Historical Evolution of Mud deposition and erosion in intertidal areas of the Scheldt estuary

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- Study Framework
- Methodology
- Results
  - Saeftinghe
  - General mass balance

Study Framework

- Mud Balance of the Sea Scheldt
  - Historical evolution
  - Mass Balance [TDM/yr]
- Historical Evolution of Mud deposition and erosion in intertidal areas of the Scheldt estuary
  - How much sediment is stored /yr in intertidal areas?
  - 1 consistent methodology over entire estuary
**Method: Ecotopes**

Ecotope Change

- Subtidal -> Intertidal
- Intertidal <-> Subtidal
- Intertidal -> Marsh
- Marsh <-> Intertidal
- Stable Intertidal
- Stable Marsh
- Marsh

Vegetation Maps

MLWS

Subtidal zone

Intertidal Flat

Marsh

Ecotopes Change (1959 – 1988)

Ecotope change between 1959 and 1988

Ecotope1959, Ecotope1988
- Intertidal flat, No data
- Marsh, Marsh
- Marsh, Intertidal flat
- Marsh, Subtidal zone
- No data, Marsh
- No data, Intertidal flat
- Intertidal flat, Intertidal flat
- Intertidal flat, Subtidal zone
Method: Zonation

Method: overview

Ecotope Change class (6)

\[
\Delta \text{Mud Mass} [\text{TDM}] = \Delta \text{Height} [\text{m}] \times \text{Area} [\text{m}^2] \times \text{Mud content} [%] \times P \text{ Dry Bulk} [\text{kg/m}^3]
\]

500 +/- 100 kg/m³
Mud deposition in Saeftinghe

(a) 1931  
(b) 1963

(c) 1992  
(d) 2004

Elevation (m MHRSL)

-5  1.5


Mud deposition in Saeftinghe
(zone 7)

1931 - 1963

90,000 TDS/yr

1963 - 1992

70,000 TDS/yr

1992 - 2004

90,000 TDS/yr

2004 - 2011

25,000 TDS/yr
Mud deposition and erosion in intertidal areas

Mass (ton/year)

<table>
<thead>
<tr>
<th>Location</th>
<th>Stable marsh</th>
<th>Stable intertidal flat</th>
<th>Marsh -&gt; Intertidal flat</th>
<th>Intertidal flat -&gt; Marsh</th>
<th>Intertidal flat -&gt; Subtidal zone</th>
<th>Subtidal zone -&gt; Intertidal flat</th>
<th>All intertidal areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Scheldt (1931-2010)</td>
<td>69,000</td>
<td>43,000</td>
<td>-11,000</td>
<td>22,000</td>
<td>-308,000</td>
<td>227,000</td>
<td>43,000</td>
</tr>
<tr>
<td>Sea Scheldt (1930-2011)</td>
<td>44,000</td>
<td>-5,000</td>
<td>1,000</td>
<td>20</td>
<td>-11,000</td>
<td>7,000</td>
<td>36,000</td>
</tr>
</tbody>
</table>

Conclusions

- Intertidal areas are a net sink of mud in both the Western Scheldt and Sea Scheldt
  - 43,000 TDM/yr for Western Scheldt
  - 36,000 TDM/yr for Sea Scheldt
- Important dynamics between intertidal & subtidal zone in the Western Scheldt
  - Gross mass fluxes one order of magnitude bigger than total net flux
- Accuracy of the method is limited in the Sea Scheldt, due to data availability
Conclusions

- A stable marsh captures about 4x more sediment TDS/ha than a stable intertidal flat
  - Sedimentation on stable marches (Saeftinge!) is more important (x1.6) than sedimentation on stable intertidal flats in the Western Scheldt.
  - But there’s 2.5 times more surface area of intertidal flats on average.
- After 2004, most of the marshes in Saeftinghe are above MHWL and close to the upper limit in elevation, resulting in a slower increase in elevation and less mud deposition

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Technical Report