

The Geology of Northern Greenland

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BEVINS, R.E. (1984). The Geology of Northern Greenland. *Proceedings of the Shropshire Geological Society*, 4, 2-3. The area is a late Proterozoic basin, with sedimentation influenced by a fold belt.

The sequences, structures and mineralogies are described, together with their tectonic setting.

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The field work for this project investigating the geology of northern Greenland took three years, the results of which are to be published in 1984. The area lies between 79° and 89° N and is a late Proterozoic basin, with sedimentation influenced by a fold belt.

At Independence Fjord, the sequences exposed are of Proterozoic sandstone with intrusions. These are older than 1250 million years, but their true age is not known. These sequences are unmetamorphosed, as are the overlying basalts. The red siltstone members are used as marker horizons. The sandstones show large scale cross bedding and are for the most part fluvial sediments, with possible shallow water environments in places. They are commonly horizontally bedded and intruded with sheets of dolerite. The cliffs here are some 200 metres high, with many rock falls and glacial debris and outwash in the valleys. The overlying basalts are 20-30 metres thick and since they are made up of individual flows, produce a stepped topography. These are flat lying tholeiitic basalts and are probably flood basalts, although the chemistry is uncertain, some pumpellyite $\text{Ca}_4(\text{Mg,Fe})\text{Al}_5\text{Si}_6\text{O}_{23}(\text{OH})_3 \cdot 2\text{H}_2\text{O}$ has been found. In total, the basalts are 1300 metres in depth and extend over 500 square kilometres. There is evidence that some basement rocks have been caught up in this sequence, leading to an increase in silica content. Associated with siliceous veins are both native copper and secondary copper carbonate precipitation. Flow to flow correlation is made difficult by scree deposits. There are intrusions within the sandstone body, providing a mixture of flow material and dykes. The sandstone close to the dykes is baked and this has produced columnar jointing in the sandstone, together with some melting leading to the production of veins of siliceous material.

This sequence is overlain by sandstone of Eocambrian age. This has good cross bedding and is a shallow water sequence of the sub- to intertidal zone. This passes up into a multicoloured sequence of mainly purple sandstones of a lagoonal facies and is overlain by dolomites, the higher parts of which contain stromatolitic structures.

In the Midsommer Sø region there is an unconformity between the sandstones, whereas in the Morane Sø there is a stepped unconformity, with evidence of breccias. These would have been formed by large blocks of sandstone sliding down the slope. The broken bedding in the blocks can be matched into the higher sequences. There are also debris flows deposited as lobes and good fluvial sandstones with large scale cross bedding in a poorly sorted sandstone sequence in a Gilbert type delta. Also present are evidence of mudcracks and a tilloid sequence. The sandstone sequence contains complex folds which is evidence of loading while the sediments still had a high water content.

In Peary Land, north, of Independence Fjord, there are carbonate sequences extending through the Cambrian to the Silurian. In northern Peary Land there is a turbidite flysch oriented east-west. This Llandovery age deposit is rich in fossils and overlies the carbonate platform.

The coast of Peary Land comprises a poorly exposed metamorphic region of sandstones and basalts with epidotes and actinolite in a chlorite matrix, forming a greenschist facies. The basalt sequence here is thinner than that in Independence Fjord, made up of only eleven individual flows and containing prehnite, $\text{Ca}_2\text{Al}_2\text{Si}_3\text{O}_{10}(\text{OH})_2$, and pumpellyite. These basalts can however be correlated with those at Independence Fjord, although they have been subject to greater

alteration due to the covering by the flysch sequence producing a higher grade metamorphism.

The Frederick Hyde Fjord is a dramatic fold belt region, with glaciers flowing into the frozen fjord. The fold belt is made up principally of Lower Palaeozoic strata, but there is no evidence of fossils. The trend in the major field structures is east-west. In the northern part of the fjord is an amphibolite sequence thrust over rhyolitic volcanics of Permian age.

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