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Stratigraphic correlation of the Duitschland/Rooihoogte formation(s) (South Africa) and its implications for the Great Oxidation Event (GOE)

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The Duitschland and Rooihoogte Fms, Transvaal Supergroup, both record a shift from mass-independent to mass-dependent S isotope fractionation, which marks the transition from a reduced to a slightly oxidized atmosphere at the ~2.32 Ga GOE. It is, however, still debated whether these depositional units were formed simultaneously or subsequently with the Duitschland predating the Rooihoogte Fm [1,2]. A synchronous deposition would indicate a sudden initial atmospheric oxygenation at the start of the GOE, while a subsequent deposition would indicate a highly oscillating and dynamic atmospheric oxygenation over a period of roughly 100 million years [3]. Here we present lithological, sequence stratigraphic and geochemical data from three drill cores intersecting both the Duitschland and Rooihoogte Fms. All drill cores show close geological and geochemical similarities, indicating a shared sediment provenance and thus contemporaneous deposition pointing towards a sudden nature of the GOE. Ongoing radiogenic isotope work aims to further constrain the detrital source of these sedimentary formations.

[1] Schroeder et al. (2018), Precamb. Res. 310; 348-364 [2] Gumsley et al. (2017), PNAS 114; [3] Poulton et al. (2021), Nature 592

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