Helioseismic Holography with GONG++

Irene González Hernández1, Doug Braun2, John Bolding1, F. Hill1, John Leibacher1,3, Charles Lindsey2, Phil Scherrer4, and Cliff Toner1

1 National Solar Observatory, Tucson, Arizona 2 NorthWest Research Associates, Boulder, Colorado 3 Institut d’Astrophysique Spatiale, Orsay, France 4 Stanford University, Stanford, California

The GONG++ Program provides daily helioseismic images of the farside of the Sun online at http://gong.nso.edu/data/farside using low resolution images that are transferred from each of the sites in near-real-time. Here we show the passage of AR 10808 through the farside before it appeared on the front side on September 7 2005. We also show the first attempts to do some statistics. More than four years of GONG++ high resolution archived data give us the opportunity to create long series of maps in order to calibrate the signal into a magnetic index.

Seismic signature of AR 10808 as it crossed the farside southern solar hemisphere from 2005 September 1 to September 7 when it emerged at the east limb of the Sun and produced the fifth most intense flare on record. The maps where calculated using GONG near-real-time data. For similar results from MDI data visit http://soi.stanford.edu/data/farside

The HMI instrument onboard SDO will provide us with unprecedented high resolution helioseismology data of exceptional quality with full coverage to the limb. This will provide a new opportunity for helioseismic holography to produce lower-noise farside maps.

First steps towards calibrating the farside holographic signal

The Solar X-ray Imager onboard GOES captured the huge X-17 flare produced by AR 10808 on September 7, coinciding with the position of the sunspot as shown in the farside maps from the previous days. (Image from the Virtual Solar Observatory; cart ID: VSO-NSO-051017-068)

This work utilizes data obtained by the Global Oscillation Network Group (GONG++) Program and the SOI/MDI instrument on SoHO. GONG++ is managed by the National Solar Observatory, which is operated by AURA, Inc. under a cooperative agreement with the National Science Foundation. The data were acquired by instruments operated by the Big Bear Solar Observatory, High Altitude Observatory, Learmonth Solar Observatory, Udaipur Solar Observatory, Instituto de Astrofísica de Canarias, and Cerro Tololo Interamerican Observatory. SoHO is a project of international collaboration between ESA and NASA. This work has been supported by the NASA Living with a Star – Targeted Research and Technology program.