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Dewatering systems of the deglacial North Sea palaeolandscape in the German Bight

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Today's North Sea shelf differs fundamentally from the environmental scenario at the transition from the last glaciation to the Holocene, when the sea-level was 110-130 m lower than today. Vast parts of the southern North Sea shelf formed a land mass that connected Great Britain to continental Europe, the so called Doggerland. This now submerged landscape with its coastal areas as well as the hinterland with its river systems provided an optimal environment for Mesolithic hunters and gatherers. A significant role in this deglacial landscape played the Elbe Palaeovalley (Elbe-Urstromtal) with its tributaries – a vast dewatering system draining the coastal lowlands. Between 10 and 7 ka cal. BP the Doggerland was affected by a relative rapid rise in sea level of about 40 m, during which wide parts of the coastal lowlands were converted to shelf and coastal seas. The coast line and its associated river estuaries were shifted within a few thousand years toward their present locations. Due to the drastically changing environmental conditions, the morphology of the dewatering structures, the depositional regime within the channels and the role of the dewatering structure itself changed also. All this is reflected in the geophysical and sedimentological record. We present exemplary the geological response of the Elbe Palaeovalley and of one of its ancient tributary systems to the Holocene marine transgression. The Elbe Palaeovalley changed its role from a glacial drainage channel, over the assumed integration into a proglacial lake, to a deglacial dewatering system and finally, after submerging into the North Sea, to a sediment trap. The tributary, on the other hand, silted up rapidly within a few hundreds of years due to sea-level rise, before it finally submerged in the inundating North Sea. 2D and pseudo-3D- shallow seismic mappings of these dewatering structures in combination with sediment cores and geotechnical cone penetration tests taken from the channel infill provides new insights into the dynamic change of this deglacial and postglacial paleo-landscape in the course of the sea level rise.