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Opphavet til magmatisme nordøst for Island gjennom de siste 25-30 millioner år har vært gjenstand for debatt. Dette studiet viser at mye av magmatismen kan knyttes til varm mantel som strømmer nordover fra Island, men at det også er en anriket, ekstra smeltbar mantel under den nordre enden av Kolbeinseyryggen, som ellers ikke er påvirket av denne varme mantelen.

The study area is located north of Iceland in the Jan Mayen-East Greenland area, NE Atlantic. It has a number of magmatic productions. Magmatism in Iceland is related to a mantle plume bringing hot mantle up from deeper levels, and it may affect surrounding areas also. In this study, we have analyzed wide-angle seismic data to determine crustal structure of a shallow plateau (Eggvin Bank) west of Jan Mayen, and reflection seismic data across a large igneous ridge (Logi Ridge) north of the West Jan Mayen Fracture Zone (WJMFZ) to determine its development over time. In addition, we integrated results from other sources based on wide-angle seismic data to determine the crust, seismic reflection data for sediment distribution, mantle tomography to derive upper mantle density below 50 km, with gravity data in order to understand the magmatic development of the larger area. This resulted in a model of the density distribution of the uppermost mantle comprising mostly the lithosphere, which can be related to how the flow of hot plume material out from Iceland affects the area.

The strongest plume influence is within the southern part of our study area around the southern Middle Kolbeinsey Ridge (MKR) It has a shallow bathymetry and thick crust. The flow increasingly deviates to the east of the MKR northwards, and apparently does not pass under the northern Kolbeinsey spreading ridge. This is consistent with published dredging results indicating that excess mantle melting is affected by an enriched mantle source. However, eastern parts may have seen episodic influence from the Iceland plume in the past. The flow crosses under Jan Mayen which has an active volcano and over the WJMFZ to the north where it becomes weaker approaching the southern tip of the Mohn's spreading ridge. The Jan Mayen Plateau is located across the WJMFZ adjacent to Jan Mayen, and has an unusually thick oceanic crust. Both Jan Mayen island and Jan Mayen Plateau correlate well with the hot asthenospheric flow. The igneous Logi Ridge north of the WJMFZ mainly developed from 25-30 until ~12Ma. The development of the ridge is coeval with the rifting of the Jan Mayen microcontinent off from Greenland, and the establishment of most of the unusual shallow seafloor (dynamic topography) on which it resides.