Oscillatory Response of the 3-D Solar Atmosphere to Photospheric Motions: Are there Alfven Waves (Invited Talk)

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There have recently been significant claims of Alfvén wave observation by means of high spatial and time resolution techniques offered by ground-based (e.g., ROSA, IBIS) and space-based (SOHO, TRACE, Hinode, etc) instrumentation in the solar chromosphere and corona. First, we discuss the pros and cons of these observations and address the key issues of the debate surrounding the detection of Alfvén waves. Next, we demonstrate how the observational properties of Alfvén waves in magnetic flux tubes can be exploited for the purposes of solar magneto-seismology, i.e., for the construction of an accurate magnetic mapping in the chromosphere and possibly in the corona. Through a few case studies specific, very high resolution Doppler observations interpreted as Alfvén waves will be discussed and a first magnetic map constructed by means of the magneto-seismology tool will be revealed. Finally, within the framework of 3D numerical modelling we will address the wave leakage, wave energy linking and dynamics governed by photospheric motion within magnetic flux tubes spanning into the corona, that are believed to be the building blocks of the solar atmosphere.

Keywords: Solar MHD waves, magneto-seismology, Alfvén waves, kink waves, longitudinal waves, numerical modelling.