LATE VALANGINIAN ORGANIC-RICH SEDIMENTS FROM SHATSKY RISE IN THE PACIFIC (ODP LEG 198) AND STEROL ETHERS AS A MOLECULAR PROXY OF PALEOENVIRONMENTAL CONDITIONS.

Simon C. Brassell
Biogeochemical Laboratories, Department of Geological Sciences, Indiana University, Bloomington, IN 47405-1403, U.S.A.(simon@indiana.edu/Fax: 812-855-7961.)

The occurrences, distributions, abundances and isotopic compositions of many biomarkers in marine sediments provide proxy records that can be interpreted in terms of environmental, climatic and evolutionary change. The exceptional preservation of biomarkers in sediments rich in organic matter permits use of molecular measures to assess oceanic events at these times. ODP Leg 198 drilled on Shatsky Rise in the West Pacific recovering pelagic sequences of the Lower Aptian OAE (1a) at three sites (1207, 1213 and 1214). In addition, at Site 1213 on the southern high of Shatsky Rise two organic-rich intervals (C$_{org}$ contents of 2.54%, 3.13%) from the Valanginian were found. Enhanced organic carbon sequestration at this time is known within the Tethyan realm, but was not recovered during previous drilling in the West Pacific. The biomarkers in both these Valanginian samples consist of components of algal and bacterial origin comparable to those found in younger sediments from OAE1a. The similarity in the distributions of steroidal hydrocarbons and ketones from Valanginian to Aptian suggests long-term consistency in the populations of planktonic eukaryotes during the early to mid Cretaceous, except that molecular evidence for contributions from cyanobacteria were conspicuously absent in the older Valanginian sediments. The occurrence of sterol ethers in Quaternary and Neogene sediments appears to be restricted to upwelling or high productivity systems. This observation 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. Thus, the recognition of a suite of sterol ethers in a late Valanginian organic-rich interval from Shatsky Rise prompts speculation that these compounds may reflect cooler waters or nutrient enrichment. Shatsky Rise lay within the equatorial divergence zone during this interval of the early Cretaceous, which suggests that the occurrence of sterol ethers may be attributed to intensified upwelling.