Seismic Interpretation and Characterization of Igneous Rocks in Jan Mayen Microcontinent, Norwegian-Greenland Sea

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Abstract

The aim of this work is to interpret evidence of magmatic activity from seismic reflection data and to see how it influences the geodynamic evolution of Jan Mayen Microcontinent (JMMC).

Igneous rocks in the JMMC are positive high amplitude reflections, which are acoustically hard and are either concordant or discordant to sedimentary bedding. The two major seismic facies interpreted from 2D seismic reflection data are a) irregular, bedding discordant, intrusive rock, i.e., dykes, saucer-shaped, bowl-shaped, transgressive intrusions and b) horizontal, layered, and bedding parallel positive reflections e.g., pillow basalts and tabular sills. The JMMC is delimited by these igneous rocks into a western margin rich in extrusive rocks and an eastern region characterized by intrusive igneous rocks.

Volcanic sills in the study area are often associated with post-depositional deformation of the Paleogene rocks. Individual sills show complex fragmentation and are found close to faults. Base on their interaction with volcanic sills, faults in the study area include deep-seated and hard-linked, intermediate and shallow faults. The important piece of information from this work is that magmatic intrusions influenced configuration of faults and are major control on structural segmentation in the study area. Volcanic rocks in the JMMC were emplaced in Early Eocene during the opening of the southern Greenland Sea and in Oligocene times due to re-configuration of plate orientation and motion.