Testing the value and limitations of redox-sentitive biomarker proxies

JORDAN KINSLEY [1]*, SIMON POULTON[2], MICHAEL KIPP[3], LENNART VAN MALDEGEM[1] AND JOCHEN BROCKS[1]

[1] The Australian National University, Canberra, 2600, Australia
(*Correspondence: jordan.kinsley@anu.edu.au)
[2] University of Leeds, Leeds, LS2 9JT, United Kingdom
[3] University of Washington, Seattle, WA 98195, USA

Lipid biomarkers present a wealth of information, and are currently used for proxies to recontruct for a variety of environmental and ecological conditons including; community composition, ocean chemistry, biodegradation, thermal maturity and redox. However, using biomarkers for the latter has been proven challenging as the limited preservation of indigenous biomarkers in sedimentairy rocks, with varying thermal and diagenitic histories throughout time, is a constant compounding factor in deciphering their systematic variation. Generally, inorganic geochemical parameters (*e.g.* iron speciation, stable isotopes), have been proven to be more robust in reconstructing the redox conditions of ancient depositional archives. To date, only a few studies have investigated the co-variation of lipid biomarkers with inorganic proxies.

Here, we present a multi- scale, multiproxy study—combining lipid biomarkers, iron speciation and stable isotopes—performed on 80 samples from the Currant Bush Formation, Georgia Basin, Australia, across a 60 meter interval, with a particular focus up a 3.5 metre subsection. The analyzed section displays a a variety of facies and multiple orders of sedimentary cycling allowing for a full comparison of the measured geochemical parameters. Our generated results display the controls, limitation and usefullness of biomarkers as redox-sentive proxies, these results will be of benefit for improved oil-source rock correlations as well as the investigation of redox conditions in ancient depostional basins which do preserved high amount of organic matter, but yield an altered or limited trace elemental composition.