Molecular Proxies for Cyanobacterial Production during OAE 1a and for Cooler Waters during the Late Valanginian at Shatsky Rise

The occurrences, distributions, abundances and isotopic compositions of preserved suites of biomarkers in organic-rich marine sediments provide proxy records that can be interpreted in terms of environmental, climatic and evolutionary change. Assemblages of biomarkers in Lower Aptian sediments from Shatsky Rise provide evidence of variations in phytoplankton production during OAE 1a. In particular, stratigraphic variations in the prevalence of 2-methylhopanoid hydrocarbons and ketones through the event attest to significant, yet fluctuating, contributions from cyanobacteria. A prominent role for cyanobacteria among the plankton is consistent with the possibility that nutrient limiting conditions favored organisms able to fix nitrogen. The occurrence of sterol ethers in Quaternary and Neogene sediments appears to be restricted to upwelling systems, which has prompted the suggestion, still unproven, that they derive from diatoms. Sterol ethers have also been found to occur in late Eocene through Oligocene sediments from high latitudes, suggesting an affinity with cooler water regimes. Recognition of a suite of sterol ethers in a late Valanginian organic-rich interval from Shatsky Rise therefore prompts speculation that these compounds may reflect the presence of cooler waters during this interval of the early Cretaceous.