Aggregation of satellite and ground data for an improved approximation of the harmonic potential

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Recent satellite missions supply us with highly accurate geomagnetic and gravitational data. Both, the gravitational and the lithospheric magnetic field can be represented via harmonic potentials at satellite altitude. Making conclusions on these potentials at the Earth's surface involves the ill-posed problem of downward continuation. The use of measurements at or near the Earth's surface does not suffer from this ill-posedness. However, such measurements are only locally/regionally available and are typically of lesser quality than satellite data.

In our presentation we try to use the whole amount of data and construct a family of approximations of the harmonic potential, where each approximation depends on the values of some tuning parameters. We are going to present a rather general approach to the choice of the approximation whose accuracy is as close as possible to that of the best approximation in the constructed family. The idea of this approach can be traced back to the concept of aggregation.