

DETERMINATION OF CRUSTAL DEFORMATIONS AND SEA-LEVEL CHANGES IN THE BALTIC SEA REGION

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ABSTRACT.

The Baltic Sea region is affected by different geodynamic and oceanographic processes. Global eustatic sea-level change due to thermal expansion and freshwater influx from melting glaciers and ice caps effects the level of the Baltic Sea too and is of special climatological interest. Recent crustal deformations in the region under investigation are dominated by glacial isostatic adjustment arising from the surface load change due to the deglaciated Fennoscandian ice-sheet.

Tide-gauge measurements for a period of more than 150 years provide a sound base to derive secular sea-level changes. The mean sea-level and its changes determined from homogeneous long-term time series are related to the Earth's crust. Therefore, tide-gauge records are not capable to infer eustatic sea-level change, because the vertical movement of the Earth's crust has to be taken into account. These deformations of the solid Earth are observable by GPS. The extraction of geophysical signals from GPS-derived time series relies upon homogeneously processed observations and a stable realization of the terrestrial reference system. Here we benefit from the results of a reprocessed global GPS network.

We determined relative sea-level changes for approximately 60 tide-gauge stations around the Baltic Sea and the adjacent North Sea. In addition we inferred crustal deformations for 44 stations of a densified regional GPS network. For stations where both techniques are collocated the combination of these results allows the determination of the eustatic sea-level change. The so inferred sea-level change rates in the Baltic Sea region are in good agreement with global change rates.