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Magnetic method as a tool to investigate glacier environments (Werenskioldbreen, SW Spitsbergen)

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We used magnetic analyses as a novel approach in the investigation of glacier environments. The aim of this study was the description of transport and deposition of material released from the receding Werenskioldbreen in SW Spitsbergen, Svalbard. Surface sediments were taken from the Nottinghambukta and Werenskiold foreland, along the two main proglacial streams (north and south). Values of magnetic susceptibility (χ) and anhysteretic susceptibility (χARM) indicated the relatively large variation in samples. Material from the north stream had the highest and the most diversified values (16 <χ< 76 $\times$ 10-8m3/kg; 83 <χARM< 234 $\times$ 10-8m3/kg), whereas specimens from the south stream were more homogeneous. Magnetic minerals were identified by volume magnetic susceptibility dependence on temperature experiment. In the initial section of the south stream and the outside part of Nottinghambukta we found only magnetite. The deposits from the north stream, the second section of the south stream and the inner part of the bay include magnetite and pyrrhotite. Day-Dunlop plotting showed two types of domain state. Sediments with pyrrhotite had more single-domain grains in comparison to those with only magnetite, which indicates more multi-domain particles. χARM/χ and χARM/Mrs ratios defined three groups of deposits in terms of magnetic properties: (i) the initial section of the south stream; (ii) the north stream, the second section of south stream and the inner part of Nottinghambukta; (iii) the remaining part of the bay. The material transported by the north stream had two groups of source rocks and higher transport intensity compared to material transported by the south stream. Distribution of susceptibility values indicated that deposition of glacial material occurs in the middle of the inner part of Nottinghambukta.