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# Optimisation of point grids in regional gravity field analysis

J. Schall, J. Kusche, and A. Eicker
Astronomical, Physical and Mathematical Geodesy, Bonn University, Bonn, Germany (schall@geod.uni-bonn.de)

In contrast to spherical harmonics, which realise global uniform resolution, regional basis functions have the advantage to be adaptable to the local data density and variability. But how to choose adequately their spatial configuration? Estimating the location of basis functions represents a non-linear problem, which is difficult to solve by ordinary statistical tools, especially when treating their number as an unknown too. For that reason, most of the regional approximation approaches define the point grid in advance.

In this contribution, we propose a Monte Carlo algorithm in a Bayesian framework to optimise the configuration of local basis functions jointly with their scaling coefficients. The problem can be formulated as a quasi-linear model. Quasi-linear models are non-linear ones, but linearity holds for a subset of the searched-for parameters. This allows us to utilise the analytical solution of the linear model, while the unknown parameters in the design matrix are kept fix. As a particular advantage of this approach, already existing gravity recovery software can be used in a black-box manner. The new method is analysed theoretically, followed by a demonstration of its applicability and performance by examples from the field of regional gravity field recovery from GOCE satellite data.