



## The relative importance of wind and ship waves in the littoral zone of a large lake

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**ABSTRACT:** Surface waves and their interactions with sediments and benthic organisms are the main hydrodynamic process affecting littoral ecosystems. Here, we present a long-term data set on surface-wave parameters, which was obtained from the analysis of measurements with a pressure sensor. The data set covers a time period of a year and allows for resolving waves with heights down to less than a centimeter and frequencies up to 0.8 Hz. Wind waves and three different types of ship waves were distinguished by their spectral properties. In Lake Constance, ship-generated waves are as important as wind-generated waves and contribute about 41% of the annual mean wave energy flux to shore. In summer, during the most productive time period, ship waves dominate the wave field in terms of the energy flux to shore and also in their frequency of occurrence. Ship waves cause a diurnal and a seasonal pattern in the frequency of occurrence and in the heights of surface waves, whereas in the case of wind waves these parameters do not vary significantly with season or between nighttime and daytime. In contrast to wind waves that occur only sporadically, ship waves propagate into the littoral zone very frequently at regular time intervals. The different pattern of occurrence of ship and wind waves results in a different pattern of disturbance in the littoral ecosystem.

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