

Trends in the amplitude of Baltic Sea level annual cycle

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The observational record of Baltic Sea tide gauge station data and climatic data sets is statistically analysed to investigate the centennial trends in the amplitude of the annual cycle of Baltic sea-level. In almost all gauge stations analysed, an increase of the amplitude is detected, i.e. winter sea-level is found to be rising relatively to spring sea-level. These trends are not large compared to the decadal variations of the annual cycle, but they are statistically significant. The magnitude of the trends is almost spatially uniform, with exception of the Skagerrak area. Since interannual and decadal variability of sea-level displays a clear spatial pattern, the mechanism responsible for the trends in the annual cycle seem to be not regional, but affect the Baltic Sea basin as a whole.

Several hypotheses are proposed as mechanism to explain the centennial trends in the winter-minus-spring sea level: the effect of wind (through the SLP field), the barometric effect, temperature and precipitation (including role of salinity). Of all explanations tested, the long-term trend in seasonal Baltic precipitation seems to be the most plausible candidate for the increasing amplitude of the annual cycle. For the other three either the sign or the magnitude of the trend make them problematic to be included as a sole explanation. However, the barometric effect was found to contribute potentially to the trend in the sea-level annual cycle.