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Setting observational constraints to the chromospheric heating problem

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The solar atmosphere is hotter than predicted by assuming radiative equilibrium. This is most obviously evidenced by the high temperature of the solar corona, but the bulk of the energy deposition happens already down in the much cooler chromosphere. While in recent years we have gain detailed understanding of many important processes that must be at work in the chromosphere, also from numerical simulations, their exact contribution to the total energy budget remains unclear.

Chromospheric heating or cooling can be estimated by calculating the radiative losses whenever a model atmosphere is available. Most comparisons between simulations and observations have used canonical values of radiative losses that have been derived from 1D models of spato-temporal averages of solar spectra (e.g., FAL / VAL models). Such approach cannot capture the high complexity and fine structures that is observed in high resolution observations. Recent studies have evidenced that spatially resolved radiative cooling can be up to five times higher in active regions than those canonical values that are usually assumed.

In this talk, we present spatially resolved radiative cooling rates computed from the inversion of high spatial resolution chromospheric datasets observed with the Swedish 1-m Solar Telescope in Ca II K, 8542 and Fe I 6301/6302. We study the distribution of radiative cooling across the FOV in different targets in active regions and in quiet-Sun. Our results will help modellers to set better constraints on theoretical predictions and models.

Student poster?

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