

Fluctuations in ocean redox during the Mesoproterozoic Era: Evidence from the Bashkirian Uplift, South Urals, Russia

KATHERINE A. DOYLE¹, SIMON W. POULTON¹,
ROBERT J. NEWTON¹, ANDREY BEKKER² AND
VICTOR N. PODKOVR³

¹Earth Surface Science Institute, School of Earth and Environment, University of Leeds, LS2 9JT, UK.
Email for correspondence: eekd@leeds.ac.uk

²Department of Earth Sciences, University of California, Riverside, CA 92521, USA

³Institute of Precambrian Geology and Geochronology, Russian Academy of Sciences, St. Petersburg 199034, Russia

The Mesoproterozoic Era (1.6 – 1.0 Ga) has long been considered a period of relative stasis in Earth's environmental evolution. This is, however, largely due to a lack of detailed geochemical studies from this period, and recent research suggests that there may have been early episodes of deep ocean oxygenation in certain basins across this time period. Here, we build upon these limited observations with a thorough redox reconstruction of the Bashkirian Uplift sedimentary sequence (1.6 – 0.6 Ga) in the South Urals of Russia.

The results from iron speciation presented here demonstrate that this water column mainly experienced anoxic, ferruginous conditions. However, during the Late Mesoproterozoic, oxic conditions prevailed in deeper waters. This suggests that at greater depths in the Mesoproterozoic ocean, deep waters were not restricted to a constant redox state, but rather underwent episodic changes. To further understand how this flux in redox affected water column chemistry, trace metals (Mo, Re, V, U, Zr, Cr), sulphur isotopes, total organic carbon (TOC) and major elements (Al, Mn, P) were also measured. In addition to presenting these new redox analyses, we will reveal new data pertaining to the behaviour of the phosphorus cycle under the variable redox conditions encountered in the Bashkirian sequence.