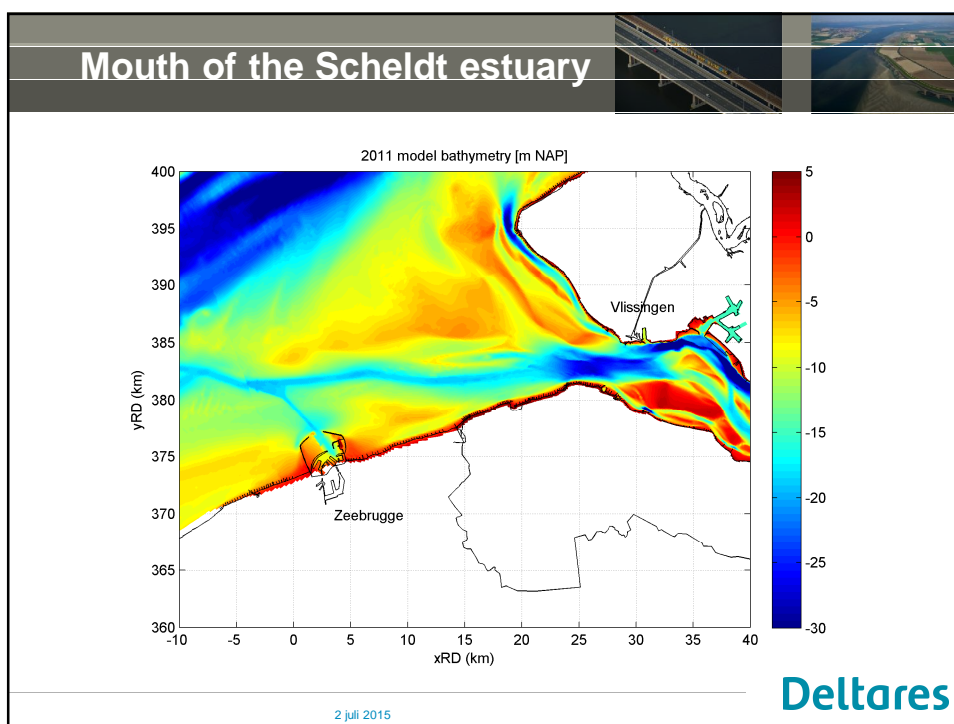


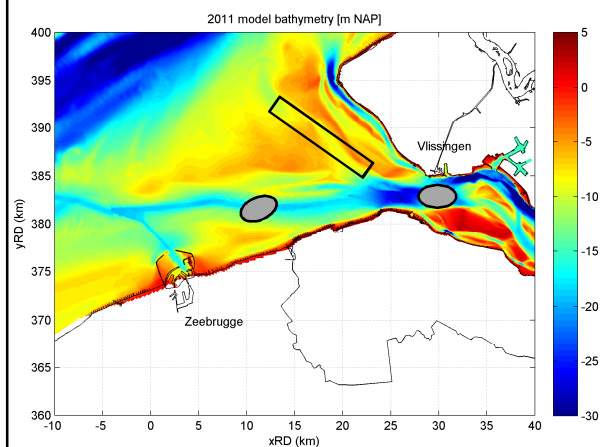
Modeling the hydro-morphodynamics of the mouth of the Scheldt estuary

Jebbe van der Werf¹, Tomas van Oyen², Bart de Maerschalc², Abdel Nnafie²,
Arnold van Rooijen¹, Marcel Taal¹, Pieter Koen Tonnon¹, Toon Verwaest²,
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Management questions



Impact large-scale interventions:

- maintenance dredging
- tidal penetration
- channel morphodynamics
- ...

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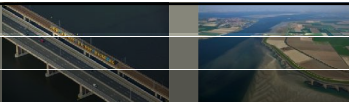
Modeling challenges

- Most previous modeling studies focussed on Western Scheldt and further upstream (e.g. Dam *et al.*, 2007; Van der Wegen & Roelvink, 2012)
- Complex physics: influence of tide, waves, wind and river (3D effects)
- Sand and mud (ETM near Zeebrugge)
- Large area of interest, long time horizon (10-20 years), required resolution ~50-100 m
- Not an easy job!
- Too many aspects for 1 single model

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Strategy: suite of models

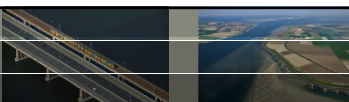


1. Large-scale, long-term (~20 years) hydro-morphodynamics: 2DH model entire Scheldt estuary (sand only)
2. Short-term (~1 year) morphodynamics: 3D sand-mud-bed model mouth of estuary
3. Large-scale mud dynamics: 3D mud model entire Scheldt estuary (no sand, "offline", no bed level change)

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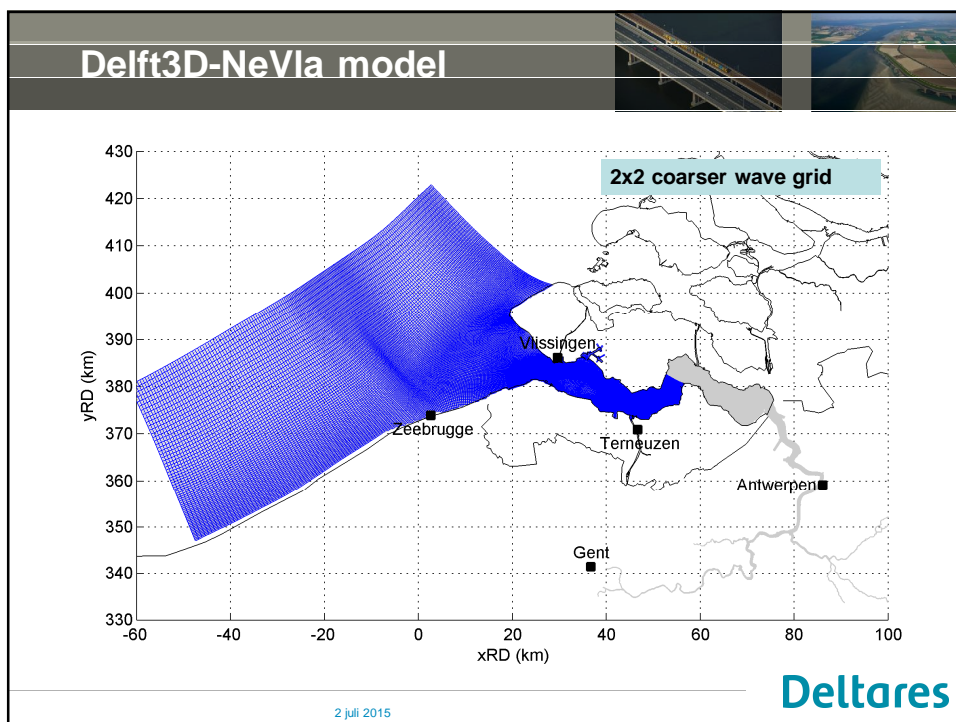
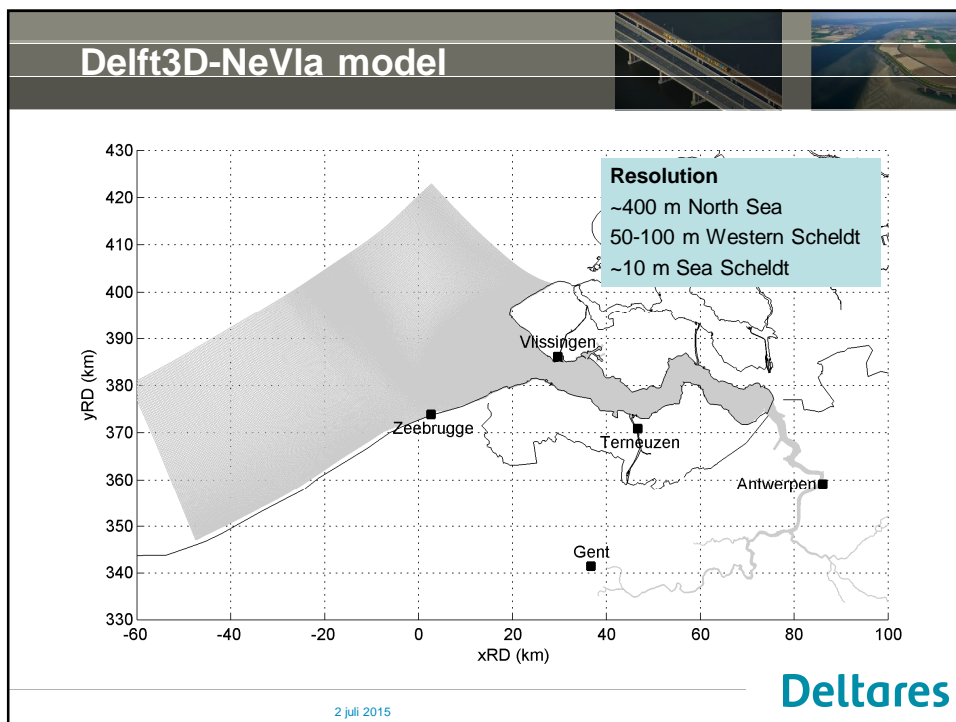
Strategy: suite of models

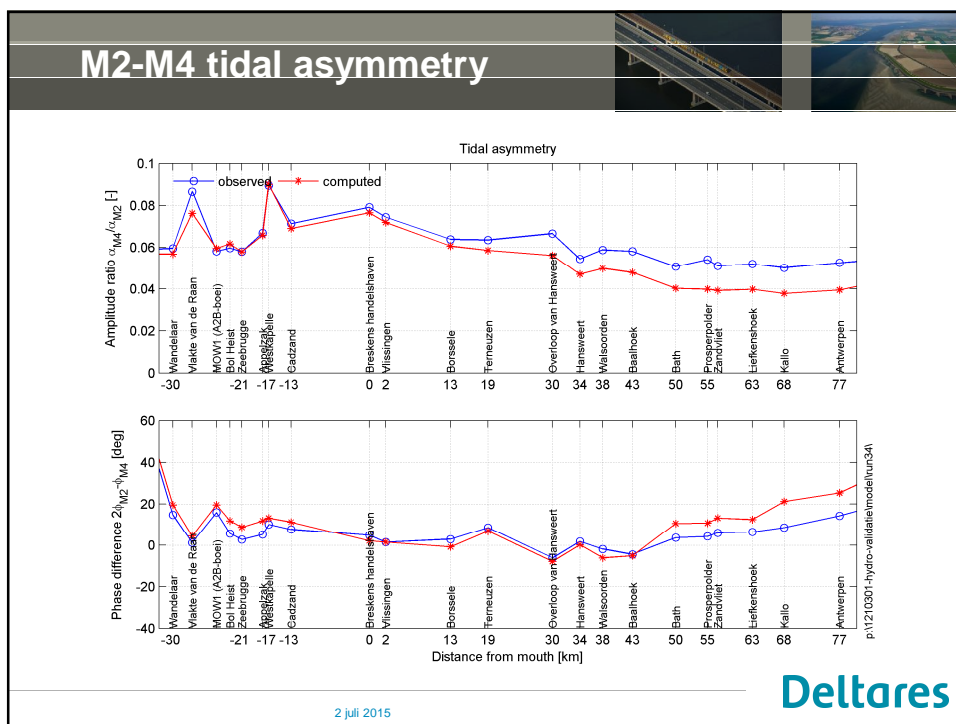
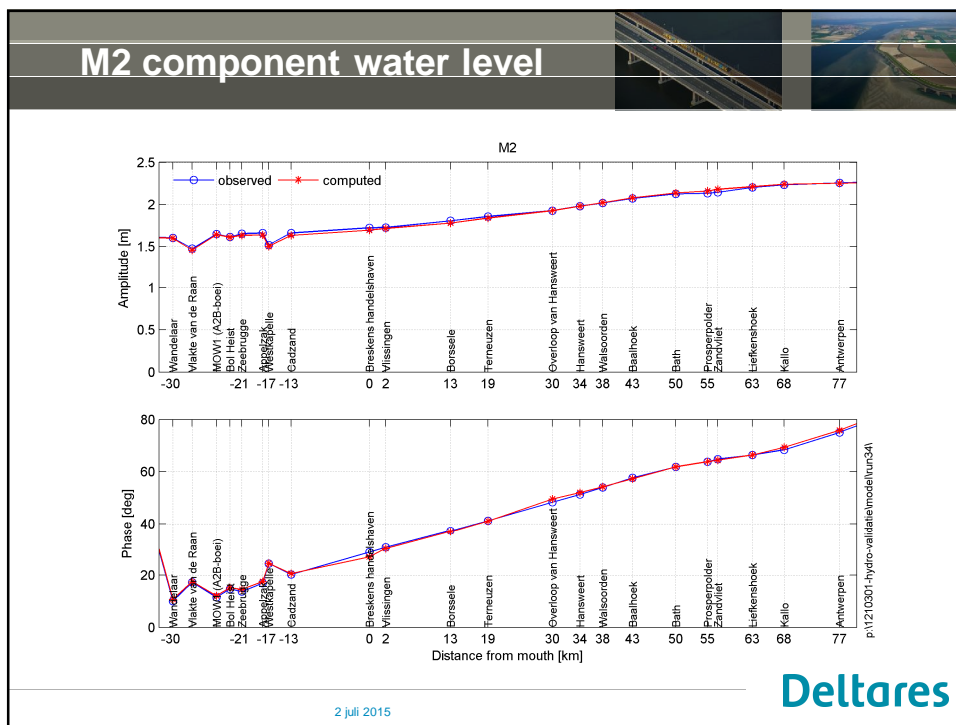


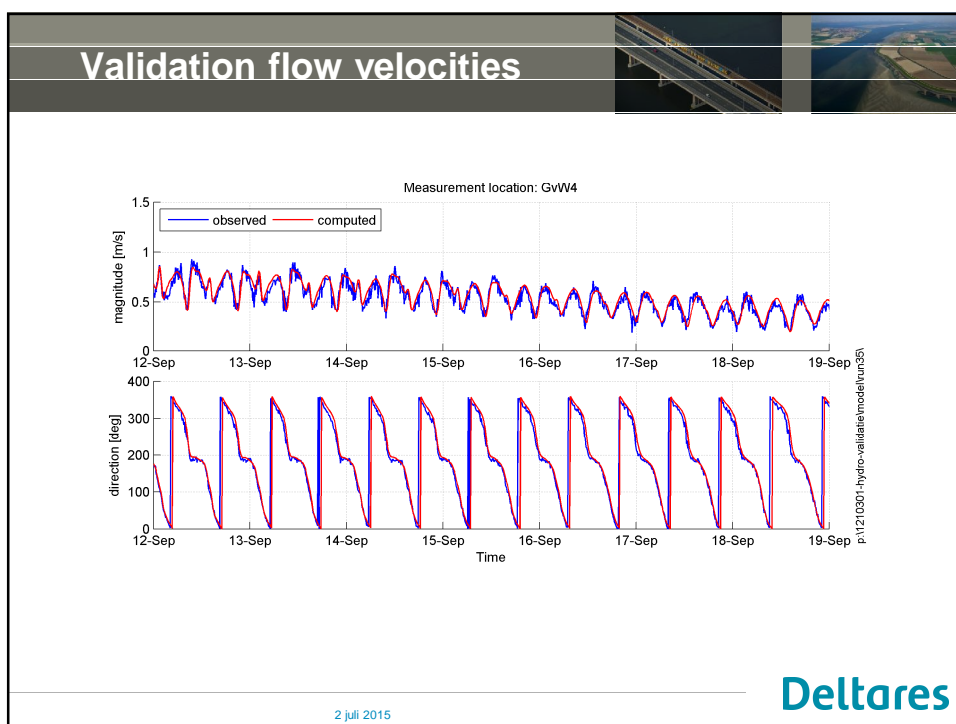
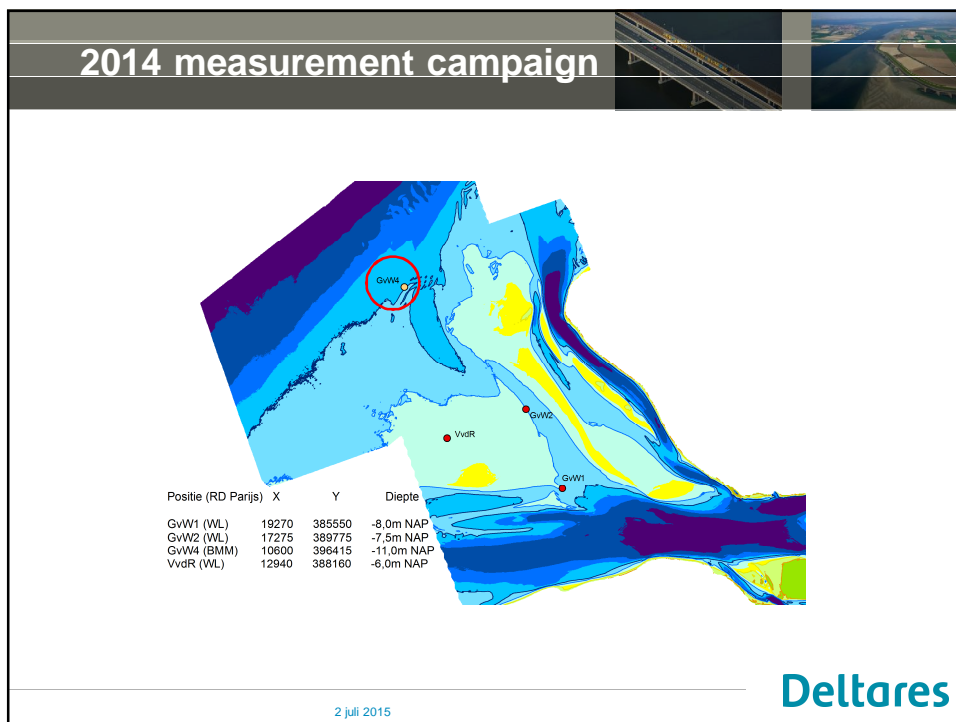
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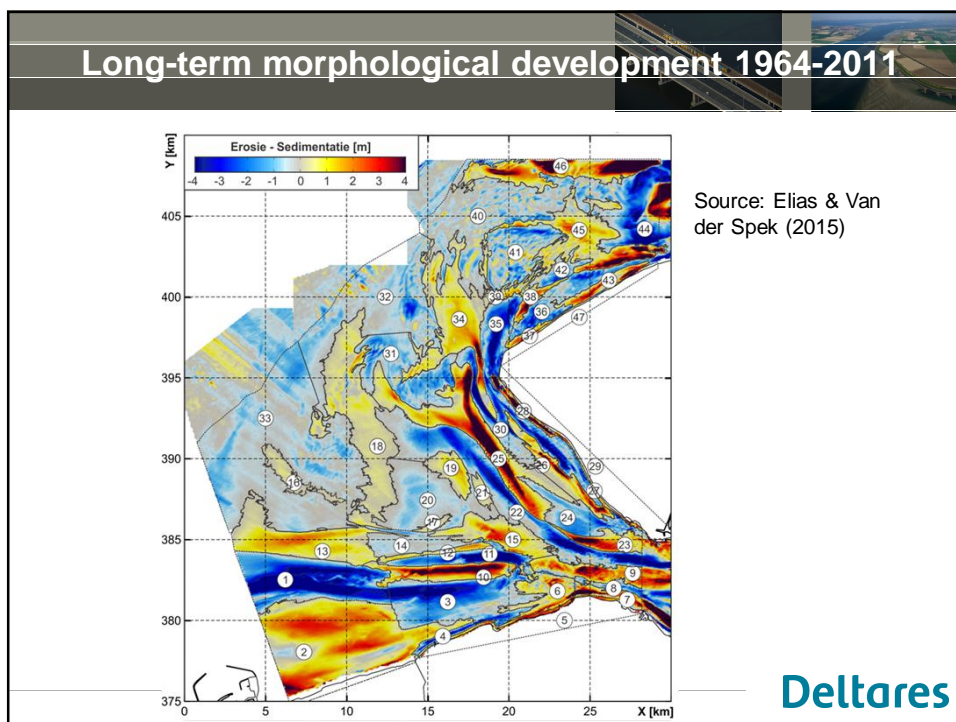
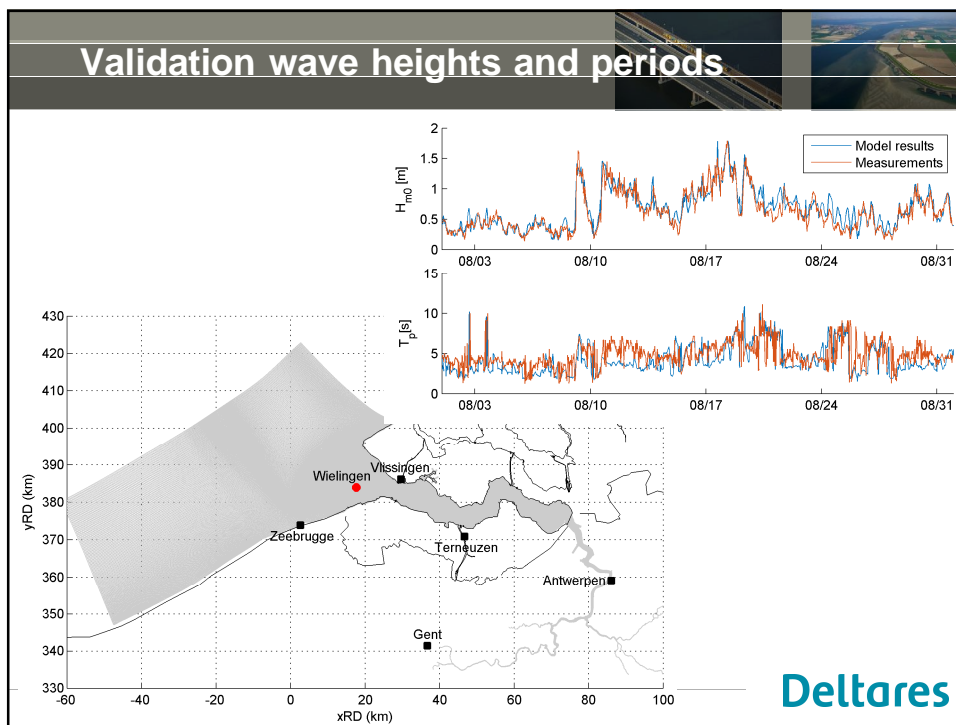
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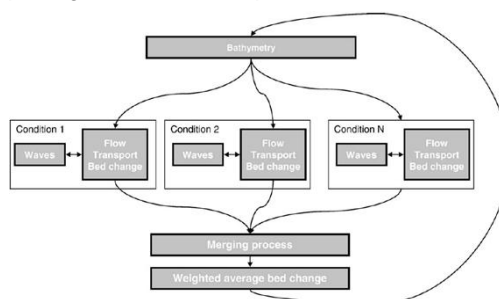






Delft3D morphological model

- Hindcast morphological development 1985-2011
- Input reduction: 1 single morphological tide and 6 representative wave conditions (mormerge)

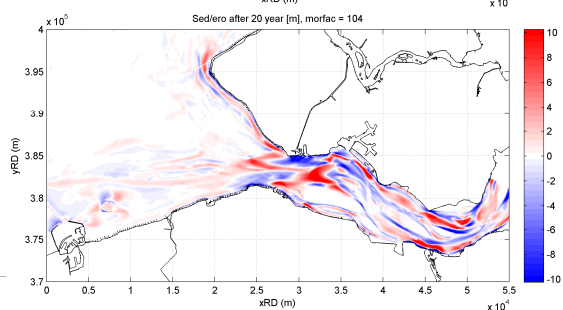
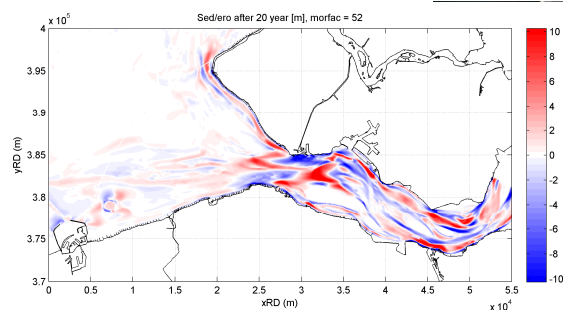


- Morphological acceleration factor of 104
- Time-varying dredging and dumping
- Non-erodible layers

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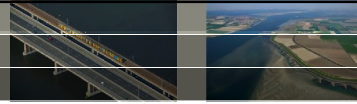
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First explorative simulations



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Conclusions and future work



1. Assessment impact large-scale morphological interventions mouth Scheldt estuary requires suite of models
2. 2DH Delft3D model Scheldt estuary that predicts water levels, flow velocities, discharges and wave heights well
3. Set-up morphological model Scheldt estuary

Work in progress:

- Hindcast morphological development 1984-2011
- 3D sand-mud morphological model of mouth Scheldt estuary
- Scenario simulations