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Rock magnetism of the Lower Triassic sedimentary rocks from Spitsbergen

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The rock magnetic and AMS study was undertaken on the Lower Triassic sediments from the West Spitsbergen Fold and Thrust Belt (WSFTB; Hornsund, Bellsund) and the foreland of this orogen (Sassendalen) in order to understand how thermal and deformational events affected their magnetic mineralogy. The anisotropy of low- and high-field magnetic susceptibility was measured in order to assess the degree of deformation and to isolate the ferro- and paramagnetic subfabrics whereas standard rock magnetic procedures were conducted to determine the type and grain size of ferromagnetic (s.l.) minerals. Magnetic mineralogy varies and only partly depends on the lithology. Thermomagnetic curves of whole-rock samples show that these rocks exhibit almost pure paramagnetic behavior whereas magnetic separates indicate the presence of magnetite and, in some sites, hematite. Magnetic susceptibility shows very weak field dependence, with a tendency to slight decrease in the higher fields. These results may indicate the presence of SP magnetite. Acquisition of IRM at low-temperatures confirmed that SP particles occur within these rocks together with SD and MD grains. Similar results were obtained from measurements of hysteresis loops. Most whole-rock samples showed almost purely paramagnetic magnetization. Samples from ferromagnetic separates fall into the PSD sector following the SD-MD mixing line on the Day-Dunlop plot. In contrast, out-of-phase susceptibility increases with the applied field which may point out for the presence of a minor amount of pyrrhotite. The magnetic fabric at all sampling sites is controlled by paramagnetic minerals (phyllosilicates and Fe-carbonates). In the fold belt, it reflects the relatively low degree of deformation in a compressional setting with the directions of magnetic lineation following the general NNW–SSE trend of the WSFTB. In the foreland, magnetic lineation is perpendicular to the WSFTB and reflects the Triassic paleocurrent direction (NE-SW).