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# Greigite as recorder of paleomagnetic and paleoenvironmental signals in the Pliocene sedimentary rocks of the Carpathian foredeep (Romania)

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During the Miocene-Pliocene, the Carpathian region represented the westernmost part of the so-called Eastern Paratethys, a paleo-bioprovince that covered central and eastern Europe as well as parts of southwest Asia. Previous paleomagnetic investigations provide a high-resolution magnetochronology for the sedimentary sequences of the Carpathian foredeep and indicate a marked transition in magnetic carriers from iron oxides to iron sulphides, at 6.0 - 5.5 Ma (chron C3r). Rock magnetic analyses and SEM observations indicate that the iron sulphide magnetic signal in the Romanian Carpathian foredeep is greigite. Thermomagnetic runs indicate an irreversible decrease in magnetisation with increasing temperature up to 400˚C and SEM observations indicate octahedral grain morphologies and Fe:S ratios that are indicative of greigite. Hysteresis loops have "rectangular" shapes, which are typical of single domain behaviour, with coercivity and coercivity remanence at values $B_c$ = 35-45 mT and $B_{cr}$ = 52-67 mT respectively. First order reversal curves diagrams have contours that close around single domain peaks with $B_c$ values of 45-90 mT. Isothermal remanent magnetisation component analysis reveals a small dispersion for the greigite component (DP $\sim$ 0.15 log units) indicating a narrow grain-size distribution.

We will argue here that (most of) the greigite was formed under early diagenetic conditions, i.e. within 1000 years of deposition of the sediment in this setting and that it thus can be considered as a reliable recorder of the paleomagnetic signal. Greigite formation was related to rapid sedimentation and burial of organic matter, similar

to other greigite-bearing environments in Taiwan and New Zealand. Biostratigraphic studies indicate that the lowermost water column remained well ventilated and sufficiently oxygenated throughout the entire succession, therefore we conclude that the anoxic conditions favouring greigite formation could only have been present within the sediments, probably related to degradation of organic matter during rapid burial.