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Estimating Formation Heights of AIA Channels in Sunspot Umbrae Using 3-Min Magneto-acoustic Waves

Multi-wavelength data from the Solar Dynamics Observatory (SDO) provide valuable insights into solar physics. This study estimates the formation heights of chromospheric and low-corona Atmospheric Imaging Assembly (AIA) channels over sunspot umbrae during quiet periods across 20 active regions. By utilizing 3-minute slow magnetoacoustic waves (MAWs) and applying a cross-correlation technique, the most frequent time lags between channel pairs are measured. These time lags, combined with local sound speed, allow estimation of the formation heights. Median formation heights for AIA 1600 Å, 1700 Å, 304 Å, 131 Å, and 171 Å channels range from 356 km to 1470 km, with UV channels showing stable heights, while coronal channels exhibit more variability. This analysis enhances understanding of solar atmospheric structures during quiescent sunspot conditions.

Contribution Type

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Theme

Solar Magnetism in High-Resolution

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