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The possible scenarios of the Neuschwanstein's NRM origin

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The Neuschwanstein meteorite (EL-6) fall occurred on April 6, 2002 in German part of Alps. Total three meteorite fragments were discovered. Our fragments come from a 1750g body found on July 14, 2002.

Magnetic experiments were carried out in order to simulate possible Neuschwanstein magnetizing scenarios and to estimate the magnetizing paleofield value. The results indicates that the Neuschwanstein is resistant to short time (˜ years) viscous terrestrial contamination and the possible extraterrestrial magnetizing fields experienced by the Neuschwanstein meteorite were higher than present geomagnetic field.

In the case of TRM (ThermoRemanent Magnetization) character of Neuschwanstein's NRM (Natural Remanent Magnetization) the paleofield determined by various methods (comparing NRM/SIRM ratio (SIRM - Saturation Isothermal Remanent Magnetization) to empirical data TRM data (Kletetschka 2003, 2004) or comparing NRM to ARM (Anhysteretic Remanent Magnetization) intensities) the paleofield determined varies between 110 mikroT and 520 mikroT. Such high fields are nowadays present in very close proximity of Sun or giant planets. However our Sun was maybe was more active in early Solar System history possibly surrounded by more intense magnetic field enabling the conditions for observed Neuschwanstein's TRM origin.

In the case of IRM (Isothermal Remanent Magnetization) character of Neuschwanstein's NRM the experimentally determined (comparing Neuschwanstein's NRM AF demagnetization curve to demagnetization curves of IRM's produced in laboratory fields) paleofield ranges between 3000 mikroT and 4000 mikroT. Such high fields can be produced by lightings or electric discharges in early Solar system history. However they can be also easily reached by artificial hand magnets or electromagnets. Our experiments shows that the ordinary bar magnet used for magnetic experiments in teaching lab is capable to produce IRM comparable to the observed NRM in Neuschwanstein meteorite up do distance of several centimeters from the magnet's edge. The artificial hand magnets are commonly used by meteorite searchers in order to test their finds for iron contents and this was unfortunately the case of Neuschwanstein meteorite as well.

See also www.volny.cz/tomkohout/meteo.

References

Kletetschka G., Acuna M. H., Kohout T., Wasilewski P. J., Connerney J. E. P. (2004): An Empirical Scaling Law for Acquisition of Thermoremanent Magnetization. Earth and Planetary Science Letters 226, 521-528, 2004.

Kletetschka G., Kohout T., Wasilewski P. J. (2003): Magnetic Remanence in Murchison Meteorite. Meteoritics & Planetary Science 38 (3), 399-406, 2003.