

LONG-TERM SAND-MUD MODELING OF THE SCHELDT ESTUARY

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A long-term morphological simulation of the Scheldt estuary is carried out using FINEL2d and using both the sand and mud fraction. The 1860 bathymetry and outline of the estuary is used as a starting point with a completely sandy bed. Land reclamations are simulated by closing off areas at the exact moment of embankment. Mud is imposed on the sea and river boundary and at a constant concentration. Initially there is sand export at the mouth (negligible sand transport at the river) and mud import from both the sea and the river, see figure 1. As a consequence the total sediment amount in the estuary is initially increasing over time because the mud import is higher than the sand export. The mud is stored in quiet areas, such as salt marshes and side branches, see figure 2. After around 100 years the mud import from the sea becomes less because the storage areas are getting full. As a consequence the mud from the river (which still continues) starts flowing to the sea because it cannot be stored. The initial mud import at the mouth becomes a mud export over time. The total sediment amount in the estuary is now decreasing because the sand export still continues and there is no more permanent settlement of mud. Nowadays it is thought that the estuary is still importing mud (and exporting sand), but as storage capacity decreases a change in net sediment direction of mud is possible in the future!

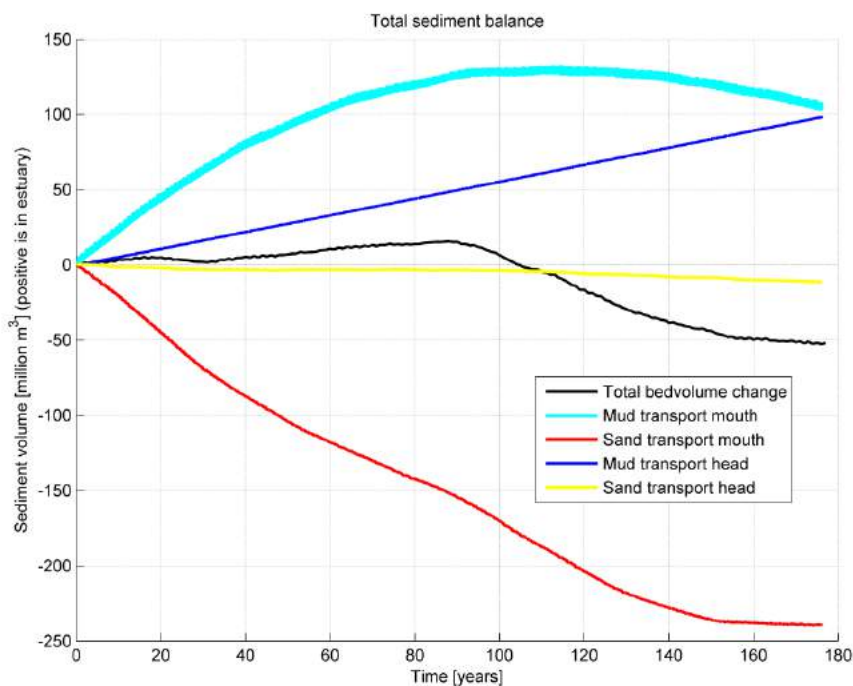


Figure 4 Net sediment transport over time.

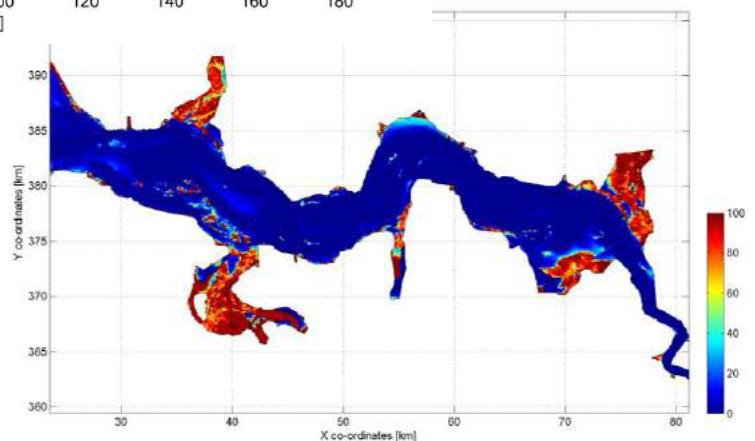


Figure 2 Mud content in bed after 175 years (1860 layout).