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Detailed Zeebrugge Hydrodynamic model

Numerical tool as part of an integral approach for accessibility and safety studies

Problem statement:

- Accessibility and safety of the port: Strong ebb and flood currents
-> Limited inbound sailing window for tall ships
- Port maintenance: strong tidally driven siltation of the outer port
-> continuous dredging activities (> 4 MTons/year)

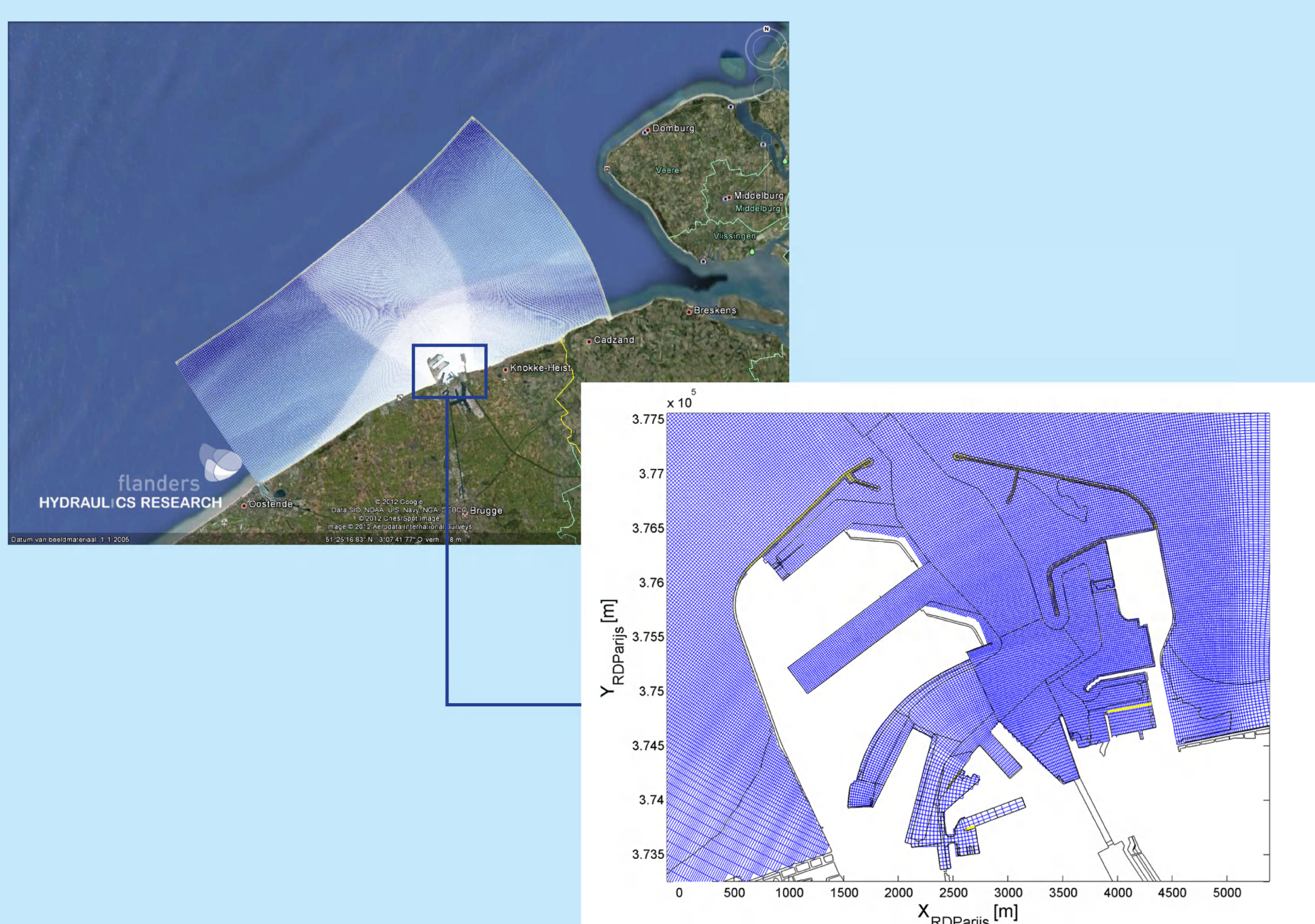
Project description:

- Development of integral approach for future assessment studies
- Numerical 3D model, physical model and simulator studies



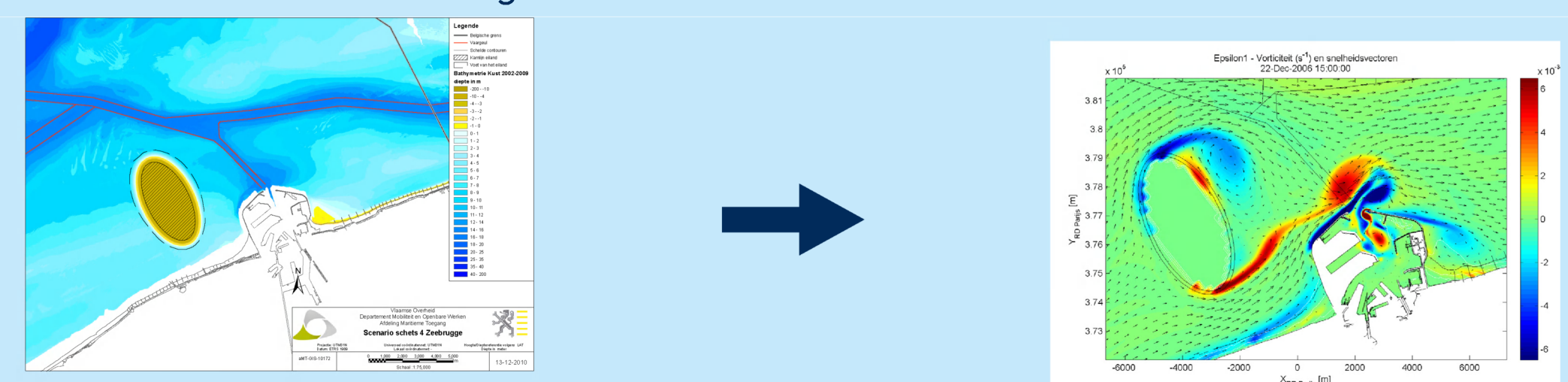
Model description

- 3D: 185.000 cells, 6 vertical σ -layers
- Resolution: 30m – 200m, $\Delta t = 3\text{sec}$
- Turbulence model: k- ϵ
- Validation: Meetnet Vlaamse Banken, In situ measurements (fixed ADCP and sailed transects: MVB, Flanders Hydraulics Research)



Model applications

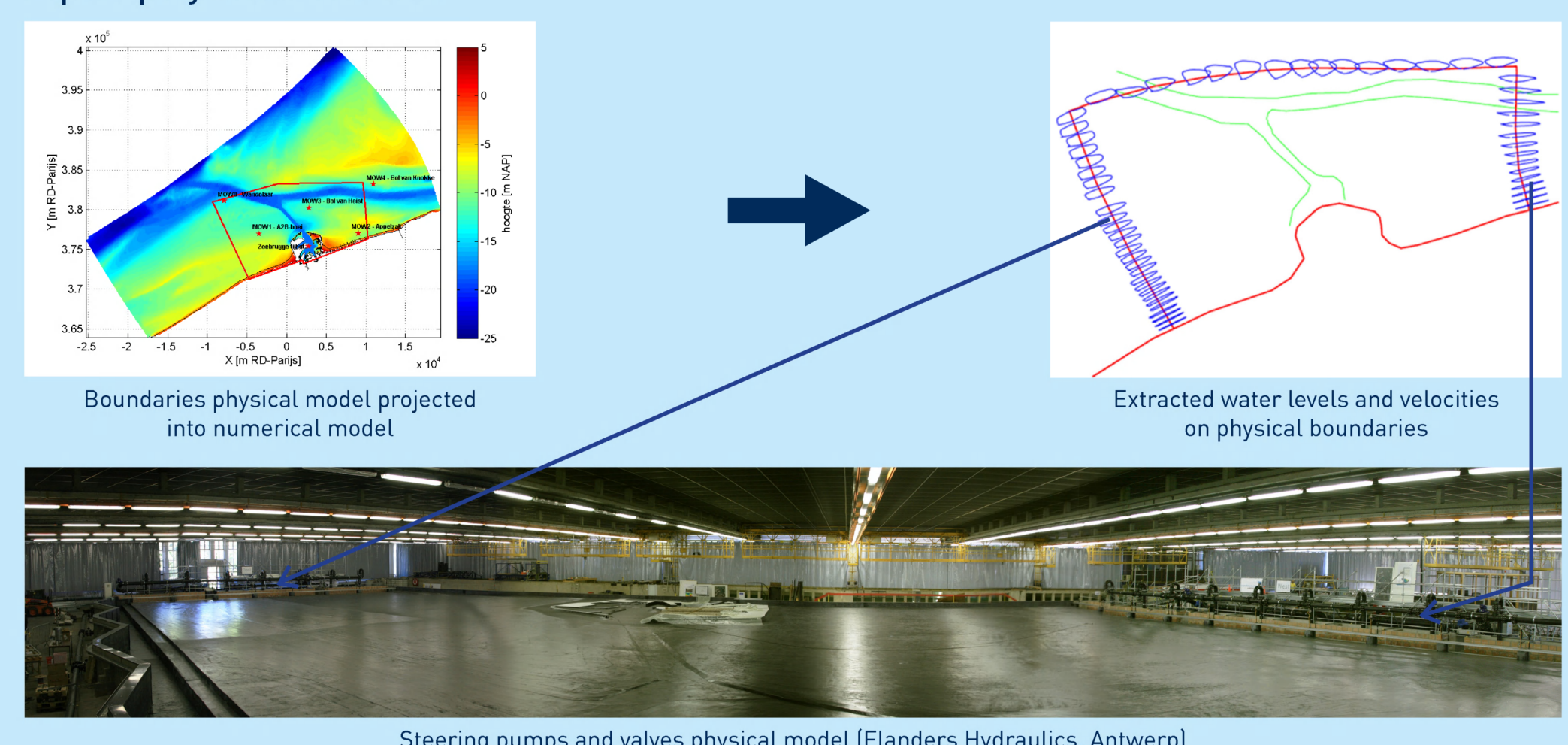
- Port extension and mitigation assessments



- Input real/fast-time simulator



- Input physical model



Steering pumps and valves physical model (Flanders Hydraulics, Antwerp)