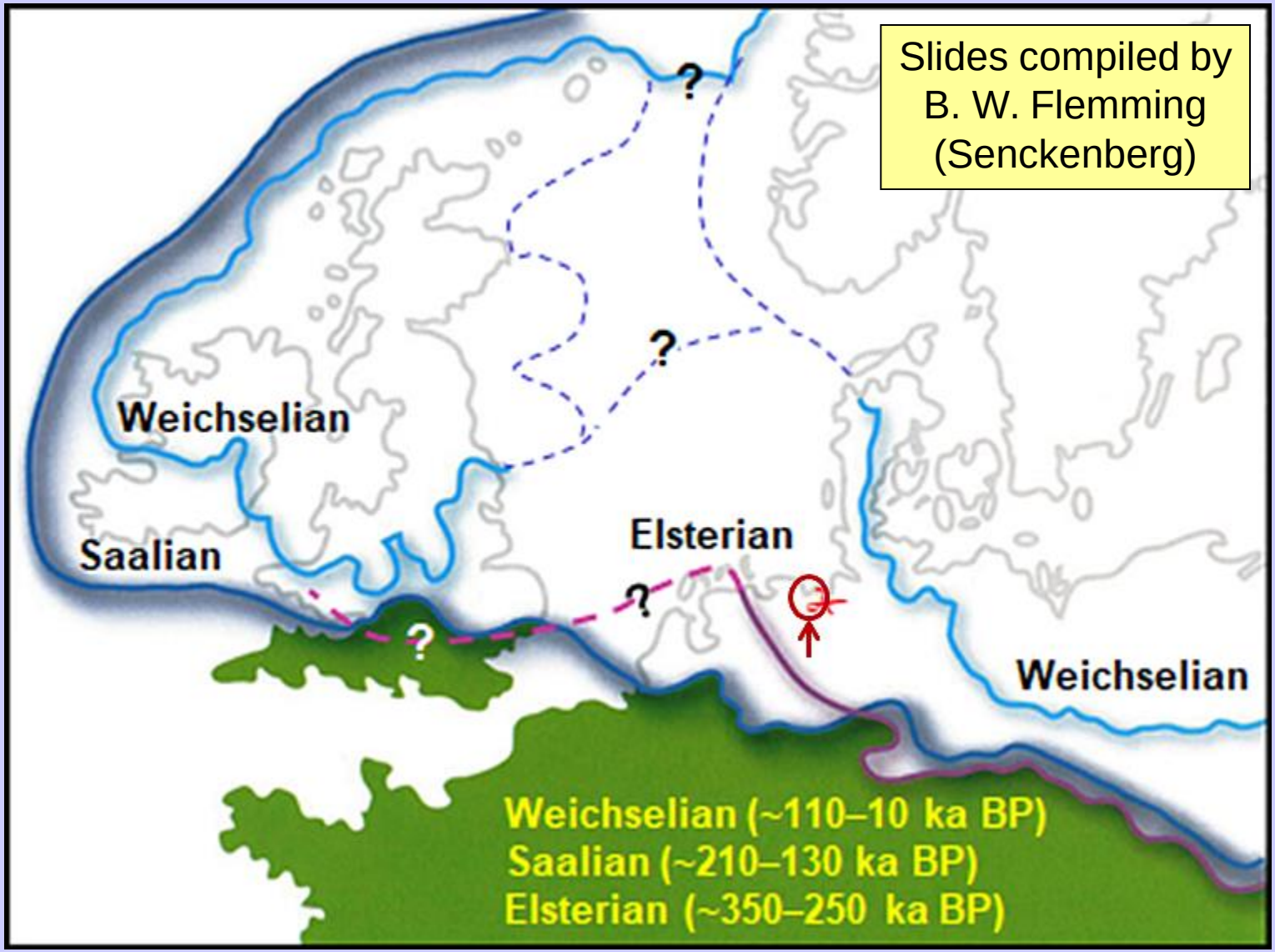
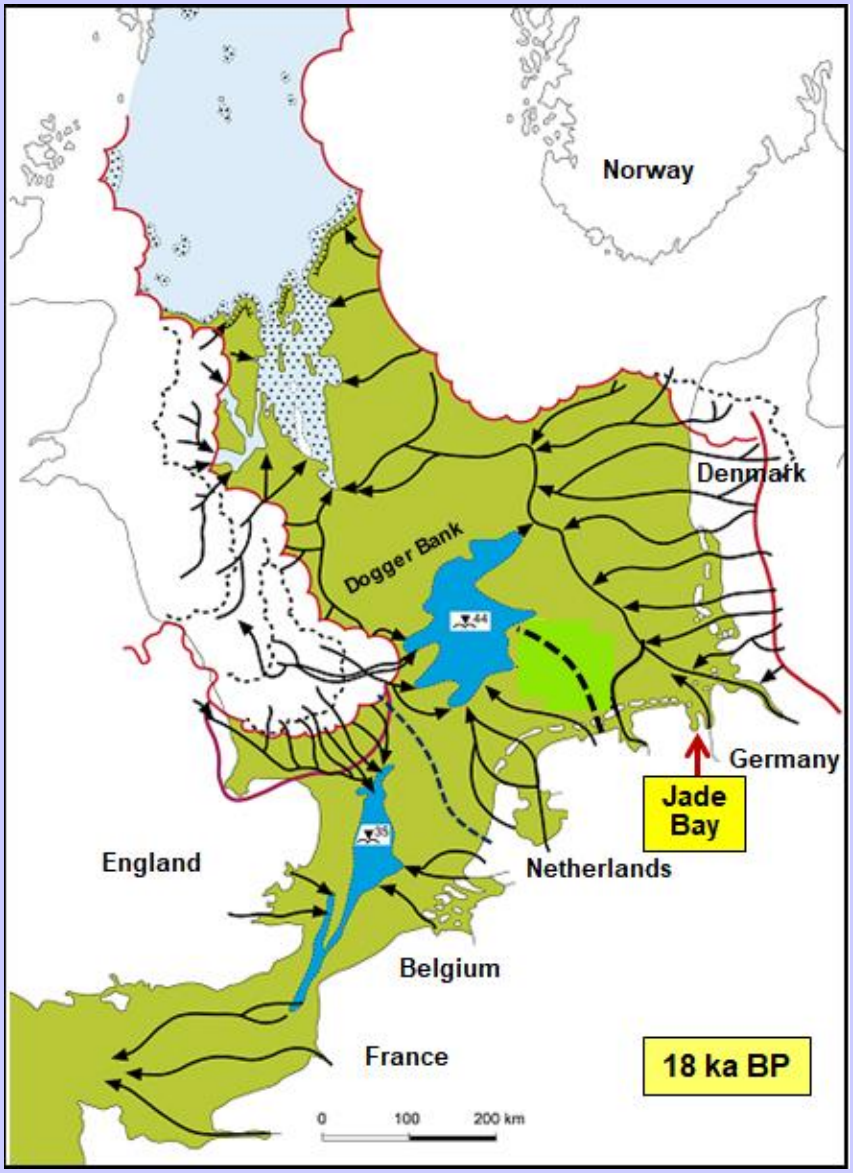
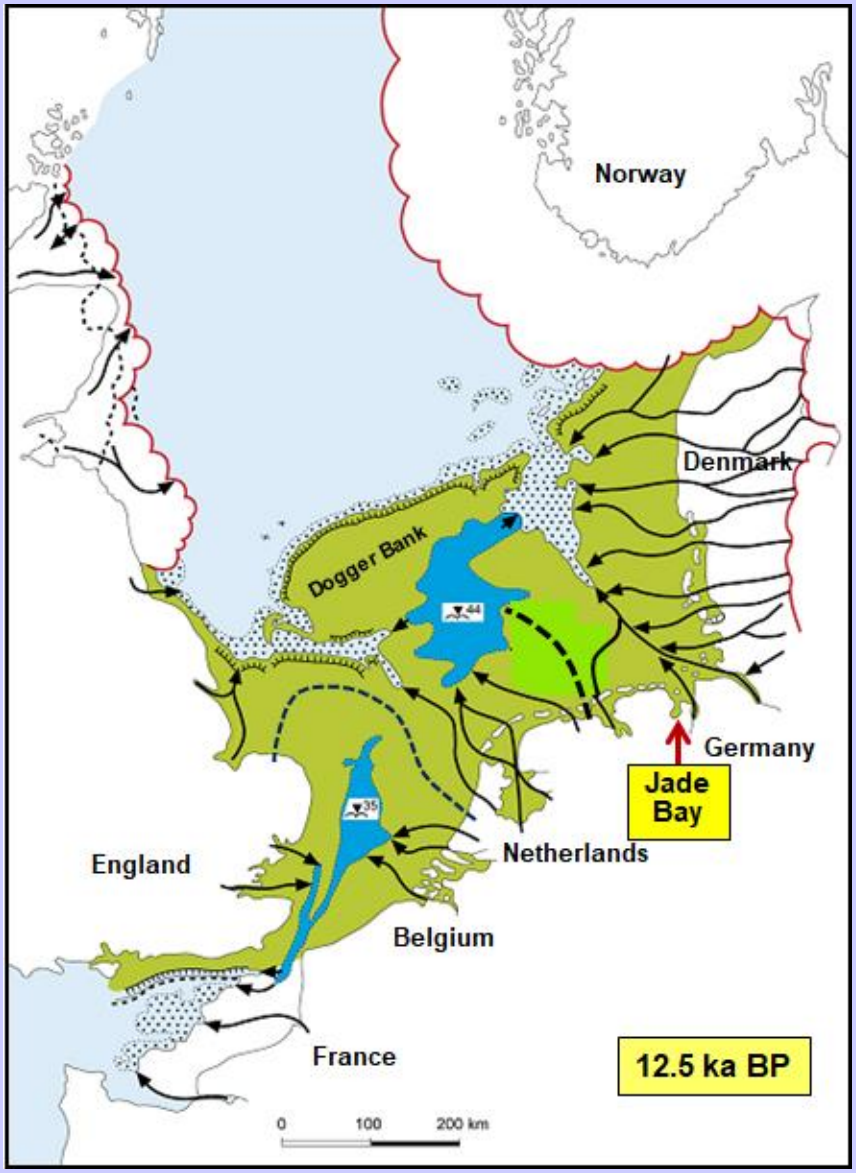
Extent of Pleistocene glaciations



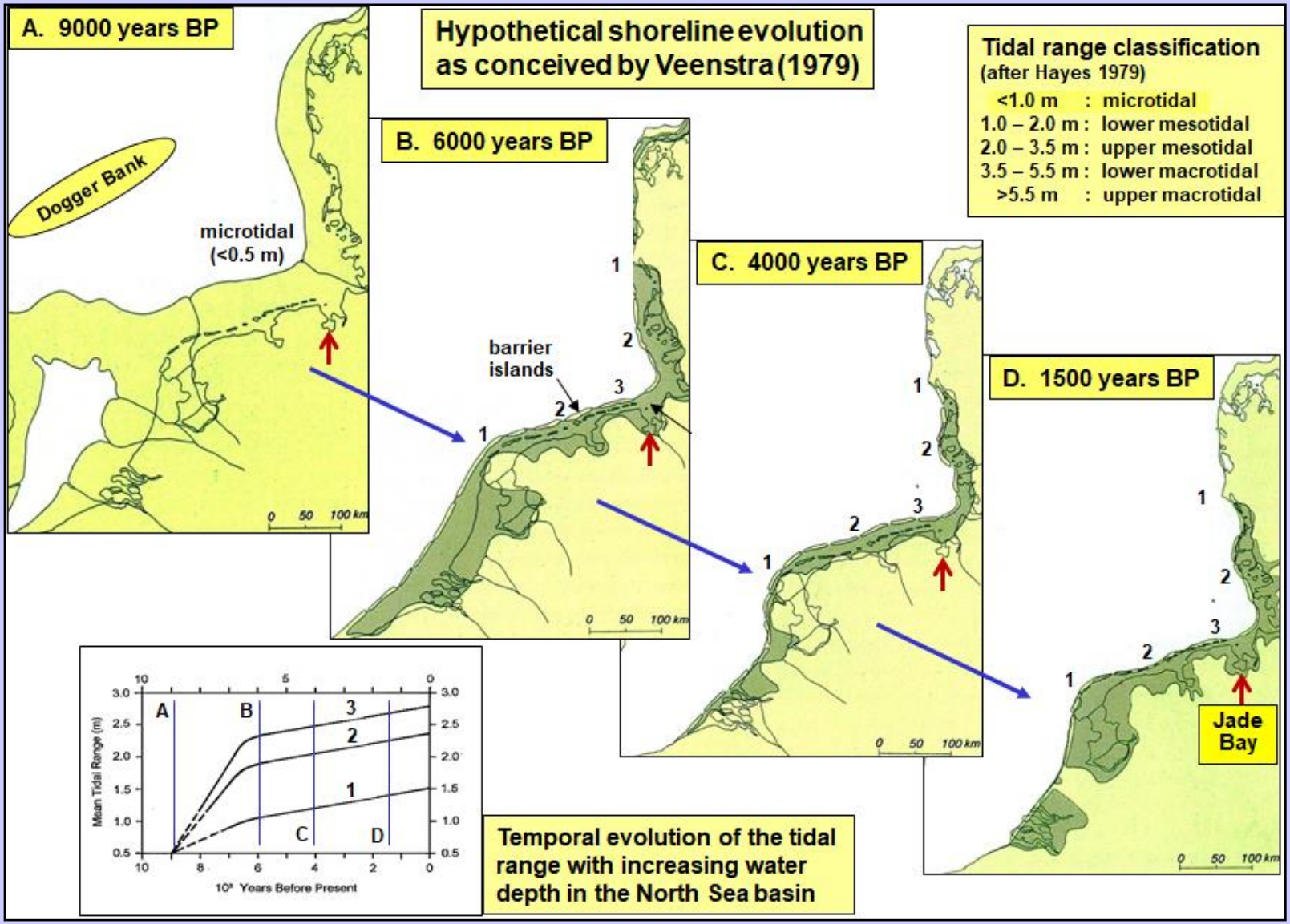
Note that northern Germany was covered by ice during all but the last glacial period.

Palaeogeography of the North Sea basin at 18 & 12.5 ka BP

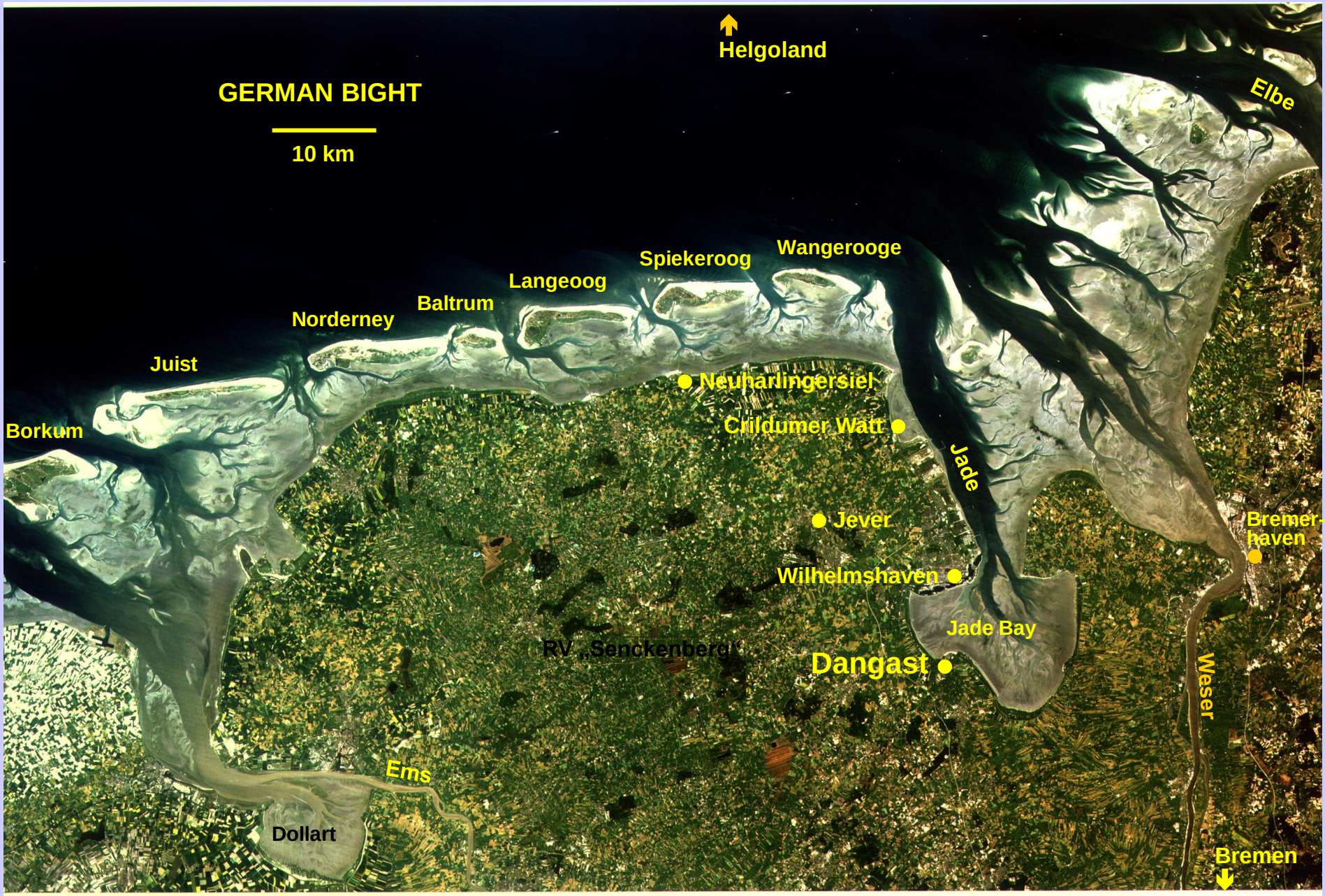




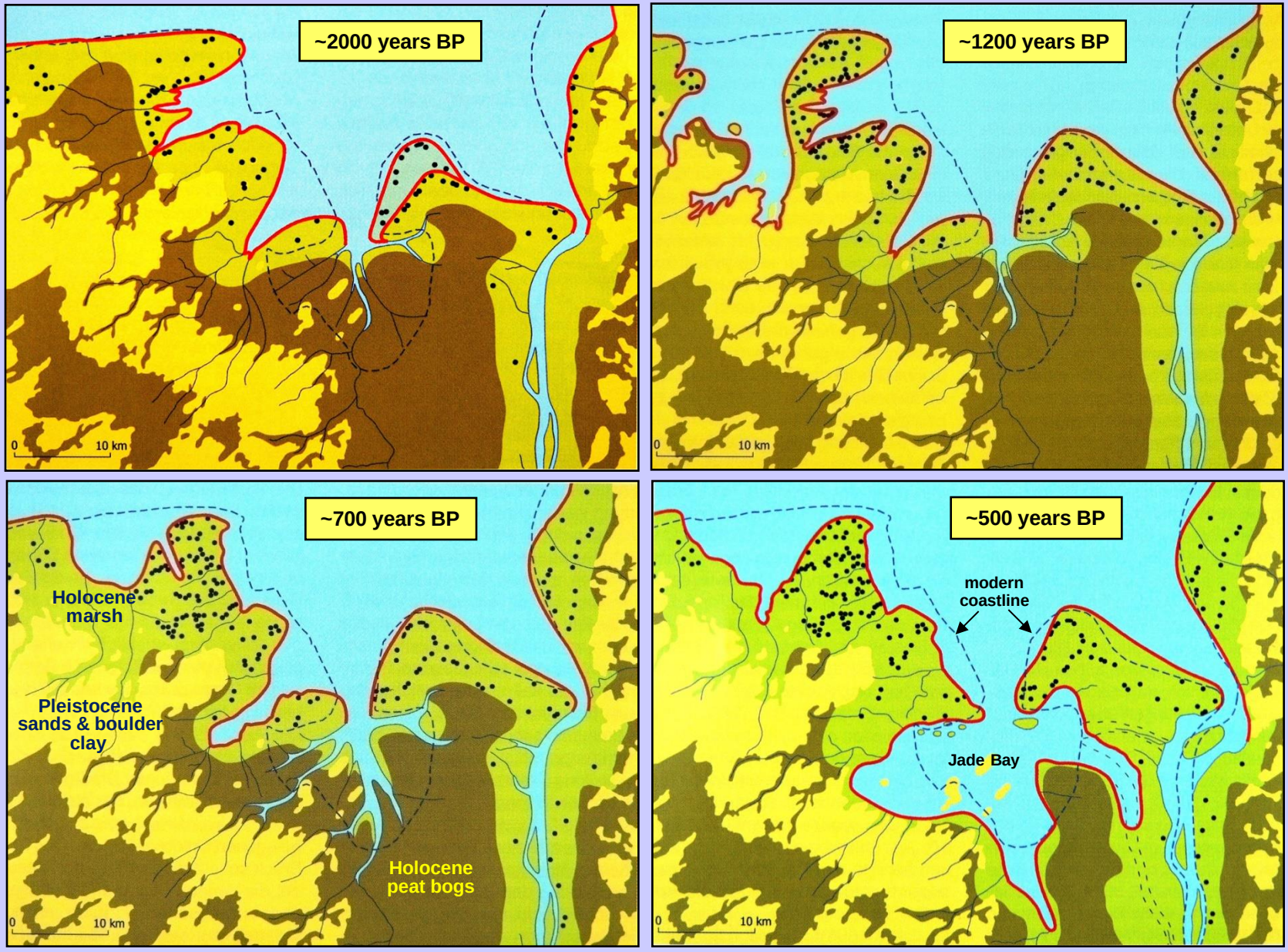
Coastal evolution from about 9 ka to 1.5 ka BP



Location of Jade Bay and Dangast

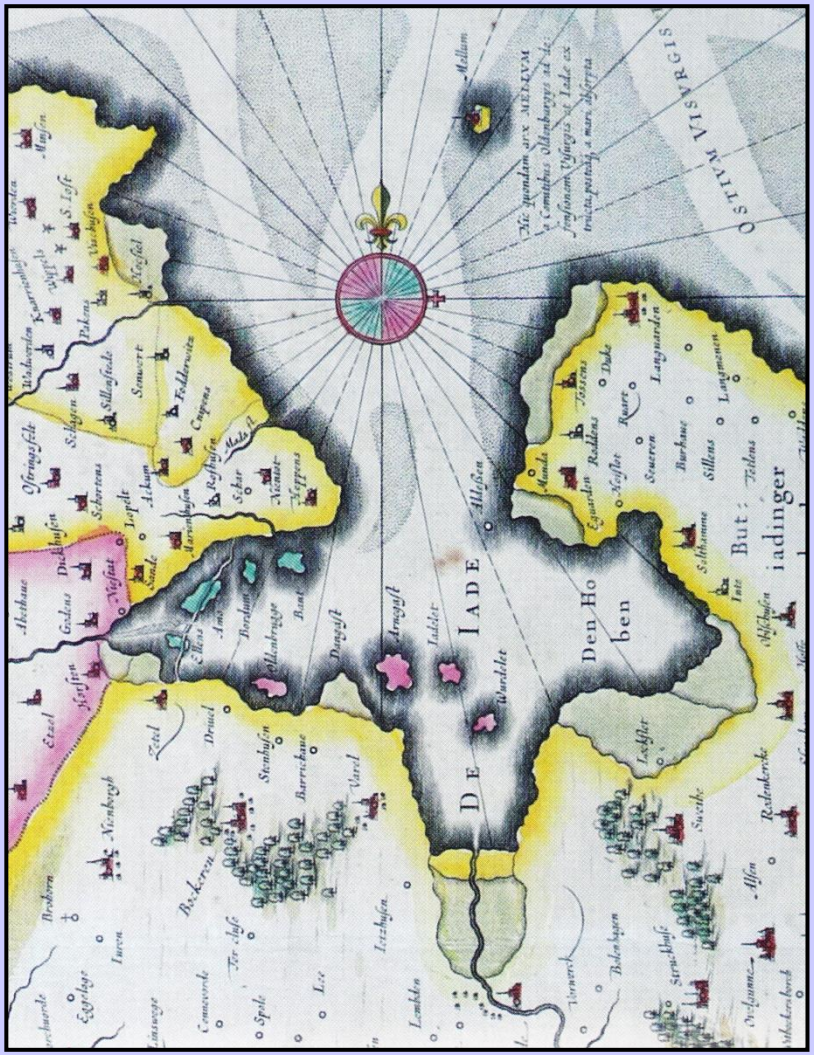


Morphological evolution of the Jade Bay region



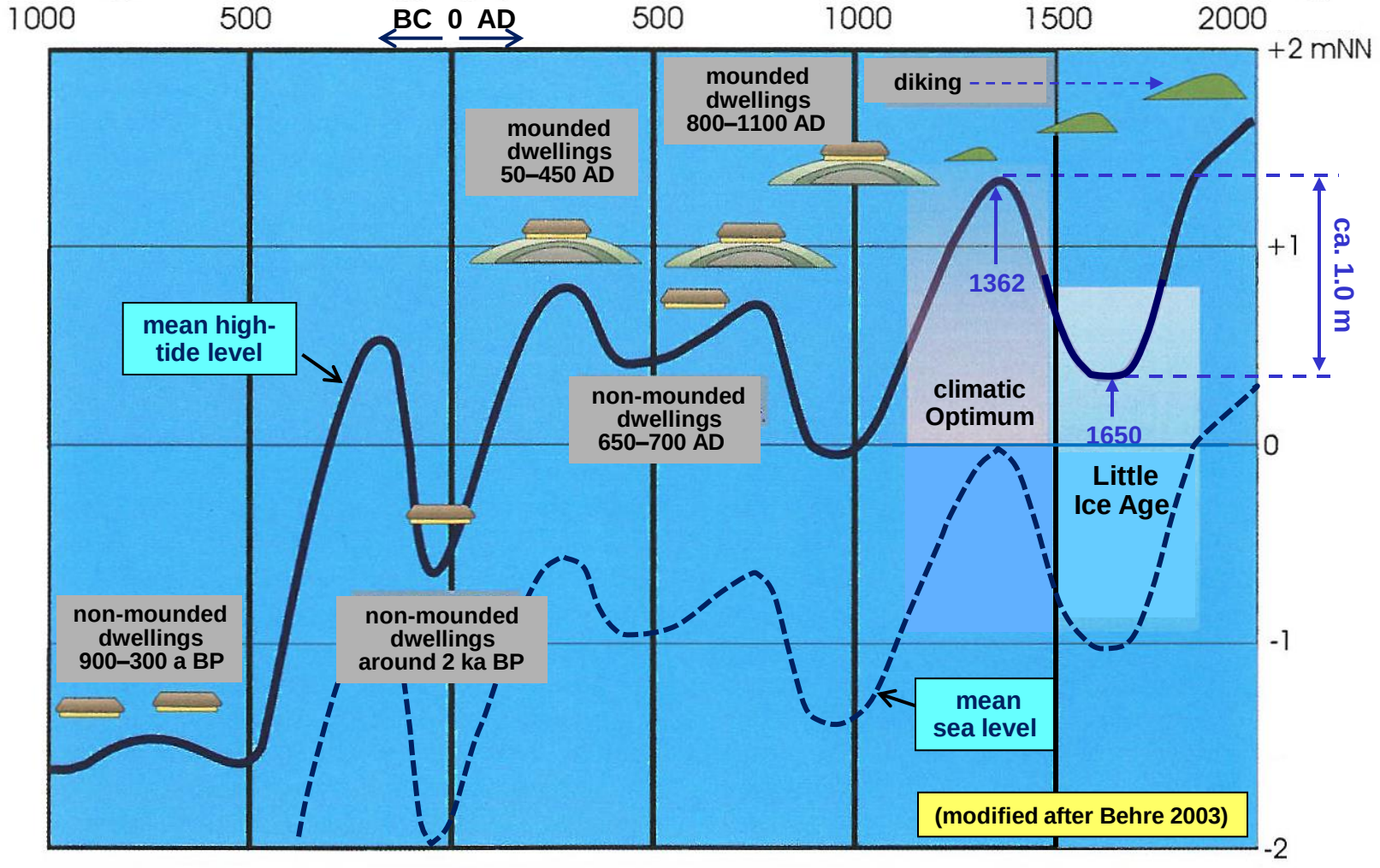
Historical maps of the Jade Bay region

Map of 1595.
For political expediency, the map was intentionally distorted.

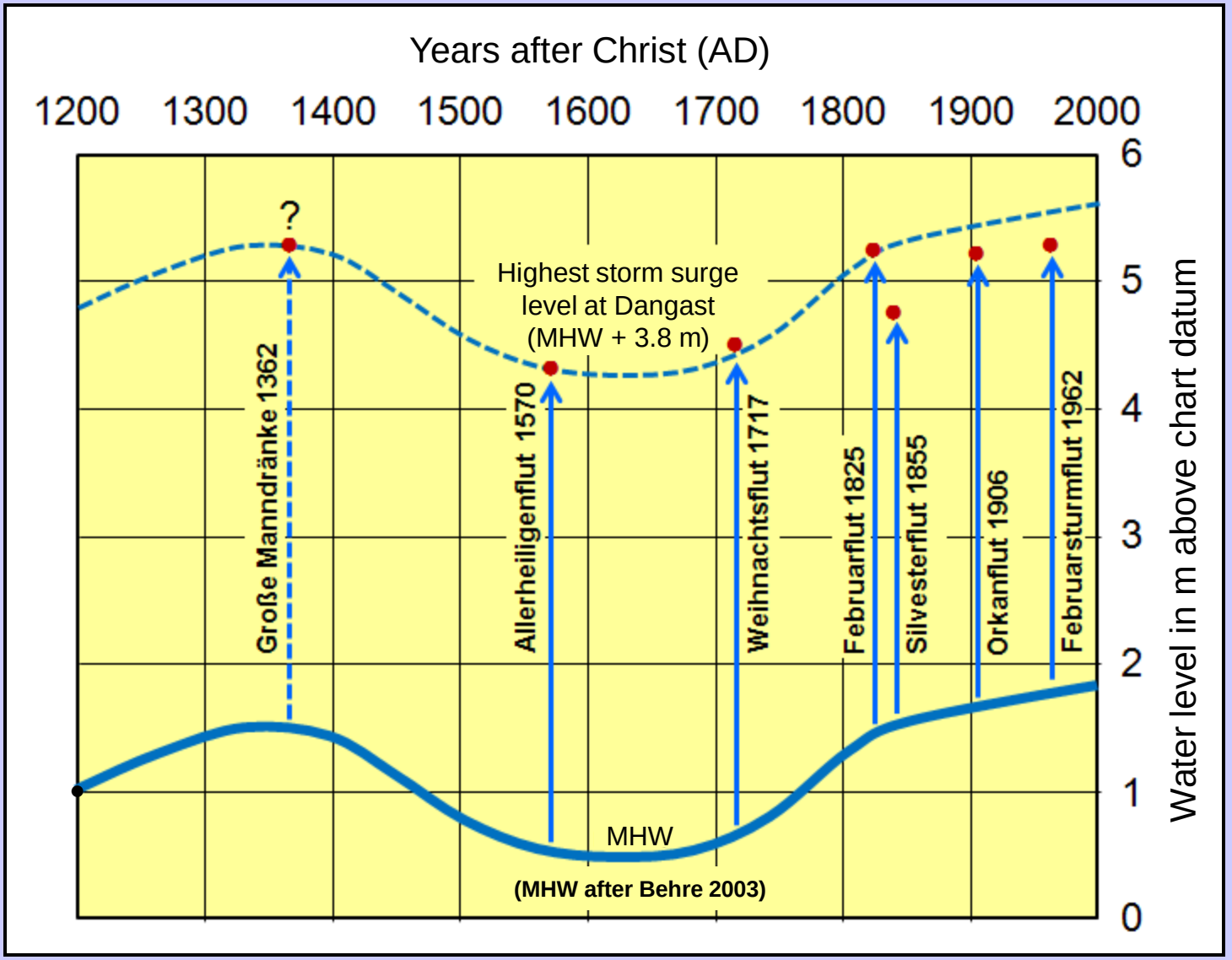


Map of 1625.
Oldest geographically reasonably accurate map.

Evolution of the mean high-water level along the East Frisian coast over the last 3000 years



Highest historical storm surge levels relative to the mean high-tide level at Dangast



Stones marking historical storm surge levels at the Dangast harbour sluice gate

The stones marking historical storm surges were installed at the correct elevations relative to Dangast.

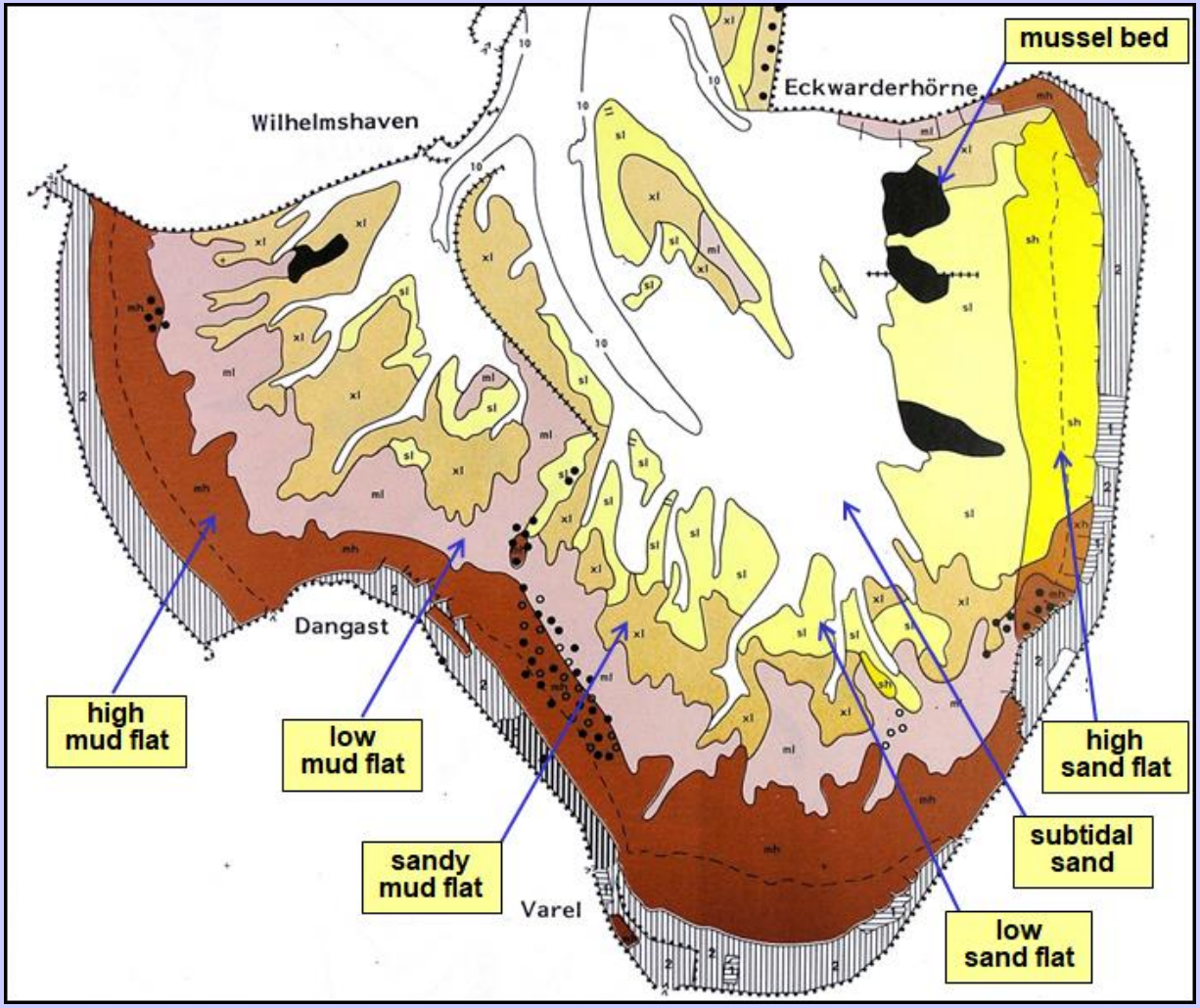
Elevated Pleistocene boulder-clay ridge at Dangast

Painting showing the actively eroding Pleistocene boulder-clay ridge about 150 years ago. Note the „Kurhaus“ on the right (today a Bistro), which was at that time still located some distance away from the edge of the ridge.

Protected Pleistocene ridge today

Photograph showing the elevated Pleistocene boulder-clay ridge, today protected by a brick revetment. Note that the „Kurhaus“ is located much closer to the ridge edge than on the painting.

Sedimentary facies of Jade Bay



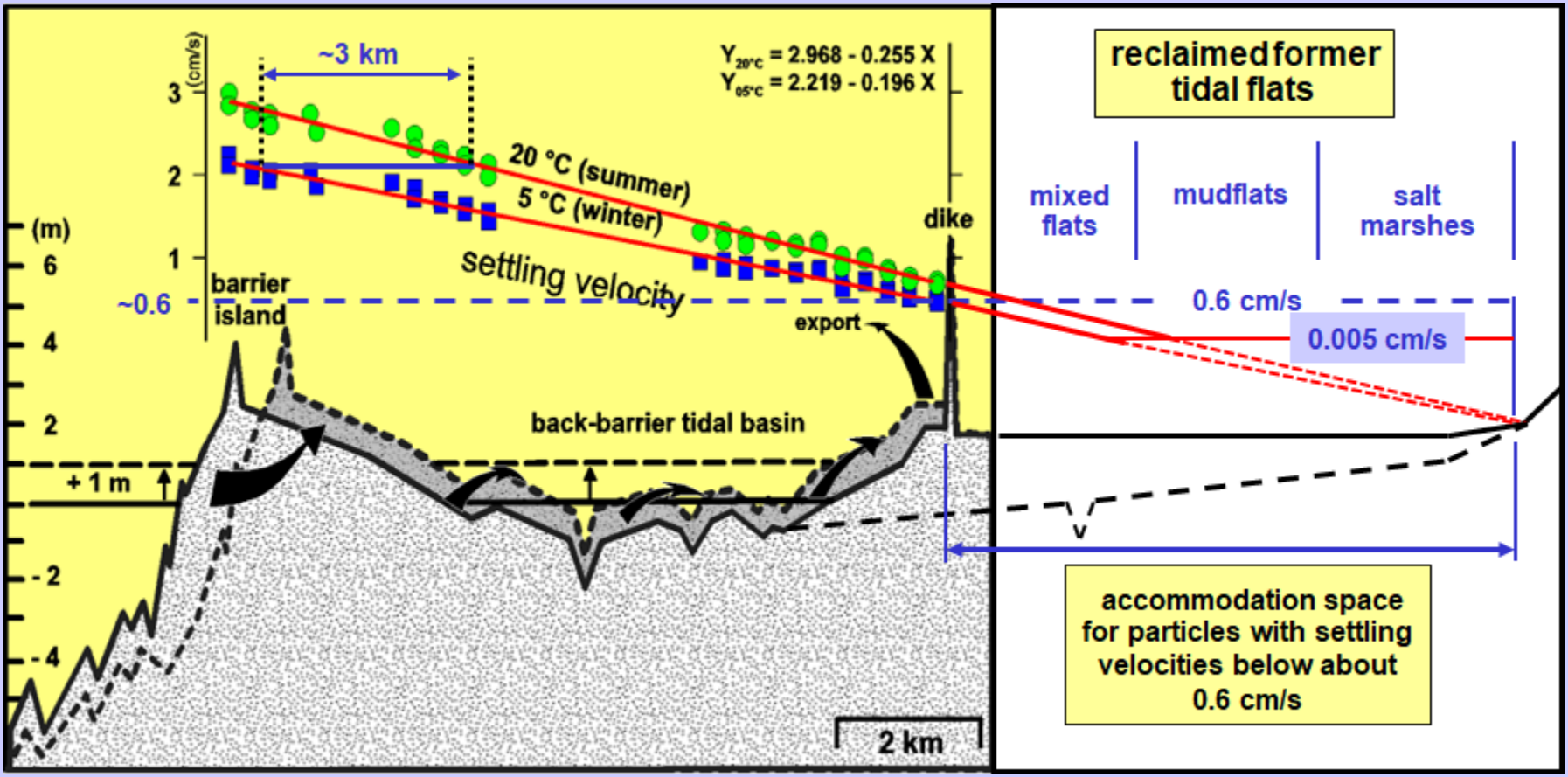
Note the pronounced east-west asymmetry in the facies pattern.

Mud cracks developed in the uppermost intertidal of Jade Bay

Cracks filled with mud chips

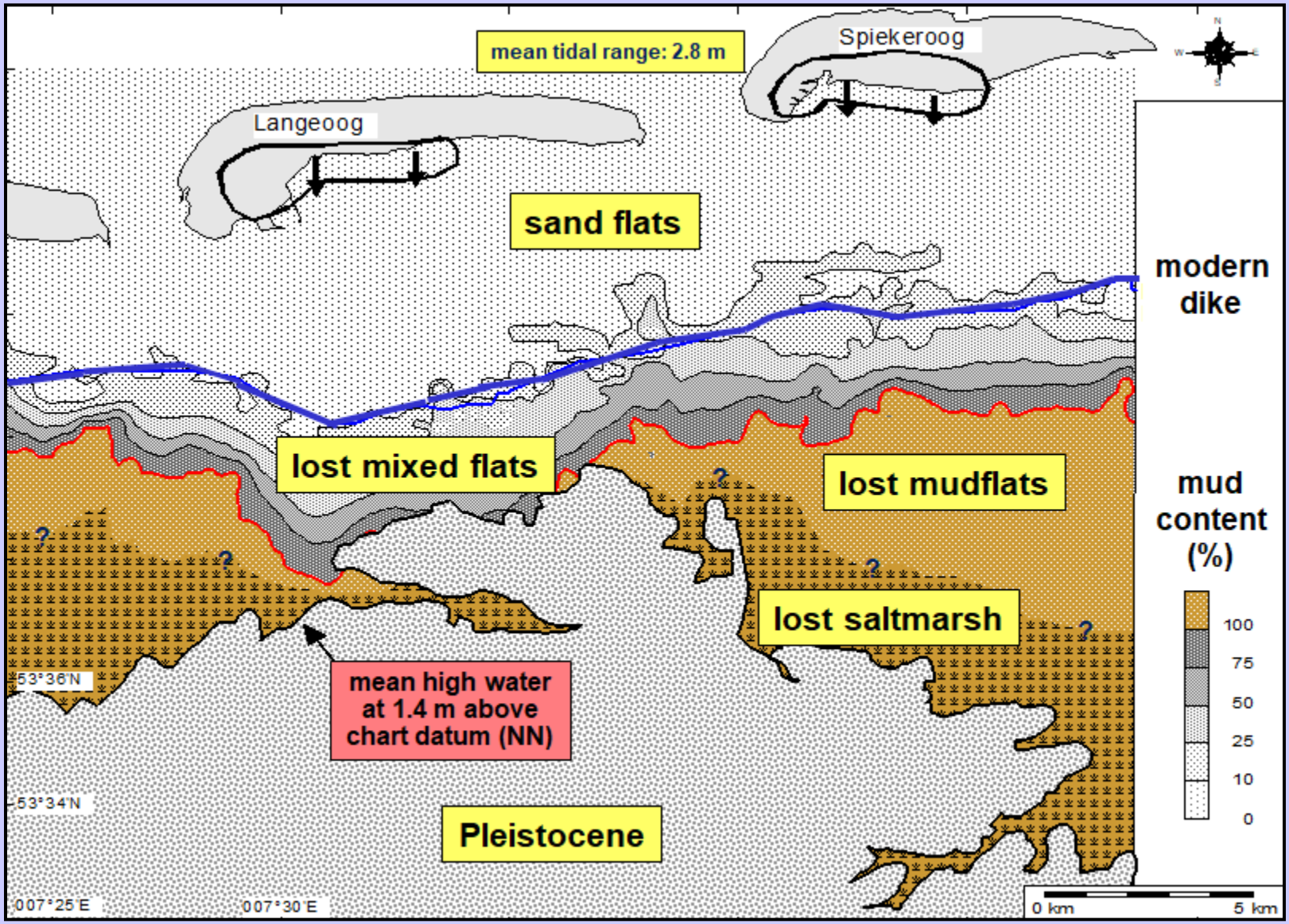
Cracks filled with tests of the snail *Hydrobia*

Extrapolation of the back-barrier energy gradient (decreasing particle settling velocities) indicating areas lost to land reclamation

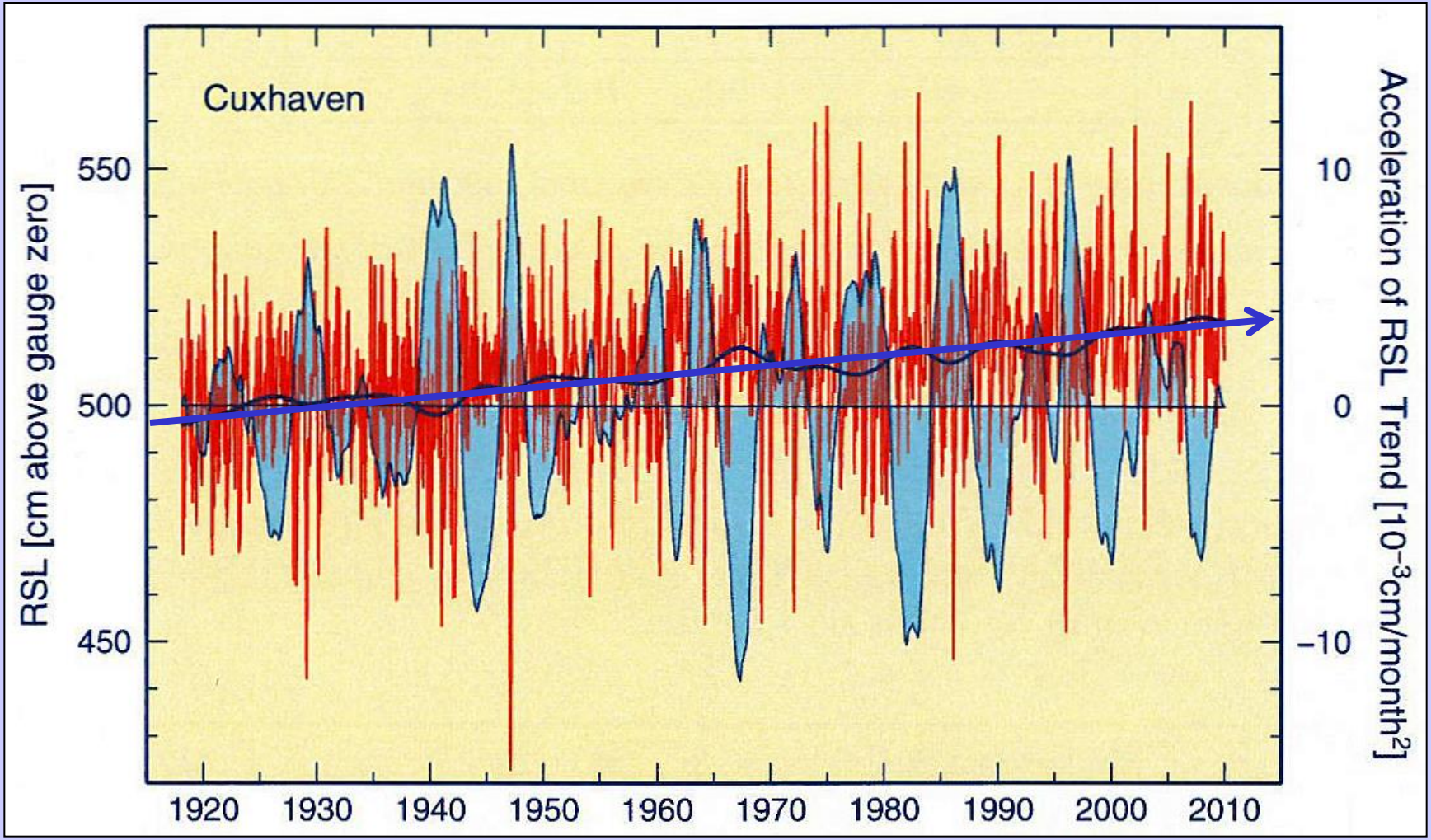


In dependence of the local energy gradient, it is possible to determine the lower cut-off point for particles still able to find accommodation space in the Wadden Sea today. This limit will increase with rising sea level!

Numerical reconstruction of tidal flats lost due to land reclamation

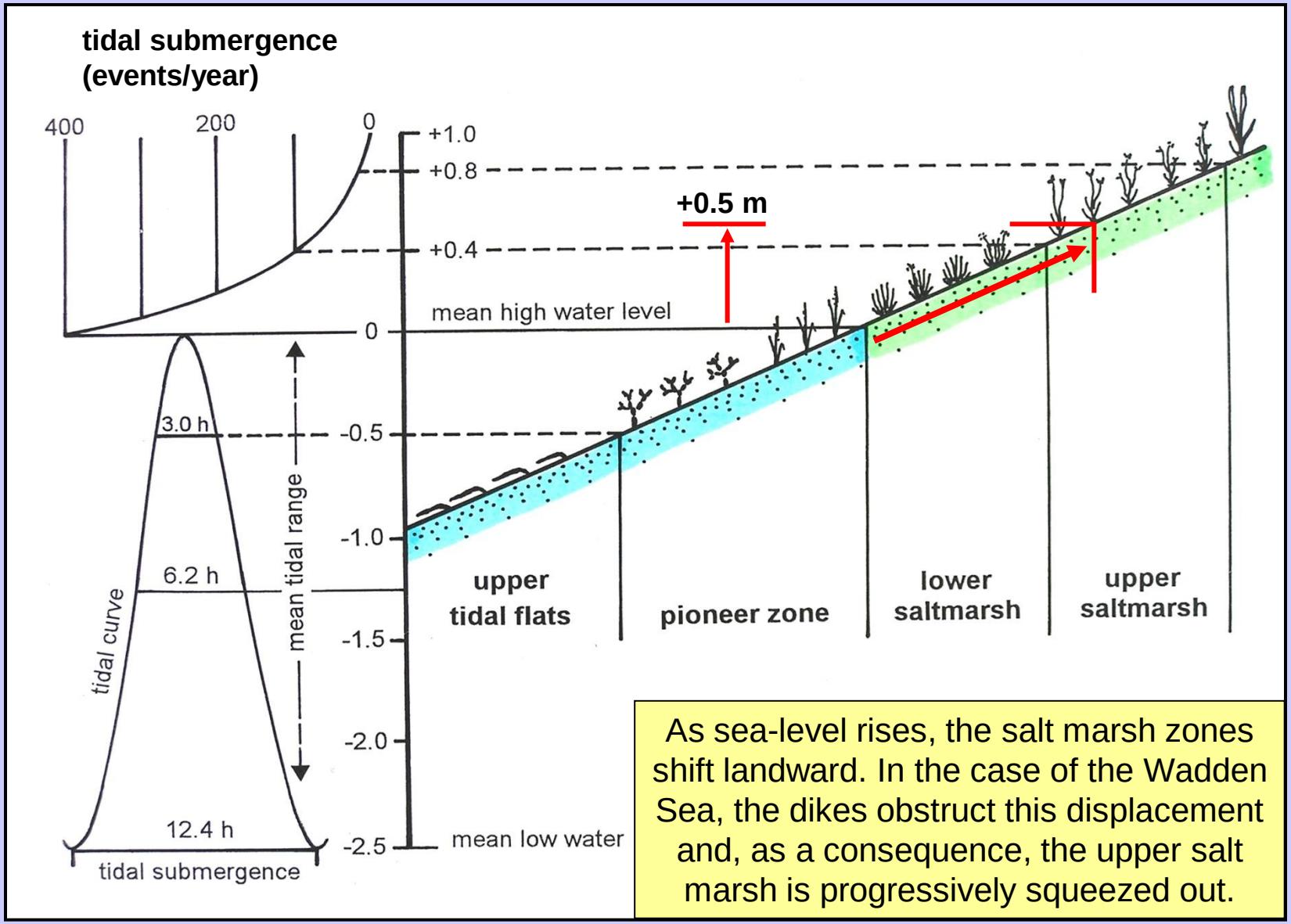


Mean sea-level fluctuations between 1920 and 2010



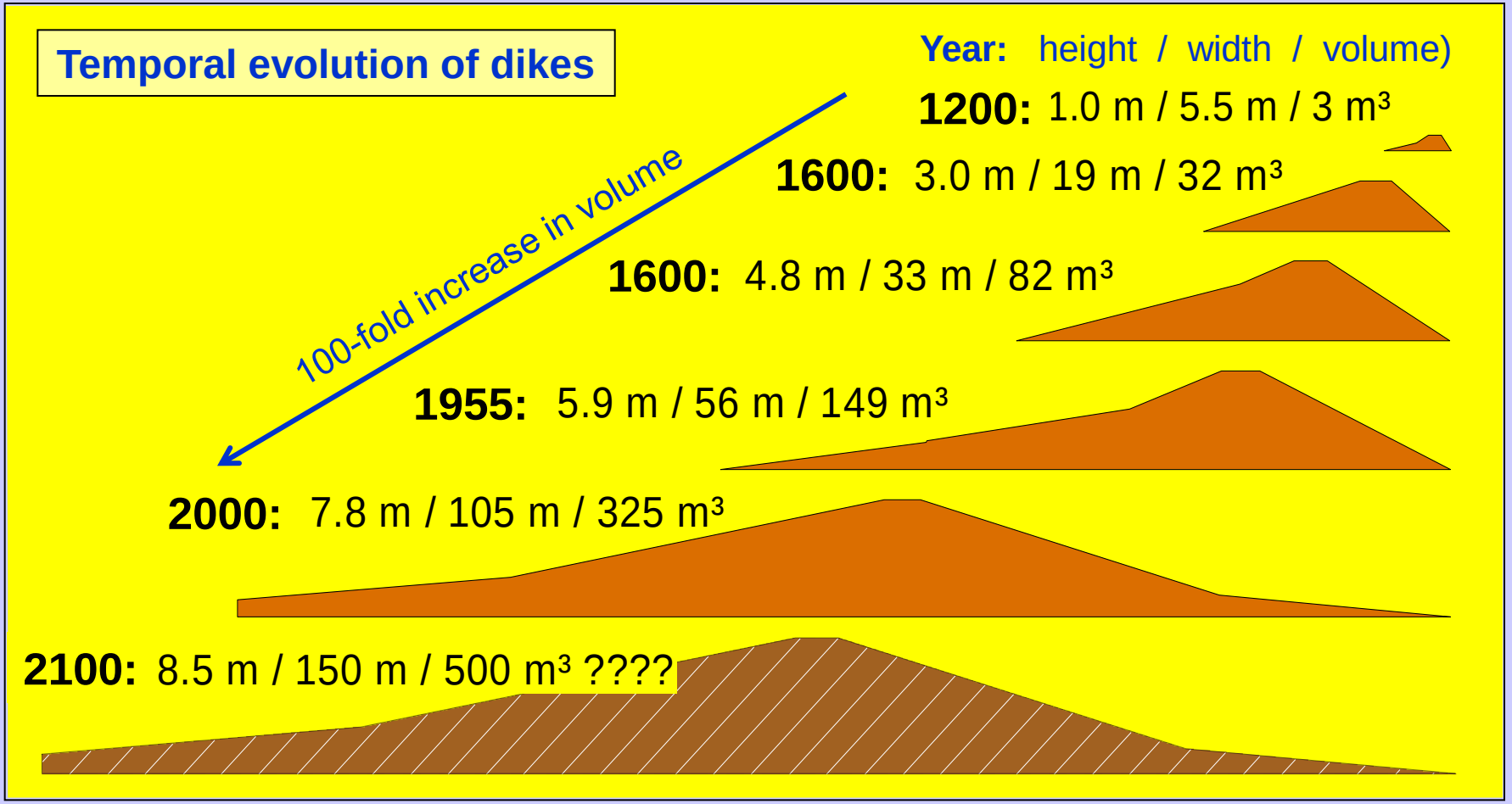
Note the lack of evidence for an acceleration in sea-level rise at the Cuxhaven gauge (inner German Bight)

Saltmarsh zonation as a function of water levels and inundation rates



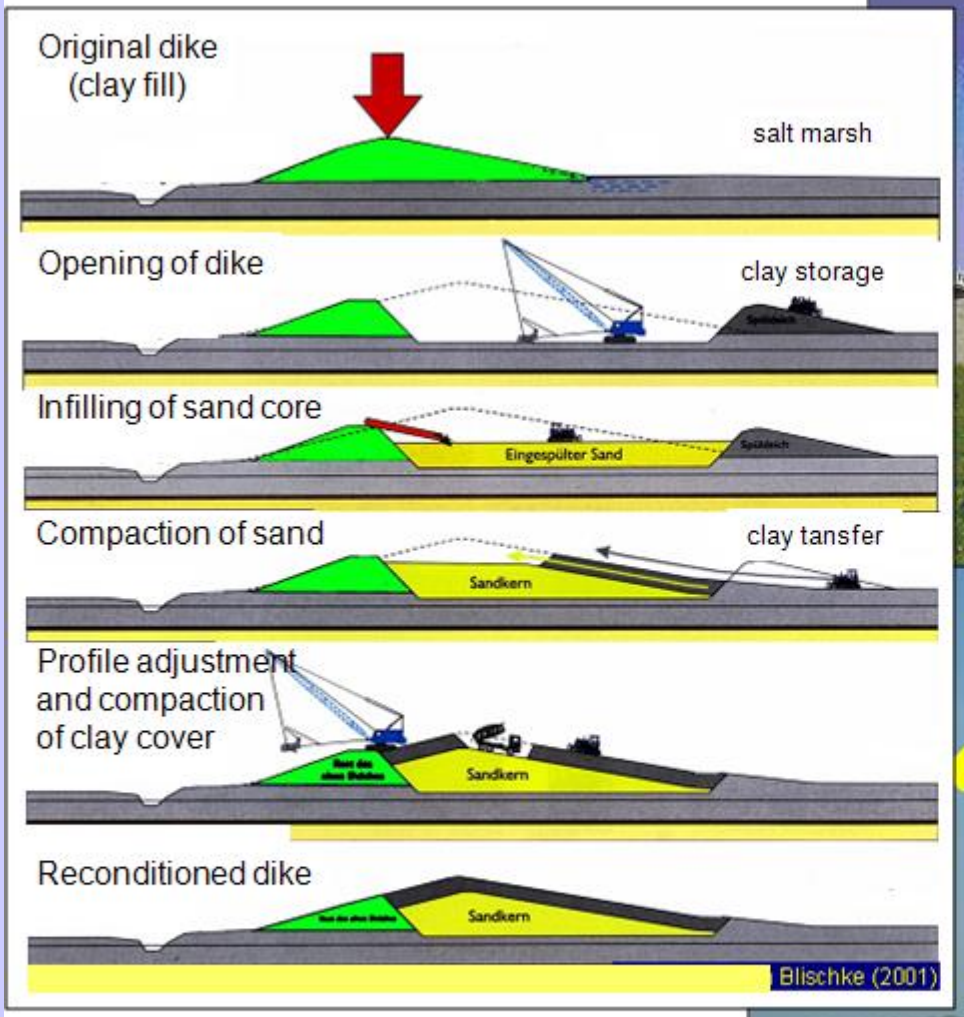
As sea-level rises, the salt marsh zones shift landward. In the case of the Wadden Sea, the dikes obstruct this displacement and, as a consequence, the upper salt marsh is progressively squeezed out.

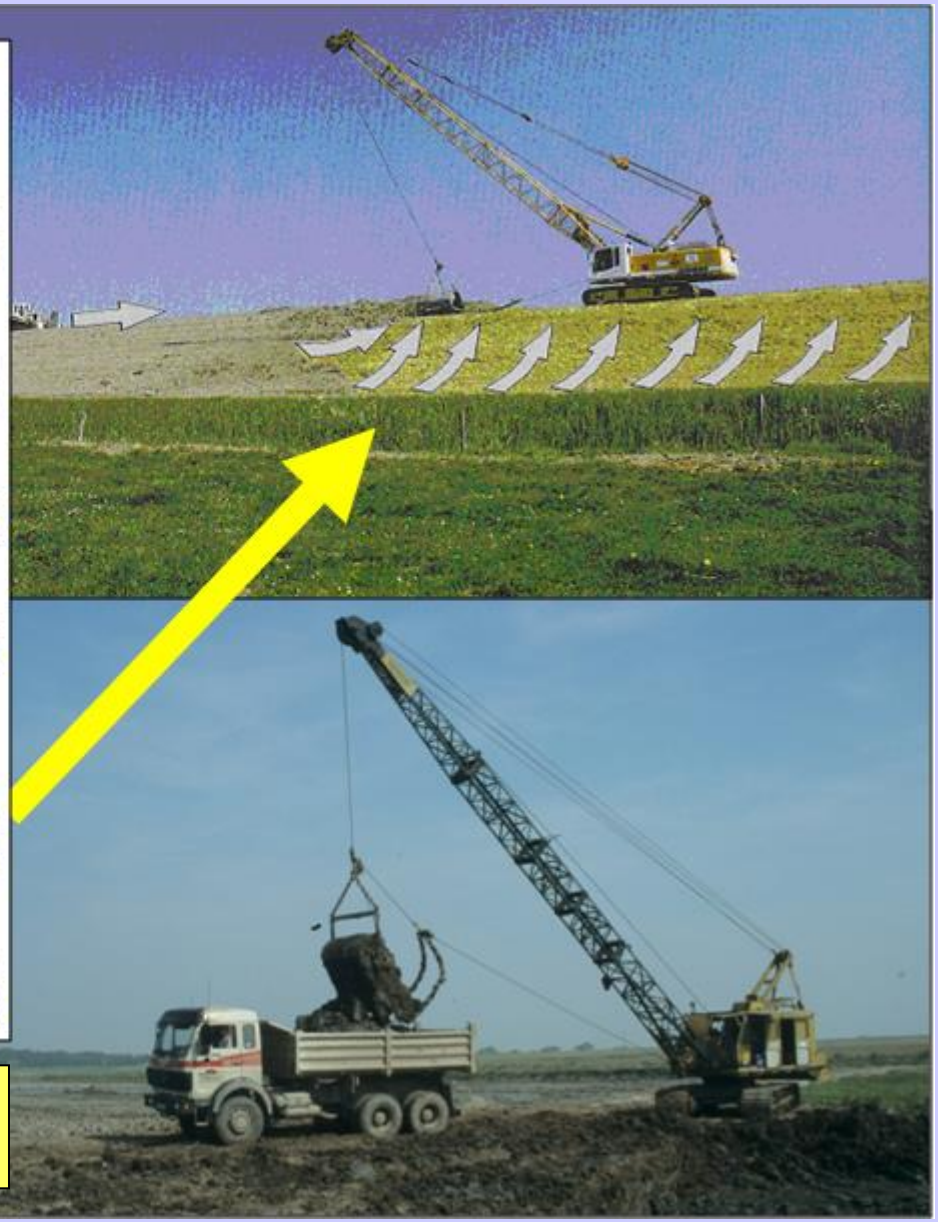
The human threat of accelerated sea-level rise



Human response to rising sea-level and storm-surge flooding over the past 800 years is documented in the increasing height and volume of dikes

Procedure when increasing the height and width of a dike





Note that the clay required for dike construction is an essential but rare commodityl