



A robust estimate of the lithospheric magnetic field over South Africa using statistical and bayesian-like approaches

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In the framework of the !Khure project we produce a regional crustal model over South Africa at 40 km resolution. We combine ground, aeromagnetic and satellite data in a joint Iteratively Reweighted Least-Squares inversion and estimate the set of parameters describing the crustal field. Regional models are sensitive to various modeling parameters (geometry of the cap, data set, maximum resolution,...) that may introduce a modeling error which is in general difficult to perceive and quantify. We discuss how the IRLS algorithm allows partly addressing this problem in a convenient way. Data errors and uncertainties may also bias the final model. In order to test for their effect, we further apply a bootstrap algorithm. We consider two satellite datasets that were corrected for the main and external fields in two different but acceptable manners and estimate the conditional probability density of the crustal field parameters. We finally discuss that the confidence intervals of all coefficients will gain their ultimate significance when converted into an estimator of the confidence interval of the geophysical properties of the sources that can, in the future, be extracted from our model (e.g.magnetization properties, Curie depth, shapes of magnetic bodies...).