

Rock-magnetic and AMS studies of the Early Triassic rocks from Spitsbergen

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The Early Triassic Vardebukta and Vikinghøgda Formations exposed in the Bellsund and Sassendalen areas of Western and Central Spitsbergen have been sampled for rock magnetic and AMS analyses. The Triassic rocks of Bellsund are located in the hinterland zone of strong deformation in the West Spitsbergen Fold and Thrust Belt (WSFTB), while the Triassic formations of Sassendalen in the eastern, near foreland, segment of the WSFTB of central Spitsbergen, are not significantly deformed. The latter formations, however, are in close proximity to the Diabasodden suite of dolerite intrusions. The aim here is to identify the magnetic mineralogy within the sampled Triassic Formations and determine the extent to which the local tectonics and thermal events have affected their magnetic properties. Magnetic properties of the specimens were studied using petrological and rock-magnetic methods. Subsequently the in-phase and out-of-phase AMS as well as the anisotropy of remanence were investigated. The dominant ferromagnetic carriers were found to be dominated by magnetite, titanomagnetite and probably iron sulphides. The initial susceptibility values of the Sassendalen samples are slightly higher and more unified ($100\text{--}300 \times 10^{-6}$ SI) than those from Bellsund ($10\text{--}250 \times 10^{-6}$ SI). The AMS revealed the presence of different types of magnetic fabrics within the sampled sites. For most sites a normal magnetic fabric of sedimentary origin was detected and a magnetic foliation prevailed over lineation. In contrast, the fabric for the Bellsund area was strain induced and the magnetic lineation directions were found to be parallel to the general NNW–SSE trend of the WSFTB. These results are consistent with the AMS directions received from the previously investigated Hornsund-Sørkapp area. For Sassendalen, the K_{\max} axes are NNE-SSW oriented and perpendicular to those obtained for the Bellsund sites. The orientation of the Sassendalen axes is parallel to the Triassic palaeocurrent direction, which suggests a sedimentary origin of this lineation. Only at two of the Vikinghøgda Fm. sites was an inverted fabric detected. The contribution of out-of-phase AMS to the bulk susceptibility of these rocks is negligible ($\chi_{\text{out}} < 2$; $\chi_{\text{out}} \text{ ca. } 10^{-9}$ SI). However, outcomes of that experiment encourage to perform further analysis. The AARM analyses suggest that the carrier of reverse fabric is a single domain magnetite. For the Vikinghøgda samples normal and inverted fabrics change through the stratigraphic profile suggesting that the SD magnetite was of sedimentary origin rather than the result of a thermal alteration event.