



Benthic foraminiferal micro-ecology and the geochemical environments they sample

Brittani Jacobsen (1), Paul Loubere (1), Iryna Yavorska (1), Dorthe Klitgaard-Kristensen (2), and Patrycja Jernas (2)

(1) Dept. of Geology and Environmental Geosciences, Northern Illinois University, USA (ploubere@niu.edu), (2) Norwegian Polar Institute, Tromsø, Norway (dorthe.klitgaard@npolar.no)

Benthic foraminifera inhabit, and are adapted to, microenvironments ranging from within the water column to centimeters into the sediments. These influence the geochemistry of the foraminiferal shell, and the paleoceanographic tracers we extract from that geochemistry. For a number of proxies it is important to know what geochemical environments the foraminifera are calcifying in, and whether species are consistent in the habitats they select for calcification. We examine these issues by sampling pore water chemistry and living species distributions on the microscale that the foraminifera themselves experience. We maintained cores from the Norwegian margin under in-situ conditions while measuring oxygen microprofiles and small scale sampling for foraminifera using rose Bengal and cell tracker green staining. In addition we sampled cores for porosity and pore water carbon isotopes using two extraction techniques so as to measure isotope profiles and degree of sediment irrigation via infaunal structures. The primary forcing variable we examined was changing labile organic carbon flux to the seabed. Under moderate to higher fluxes we found evidence for extensive bio-irrigation which influenced the composition of pore waters and microhabitats available to foraminifera. Macro-meiofaunal burrows and tubes produced a mosaic of pore water geochemical conditions rather than smooth gradients from the sediment-water interface. We found species adapted to particular conditions living at various subsurface depths, where their preferred conditions existed. We also found evidence that foraminiferal species responded to larger organism activities (feeding activities) and products (fecal deposits). It appears that taxa select for particular conditions rather than simply living at specific subsurface depths, recording whatever geochemistry happens to exist at that level.