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Magnetic properties of Upper Cretaceous sandstone, siltstone, and mudstone at the Simpson oil field (Alaskan North Slope) reflect contributions from authigenic greigite and from detrital Fe-Ti oxide minerals. Magnetic minerals, separated from 103 samples taken from 9 borehole cores (10-300 m depths), were identified by thermomagnetic, petrographic, and X-ray diffraction analyses. Greigite (Fe_3S_4; spinel structure) is the major magnetic mineral in most samples (G-group) from each rock type. Detrital Fe-Ti oxide minerals, principally ferrimagnetic titanohemitite and titaniferous magnetite, occur with greigite in some samples but are dominant remanence carriers in only 20-30% of the samples (FT-group). Intensities of NRM of the G-group samples range from 3×10^{-3} to 2×10^{-1} A/m, whereas those of the FT-group samples range from 6×10^{-4} to 10^{-2} A/m. Low-field susceptibilities ($4\times10^{-5}<\chi<3\times10^{-3}$ SI [volume] units) are similar for both groups. Clear distinctions between the groups can be made from plots of ARM vs. χ, and from the ranges in values of the coercivity of remanence (B_{cr}) and of the median destructive inductance (MDI) from the AF demagnetization of NRM. Slopes of ARM vs. χ are steep for G-group samples; slopes appear to decrease systematically with higher relative content of detrital Fe-Ti oxides. Values of B_{cr} (55-71 mT) and MDI of NRM (38-48 mT) in the G-group samples contrast with those values (39-48 mT and 13-22 mT, respectively) in the FT-group samples. The different magnetic characteristics of the groups probably reflect mainly the differences in size between greigite (<0.7 μm, based on SEM examination) and the detrital oxides (typically 5-50 μm), but compositional influences cannot be discounted. The value of these characteristics as discriminators among fine (<1 μm) magnetic spinels of different compositions and origins is uncertain.

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