

Impact of wave action on the morphological evolution of the tidal flats and marshes in the proximity of the port of Antwerp

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The Galgeschoor is a protected nature area of tidal flats and marshes within the port of Antwerp area along the Scheldt estuary (Belgium). In the future, shipping traffic is expected to increase in front of the Galgeschoor due to the construction of a new dock (the Saeftinghedok) and the recent opening of the Kieldrechtshuis, which connects the Deurganckdok to the Waaslandhaven. This economic development may trigger potential environmental impacts. In particular, the tidal flats and marshes of Galgeschoor may experience changes in wave exposure as a result of the expected increase in ship-induced wave climate intensity.

In this contribution we present an ongoing study which aims to understand and quantify the relative importance of wind-induced waves versus ship-induced waves on the morphological evolution of the low and high tidal flats of Galgeschoor. Investigations centre on the relationships between wave height characteristics and wind properties (speed and direction), as well as ship properties (length, width, speed). Results notably show a significant positive correlation between wave height and wind speed and that peak wave height occurs for southwest winds. However, although the increase in the amplitude of ship-induced primary waves could be attributed to the increasing ship speed for large vessels, no obvious relationships seem to arise between wave height and ship properties. The analysis is then extended to the comparison between hydrodynamic forcing (waves and tidal currents) and surface elevation changes at the tidal flats.

Preliminary results indicate that periods of high erosion seem to be primarily driven by events of significant wave heights at the high tidal flat whereas the more dynamic and stronger elevation changes occurring at the low tidal flat do not seem to be explained by waves solely.