Structures and magmatism associated to a triple junction in Traill Ø, East Greenland

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The Late Eocene–Oligocene post-breakup magmatism of the North Atlantic Igneous Province (NAIP) (Fig. 1), is represented by sub-volcanic intrusions associated with a NE-SW oriented magmatic lineament, the Werner Bjerge Rift (WBR), extending for more than 100 Km from eastern Traill Ø to Werner Bjerge in East Greenland (Fig. 1). In the same region, strike-slip post-breakup faulting is documented along N-S trending faults belonging to the Loch Fyne Fault Zone (LFFZ), extending more than 300 Km from Traill Ø up to the north. The NW-SE trending, East Jan Mayen Fracture Zone (EJMFZ) offshore East Greenland, represented the northern boundary of the Jan Mayen Micro Continent during the Eocene–Oligocene, and extended westward, toward Traill Ø (Fig. 1). The LFFZ together with the WBR and the EJMFZ, were active during the Late Eocene–Oligocene and intersected at a 120° angle in eastern Traill Ø, typical for triple junctions. These trends are interpreted to represent the tectonic elements of a Fault-Fault-Ridge triple junction in East Greenland reactivating old structures inherited from the Caledonian Orogeny and from multi-stage rifting episodes that characterized the East Greenland basin system. Age and geochemistry of the magmatism in the WBR suggest that the Traill Ø triple junction was generated by new plate tectonics configuration and not by a mantle plume. The alkaline magmatism of the WBR initiated at Kap Parry while left-lateral strike slip faults were active and interconnected along the N-S trending LFFZ. The oceanic extension was oriented NW-SE and the EJMFZ, representing the northern crustal boundary of the Jan Mayen Micro Continent, accommodated left-lateral movement associated to the spreading along the Mohns ridge. The same strike-slip movement along the EJMFZ was responsible for tectonic inversion in the Vøring basin. Several triple junctions in the Northeast Atlantic Ocean were interpreted using geophysical data while, this paper, shows the onshore geological evidence of deformation and magmatism associated to a triple junction, highlighting the importance of inherited structures during breakup and their response to stress variations during plate tectonic modifications.

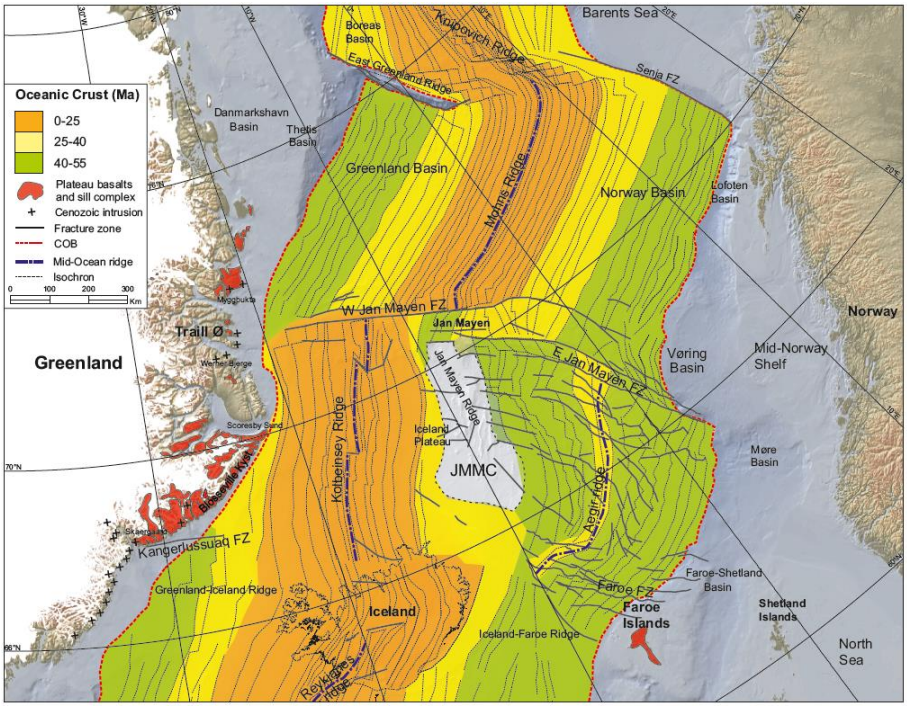

Figure 1. Northeast Atlantic Ocean magnetic anomalies, fracture zones, and gridded age of oceanic crust, showing onshore basalts and magmatic intrusions associated with the NAIP. JMMC-Jan Mayen Micro Continent.