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## Long waves in the Port of Klaipėda

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The entire strait is the base of the port aquatorium and a vital shipping artery from the Baltic Sea to the Curonian Lagoon as well as a complex water system connecting two water basins of different sizes and depths and nature: differing considerably in salinity and density. Although the quays are well protected from the waves of the open sea, dangerous water level fluctuations still occur in the port area, the origin of which is not yet well understood. This study aims to identify the occurrence and main characteristics of the long waves, with the period from minutes to several hours, to identify their origin and impact.

Analysis of the spectral composition of these oscillations is based on continuous pressure recordings at a frequency of 4 Hz in Klaipėda harbour during the stormy season 2016-2017 and repeated during calm and stormy seasons in 2021. Most of the oscillation energy is concentrated in two frequency bands. Significant water level changes occurred due to infragravity motions with periods of 30 s (0.03 Hz) and disturbances with the typical periods of wind waves on the Lithuanian coast with periods of 3-10 s (0.1-0.3 Hz). The highest peak in the wind wave frequency band corresponds to typical storm conditions in the Baltic Sea with periods of 5-9 s. While the typical amplitudes of the oscillations in this range were modest, hazardous changes in water level occurred at lower frequencies with amplitudes of 0.5 m. The record shows the presence of harbour oscillations with periods of 30-200 s (0.005-0.03 Hz) and seiches of the Curonian Lagoon with periods of 1200 s (0.0008 Hz).

The largest oscillations are created by a combination of wind waves and infragravity waves with periods that roughly match the natural seiche periods of Klaipėda Strait and harbour oscillations and seiches can be observed not only during the stormy season.