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Dating reductive fluids flow by means of paleomagnetic data; example from the Triassic sandstones of the southern Spitsbergen.

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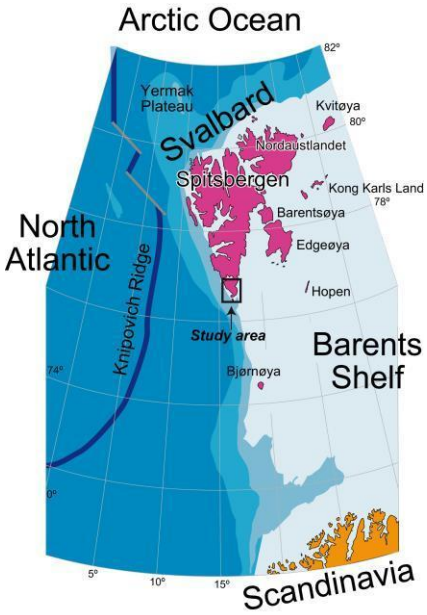

Objectives. Our goal was to use components of natural remanent magnetization (NRM), recorded in phyrrhotite grains, for a relative dating of reductive fluids flow through the sedimentary rocks of the southern Spitsbergen (Svalbard). Pyrrothite (Fe_7S_8), the only magnetic phase of iron sulphides, frequently originates during burial and/or changes of redox conditions (e.g. due to hydrocarbon migration), acquiring crystalline NRM aligned with the ambient geomagnetic field.

Methods. We present preliminary paleomagnetic results from the Triassic reservoir clastic deposits of the Sassendalen Group in southern Spitsbergen (Fig 1). These deposits occur in tectonically isolated blocks along the West Spitsbergen Fold-and-Thrust Belt that was formed during the Paleogene Spitsbergen orogeny. Magnetite and pyrrhotite have been identified as the main magnetic carriers.

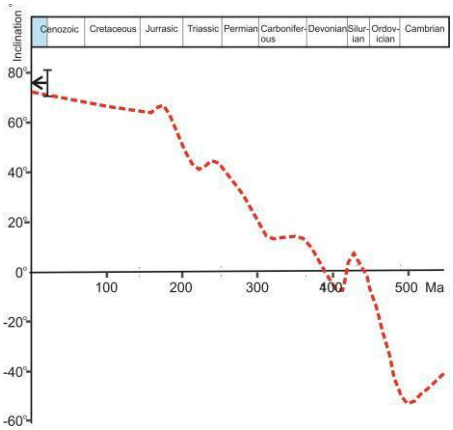

Figure 1. Location of Svalbard in the NW corner of the Barents Shelf. Rectangle indicates the study area in southern Spitsbergen.

Figure 2. Diagram showing variability of paleomagnetic inclination for the southern Spitsbergen in Phanerozoic. Arrow show a mean inclination recorded in pyrrhotite [77^{o}, reversed] with an associated error. Blue field represent inferred range of time (i.e. Late Cainozoic) of the remanence acquisition.

Intermediate unblocking temperature component as well as an intermediate coercivity component, can be assigned to phyrrhotite. The mean inclination for this component is $77^{o}\pm5^{o}$ (reversed polarity). This inclination falls within the range of the late Cenozoic paleomagnetic inclinations, calculated for the southern Spitsbergen from the APWP for Baltica [1].

Conclusions. Pyrrhotite in the Triassic sandstones of the Sassendalen Group originated in the late Cainozoic time, probably due to hydrocarbon migration through the Triassic reservoir rocks during the Spitsbergen orogeny (Fig. 2).

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References:

[1] Michalski et al (2011) Geological Magazine, 149(4): 696-721