Dual-Line Spectral Imaging of the Chromosphere

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Abstract Hα filtergrams are notoriously difficult to interpret, "beautiful to view but not fit for analysis." We try to remedy this by using the IBIS bi-dimensional spectrometer at the Dunn Solar Telescope at NSO/Sacramento Peak to compare the quiet-sun chromosphere observed in Hα to what is observed simultaneously in Ca II 854.2 nm, sampling both lines with high angular and spectral resolution and extended coverage of space, time, and wavelength. Per (x, y, t) pixel we measured the intensity and Dopplershift of the minimum of each line's profile at that pixel, as well as the width of their inner chromospheric cores. A paper submitted to A&A (December 2008) compares these measurements in detail.

The figure below shows 1-h averages. The time averaging reduces the large modulation by repetitive 3-min chromospheric shocks seen everywhere in both lines. The figure shows remarkable dissimilarity between the time-averaged intensity scenes in the two lines and remarkable agreement between Ca II 854.2 nm intensity and Hα core width. The latter is a good indicator of chromospheric temperature through the low mass of the hydrogen atom, and so a principal Hα measure.

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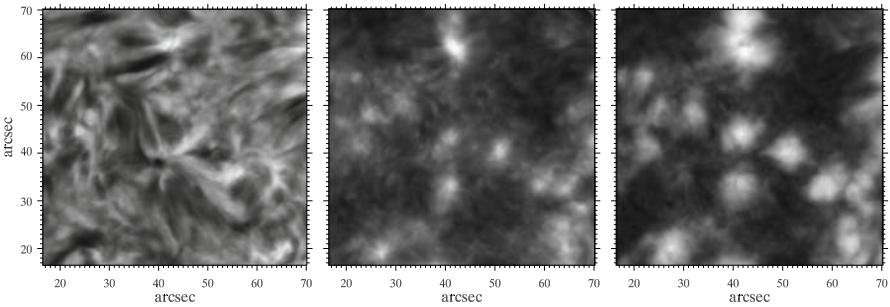

Fig. 1 Time-averaged IBIS measurements per pixel. *Left*: Hα profile-minimum intensity. *Middle*: Ca II 854.2 nm profile-minimum intensity. *Right*: Hα core width