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Submerged terrestrial landscapes in the Baltic Sea: Evidence from multiproxy analyses of sediment cores from Fehmarnbelt

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Five sediment cores were taken from the southern part of the Fehmarn Belt (Baltic Sea) in the context of an environmental impact study for the intended fixed traverse between Germany and Denmark. The lithologies of the 8m long cores reveal dramatic changes in sedimentary environments which reflect the early Holocene history of the southern Baltic Sea. A succession of terrestrial, semiterrestrial and limnic facies from glacial sediments to peat, lacustrine/estuarine deposits and finally marine sediments document the interplay of eustatic sea level rise and isostatic rebound, which finally lead to the establishment of marine conditions during the Littorina transgression. An age control of the observed changes was established by dating over 50 C-14 samples of different fractions. During the Lateglacial minerogenic varves with thicknesses of several centimeters verify the existence of a proglacial lake in the Fehmarnbelt. Peat development started around 11.250 cal. BP and terminated ca. 10.600 cal. BP which is roughly contemporaneous with the end of the Yoldia Phase in the central Baltic Sea. The oldest peat layers consist of undecomposed sedges and reed. Woody remains of willows appear not before 10.700 cal BP and indicate a stagnant or slowly decreasing water table. This semi-terrestrial phase is followed by a shallow inland lake which existed until the Littorina transgression around 8.300 cal. BP. Initially the lacustrine sediments exhibit high C/N ratios, low low $\delta^{13}C_{org}$ values and contain numerous wood fragments as well as other botanical macro remains. This indicates shallow conditions close to the lake shore. Later, the occurrence of planktonic diatom species such as *Aulacoseira ambigua* suggest greater water depths. We did not find any indications of the often postulated catastrophic outburst of the Ancylus Lake via Fehmarnbelt and the Great Belt into the North Sea. Likewise, XRF scanning does not show conspicuous peaks in Ti or K which would have been deposited during floods in old river channels of the hypothesized Dana River. Instead diatom assemblages indicate rather calm conditions. Between 9.850 and 8.900 cal. BP carbonate rich sediments were deposited under now shallow water conditions consisting of autochthonous carbonates, mollusk shells (especially *Bithynia tentaculata*) and oogonia of charophytes. The diatom record shows first indications of slightly brackish conditions starting ca. 10.300 cal. BP with the appearance of *Mastogloia smithii* which is about 2000 years older than the Littorina transgression dated in our record to around 8.300 cal. BP. This marine transgression finally inundated the inland lake and caused a rise of the water level of more than 20 m.