Digital compilation of geological maps from Dronning Maud Land

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Background

The Norwegian Polar Institute has initiated a project which aims to compile existing geological maps from Dronning Maud Land (DML), and to develop a digital, uniform geological GIS database for the area between 20 °W and 45 °E. Geological mapping and investigations of the mountain chain in Dronning Maud Land have been carried out by a number of geologists from various nations and institutions over the last 40-50 years. As a result, existing map sheets are on different scales, contain different levels of details and geological knowledge, and the standard for classification of the rocks units differs considerably between the maps. The goal of the map compilation project is to integrate existing geological maps into a new digital, uniform and seamless geological GIS database for DML.

Status and further work

A total of 79 hard-copy geological maps are available from Dronning Maud Land. All source maps have been scanned, georeferenced and digitized, without modifications, in ArcGIS. There are some nunatak areas in the westernmost part of DML, for instance Vestfjella, that are not covered by published geological maps. Data from these regions are collected from various scientific publications.

The next step in the project will be to compile the an overview map on the scale of 1:250 000. This task involves correlation of geological units between the different maps. Building up a new unified descriptive legend for the new overview map is one of the core-tasks of this project, and this part necessitates close collaboration with other scientists with experience from the geology of Dronning Maud Land. International standards will be implemented in the construction of the new legend.

A printed version of the overview map will be to the scale of 1:250 000, and will contain a series (11-12) of square degree sheets with standard layout and legend. Additional information on the printed maps will include geological profiles, a tectonic overview map, an index of working areas, source references etc.

Challenges

The existing digital topographic dataset from Dronning Maud Land is based on relatively old topographic maps from the 1960s. There is a significant discrepancy between the topographic dataset and the more recent Landsat images, for instance, several smaller nunataks are not present on the older topographic maps. To ensure that the new GIS database matches the real topography we have georeferenced geological maps to recent Landsat imagery.

An additional major challenge is to combine and unify the different legends of the original maps to a new unified legend. Building a new legend involves development of a regional geological model for Dronning Maud Land. Then again, the fact that the level of detail vary between the source maps, and some are based on fairly old data, limits the value of the maps for developing a regional tectonic model.