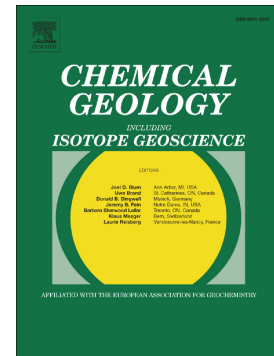


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## FRACTION-SPECIFIC CONTROLS ON THE TRACE ELEMENT DISTRIBUTION IN IRON FORMATIONS: IMPLICATIONS FOR TRACE METAL STABLE ISOTOPE PROXIES

P.B.H. Oonk<sup>a,b,\*</sup>, H. Tsikos<sup>a</sup>, P.R.D. Mason<sup>b</sup>, S. Henkel<sup>c,d</sup>, M. Staubwasser<sup>c</sup>, L. Fryer<sup>a</sup>, S.W. Poulton<sup>e</sup> and H.M. Williams<sup>f,1</sup>

<sup>a</sup> Geology Department, Rhodes University, Artillery Road, Grahamstown, 6140, South Africa

<sup>b</sup> Department of Earth Sciences, Universiteit Utrecht, Budapestlaan 4, 3584CD Utrecht, The Netherlands

<sup>c</sup> Institute of Geology and Mineralogy, University of Cologne, Zùlpicher Str. 49a, 50674 Cologne, Germany

<sup>d</sup> Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Am Handelshafen 12, 27570 Bremerhaven, Germany

<sup>e</sup> School of Earth and Environment, University of Leeds, Leeds LS2 9JT, United Kingdom

<sup>f</sup> Department of Earth Sciences, Durham University, DH1 3LE, United Kingdom

### ABSTRACT

Iron formations (IFs) are important geochemical repositories that provide constraints on atmospheric and ocean chemistry, prior to and during the onset of the Great Oxidation Event. Trace metal abundances and their Mo-Cr-U isotopic ratios have been widely used for investigating ocean redox processes through the Archean and Paleoproterozoic. Mineralogically, IFs consist of three main Fe-bearing fractions: (1) Fe-Ca-Mg-Mn carbonates, (2) magnetite and/or hematite and (3) Fe-silicates. These fractions are typically fine-grained on a sub- $\mu\text{m}$  scale and their co-occurrence in varying amounts means that bulk-rock or microanalytical geochemical and stable isotope data can be influenced by cryptic changes in mineralogy. Fraction specific geochemical analysis has the potential to resolve mineralogical controls and reveal diagenetic versus primary precipitative controls on IF mineralogy. Here we adapt an existing sequential extraction scheme for Fe-phases (Poulton and Canfield, 2005) to the high Fe-content in IF and the specific three-fraction mineralogy. We optimized the scheme for magnetite-dominated Archean IFs using samples from the hematite-poor Asbestos Hills Subgroup IF, Transvaal Supergroup, South Africa. Previously commonly-used hydroxylamine-HCl

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\* Corresponding author: Department of Earth Sciences, Universiteit Utrecht, Budapestlaan 4, 3584CD Utrecht, The Netherlands E-mail: [pbhoonk@gmail.com](mailto:pbhoonk@gmail.com).

<sup>1</sup> Current address: Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge, CB2 3EQ, United Kingdom

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