Holocene relative sea level variations at the spit system Feddet (Denmark) resolved by ground-penetrating radar and geomorphological data

Hede, Mikkel Ulfeldt; Bendixen, Mette; Clemmensen, Lars B; Kroon, Aart; Nielsen, Lars

Geophysical Research Abstracts
Vol. 15, EGU2013-4568, 2013
EGU General Assembly 2013

Holocene relative sea level variations at the spit system Feddet (Denmark) resolved by ground-penetrating radar and geomorphological data

Mikkel Ulfeldt Hede, Mette Bendixen, Lars B Clemmensen, Aart Kroon, and Lars Nielsen

University of Copenhagen, Department of Geosciences and Natural Resource Management, Copenhagen K, Denmark (muh@geo.ku.dk)

Estimates of Holocene sea-level variations have been presented in a range of studies based on different approaches, including interpretation of internal beach ridge characteristics from ground-penetrating radar (GPR) and geomorphological data.
We present GPR data and geomorphological observations collected across beach ridge deposits from Feddet, eastern Denmark, and resolve past relative sea level with a relatively high precision. Feddet is a spit located in Faxe Bay (western part of the Baltic Sea) close to the current 0-isobase of isostatic rebound and is considered a key locality for studies of sea level variation and vertical land movement in southern Scandinavia in response to unloading after the last glaciation.
We have tested the validity of downlap points, which marks the transition from beach to upper shoreface as sea-level markers. The test is based on comparative analyses of independent GPR and geomorphologic data collected across the recent and sub-recent beach ridge deposits. The data analyses include coastal topography, internal dips of beach ridge layers, and sea-level measurements. A clear change in characteristic layer dip is observed between beach face and upper shoreface in both the present beach face and upper shoreface deposits and in the interpreted beach face and upper shoreface GPR reflections. The break point marks the present transition from beach to upper shoreface and coincides with actual sea level within a few centimetres. Furthermore, our observations indicate that downlap points of deposits formed under both relatively high and low water levels are preserved and are identified in GPR reflection data.
Thus, records of these sea-level markers constrain the local relative sea level history during the Holocene. Downlap points identified in GPR data across other microtidal beach ridge systems can also constitute markers of past relative sea level at the time of deposition. Comparison of these relative sea-level curves from different localities can be used to infer the pattern of isostatic rebound and local tectonic movements.

Keywords
Sea level, ground-penetrating radar, beach ridges, isostatic rebound, Holocene, Denmark.