

Lipid biomarker records from the Early-Middle Ordovician of Spitsbergen, Norway

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The Ordovician period (485-444 Ma) was a time of dramatic climatic and biospheric changes, including both a major biodiversification in the Early-Middle Ordovician ocean and a glaciation and major mass extinction in the Late Ordovician. Changes in climate, oceanographic state, and trophic structure are hypothesised to have been major drivers of these biotic events, but relatively little is known about the structure of microbial communities at the base of the food chain. Detailed lipid biomarker and organic geochemical analyses have been generated for the Late Ordovician (e.g., Rohrssen et al., 2013), but the Early-Middle Ordovician marine record has been less scrutinised.

This study examines exceptionally well-preserved strata spanning the Tremadocian through Upper Dapingian from the Oslobreen Group in Spitsbergen, Norway. Strata were pre-screened using Rock Eval pyrolysis and this places the thermal maturity of these rocks in the early-middle oil window stages. Samples from the Kirtonryggen Formation and overlying Valhallfonna Formation were extracted and analysed using highly sensitive gas chromatography-mass spectrometry in metastable reaction monitoring mode (MRM). We use a compilation of lipid biomarker and stable isotope stratigraphic records to better characterise microbial communities, paleoenvironments, and marine nutrient cycling during this time period.