How to include H-Alpha images to estimate the chromospheric and coronal magnetic field from photospheric vectormagnetograms?

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The solar magnetic field vector is measured routinely with high accuracy only in the photosphere with, e.g., Hinode/SOT and in future with SDO/HMI. These measurements are extrapolated into the corona under the assumption that the field is force-free. That condition is not fulfilled in the photosphere, but is in the chromosphere and corona. In order to make the observed photospheric data consistent with the force-free assumption, we therefore have to apply a preprocessing routine before nonlinear force-free extrapolation codes can be legitimately applied. We develop a minimization procedure that uses the measured photospheric field vectors as input to approximate a more chromospheric-like field. The procedure includes force-free consistency integrals, spatial smoothing, and an improved match to the field direction as inferred from fibrils as can be observed in, e.g., chromospheric H-alpha images. We test the procedure using a model active-region. Our method computes the chromospheric magnetic field vector correctly within a few degree and estimates the coronal magnetic energy with an error of less than 1 percent.