Abstract:

Acoustic and magnetoacoustic waves play an important role in the chromospheric heating, exhibiting the capability of depositing a main part of their energy in the chromosphere. To study the heating of solar chromospheric magnetic and non-magnetic regions by acoustic and magnetoacoustic waves, the deposited acoustic-energy flux, derived from observations of strong chromospheric lines (H-alpha, H-beta, Ca II 854.2 nm, and MgII k&h), is compared with the total integrated radiative losses. A set of quiet-Sun and weak-plage regions was observed with the Interface Region Imaging Spectrograph (IRIS), Vacuum Tower Telescope (VTT), Dunn Solar Telescope (DST) and Goode Solar Telescope (GST). The deposited acoustic-energy flux is derived from Doppler velocities observed at two different reference heights corresponding to the middle and upper chromosphere. A set of scaled non-LTE 1D hydrostatic semi-empirical models, obtained by fitting synthetic to observed line profiles, is applied to compute the radiative losses. In the quiet chromosphere, the deposited acoustic flux is sufficient to balance the radiative losses and maintain the semi-empirical temperatures in layers between the two reference heights. In the magnetic active-region chromosphere, the comparison shows that the contribution of magnetoacoustic energy flux to the radiative losses is only 10–30 %, so that the contribution is too small to balance the radiative losses in the chromosphere, which has to be heated by other mechanisms.