

## O01.3

### **Seasonal variations in flocculation and erosion affecting the large-scale suspended sediment distribution in a tide-dominated estuary: the role of biotic effects**

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#### **Abstract**

Estuaries often display seasonality in the estuarine-scale distribution of suspended particulate matter (SPM). Various factors determine this SPM distribution, including salinity intrusion, freshwater discharge, erodibility, and the capacity of cohesive SPM to flocculate and form larger flocs. The erosion and flocculation processes have been reported to be highly dependent on biotic agents excreted by bacteria and algae, such as sticky extracellular polymeric substances (EPS) and transparent exopolymer particles (TEP). Therefore, seasonality in these biotic effects may have a crucial imprint on seasonality in the estuarine SPM distribution.

Various authors studied the impact of abiotic factors, such as freshwater discharge, on the seasonal behavior of the large-scale SPM distribution, but the contribution of seasonality caused by biotic factors is mainly unexplored. In this presentation, we study the relative influence of biotic seasonality on estuarine-scale SPM distribution through erosion and flocculation. To this end, we apply a reverse engineering strategy and calibrate a coupled sediment transport-flocculation model to a unique, long-term turbidity (cf. SPM) data set observed in the Scheldt estuary. To validate our model results, we also compare the modeled floc sizes to in-situ observations, measured simultaneously with the turbidity profiles. Our calibration shows a limited biotic seasonality in flocculation (relative difference of ~10%), which falls within the uncertainty of the model and observations, and also shows that the erodibility of sediment does not need to be changed for different seasons. Observations of TEP, which are known to have a dominant impact on erosion and flocculation, strengthen our model results because these observations also lack a significant seasonal pattern. We conclude that the model captures both the observed seasonality in estuarine-scale SPM distribution and floc size. This seasonality is mainly driven by seasonality in turbulence and freshwater discharge and does not require seasonality in biotic processes that influence erosion and flocculation.

#### **Keywords**

sediment distribution, biotic seasonality, flocculation, erosion