HOLOCENE DEPOSITS IN THE NORTHERN NORTH SEA: EVIDENCE FOR DYNAMIC CONTROL OF THEIR MINERAL AND CHEMICAL COMPOSITION – REPLY –

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We agree with JANSEN (1980) that the late-glacial and postglacial history of the northern North Sea strongly influenced seafloor morphology and stratigraphy in that region. We further agree that sedimentation rates in the early Holocene were much faster than they are today. These are stated in JOHNSON & ELKINS (1979).

At present sediment accumulates only in water depths exceeding 115-120 m throughout most of the northern North Sea, where the Upper Witch Deposits of JANSEN ET AL. (1979) are found. JANSEN (1980) mentions that little or no late Holocene pollen is found in Upper Witch Deposits. This indicates that most fine-grained material comprising the clayey Upper Witch Deposits is derived from nearby topographic highs, or that present-day pollen decomposes before it can be transported to and buried in the depressions of the northern North Sea. Topographic highs undoubtedly are swept free of Recent sediment whenever the North Sea is subjected to large storms. The topographic highs consist primarily of poorly-sorted sandy clays (morainic or proglacial Hills Deposits of JANSEN ET AL., 1979), but they frequently are covered with a few centimetres of relatively well-sorted sand (Upper Witch Deposits) (JANSEN ET AL., 1979; JOHNSON & ELKINS, 1979), indicating that bottom currents not only prevent deposition of Recent sediment, but also winnow the fines and presumably transport them to the nearby deeps. Thus, using the stratigraphic nomenclature of JANSEN ET AL. (1979), much of the northern North Sea floor is covered by Upper Witch Deposits. We could classify the Upper Witch Deposits further into the sandy lag facies on the topographic highs, and the clayey chaff facies in the surrounding depressions. Jansen may contend that any sediments in the basins with a median grain size finer than 25 μm are early Holocene, Lower Witch Deposits or the underlying Fladen Deposits. We would counter with our C-14 date of 4780 $\pm$ 130 years BP at 27 cm depth in Core 59BX, wherein the sediment has a mean grain size of about 10 μm. This clearly indicates that all late Holocene sediments in the northern North Sea do not fall within the textural definition of JANSEN ET AL. (1979) for Upper Witch Deposits.

JOHNSON & ELKINS (1979) focused upon the variations in texture, biogenic and inorganic composition of near-surface sediments cored from throughout a large area of the North Sea. Most of these sediments are Upper Witch Deposits, and thus are from the same stratigraphic horizon. Sediments from the Norwegian Channel (Cores 30BX, 50G, 51G) are also Recent, and we see no *a priori* reason to discard them from our results. They are time-equivalent to our samples to the west. Similarly Cores 1BX and 2BX from the southern North Sea recovered Recent sediment, and can be compared to our Recent sediments farther north. We believe that JANSEN (1980) may be justified in criticizing our inclusion of the following 8 samples in our study because they may be Lower Witch Deposits of early Holocene age: Core 3G, bottom 3 samples; Core 19BX, bottom sample; Core 70BX, bottom 2 samples; and Core 72BX, bottom 2 samples. When we discard these samples from our data base we arrive at the same conclusions that we obtained from the original 62 samples. Similarly, when we examine only our samples from the Flex Box, we still arrive at the same conclusions.

The bottom sediments of the northern North Sea cannot be viewed as a static mosaic of late-glacial and Holocene strata cropping out upon the present sea floor. We do not deny that the Quaternary history of the area influences the composition and texture of the sediment cover. However, the variations in composition and texture of the late Holocene deposits undoubtedly reflect their response to present ocean conditions, as described in JOHNSON & ELKINS (1979).

REFERENCES

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