PALEOMAGNTIC AGE OF IRON-RICH LENSES IN DEVONIAN SANDSTONES, ESTONIA

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We have studied horizontally elongated dark-red, hard lens-like interlayers in the unconsolidated Middle Devonian sandstone in the Kooskora quarry, SE Estonia. The previous mineralogical study by Shogenova et al. (2009) assumed that these unique iron-rich concretionary bodies are of diagenetic origin due to mobilization of iron by groundwater in the host sandstones. It was supposed that the diagenesis was associated with Caledonian tectonism at the end of Middle Devonian. To test the validity of this estimation, we have performed new paleomagnetic, rock magnetic and mineralogical (X-ray, SEM) studies of the formation.

Our mineralogical studies show that the pore space of the primary sand-composing minerals (quartz, muscovite, K-feldspar, rutile) is almost fully filled with fine-grained matrix composed of secondary hematite, goethite and clay minerals which hint for oxidizing environment during cement formation.

Two high coercivity and high unblocking temperature hematite-carried magnetizations were identified after thermal and alternating field demagnetization of altogether 41 samples. The components represent dual polarity ($D = 2.8^{o}$; $I = 71.0^{o}$; $k = 67.3$; $\alpha_{95} = 4.1^{o}$ and $D = 142.0^{o}$; $I = -71.9^{o}$; $k = 145.0$; $\alpha_{95} = 3.2^{o}$) but do not pass the reversal test. The virtual poles from these directions are close to the present Earth`s magnetic field, but the dual polarity and the carrier of remanence (hematite) make the viscous origin unlikely.

Paleomagnetic data suggest that these concretions may be (i) diagenetic, whereby the primary iron mineral altered to hematite in late Cenozoic or (ii) secondary late Cenozoic formations, resulting from processes associated with neotectonic movements.

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