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A Stochastic Joint Inversion of Airborne Gravity Gradient Data over the Karasjok Greenstone Belt, Northern Norway

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We present the results of gravity gradient inversion over the Karasjok Greenstone Belt in northern Norway. Here airborne gravity gradients are available and previously by integrating the geophysical data with surface geological observations, an a priori geological model has been built. However, the existing model fits the long-wavelength signal of gravity gradient data but poorly explains the short-wavelength signals. To improve the knowledge of the survey area, we applied stochastic inversion for the density distribution using the measured components of the AGG system. To handle uncertainties of models and to avoid large-scale matrix inverse calculation, we undertake the task in a Bayesian inversion framework. And the preliminary sensitivity tests of the inversion were done to the multiple components and single component. Joint inversion of both measured components, which can pose relatively stronger constraints on the model space, delivered better results. The output of the Bayesian inversion is an ensemble of models which can fit the measured gravity gradient data over the entire spectral range. The statistics derived from the set of models, such as the mean of the models and the standard deviation of the models, offer insights into the internal setting of the area of interest. The posterior density distribution of some structure previously interpreted as homogeneous bedrock lithology clearly indicates otherwise. Another example is the intrusions within the Karasjok Greenstone Belt that feature higher density than that of surrounding areas, which may point its potential for mineral prospection.