Magnetic Properties of Greigite-bearing Cretaceous Strata, North Slope, Alaska (abstract only)
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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 ($\text{Fe}_3\text{S}_4$; spinel structure) is the major magnetic mineral in most samples (G-group) from each rock type. Detrital Fe-Ti oxide minerals, principally ferrimagnetic titanohematite 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 $3 \times 10^{-3}$ to $2 \times 10^{-1}$ A/m, whereas those of the FT-group samples range from $6 \times 10^{-5}$ to $10^{-3}$ A/m. Low-field susceptibilities ($4 \times 10^{-5} < \chi < 3 \times 10^{-3}$ SI [volume] units) are similar for both groups. Clear distinctions between the groups can be made from plots of ARM vs. $\chi$, 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. $\chi$ 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.