M17a The relation between the Ca brightening and oscillation in the chromosphere

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Ca bright grains are short-lived and repetitive brightenings found in the internetwork of quiet Sun. Many observations suggest that they are related to 3-min oscillation of the chromosphere, and Carlsson & Stein (1997) demonstrated that they were produced by acoustic shocks propagating in the chromosphere. Although they reproduced the evolution of Ca spectra, spectroscopy other than Ca spectral line is required to determine the velocity evolution in the chromosphere.

We carried out sit-and-stare observation of the quiet region at disk center in August 2004. Hα, Ca II H, and Fe I spectral lines were simultaneously obtained with Horizontal Spectrometer of Domeless Solar Telescope (DST) at Hida Observatory. Detailed analysis of the spectra shows that the intensity enhancement in the Ca H was well correlated with large velocity oscillation in the Hα. At the same time, velocity derived from Fe I also indicated increased velocity in the photosphere. In addition to that, we also observed Hβ instead of the Hα and inferred similar characteristics except that the velocity amplitude was smaller in Hβ than in Hα.

These results suggest that Ca brightening in the chromosphere are caused by propagating shock in the chromosphere, which is likely induced by photospheric motion. We discuss the relation between the Ca brightening and oscillation in the chromosphere.