Geophysical Research Abstracts
Vol. 15, EGU2013-383, 2013
EGU General Assembly 2013

Mode conversion and transmission of waves in quiet solar regions

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We investigate the interaction between acoustic oscillations and the fine-scale structures found at the chromospheric network boundaries that form the magnetic canopy. We use high precision photospheric magnetograms obtained by SOT/SP on-board the Hinode satellite and time series of high spatial resolution filtergrams in five wavelengths along the Hα line profile taken by the Dutch Open Telescope. We extrapolate the photospheric magnetic field using the current-free hypothesis to calculate the vector of the magnetic field and reconstruct the magnetic configuration of the chromosphere. Assuming the VAL-C atmospheric model we are able to estimate the height of formation of the magnetic canopy. We use the wavelet analysis on the Ha observations and obtain the 2-D distribution of the oscillatory power at different atmospheric heights. We then compare the obtained distribution of power with the one predicted by the 2-D model of Schunker & Cally at various magnetic field inclination angles.

Our results show that the magnetic shadow and power halo phenomena observed in network regions may be attributed to the conversion/transmission of magneto-acoustic waves on the magnetic canopy. The amount of transmission/conversion depends on the attack angle, i.e. the angle between the wave vector and magnetic field direction. Waves which experience mode conversion and/or transmission can propagate to greater atmospheric heights while some fraction of their energy escapes into the solar wind.