

# EROSION AND RECOVERY OF THE BED AT MUDFLAT KAPELLEBANK - WESTERSCHELDE

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## 1. Kapellebank - Westerschelde

We consider the Kapellebank, a semi-enclosed tidal flat along the north bank of the Westerschelde Estuary near Hansweert. A range of measurements with in situ instruments on frames, tracking path lines with GPS-drifters and visualization by areal pictures made with a UAV (drone). Here, we focus on the results of the instruments at the three frames (A1–A3, see Figure 1) along a cross shore transect. At these frames, waves, currents, SSC, and bed level changes were measured to get insights in the exchange of sediment between channel and mud flat.

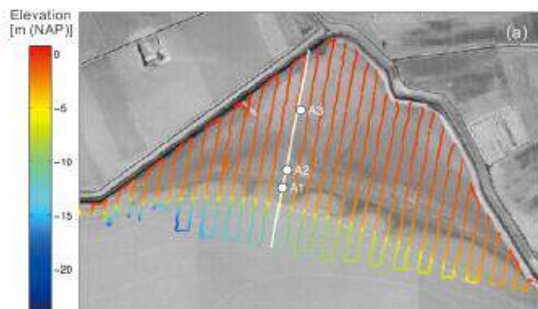


Figure 1: (top) Location of the Kapellebank in the Westerschelde. (bottom) position of the frames A1-A3.

## 2. Measurement Results

Timeseries were obtained over a period of 1 month at three locations. A period with high wind speeds coincided with neap tide. During this period, Location A1 was always flooded, resulting in high orbital velocities due to large wave heights during low tide. Subsequently erosion events occur during low water. Within several days a degradation of 10cm was found at location A1. Recovery of the bed took place in the weeks after. Approximately 2 weeks are needed for recovery of the bed. The other two locations (A2 and A3) hardly show bed level variations.

## 3. Interpretation

High waves are not sufficient to obtain high orbital velocities and associated erosion. Maximum near bed velocities are found at shallow water conditions, leading to erosion events. A storm is therefore most effective at the locations just below low water, as for these locations the period with waves in combination with shallow water is longest.

No significant bed level changes are found further on the flat, as erosion takes place when this part is dry. It is expected that the sediment has been transported into the channel. There, the bed shear stresses due to tidal currents are too high for sedimentation. The sediment concentration in the channel therefore increases. Deposition will subsequently take place again on the tidal flat. Recovery of the bed level is therefore relatively fast (weeks).

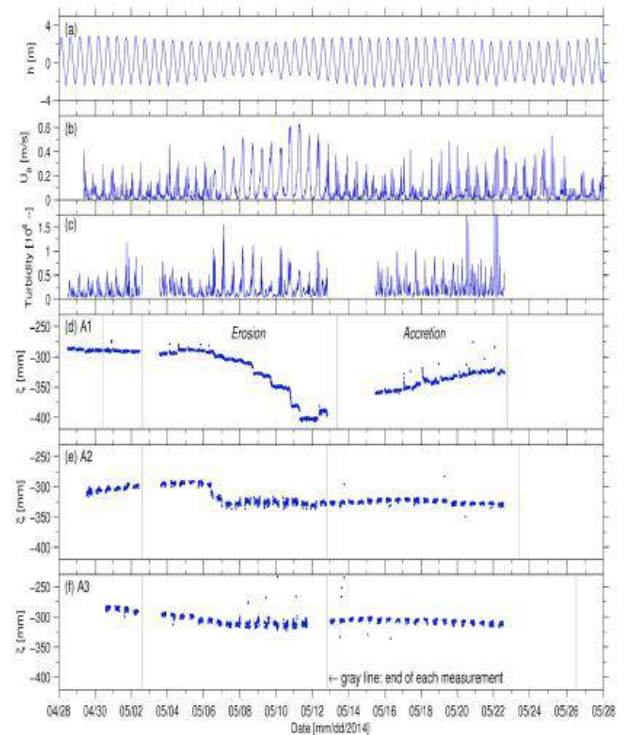


Fig. 1. Time series of (a) water level (b) orbital velocity at site A1, (c) turbidity obtained by OBS attached on Vector, and (d)–(f) bed level changes measured by ADV at site A1, A2 and A3.