Efficient Geological Modelling of Large AEM Surveys

Torben Bach (1), Tom Martlev Pallesen (1), Flemming Jørgensen (2), Mats Lundh Gulbrandsen (3), and Thomas Mejer Hansen (3)

(1) I•GIS A/S, Aarhus, Denmark, (2) GEUS, Geological Survey of Denmark and Greenland, Aarhus, Denmark, (3) DTU, Technical University of Denmark, National Space Institute, Div. of Mathemathical and Computational Geoscience, Copenhagen

Combining geological expert knowledge with geophysical observations into a final 3D geological model is, in most cases, not a straight forward process. It typically involves many types of data and requires both an understanding of the data and the geological target. When dealing with very large areas, such as modelling of large AEM surveys, the manual task for the geologist to correctly evaluate and properly utilise all the data available in the survey area, becomes overwhelming. In the ERGO project (Efficient High-Resolution Geological Modelling) we address these issues and propose a new modelling methodology enabling fast and consistent modelling of very large areas.

The vision of the project is to build a user friendly expert system that enables the combination of very large amounts of geological and geophysical data with geological expert knowledge. This is done in an "auto-pilot" type functionality, named Smart Interpretation, designed to aid the geologist in the interpretation process. The core of the expert system is a statistical model that describes the relation between data and geological interpretation made by a geological expert. This facilitates fast and consistent modelling of very large areas. It will enable the construction of models with high resolution as the system will "learn" the geology of an area directly from interpretations made by a geological expert, and instantly apply it to all hard data in the survey area, ensuring the utilisation of all the data available in the geological model. Another feature is that the statistical model the system creates for one area can be used in another area with similar data and geology. This feature can be useful as an aid to an untrained geologist to build a geological model, guided by the experienced geologist way of interpretation, as quantified by the expert system in the core statistical model.

In this project presentation we provide some examples of the problems we are aiming to address in the project, and show some preliminary results.