Convection, Radiation, Shocks - All In One Box.

Sven Wedemeyer[1], Bernd Freytag[2], Matthias Steffen[3], Hans-Günter Ludwig[4], Hartmut Holweger[1]

[1] *Inst.f.Theo.Phys.u.Astrophysik, Univ. Kiel, D-24098 Kiel, Germany*
[2] *Uppsala University, SE-75120 Uppsala, Sweden*
[3] *Astrophysikalisches Institut Potsdam, D-14482 Potsdam, Germany*
[4] *Lund Observatory, SE-22100 Lund, Sweden*

Present hydrodynamic models show that the motions at the top of the solar convection zone generate acoustic waves which propagate upwards towards higher layers. Dissipation of these acoustic waves at chromospheric heights might release a sufficient amount of energy which could account for the observed chromospheric emission.
Our aim is to check this heating mechanism with detailed numerical simulations. With COBOLD, a radiation hydrodynamics code developed by B. Freytag and M. Steffen, we are able to compute 2-D and 3-D models which include the upper convection zone, photosphere and the chromosphere, thus describing generation, propagation and dissipation of acoustic waves in a self-consistent way in the same model.
We compare different model assumptions to investigate which details have the strongest influence on the results. Based on this first parameter study we recommend 3-D models with a frequency-dependent scheme for radiative transfer (adapted to chromospheric conditions) and opacities with molecular contributions.