Geochemical fingerprinting of eccentricity-related cycles in ~2.5 Ga banded iron formation

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In a recent study, we showed that outcrops of the ~2.5 Ga Kuruman Banded Iron Formation (BIF) in South Africa reveal a characteristic pattern in weathering profile that can be laterally traced over ~250 km (Lantink et al., 2019)*. Cyclostratigraphic analysis combined with high-precision U-Pb dating indicated that this pattern reflects a hierarchy of two superimposed cycles linked to orbital eccentricity, i.e. astronomical climate forcing. Here we present magnetic susceptibility and high-resolution XRF core scan data of a new drill-core through the Kuruman BIF, providing insight into the chemical changes that are associated with the cyclicity observed in the field. The characteristic pattern is particularly well expressed in the Fe/Mn record, suggesting a direct climate control on the deposition and relative abundance of iron oxide and iron carbonate minerals. Combined with precise U-Pb ages, this record may additionally be used to establish cyclostratigraphic correlations.

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