

**Polyphase mafic dykes in the Caledonides of Finnmark revealed by a new  
high-resolution aeromagnetic dataset**

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New high-resolution aeromagnetic data from the Caledonides and Archaean-Palaeoproterozoic basement of Finnmark and North Troms derived from surveys conducted as part of NGU's MINN programme provide spectacular and confirmatory evidence for the continuation of diverse, Precambrian greenstone belts and granulite terranes beneath the relatively thin-skinned Caledonian nappes. In addition, the surveys highlight the extensive presence of blind metadolerite and unmetamorphosed dolerite dykes. Three ages of dykes are documented from isotopic dating studies – Ediacaran, Late Devonian and Early Carboniferous. The mafic dykes of Ediacaran age (c. 577 Ma) occur as swarms of metadolerite dykes in thrust-sheets in northwestern Varanger Peninsula, north of the Trollfjorden-Komagelva Fault Zone (TKFZ), and are clearly recognised as high-amplitude magnetic responses in our dataset. Such metadolerites also occur quite extensively in the Laksefjord and Kalak nappe complexes. In NW Varanger Peninsula, individual metadolerite dykes can be followed inland as linear positive magnetic anomalies over distances of 25 km or more.

In the case of the younger unmetamorphosed dolerite dykes, actual dyke outcrop is very limited. The few Late Devonian dykes (c. 370 Ma) occur mostly in eastern Varanger Peninsula. The new aeromagnetic data show, however, that up to 20 such dolerite dykes can be followed inland in the subsurface based on their linear positive magnetic anomaly signatures. The c. NNE-SSW-trending, blind dykes clearly transect structures of both Timanian and Caledonian age. South of the TKFZ, two well studied dykes are clearly identifiable by their long, linear, magnetic signatures both onland and offshore beneath Varangerfjorden. Perhaps the most spectacular manifestations of blind dolerite dykes are seen as linear positive magnetic anomalies coinciding with Early Carboniferous (Visean; c. 337 Ma) dolerite dykes exposed on Magerøya and western Digermul Peninsula. These prominent linear anomalies can be traced along many of the NW-SE to WNW-ESE-trending faults that have disrupted the Caledonian nappes. These particular dykes and faults are interpreted as relating to a period of major rifting and extension that occurred in the SW Barents Sea and onshore areas of Finnmark in Carboniferous time.