

The benthic fauna from the lower Maastrichtian chalk of Kronsmoor (Saturn quarry, northern Germany): composition and palaeoecologic implications

Julia Engelke (1), Christian Linnert (2), Jörg Mutterlose (2), and Markus Wilmsen (1)

(1) Senckenberg Naturhistorische Sammlungen Dresden, Museum für Mineralogie und Geologie, Dresden, Germany (julia.engelke@senckenberg.de, markus.wilmsen@senckenberg.de), (2) Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum, Bochum, Germany (christian.linnert@rub.de, joerg.mutterlose@rub.de)

The Saturn quarry near Kronsmoor (northern Germany) offers an undisturbed section of upper Campanian to lower Maastrichtian chalks. The target interval of the DFG project “Biodiversity and plankton-benthos coupling: an integrated ecosystem analysis from the Late Cretaceous Chalk” is focused on the lower Maastrichtian *Belemnella obtusa* Zone to mid-*Belemnella sumensis* Zone, i.e. to the uppermost Kronsmoor and lowermost Hemmoor formations. In this interval, a conspicuous increase in macrofossil abundance without apparent lithofacies changes has been observed and the project intends to integrate planktic, benthic and geochemical proxies for a comprehensive understanding of the Chalk Sea ecosystem. The aim of this study is the analysis of the benthic community. In a first step, the benthic body fossils of the c. 25-m-thick section were semi-quantitatively studied based on a collection of more than 1,000 specimens. Two successive benthic macrofossil assemblages were recognised: the lower interval (upper part of the Kronsmoor Formation, *B. obtusa* Zone) is characterized by low abundances, only about 100 macroinvertebrates were collected, mostly irregular and regular echinoids, brachiopods and crinoids. The upper interval (*B. sumensis* Zone) shows an eight times higher macroinvertebrate abundance and a conspicuous dominance of brachiopods, increasing from only 30 to over 500 specimens. In order to quantify the observed qualitative palaeoecological changes, 33 bulk samples of about 6 kg each were retrieved in a distance of c. 0.75 m. The bulk samples were frozen and thawed, washed and sieved in different sizes. The fraction 500 μm –1 mm and >1 mm were picked, sorted and counted. A diverse assemblage of bryozoans, foraminifers, shell fragments of brachiopods and bivalves, spines and test fragments of different echinoid taxa, parts of asteroids and ophiuroids, sponge debris, crinoids and small serpulids, is present. Reduced abundances in the lower part and generally higher abundances in the upper part are recognised. The palaeoecological analysis of both datasets indicates different guilds, of which epifaunal suspension feeders (fixo-sessile and libero-sessile guilds), comprising c. 50 % of the fauna in the lower interval, increase to a dominance of c. 80 % in the upper interval, including a considerable proportion of rhynchonelliform brachiopods. The palaeoecological data of benthic communities at Kronsmoor are indicative of increased nutrient availability during the early Maastrichtian. However, in the absence of any evidence of increased productivity in the overlying photic zone (calcareous nannofossil data), a lateral input (upwelling) of nutrient-rich waters onto the shelf to fuel the benthic ecosystem has to be considered. This view is supported by records of contemporaneous changes in latest Cretaceous ocean circulation that followed the latest Campanian cooling event, inclusive of a southward spread of waters of intermediate depth from high-latitudes.