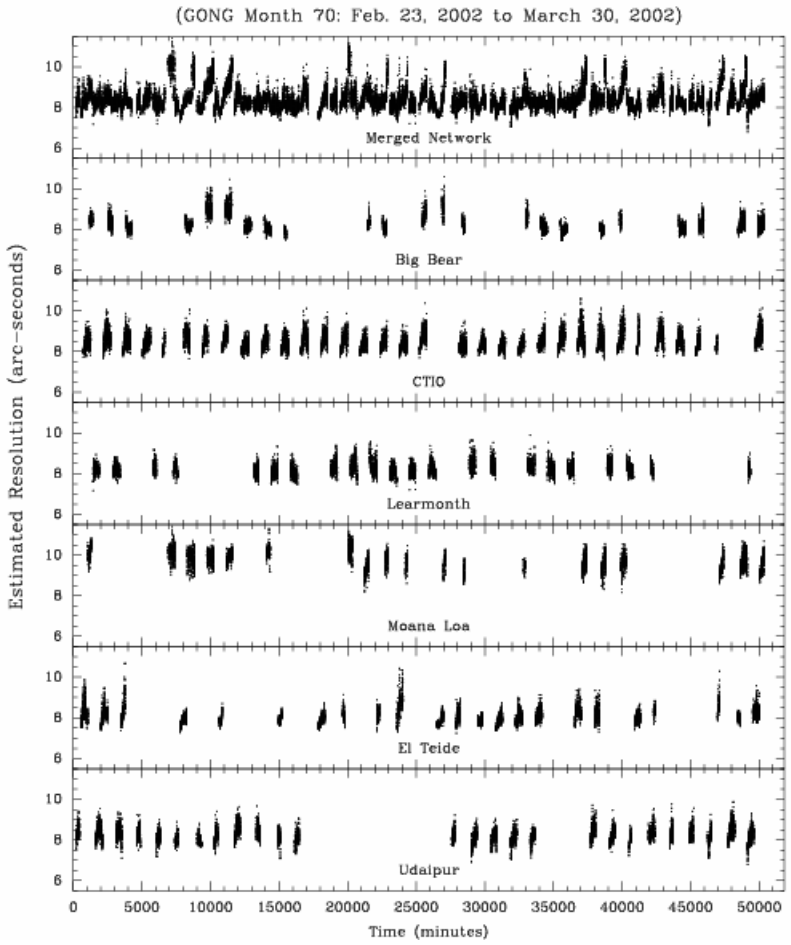
≈ 3 gauss in one minute

Precision

≈ 1 gauss

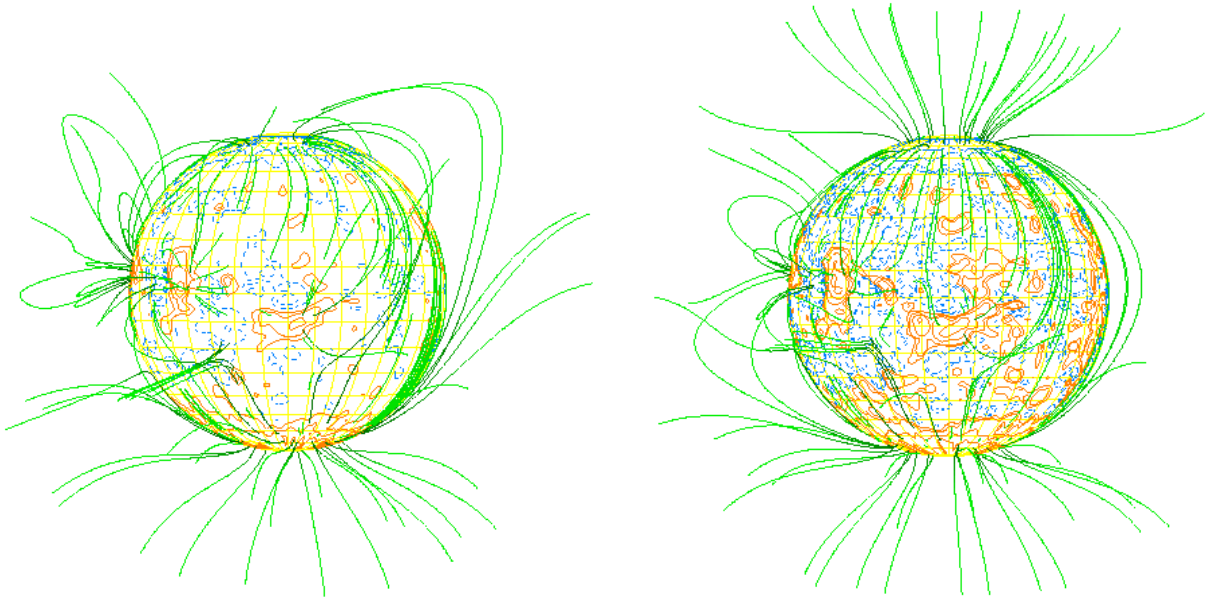
≈ .1 gauss after correction [goal]

Spatial Resolution



Courtesy Cliff Toner

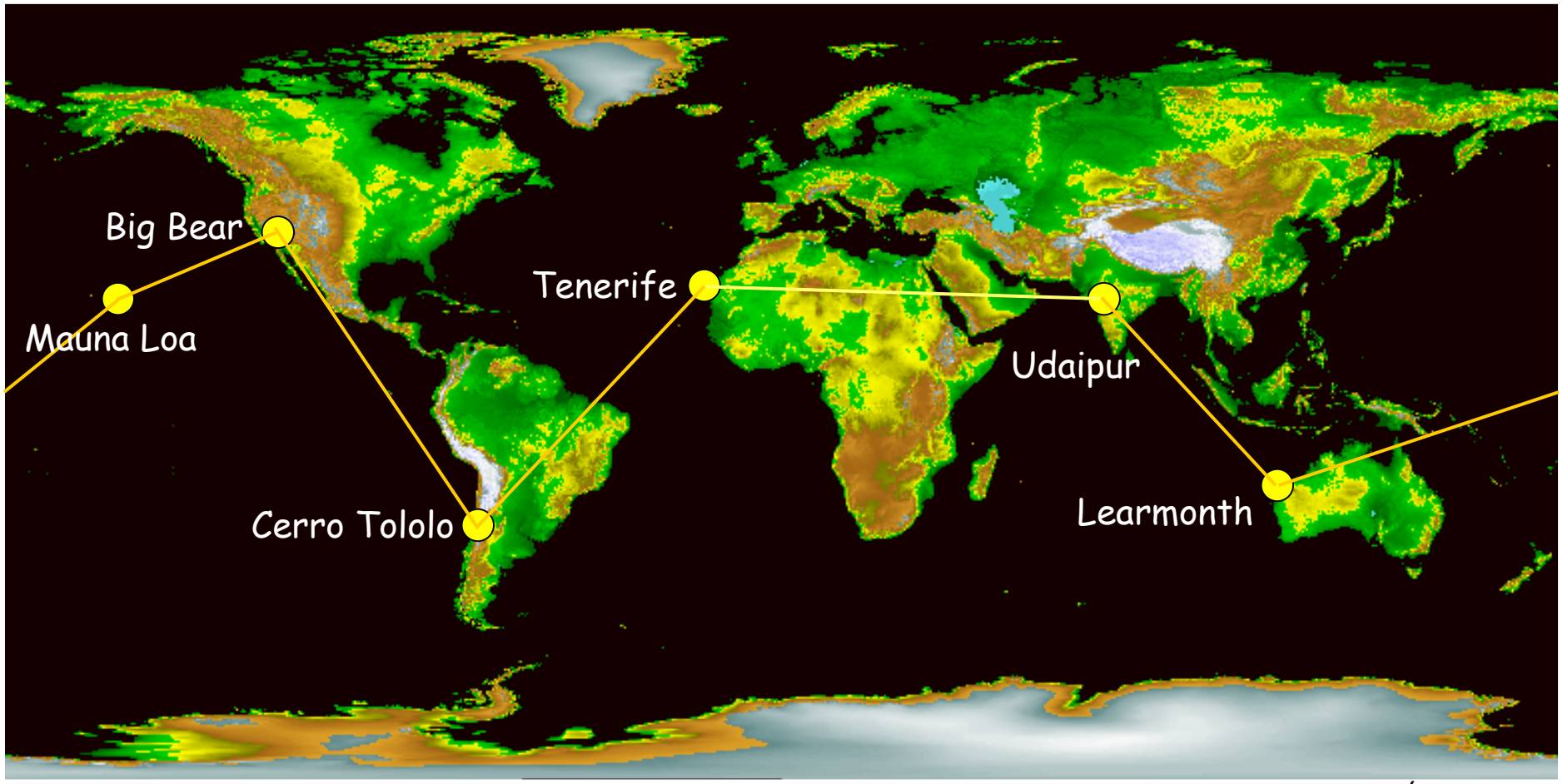
Magnetic Field Zero Point



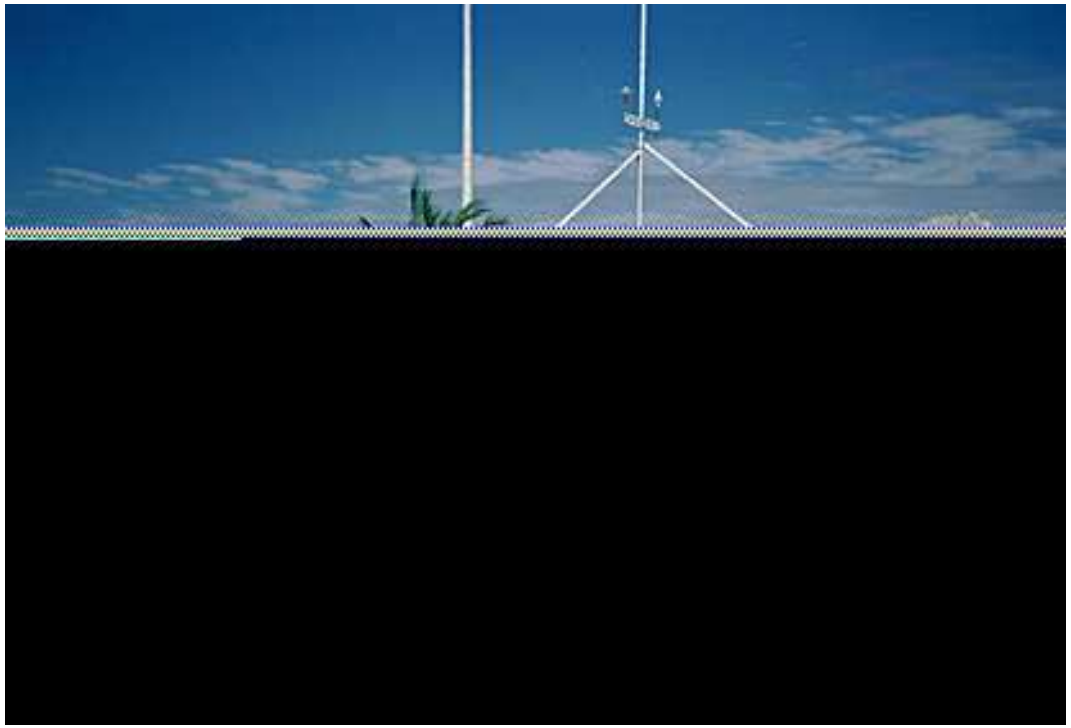
Differences in the potential magnetic field lines extrapolated above the solar surface with and without a 3 gauss zero error

Courtesy J. Harvey & T. Sakurai

The Network


Big Bear
Mauna Loa
Tenerife
Udaipur
Cerro Tololo
Learmonth

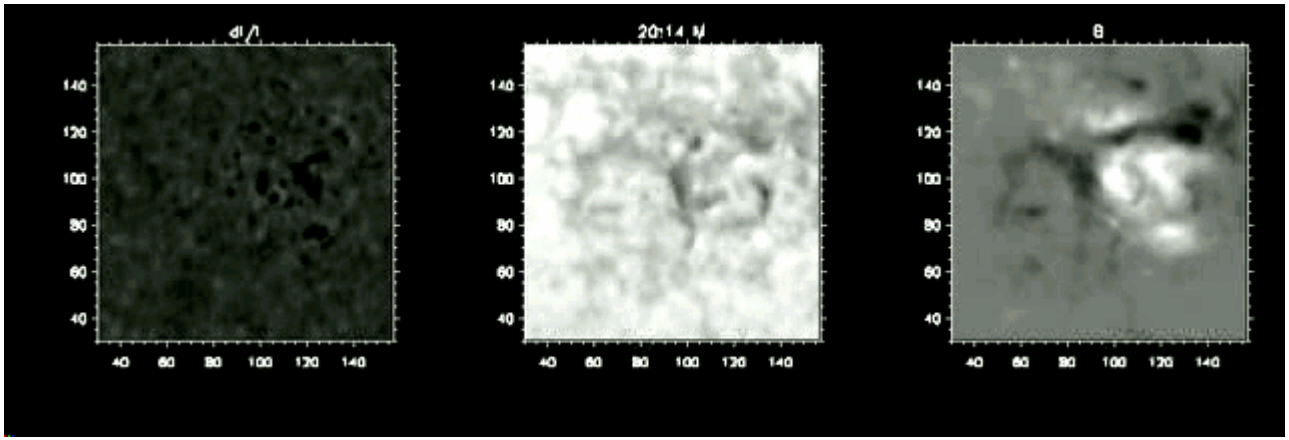
GONG at Learmonth, Western Australia



The GONG Instrument

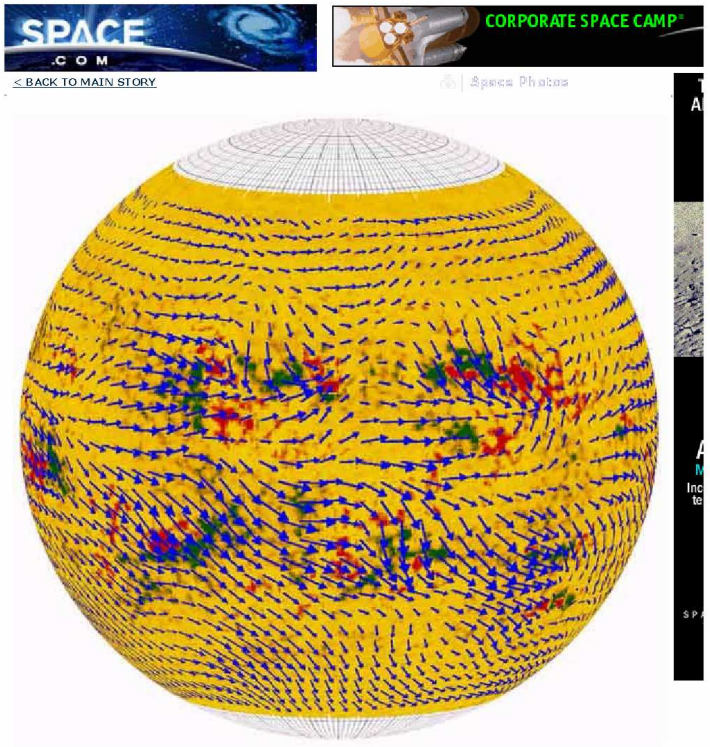
- 6768 Å Ni I
- 10 cm objective
- Autonomous operations
- 100 Gb per week [DLT]
- Merged in Tucson ≈2 Months
- Upgraded from 256^2 to 1024^2 in 2001

X10 flare in AR 10486



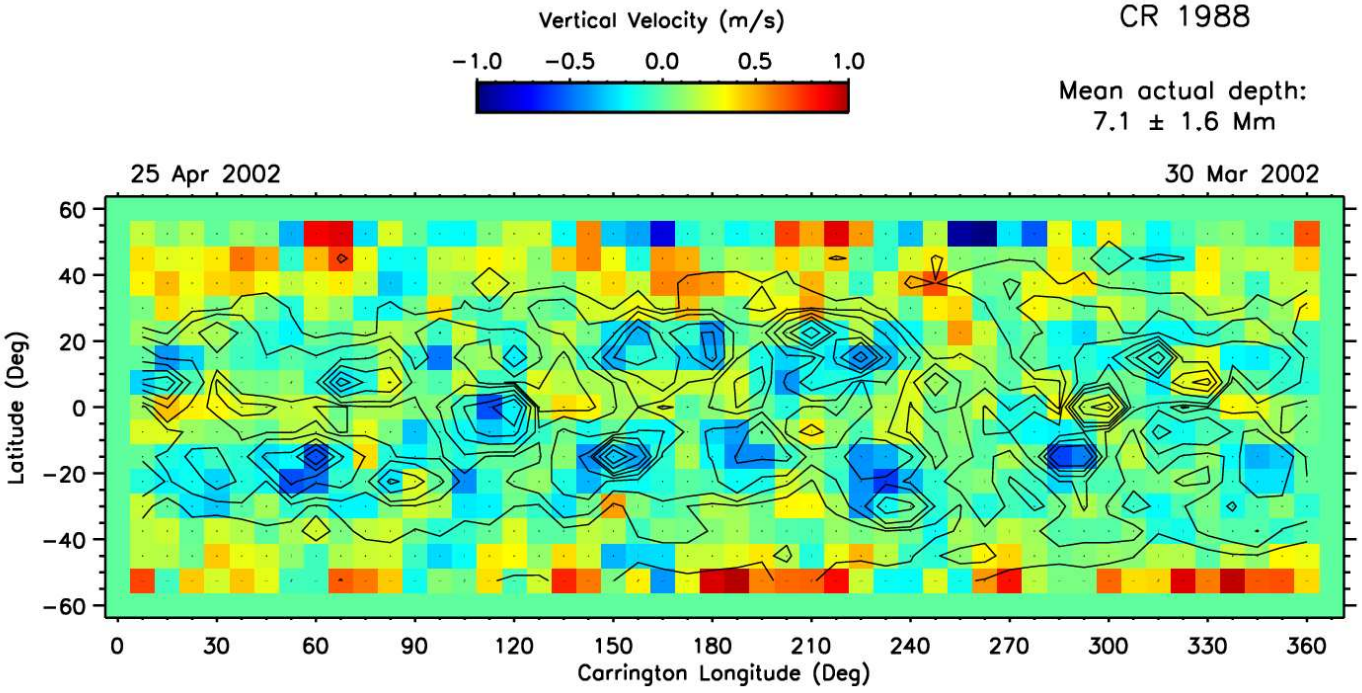
Courtesy Rachel Howe

Solar Subsurface Weather



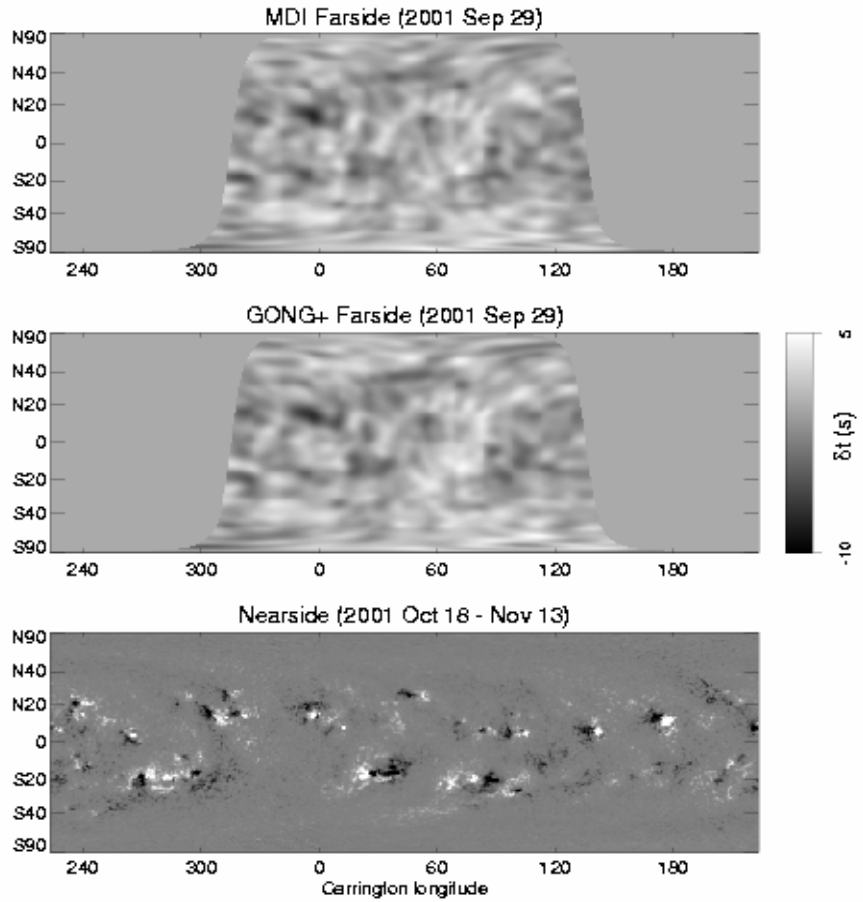
Courtesy Deborah Haber, Brad Hindman, Rick Bogart, Juri Toomre

Vertical Velocity from GONG



Rudi Komm,Thierry Corbard, Bernard Durney, Irene Gonzalez Hernandez, Frank Hill, Rachel Howe, & Cliff Toner

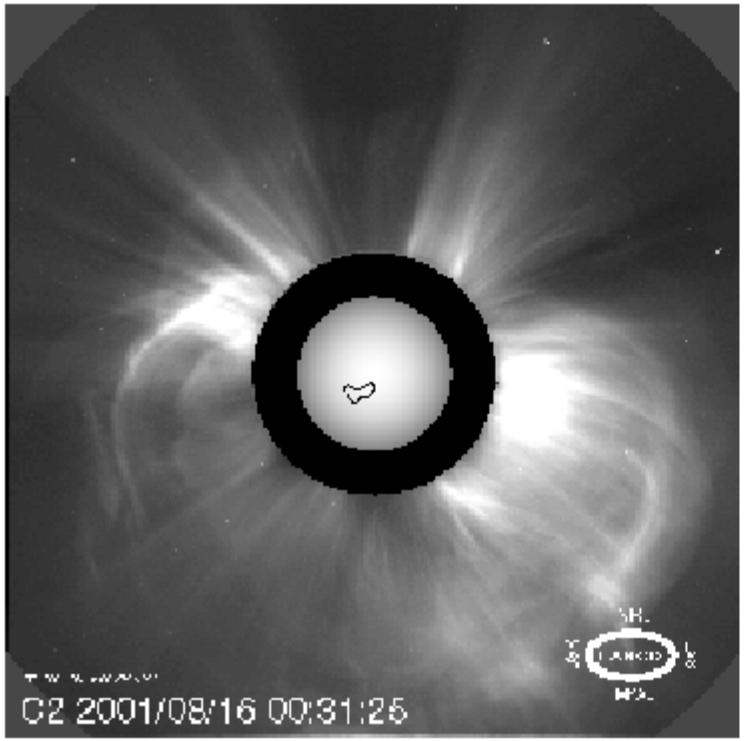
Farside Image Comparison



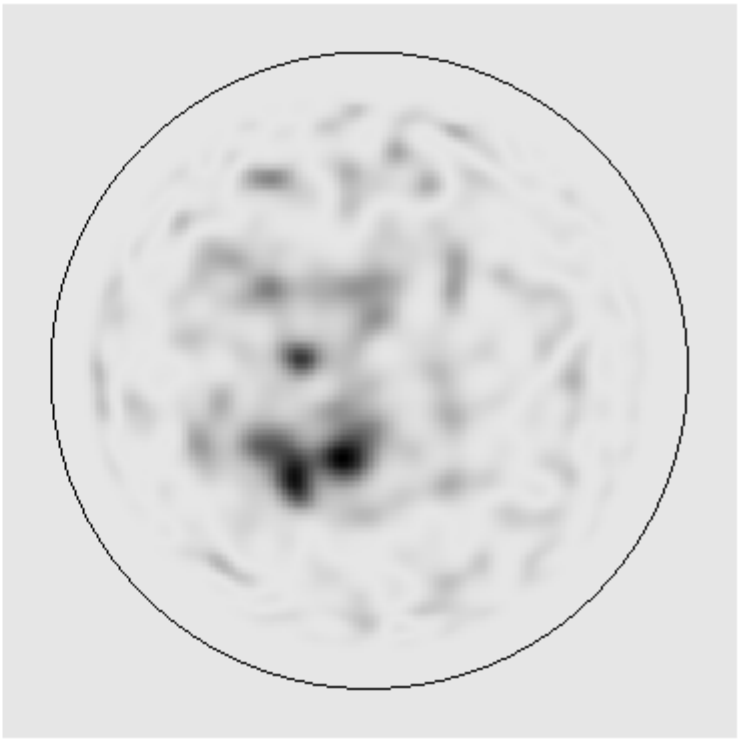
Courtesy of Doug Braun and Charlie Lindsey

A Farside CME & its Source

a) LASCO



b) Farside

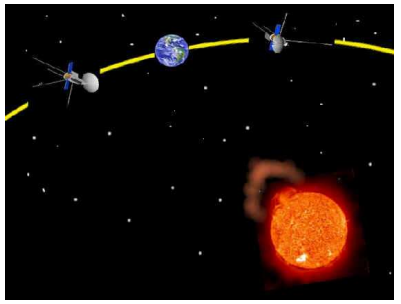


Courtesy of Phil Scherrer, Doug Braun and Charlie Lindsey

SOLIS Core Data Products

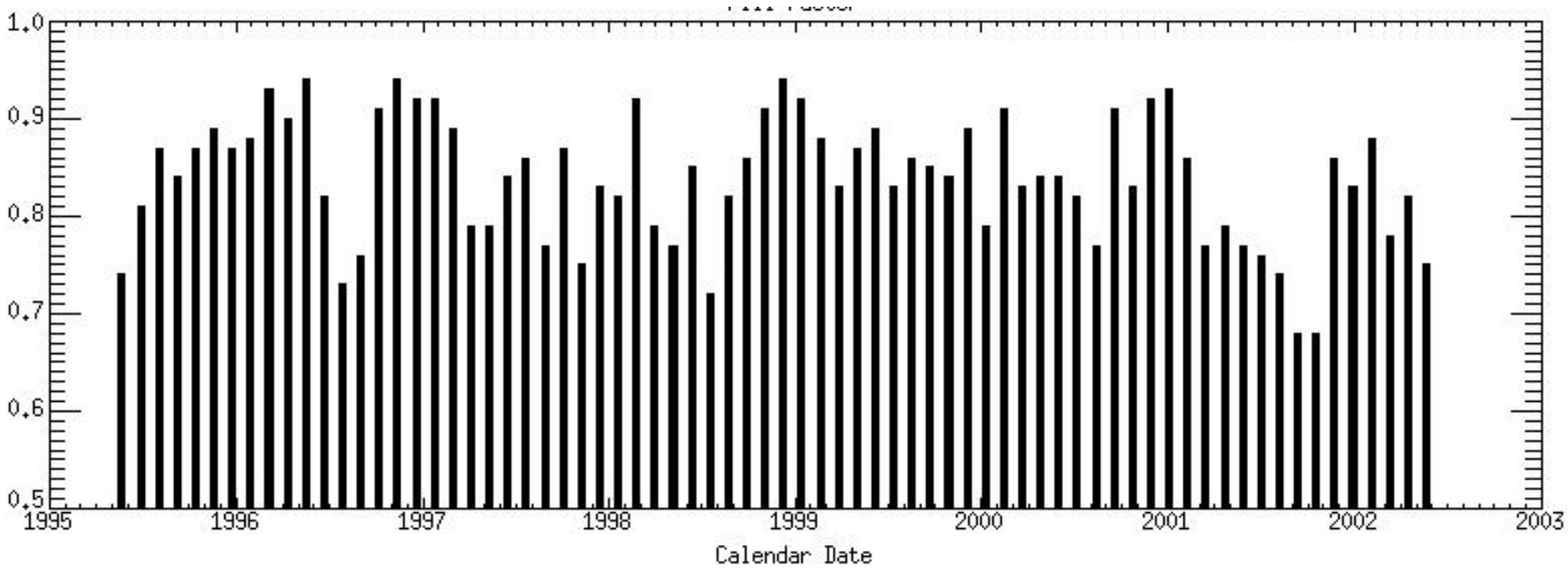
Data Product	Frequency
Full-disk vector magnetogram in Fe I 630.15, 630.25 nm	3 per day
Full-disk line-of-sight magnetogram in Ca II 854.2 nm	3 per day
Full-disk intensity in He I 1083.0 nm	3 per day
Full-disk deep line-of-sight magnetogram at 630.2 nm	1 per day
H□ core and wing intensity, velocity	1 per minute
Helium 1083 nm core intensity and velocity	1 per minute
Continuum (white light)	1 per 10 minute
Ca II K core and wing chromospheric intensities	1 per 3 hours
Oscillation-free photospheric velocity	1 per day
Various sun-as-a-star spectral lines	2 series per day

GONG & STEREO



- **Continuous Magnetograms**
  - To support your science
- **Sub-surface flows**
  - Sources of magnetic variability

Fill Factor

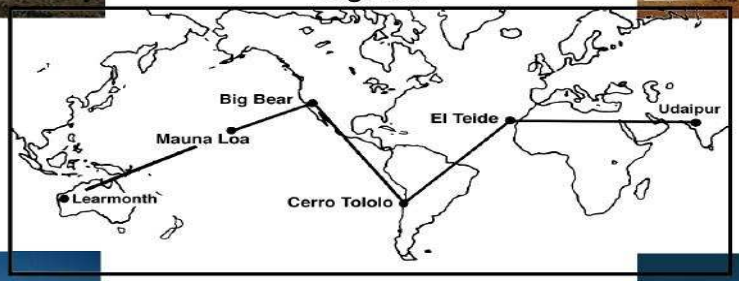

1.0
0.9
0.8
0.7
0.6
0.5
1995
1996
1997
1998
1999
2000
2001
2002
2003
Calendar Date

The GONG Network

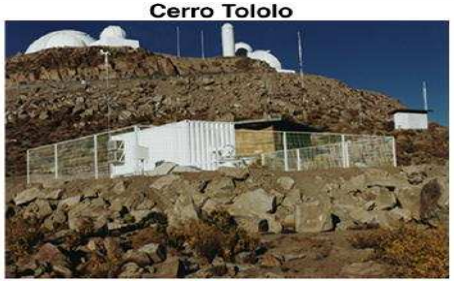
Mauna Loa

Big Bear

Udaipur



Learmonth


Cerro Tololo

El Teide

- Our noise is your signal
- Understand the causes and mechanisms triggering coronal mass ejections;
- •
- Characterize the propagation of coronal mass ejections through the heliosphere;
- •
- Discover the mechanisms and sites of energetic particle acceleration in the low corona and the interplanetary medium; and
- •