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Magnetic mineral assemblages in soils and paleosols as the basis for paleoprecipitation proxies: A review of magnetic methods and challenges

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ABSTRACT

Magnetic iron oxide minerals, principally magnetite, maghemite, hematite, and goethite are formed in well-drained soils in response to a suite of physical, chemical, and biological factors. Despite a wide range of complexity in the pedogenic processes that lead to magnetic mineral formation, dissolution, and transformation, there are well-documented empirical relationships between various magnetic mineral assemblages in soils with environmental and climatic conditions. Recently there has been an increase in the number of quantitative magnetic paleoprecipitation proxies that have been developed, and there is great potential for magnetic methods to be used in the geologic record to develop reconstructions of past climates. Magnetic paleoprecipitation proxies have been widely utilized in Quaternary or younger loess-paleosol systems; however, they have yet to be utilized in the pre-Quaternary fossil record. Future studies

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