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Modelling magneto-hydro-static equilibria in quiet Sun regions

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The solar magnetic field is measured routinely only in the solar photosphere. While reliable measurements of the photospheric magnetic field vector are only available in active regions, in the quiet Sun at present only the vertical component of the magnetic field can be obtained accurately.

To derive magnetic field structures throughout the solar atmosphere, from the chromosphere to the corona, we extrapolate these photospheric measurements into the upper photosphere, chromosphere and corona with a magneto-hydro-static model. We optimize free model parameters by comparing the modelled magnetic field lines with structures observed in solar images. The comparison is done automatically with a number of quantitative measurements and the optimal model parameters are found with the help of a downhill simplex minimization. This newly developed modelling approach can provide an accurate and deep understanding of the magnetic field structures that extend to any height in the solar atmosphere.