

Mg II 280nm diagnostics

Mats Carlsson

Institute of Theoretical Astrophysics, University of Oslo
Solar-C meeting, Takayama, November 11 2013

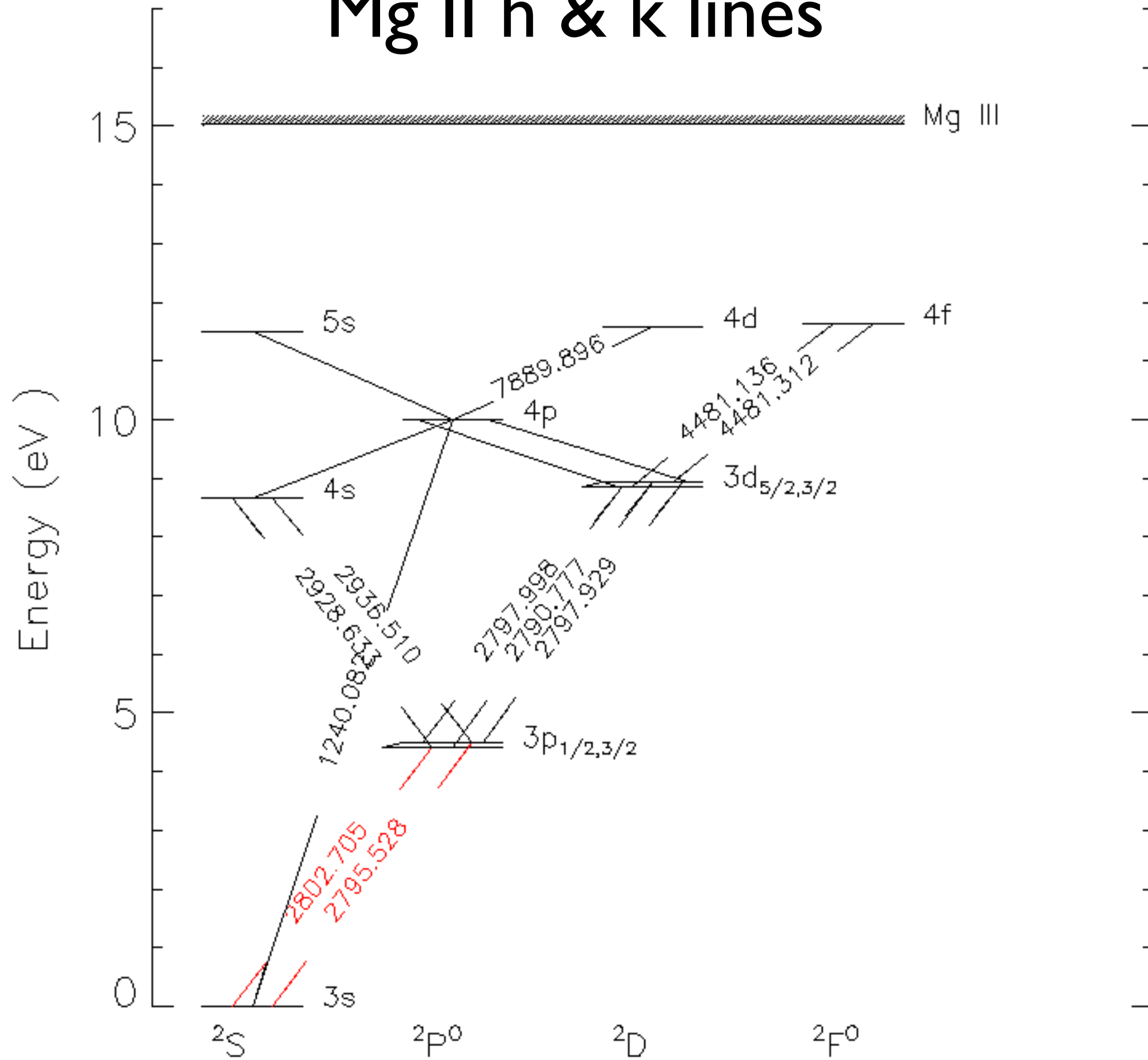
Recent papers (2013)

Leenaarts, Pereira, Carlsson, Uitenbroek, De Pontieu (in various permutations):

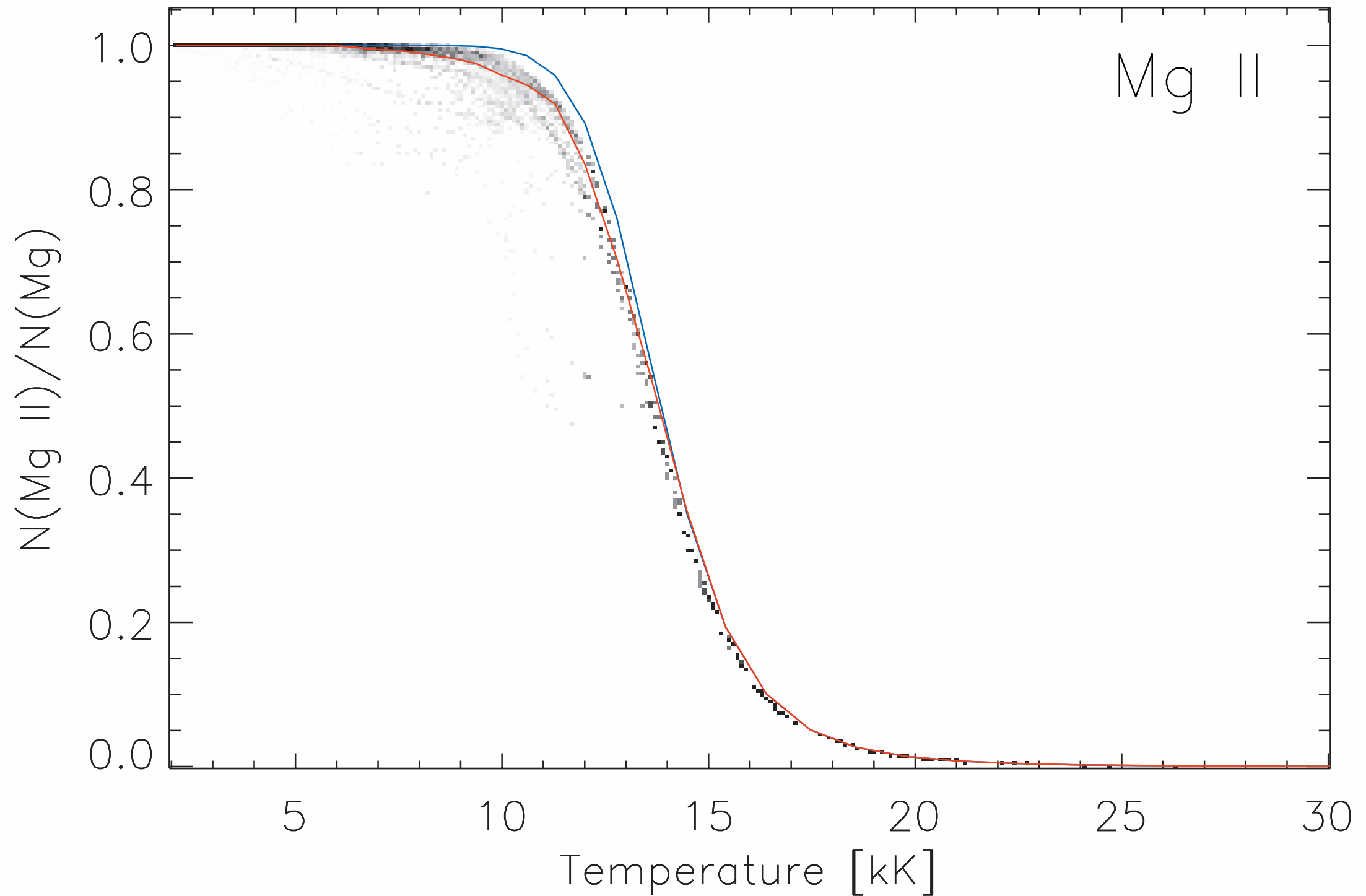
The Formation of IRIS Diagnostics:

- I. A Quintessential Model Atom of Mg II and General Formation Properties of the Mg II h&k Lines
- II. The Formation of the Mg II h&k Lines in the Solar Atmosphere
- III. NUV Spectra and Images

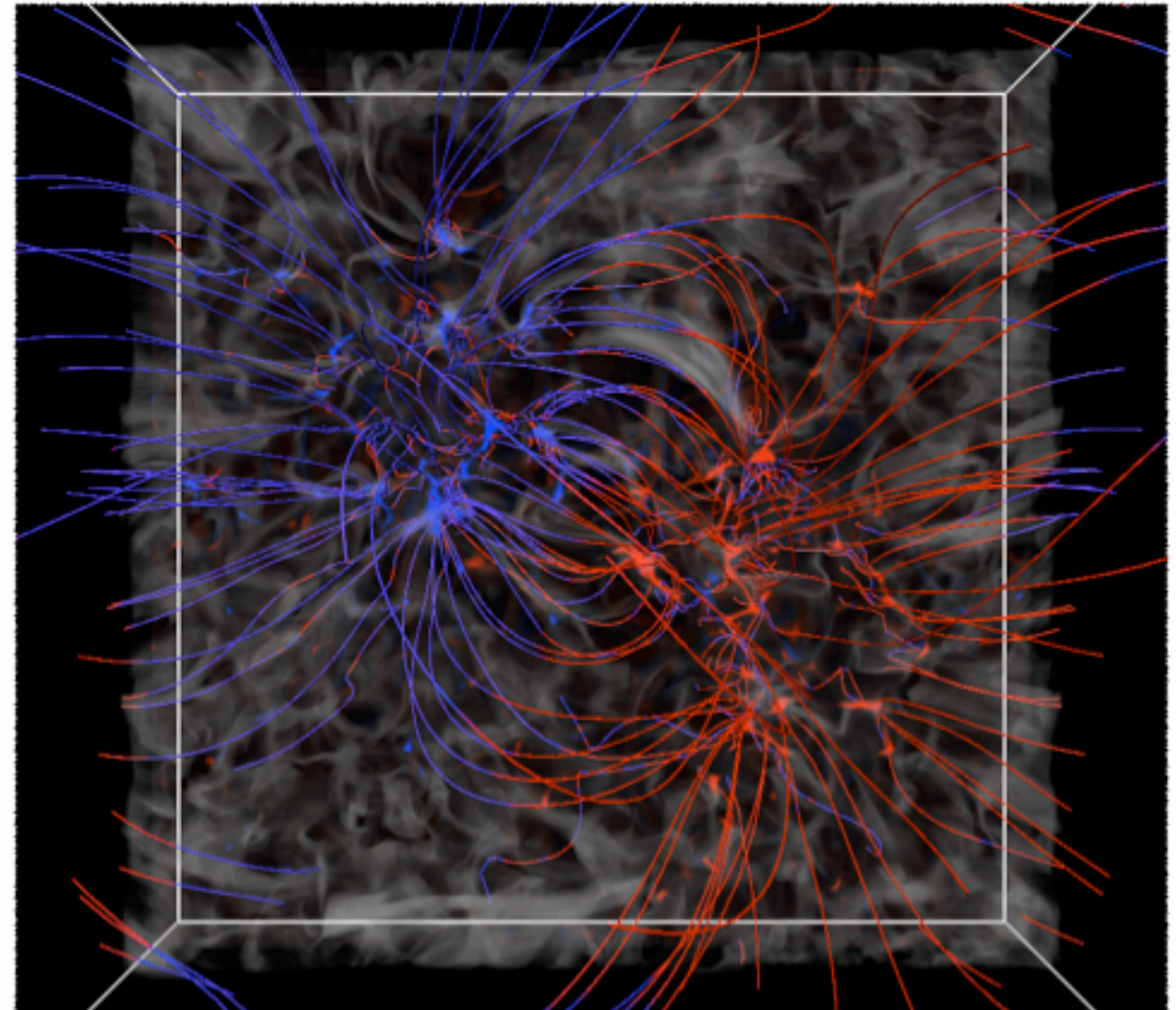
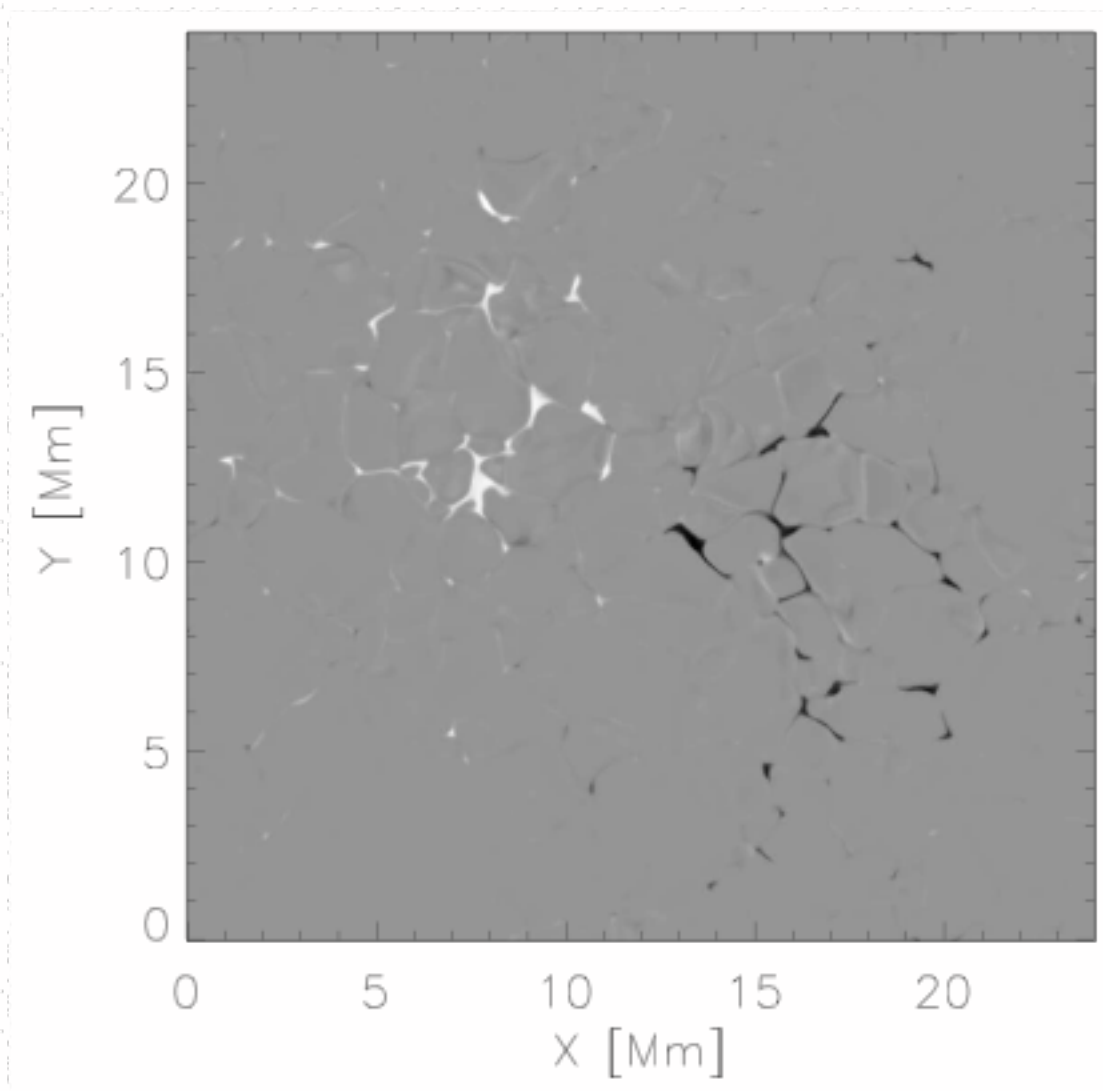
Mg II h & k lines



Mg has 18 times the abundance of Ca
formed 3 scale-heights higher up

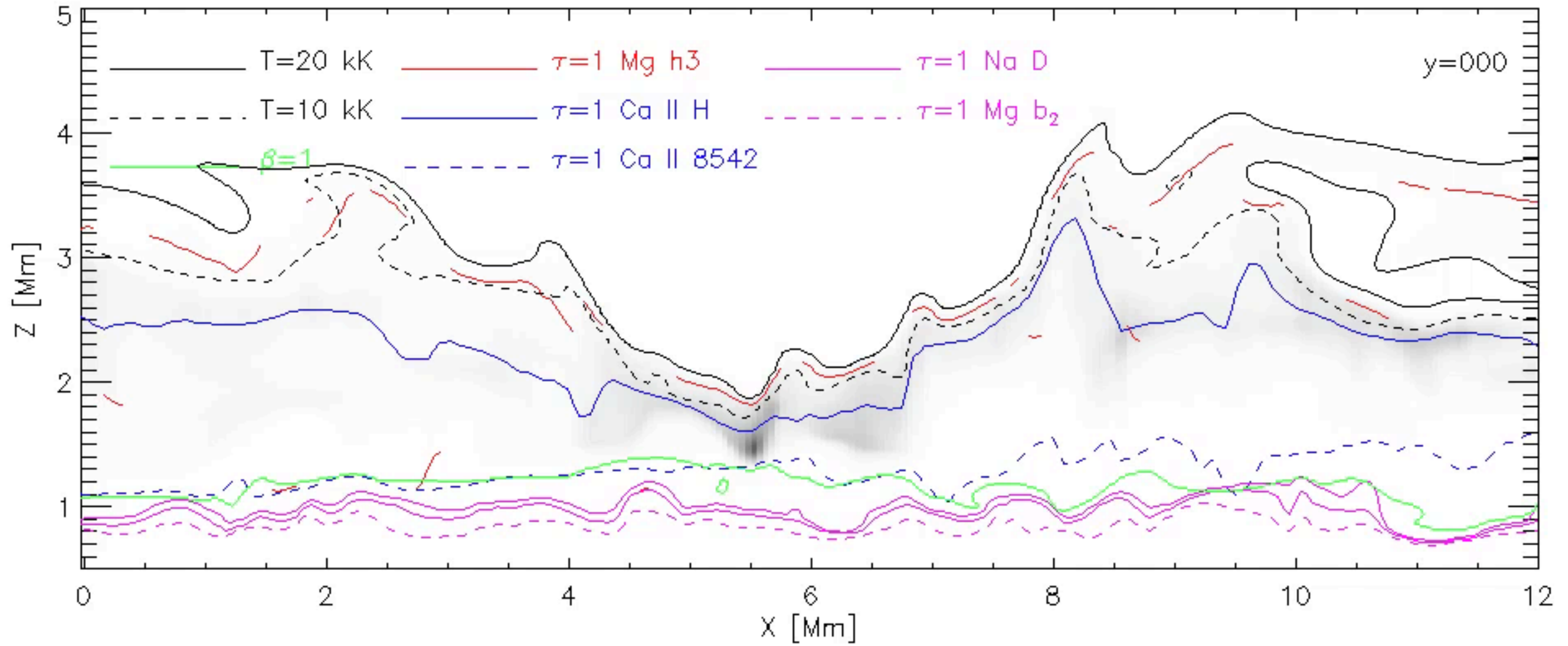


Bifrost model

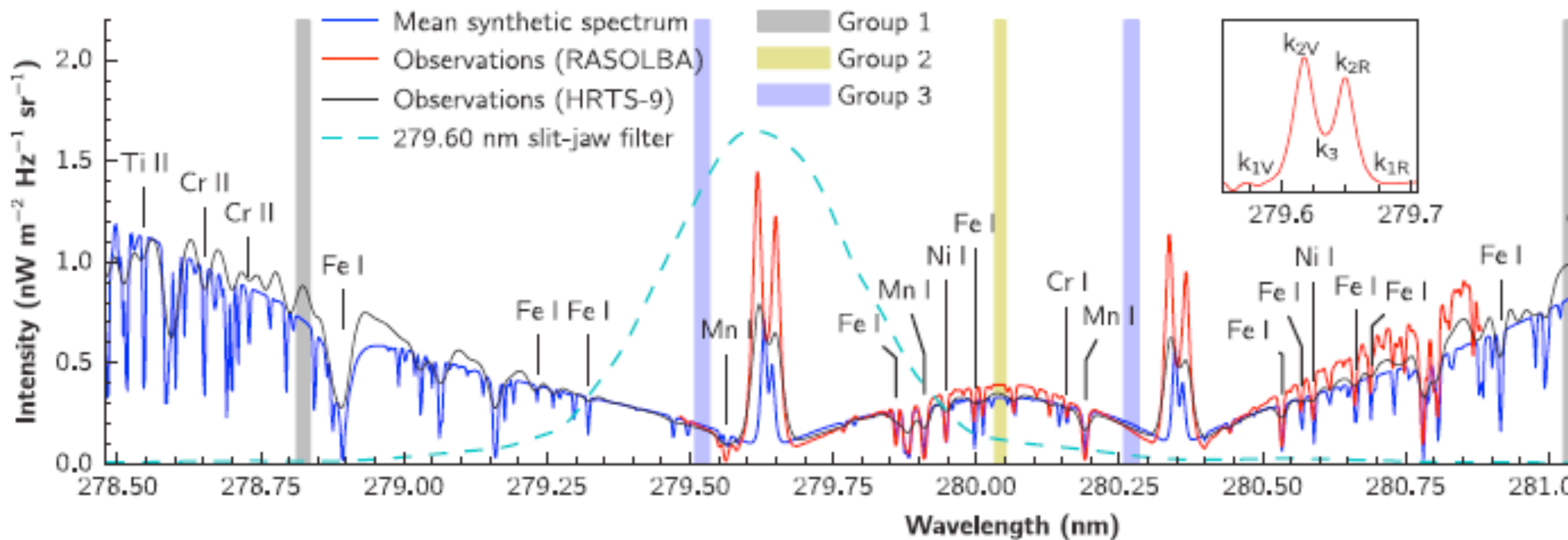


Made available at <http://sdc.uio.no/search/simulations>

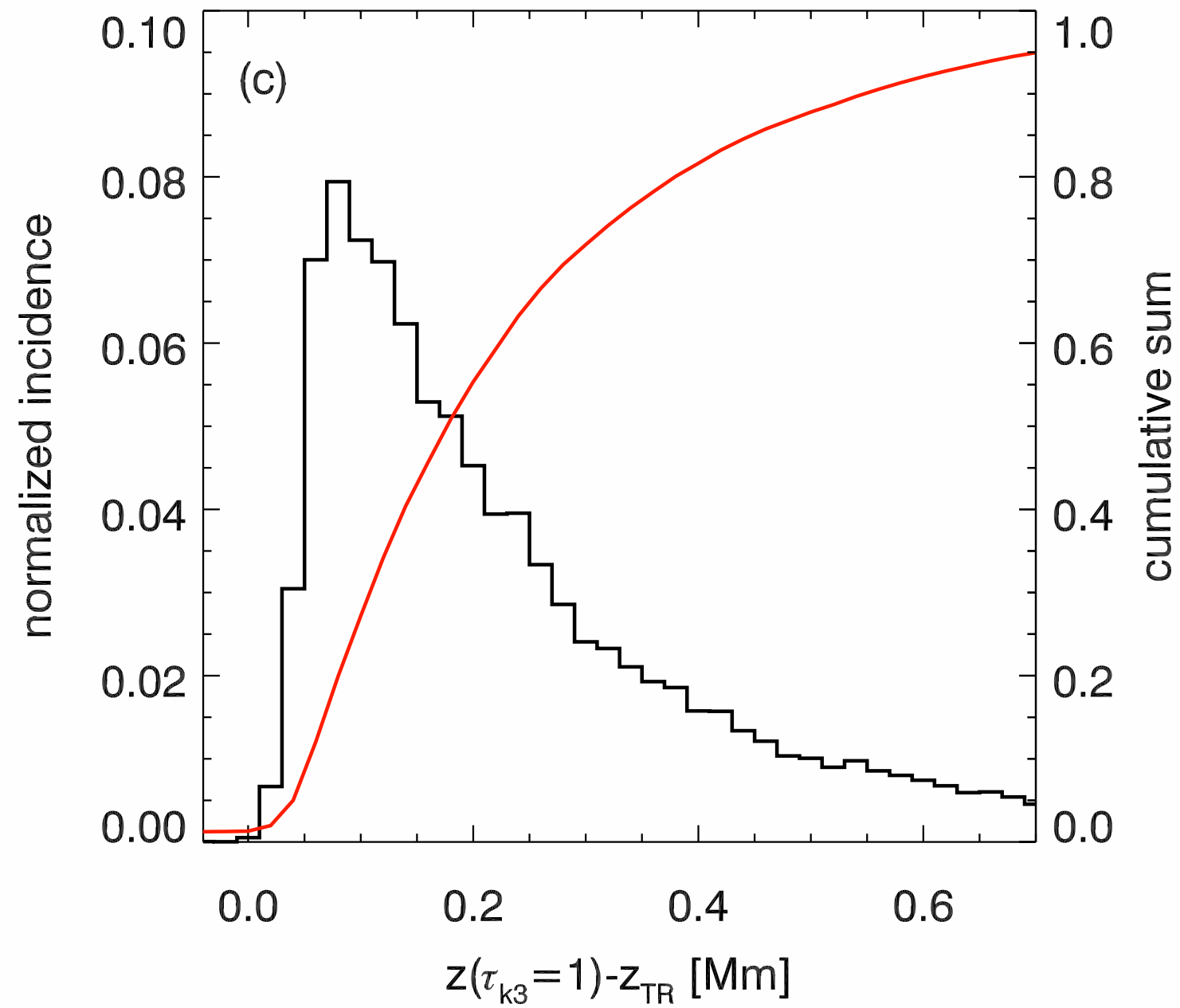
Diagnostics sample different heights



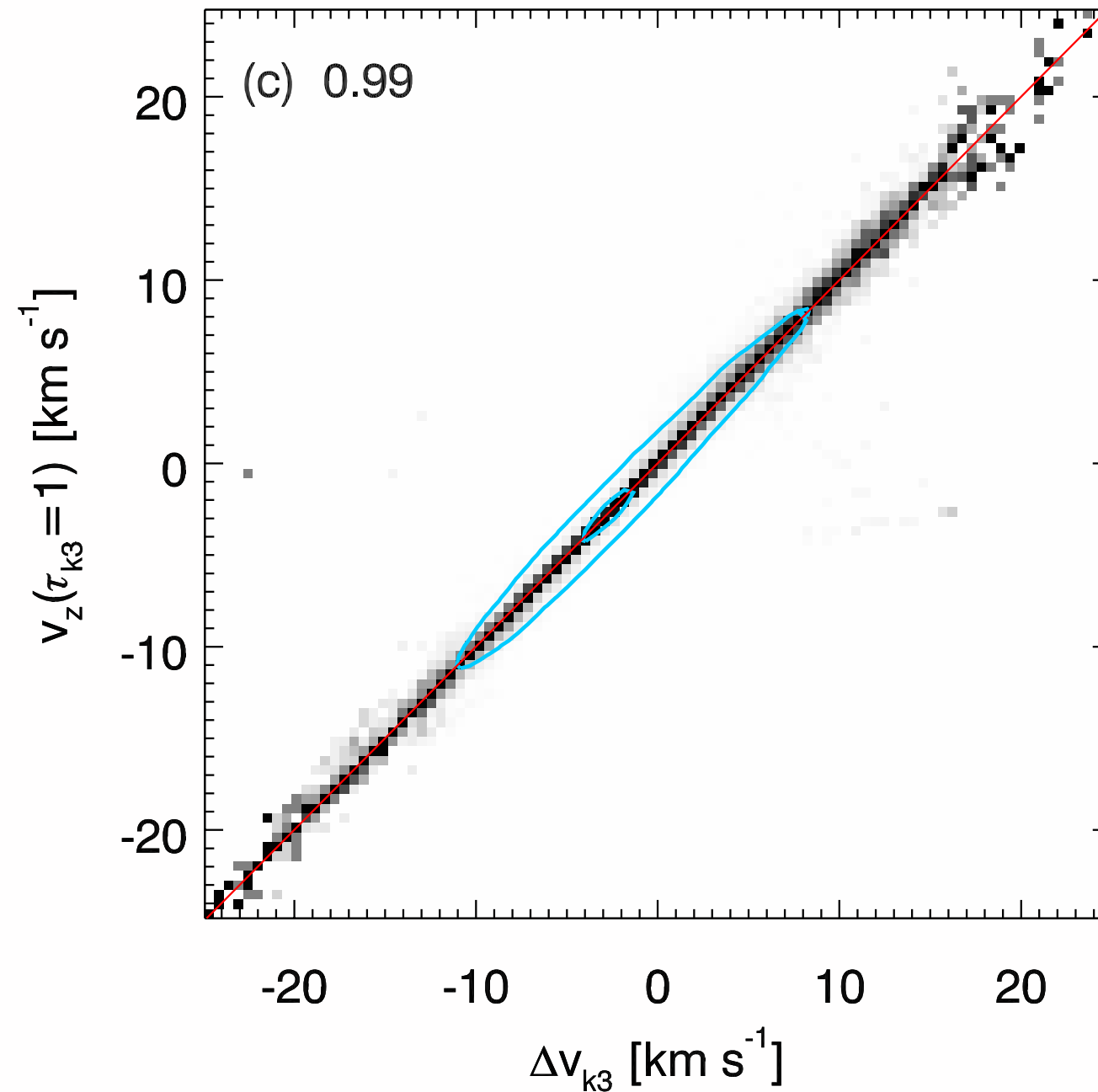
Observables: intensity and Doppler-shift of features



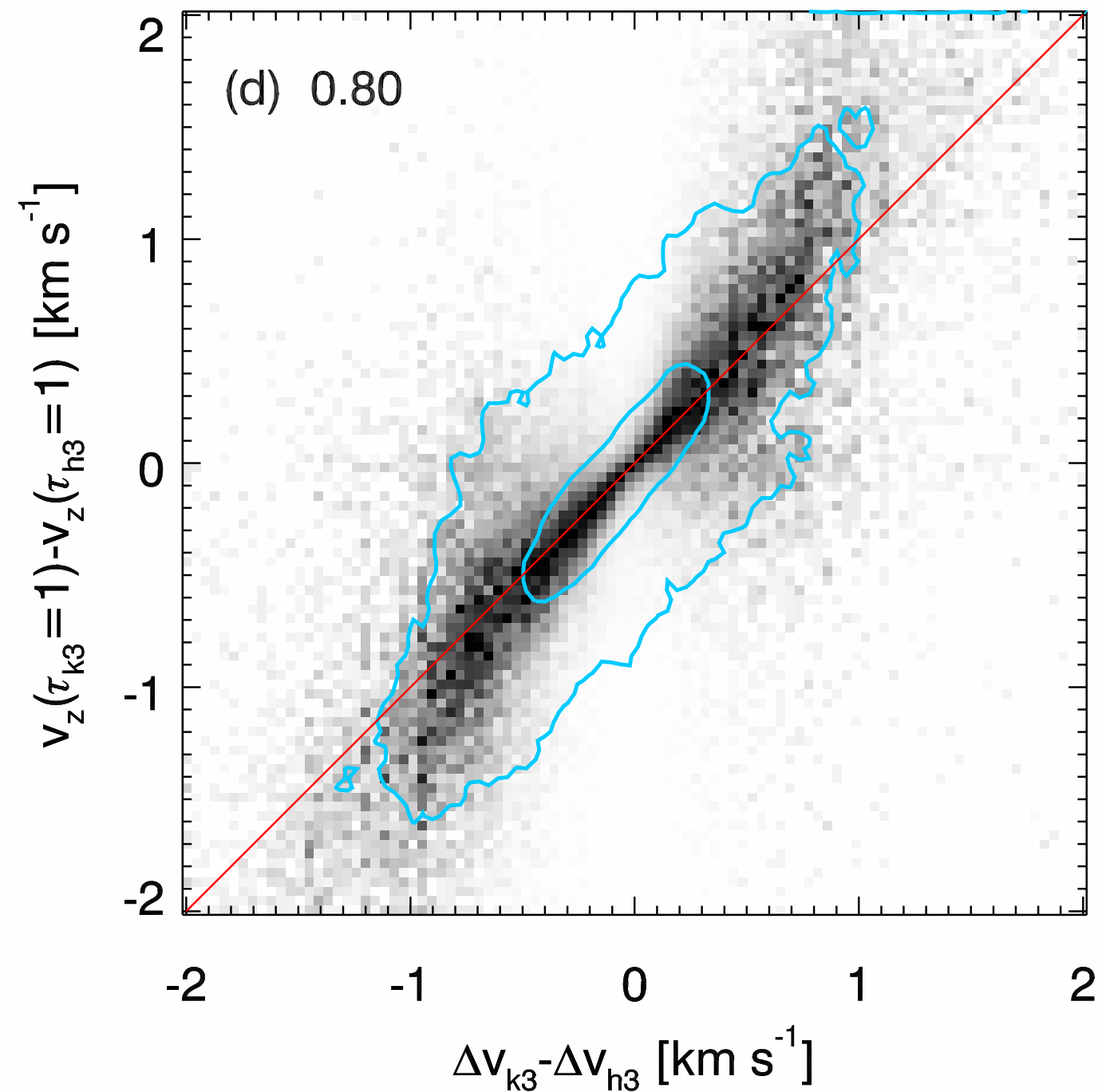
Mg II h&k: line core forms 200 km below the TR



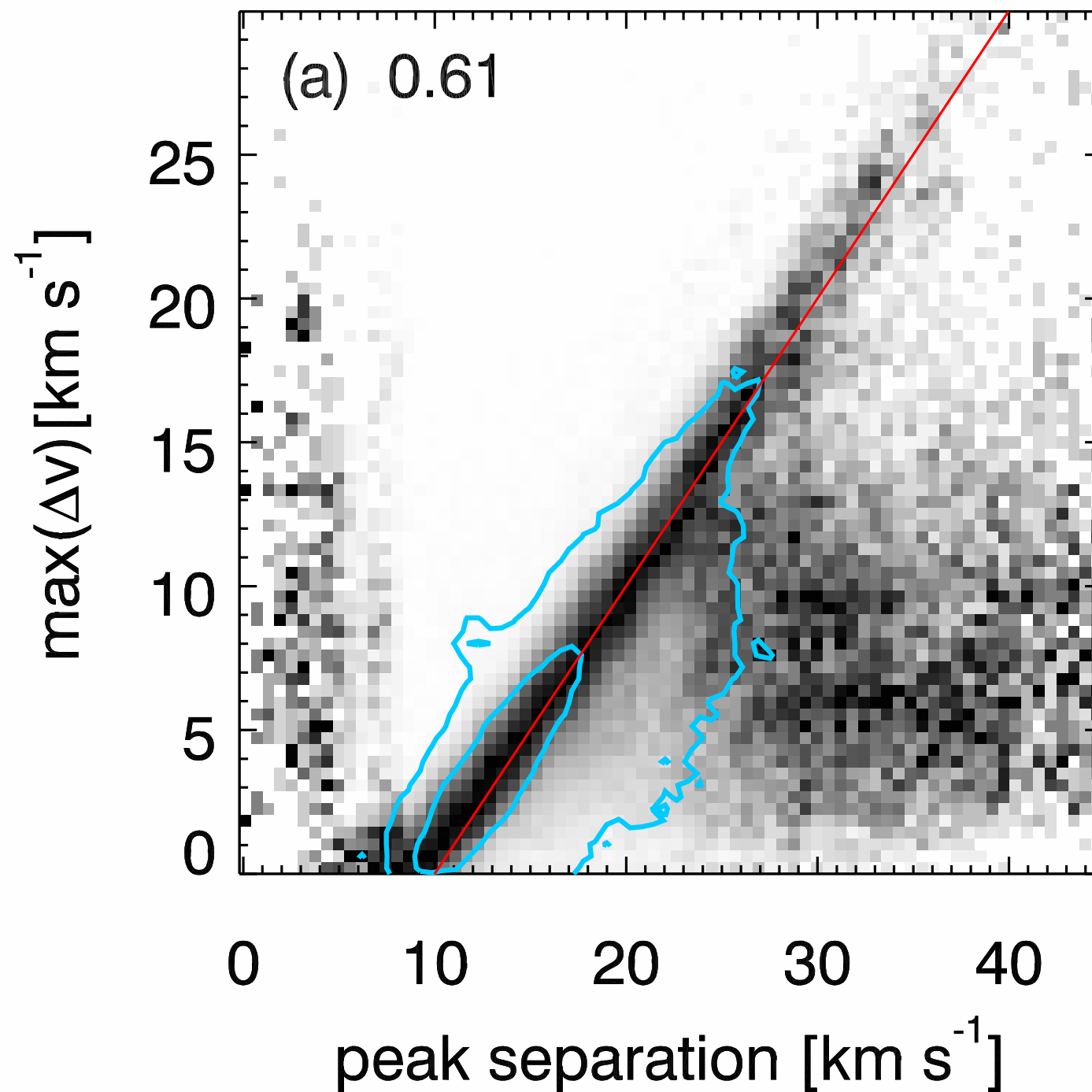
Mg II h&k: h3/k3 minimum Dopplershift correlates with $v_z(\tau=1)$



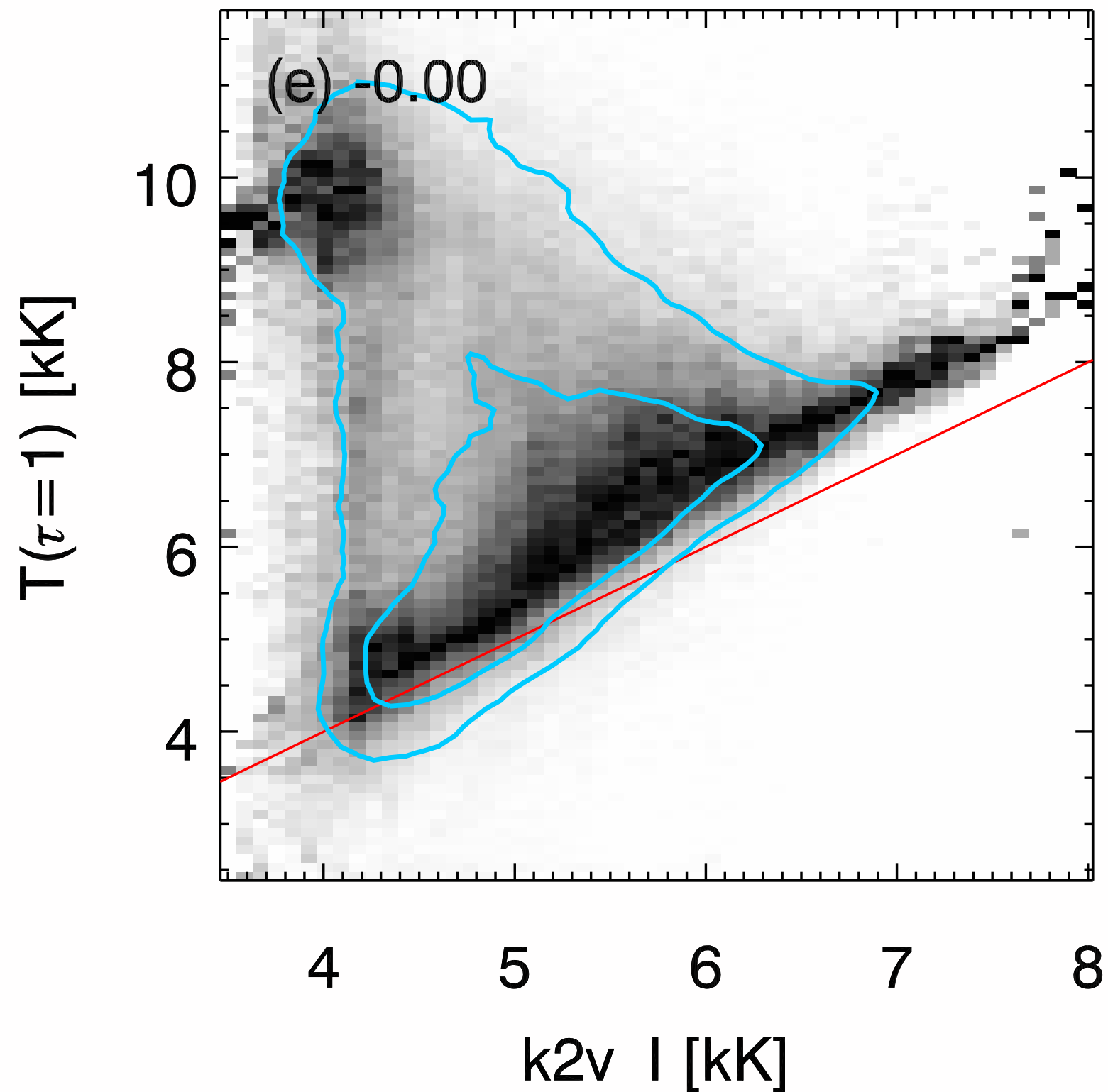
Mg II h&k: h3-k3 Dopplershift measures velocity gradient



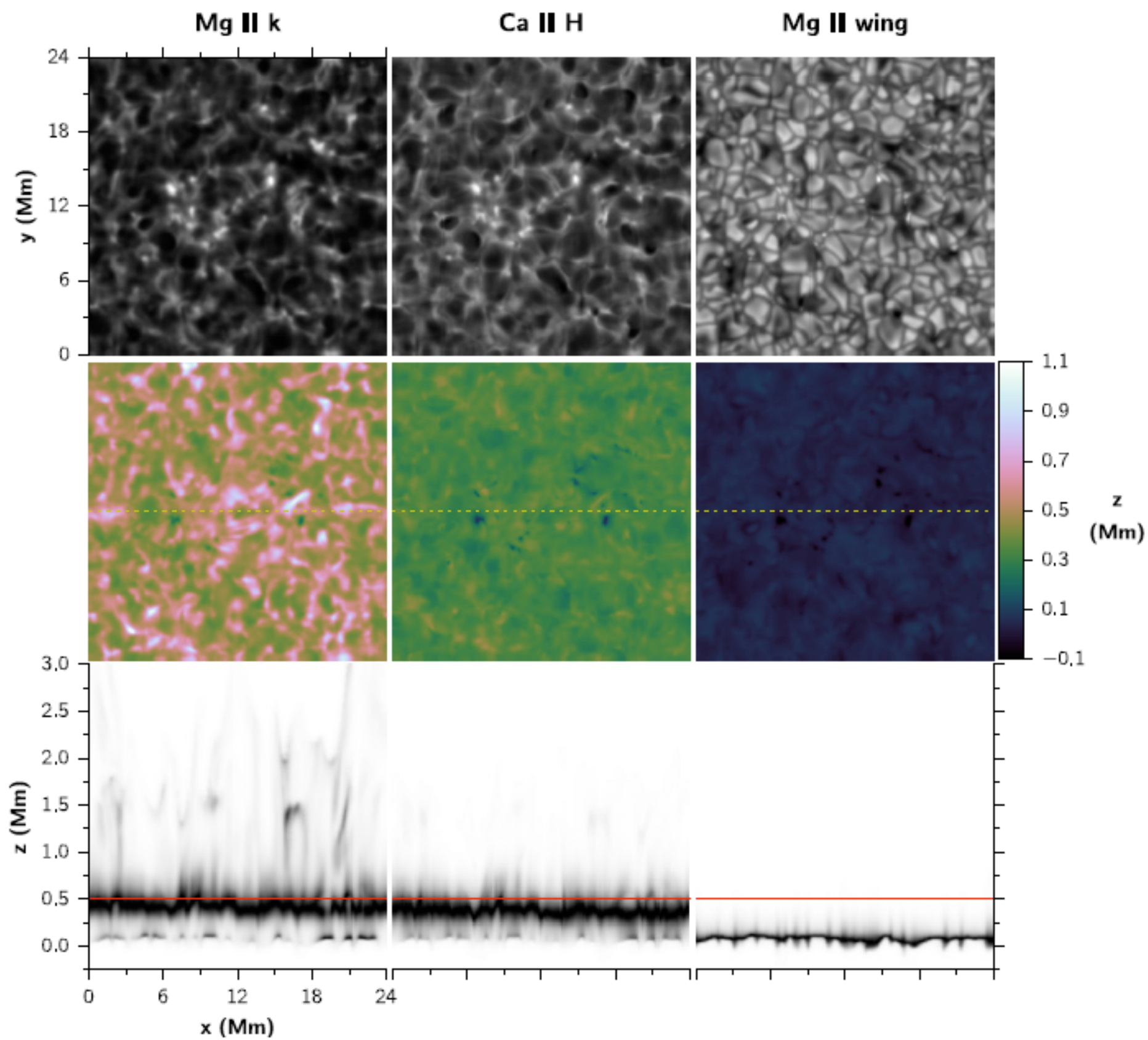
Mg II h&k: peak separation measures velocity extremes



Mg II h&k: peak intensity measures temperature

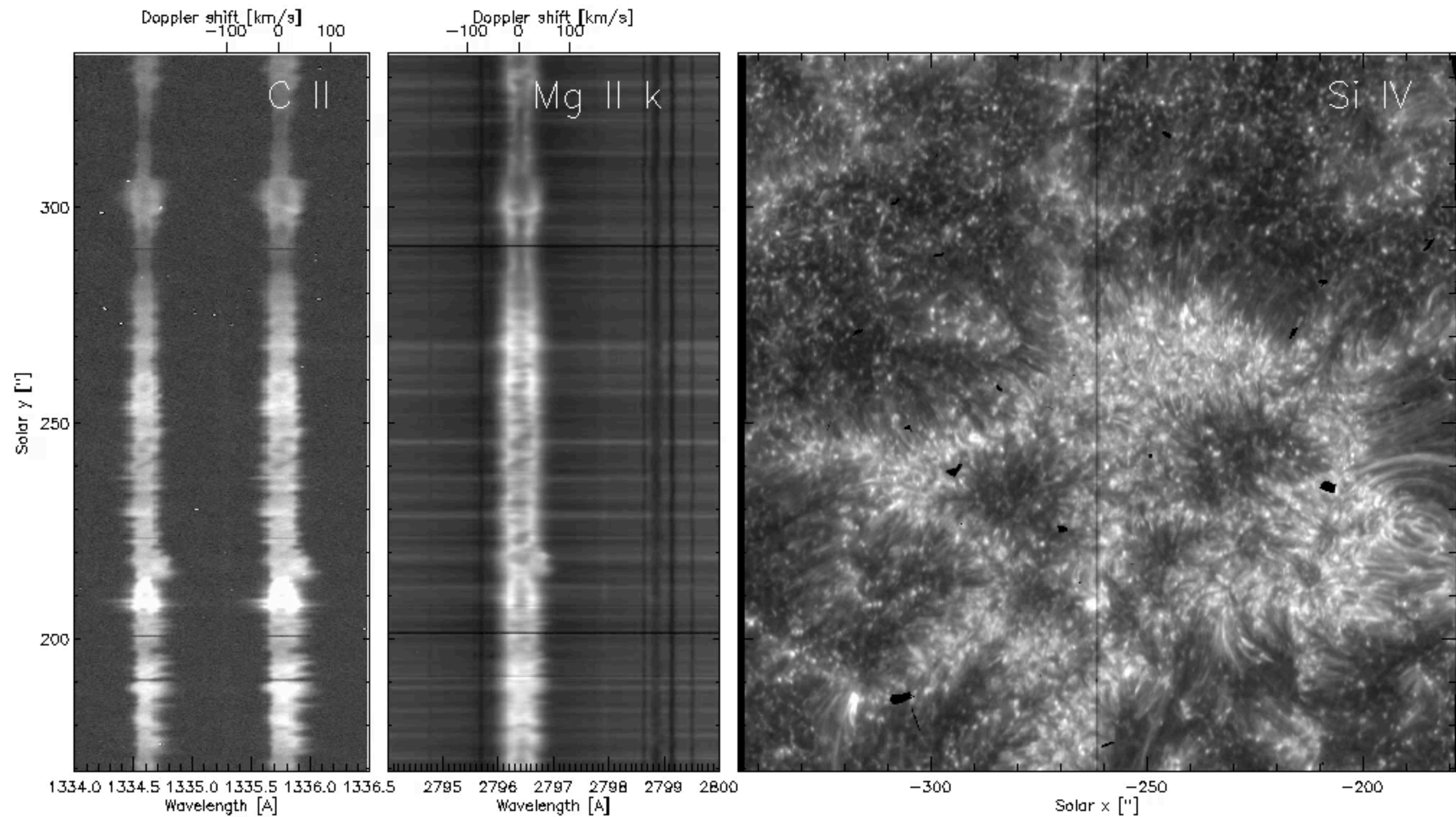


Wide band filters

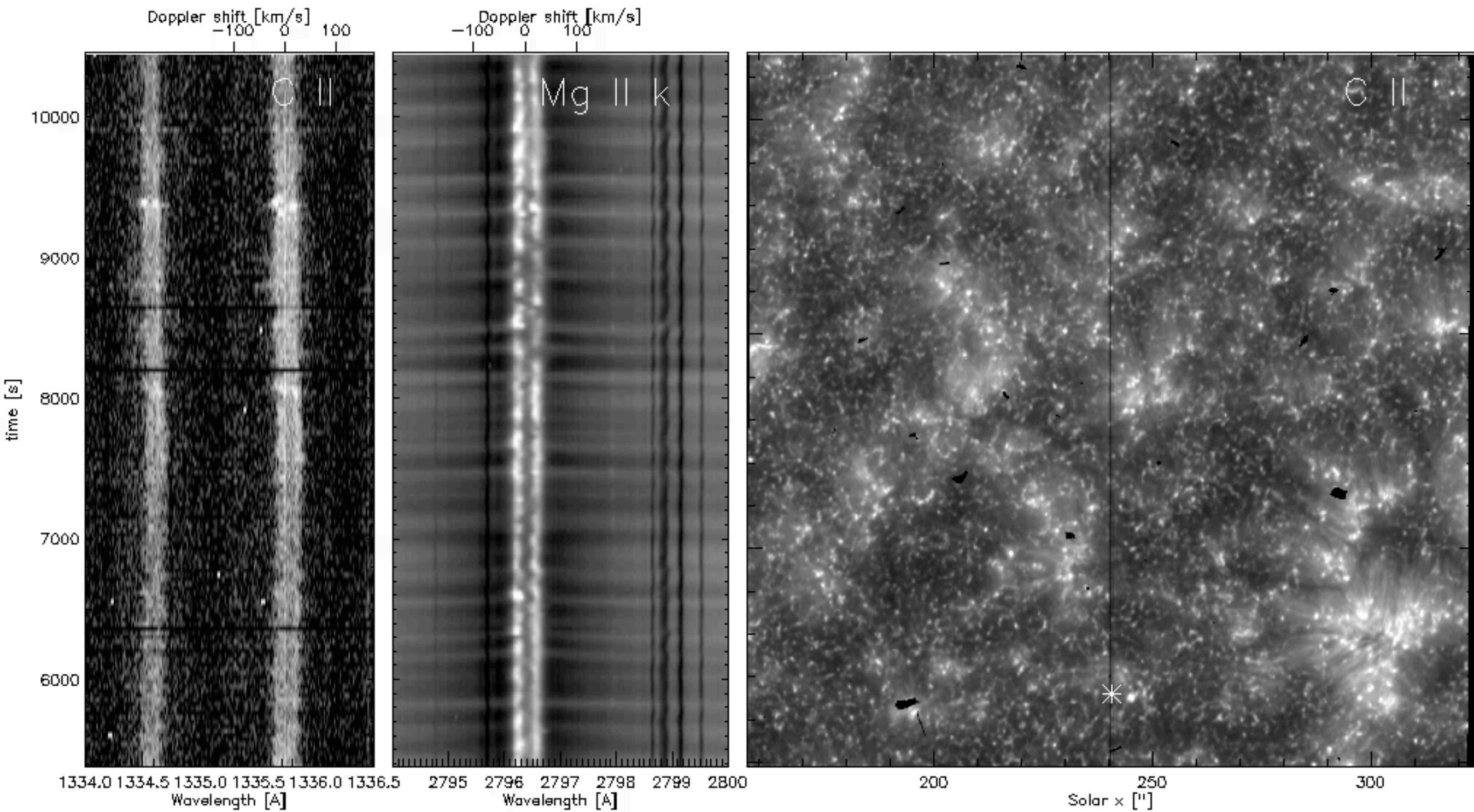


IRIS observations

30s exposures, 400 step raster

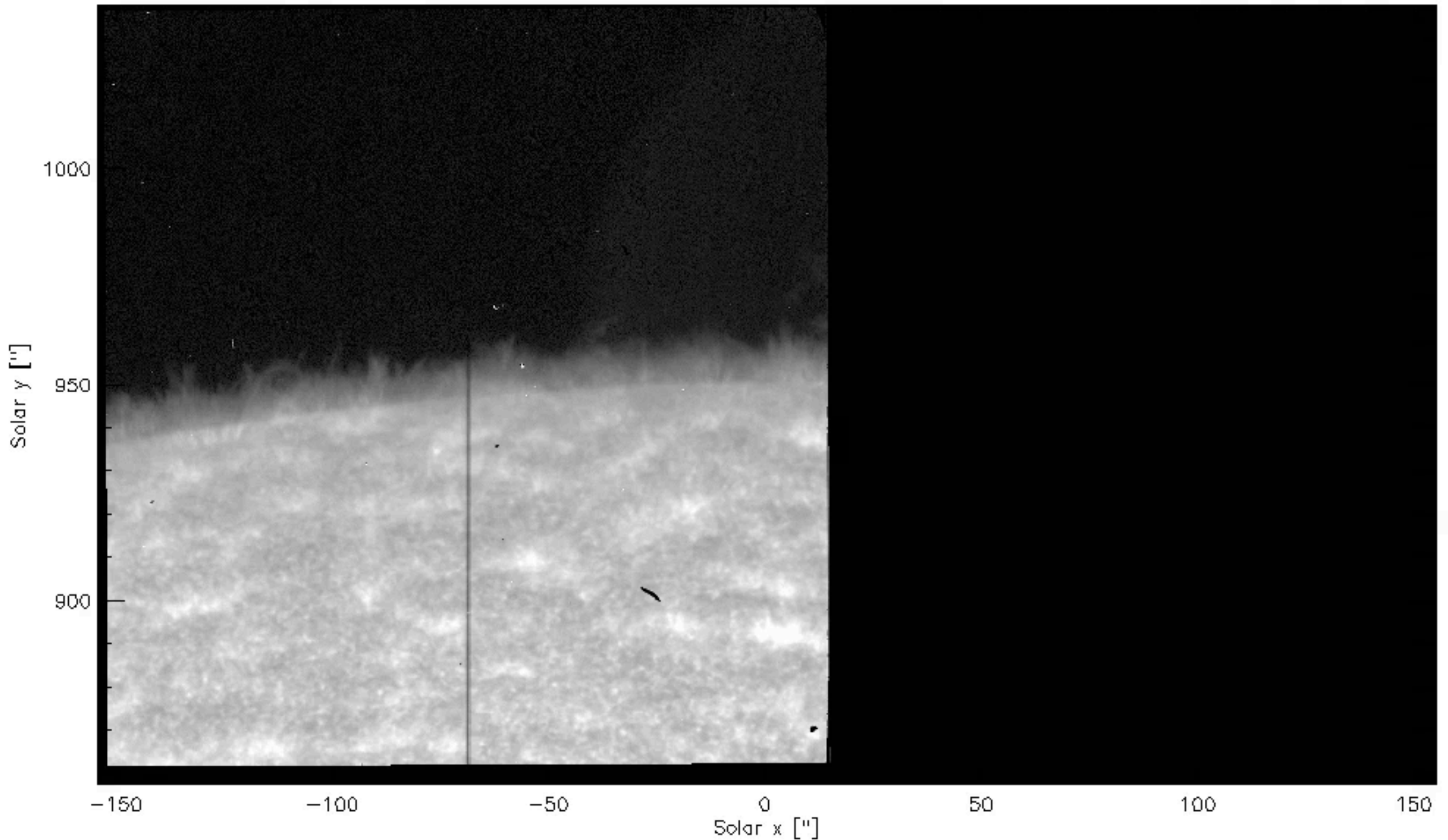


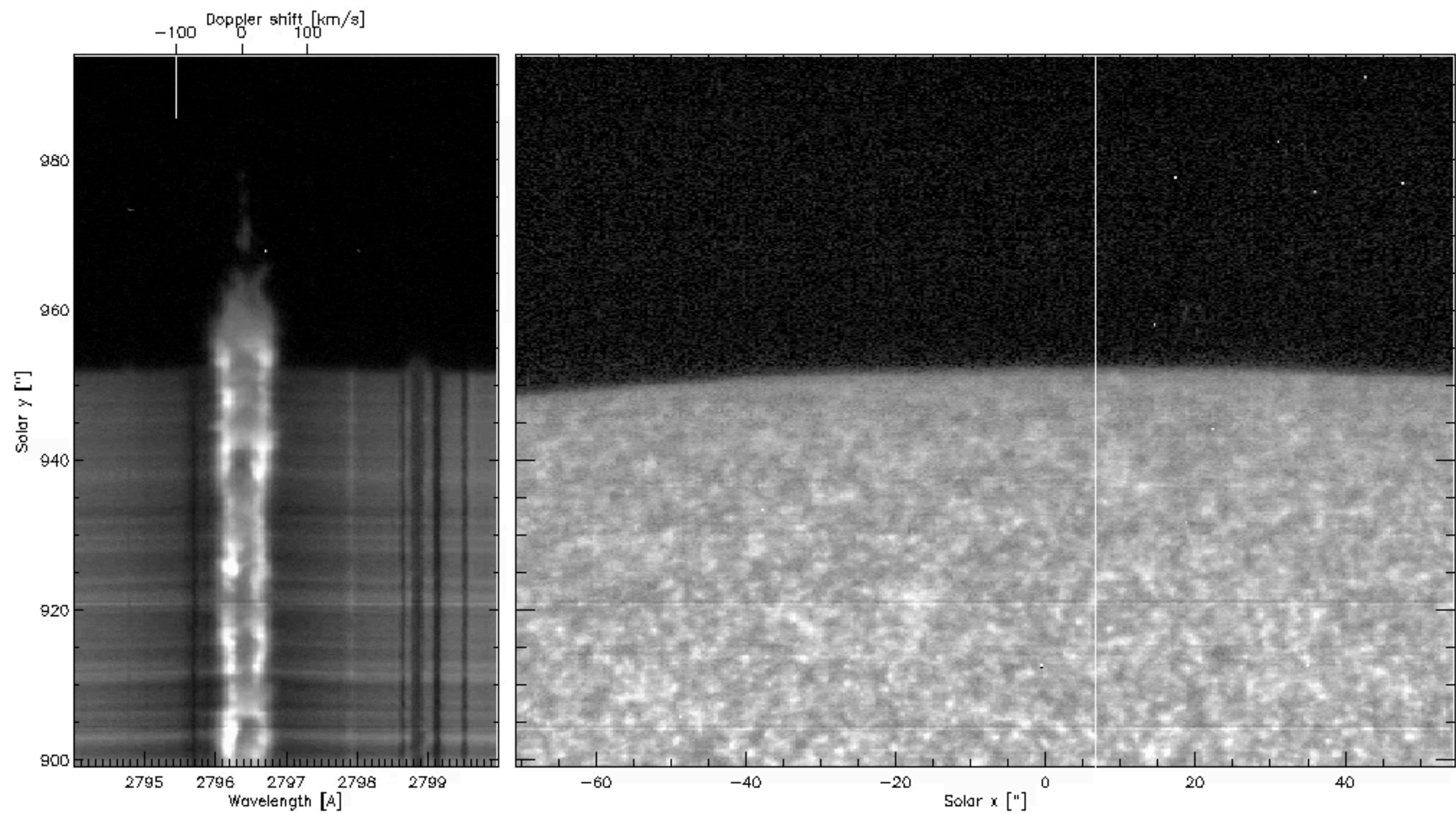
Temporal behaviour



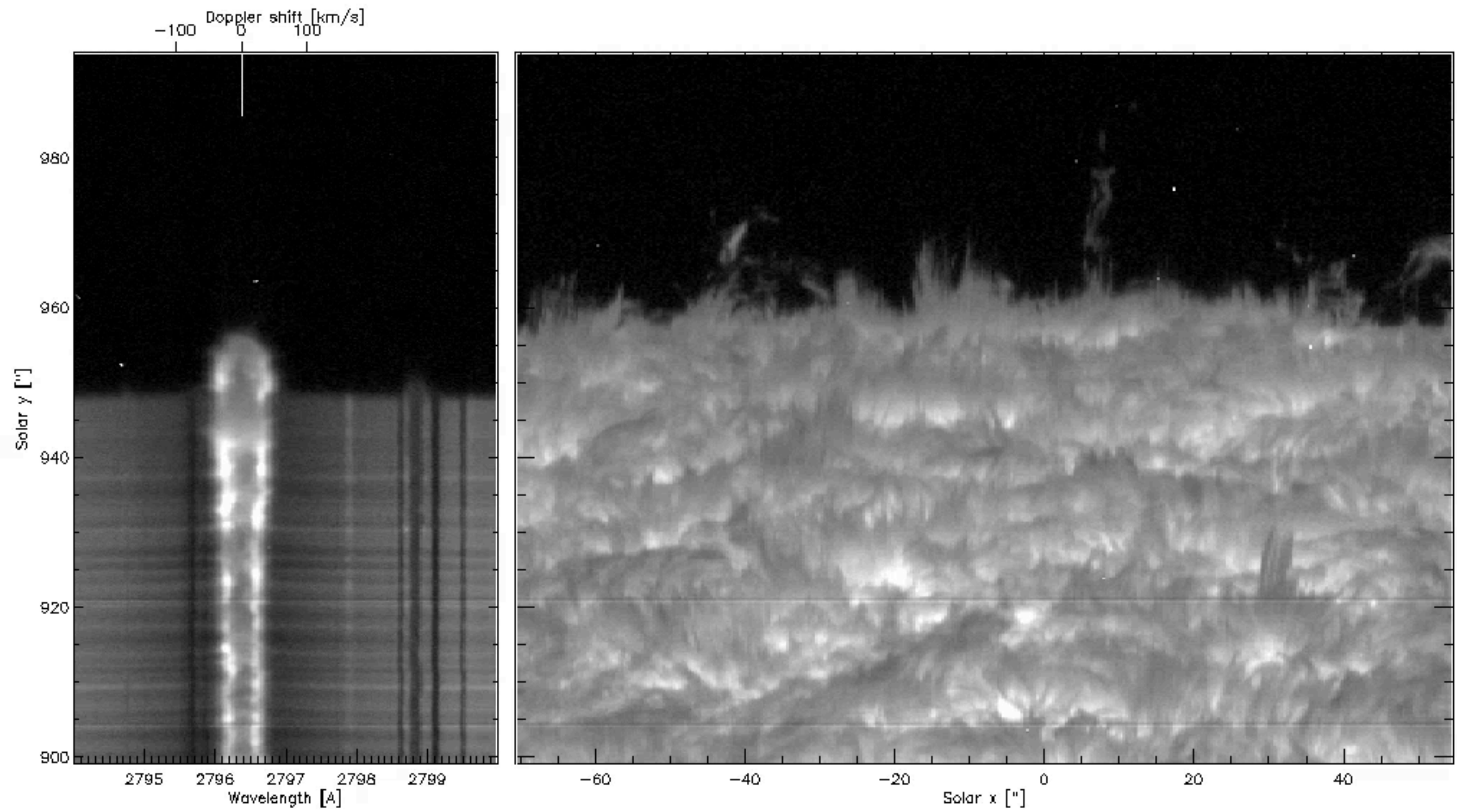
Diagnostics of spicules

8s exposures, 400 step raster, 9s between raster steps





20131009_131001_3800259146



20131009_131001_3800259146

Mg II h&k

- High spatial resolution
- Large number of photons
- Unique diagnostics
 - upper chromosphere
 - cool gas component at large heights
- Not accessible from the ground