The dynamic chalk sea floor: Seismic data and photogrammetry of the Stevns Klint area reveal long-lived contour current systems influencing bathymetry

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tirsdag den 2. marts kl. 16:00
Geologisk Museum, Øster Voldgade 5-7

Stereo-photogrammetric mapping of the 12 km long sea cliff Stevns Klint in cooperation with Tove Damholt and Morten Bjerager provides the first complete profile of the cliff since 1853. The method allows projection of the digitally recorded data representing all bedding planes, flint bands and hardgrounds onto planes parallel to the main lines of section. The result is a stunning picture of one of the World's finest examples of a biogenic carbonate mound complex.

New seismic data recorded offshore Stevns Klint by Holger Lykke-Andersen and Finn Surlyk necessitate a complete re-evaluation of chalk deposition and palaeoceanography. The data show that the c. 1 km thick chalk succession is not neatly horizontally bedded as should be expected from a pelagic sediment composed mainly of micron-sized coccoliths. In contrast a system of valleys and ridges characterised the chalk sea floor from Cenomanian–Turonian time and persisting until its demise in the early Cenozoic. The ridge-valley system has wavelengths in the kilometre scale and amplitudes up to 150 m and is traced onshore to the Stevns peninsula based on shallow well data. The bathymetric relief is mainly of depositional nature, but erosion, bypass and condensation can also be recognized. The ridge-valley system is oriented roughly NW–SE, parallel to the Tornquist Zone, which was a prominent topographic feature formed by inversion tectonics along the NE margin of the Danish Basin. The ridges and valleys are interpreted as controlled by a system of bottom currents flowing parallel to bathymetric contours along the length of the Tornquist Zone.

The chalk sea floor was thus a highly dynamic environment influenced by long-lived current systems, which controlled the formation of a rather dramatic sea-floor relief. Outcrop, well and oil field data should be re-examined in this light and be integrated into a broader picture of the Late Cretaceous cool-water carbonate province.

Finn Surlyk received his cand. scient. (M.Sc.) degree in 1968 and subsequently a Ph.D in 1971, both from the University of Copenhagen. From 1971 to 1980, he worked as an Associate professor at the University of Copenhagen and received a dr.scient. degree in 1978. Finn Surlyk then became Head of the Petroleum Geology Department of the Geological Survey of Greenland (GGU) from 1981 to 1984. From 1984 to 1989 he worked as Research Professor at the GGU, and has since 1989 been Professor at the University of Copenhagen. During his research career Finn Surlyk has published more than 141 papers in international journals.