

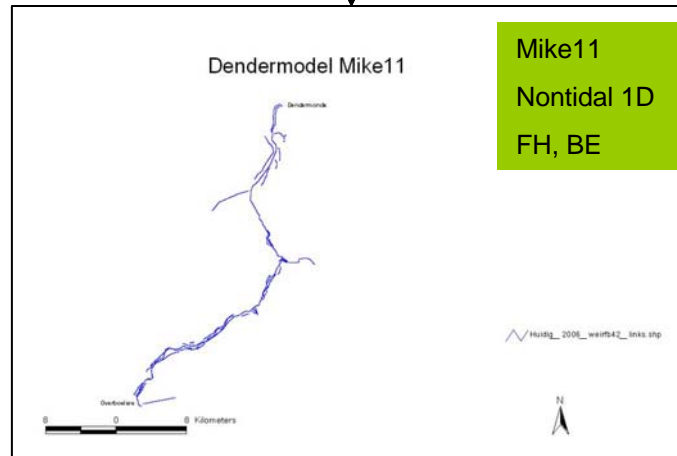
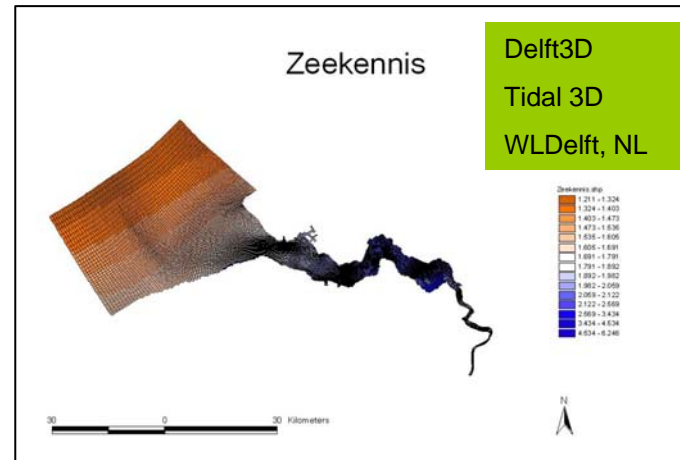
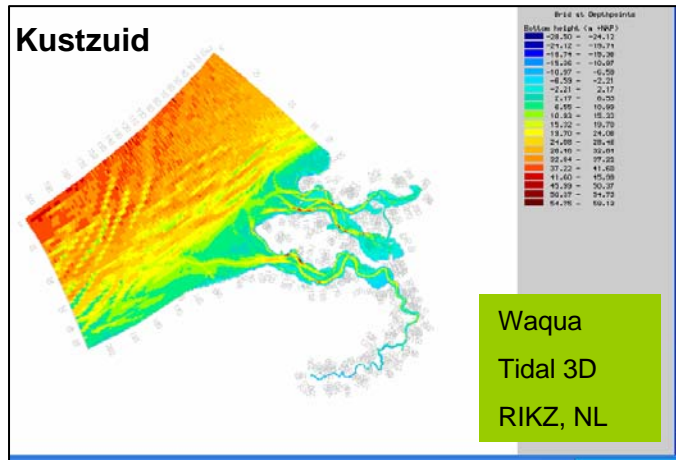


Defining the Scheldt Use case d

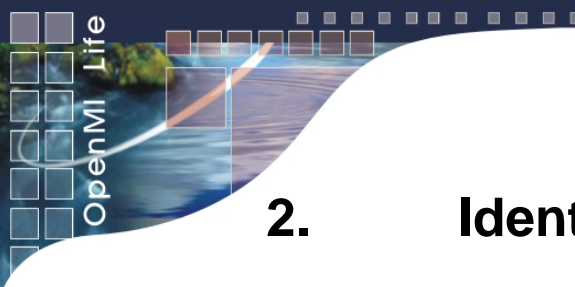
**Linking a 1D-river model (Dender)
to a more dimensional estuary model (of the Westerschelde)**

**Hans Vereecken – Flanders Hydraulics
Workshop 18-19 april 2007, Aquafin, Aartselaar**

1. Short description of the use case



+ additional calculations with Mike11 SIGMA model



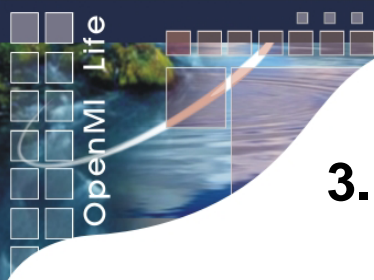
2. Identification of the management / policy issue

Models with different extend and detail at different Authorities:

no integrated policy or management

Main management and policy issues:

- Improvement of boundary conditions within each model
- Improvement of flood forecasting during storm surges and/or high inland discharges
- Improvement of discharge and velocity distribution in Westerscheldt due to high inland discharges in the scope of an improved forecasting of the accessibility of Antwerp Harbour.



3. Solution to this management / policy issue



RIKZ: Kustzuid model up to Dendermonde

WLDelft: Zeekennis model up to Dendermonde

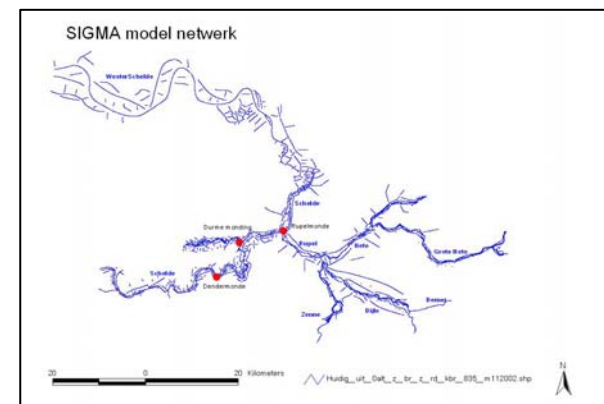
FH: Dendermodel on to Dendermonde

+ lateral discharge inputs of SIGMA model:

Durme at Tielrode

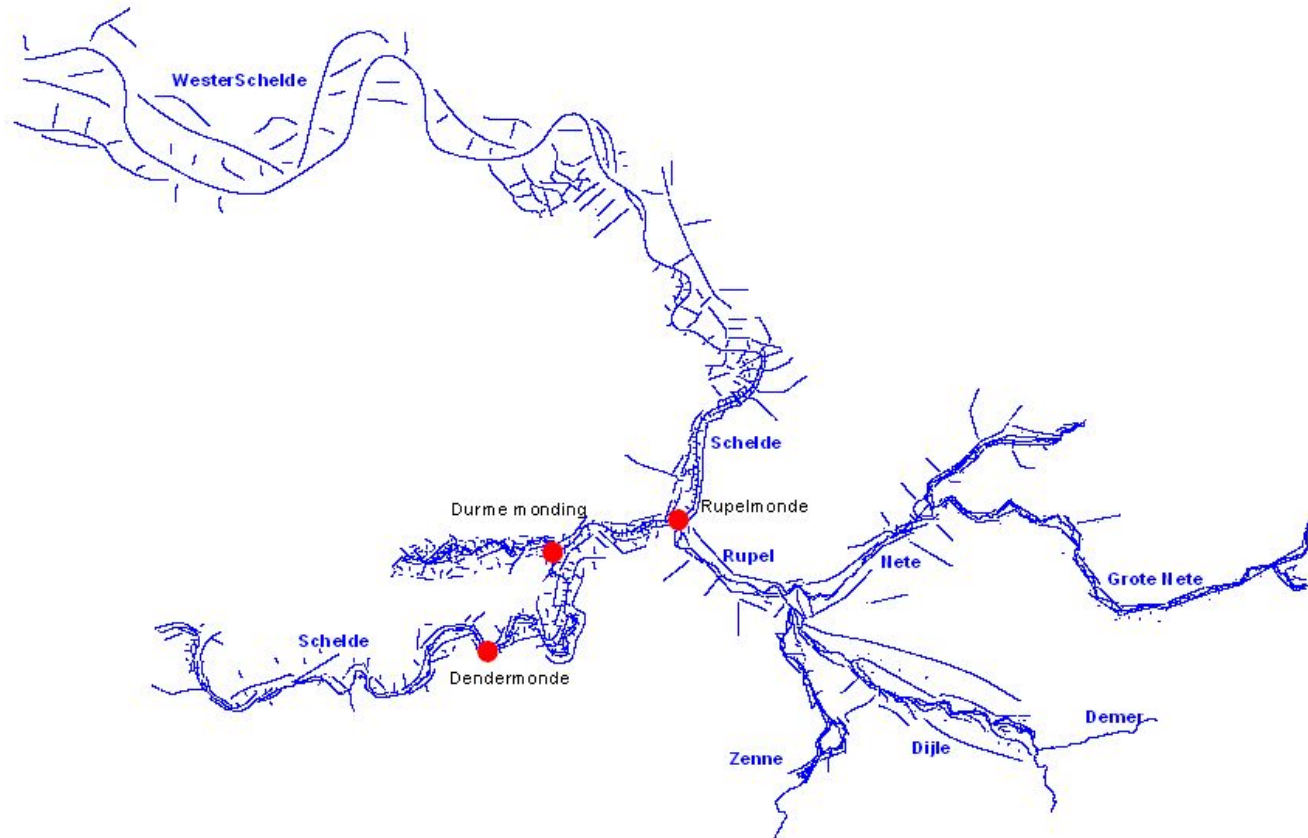
Rupel at Rupelmonde (Nete, Zenne, Dijle, Demer)

Scheldt at Dendermonde



3. Solution to this management / policy issue

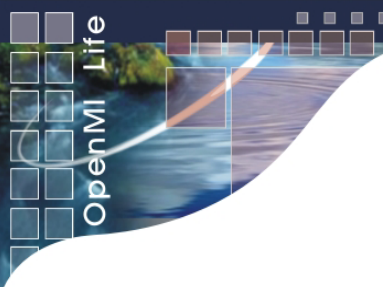
SIGMA model netwerk



20 0 20 Kilometers

Huidig_uit_0alt_z_br_z_rd_kbr_835_m112002.shp





4. Setting the objectives

4.1 Specific use case objectives

The classic approach

For the 1D-river model:

A downstream boundary would be a time series of water level in the Scheldt, produced by a 1D-tidal river model, which can not take into account the exact propagation of storm surges in this area.

Alternative via OpenMI

By enlarging the more dimensional models up to Dendermonde, this propagation will hopefully be more precise and will deliver better downstream boundary conditions for the river model Dender.

For the 2D-tidal models:

An upstream boundary would be a time series of flow.

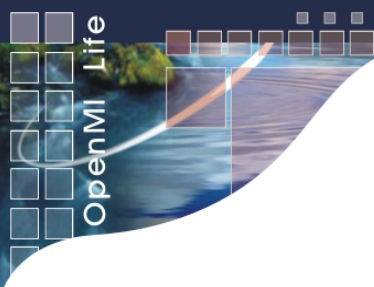
The model of WLDelft uses estimated discharge time series for Rupelmonde.

The model of RIKZ covers the whole tidal part of the Scheldt and uses measured discharge time series at Melle and estimated discharge time series at Rupelmonde.

The models of both WLDelft and RIKZ lack detailed terrain information in Flanders, for instance the management of artificial large scale flood areas in the upstream area, which strongly influences the flow.

Alternative via OpenMI

The SIGMA model and the Dender model have detailed information about such areas, which will lead to a better understanding of discharge inputs into the Scheldt.



4. Setting the objectives

4.1 Specific use case objectives

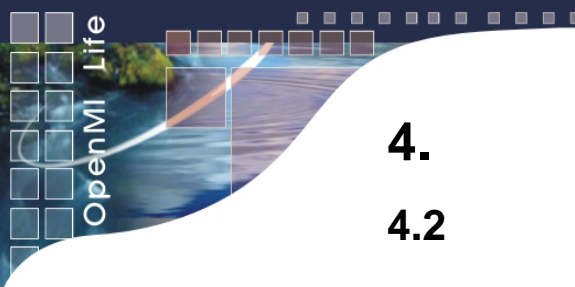
Practical feasibilities of calculation time, version management

Table 1. Time step and calculation time for the models of Scheldt use case D.

Model	Time step	Calculation time (1 month)
Mike11 Dender	30 seconds	1 hour
Delft3D Zeekennis	1 minute	1 hour
Waqua Kustzuid	30 seconds	3 hours

Quality of product of linked models

- Impact assessment analyses (controlled flood areas in the upstream part)
- Flood forecasting in Scheldt basin
- Accessibility of Antwerp Harbour



4. Setting the objectives

4.2 Wider perspective objectives

- *Objectives about integrated water management*

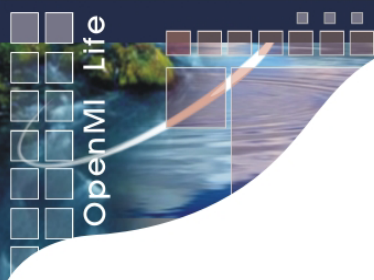
Linked models will be able to simulate the impact of the management of the complete river system of the Scheldt basin.

In this way modelling cost can be reduced as the overlap in the models is reduced or even omitted.

Respect for each others methods and models will contribute to a better dialogue with the different partners.

- *Objectives about remote linking*

In operational use, it should be possible that both river managers can run their own model in their own offices linked at runtime with the other model which runs on the hardware at the offices of the other river manager.



5. Defining the actions

5.1 Preconditions for linking models

OpenMI compliancy of the 3 models:

Delft3D accept discharges and delivers water levels

Mike11 delivers discharges and accept water levels

Waqua accept discharges and delivers water levels (in the very near future)

Software and licenses installed at different partners: start of trial phase

5. Defining the actions

5.2 Actions for the definition phase

Hardware environment

laptop pc's for each partner

Define interactions

Time domain

Time step of models (tests equal/multiple time steps)

Historical periods with different flow regimes:

- standard/normal tidal period
- storm period, selected from a RIKZ-list of storms
- december 2002- january 2003, a period with high inland discharge

COMMON PERIODS OR EASY FOR DATA RETRIEVAL

5. Defining the actions

5.2 Actions for the definition phase

Define interactions

Spatial domain

Link at Dendermonde:

RIKZ-Kustzuid: cutoff unnecessary parts (Melle-Dendermonde)

WLDelft-Zeekennis: enlarge up to Dendermonde

FH-Dender ok

FH-SIGMA offline calculations for discharge inputs

Onedimensional <> Moredimensional features: solution via Delft3D tool

Different water level reference systems (NAP vs. TAW): solution via OpenMI

5. Defining the actions

5.2 Actions for the definition phase

Define interactions

Working scheme

Prepare models for linking

Install different softwares at each partner

Select calculation periods

Stand-alone simulations for the selected periods and deliver results to partner

Offline OpenMI-link (OpenMI-AsciiReader)

OpenMI-Linking of the models itself

Vocabulary



5. Defining the actions

5.3 Actions for the trial and demonstration phase

carry out runs in operational mode,
evaluate the performance and stability
perform the required changes to the models
repeat the operational runs after changes in place

5.4 Actions for the evaluation phase

Answering different questions (computing time, improved results, differences in results, support from OpenMI, stable runs,...)

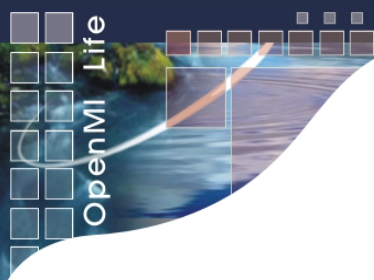
6. Milestones, deliverables, success scenarios

6.1 Technical:

OpenMI compliant models, linkable via OpenMI GUI

6.2 Use case specific:

Definition and Evaluation report



Flanders
Hydraulics



WLDelft
Hydraulics



RIKZ