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Holocene environmental and transgressional history of the North Sea (German Bight)

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A thorough understanding of the transgressional history of the southern North Sea during the Holocene is extremely important as the relative sea level rise has greatly influenced and is still influencing the intricate coastal landscape of barrier islands, tidal flats and marshland which is characteristic of the lowland areas of the Netherlands, north-western Germany and western Denmark today. In this study, a refined relative sea-level curve of the German Bight for the last approximately 10 cal. kyr is presented, compiled from Behre (2003). The area was laid completely dry during the Weichselian glacial period. Sea level is then assumed to have risen rapidly by ca. 1.25 m per century up to 7 cal. kyr BP, after which fully marine conditions became widely established and a relative sea level of approximately -8 m NN was reached. However, dated transgression level fix-points from the southern North Sea during this original period of sea level rise are still rare (e.g. compilation of Shennan et al. 2000) and very little information is available on the exact character and continuity of the transgression. During the last approximately 7 kyr, the rate of relative sea-level rise (RSLR) greatly fluctuated but decreased, on average, to about 0.11 m per century. Several marine still stands and regressions have been registered by the occurrence of extensive intercalated peat layers in the tidal flat areas far beyond the present coastline (Behre, 2003). This part of the German sea level curve is much better constrained with respect to available time-depth fix-points.

The main aim of the present study is to add new transgression level fix-points (through radiocarbon and palynological dating of North Sea cores) to the present relative sea level curve of the German Bight (especially for the Early Holocene), and to compare the refined curve with similar sea level curves from Belgium and The Netherlands, in

addition to several widely accepted, conventional eustatic sea level curves. A decreasing rate in RSLR is found from the German Bight, through the northern and western Dutch North Sea sectors, to the Belgian sector. These differences provide insight into the net subsidence rates of the North Sea and its coastal areas during different time intervals, which in turn have been caused by one or a combination of interacting regional/local factors such as crustal movement and/or glacio- and hydro-isostatic rebound. Exact determination of the nature of RSLR and its potential causes and effects may help predict the future morphological development of the southern North Sea and its intensively utilised coastal zone.

References:

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