



## **Time series decomposition for assessing long-term changes in the seasonality of Baltic sea-level**

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The seasonal cycle accounts for about 40% of the total sea-level variability in the Baltic Sea. Previous studies suggested the existence of long-term changes in the seasonal cycle, in particular a possible increase of the annual amplitude. In order to assess long-term changes in the seasonality of Baltic sea-level, and derive robust estimates of the annual amplitudes and cycle phases, century-long tide gauge records in the Baltic Sea are decomposed by applying a multitude of complementary methods including continuous wavelet filtering, multi-resolution decomposition based on the maximal overlap discrete wavelet transform (MODWT), autoregressive-based decomposition, singular spectrum analysis (SSA) and empirical mode decomposition (EMD). The results show that all methods generally trace a similar long-term variability of the annual cycle amplitudes. Additional variables such as atmospheric pressure, surface air temperature, and precipitation are analysed using the same approach in order to investigate potential mechanisms for the identified changes in the seasonal cycle.