

Assessment of Acoustic Holography Parameters from the Solar Far Side as a Proxy of Magnetic Activity on the Sun's Near Side

This work presents a detailed analysis of the correlation between acoustic holography parameters obtained from the far side of the Sun and the subsequent appearance of active regions on the visible side of our star. Using acoustic holography techniques Gonzalez-Hernandez, Irene et al. "Far-side Helioseismic Holography: Calibrating The Signature Of Active Regions."(2007)., optimal parameters were identified in the acoustic maps that can characterize regions with a high probability of significant magnetic activity and that are about to transit to the visible side of the Sun. Gonzalez-Hernandez et al., "Farside helioseismic holography: recent advances".

Through the shift measurement of the 6173 Å Fe I spectral line, the HMI instrument on board the Solar Dynamic Observatory (SDO) produces solar Dopplergrams. Using this data and applying helioseismic holography techniques, a team at NorthWest Research Associates routinely constructs maps of the far side of the Sun Far-side's AR list, where we analyze the predicted arrival date of each far-side's active region at the east limb. On the other hand, using the solar active regions summary provided by the National Oceanic and Atmospheric Administration (NOAA) Solar AR summary we developed a list of active regions transiting to the Sun's near side (via its eastern limb) for each week during the last solar cycle and generate histograms. We rigorously assessed the correlation between the acoustic parameters from the far side and the histograms of the active regions observed on the visible side. The implications of the correlations found are discussed, exploring the potential of using acoustic maps from the far side to predict solar magnetic activity on the visible side.

This study provides a deeper understanding of solar dynamics and suggests a potentially valuable tool for long-term predictions of solar activity (from days to weeks), benefiting the scientific community in monitoring and studying space weather.

Nivel de formación

Pregrado

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