Interpretation of potential field data in the area of the Loppa High, Western Barents Sea, Norway

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A b s t r a c t : We present a preliminary 2D model of a combined gravity and magnetic field interpretation of the Loppa High in the SW Barents Sea. The advantage of our modelling approach allow us to distinguish features pertaining to the nature of the basement, which is not possible using only the gravity field. Our model is constrained by seismic profiles, well logs, petrophysical measurements, and core samples. The Euler Deconvolution Solutions (EDS) are commonly computed to estimate the depth to magnetic sources. In our context, this method has revealed two very interesting features. Plotted EDS on a map allows us to follow alignments of tilted blocks occurring in parallel bands; and plotted EDS along 2D profiles enables us to outline the changes in magnetic properties within the basement in the Loppa High.

Below the Bjørnøyrenna Fault Complex (BFC), which marks the northwestern boundary of the Loppa High, we have to include high-density material. Combined with the inferred existence of a detachment below the BFC, the model has helped to depict what could be a gneiss dome. The extension of that structure could fit the gravity anomaly that exists between the BFC and the Loppa High.

Based on petrophysical measurements of rocks outcropping onshore in northern Norway, the magnetic modelling highlights the Precambrian basement as the main source of the magnetic anomalies. The Precambrian basement units are characterised by magnetic susceptibility values from 0.010 (SI) to 0.080 (SI) and a remanence of 0.550 A/m. In this area, the Fennoscandian Shield is mainly covered by Caledonian nappes that locally reach up to 5 km in thickness *(Olesen et al., 1990; Sigmond, 1992)*. Even if their magnetic properties are representative, with magnetic susceptibility values of 0.072 (SI) and a remanence of 0.0397 A/m, their abundance is not sufficient to act as significant magnetic source. The modelling also shows that the magnetic anomalies within the Precambrian basement in the Loppa High reflect its buried 'hilly topography' that is an erosion unconformity.

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