



Why every paleomagnetist should care about greigite

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Greigite (Fe_3S_4) is an authigenic ferrimagnetic mineral that can grow within sediments or sedimentary rocks at any time during diagenesis when dissolved iron and sulphide are available for sulphidization reactions under appropriate Eh-pH conditions. Previous studies have reported dominantly single domain (SD)-like magnetic properties for natural samples, which, along with thermal instability at temperatures of $\sim 270\text{-}350^\circ\text{C}$, has been taken to be characteristic of sedimentary greigite. We have recently demonstrated that greigite also commonly occurs within sediments in the superparamagnetic (SP) state. Variable mixtures of SD and SP greigite produce a range of magnetic properties, which, when recognised, indicates that greigite is much more widespread within the geological record than was previously thought. Attribution of this more complete range of magnetic properties to the presence of greigite will aid its identification, and will also help to constrain interpretation of magnetic signals carried by greigite. The fact that greigite can form at variable times during diagenesis, and that it is widespread in rocks deposited under anoxic conditions, has major implications for paleomagnetic records. Paleomagnetists working on such rocks and sediments should be concerned about the possible presence of greigite and its potential to complicate interpretation of paleomagnetic records.