Digital twins for safe and sustainable delta development in a changing climate

A perspective on the Destination Earth Initiative (DestinE)

Femke C. Vossepoel*, Neelke Doorn, Nick C. van de Giesen, Arnold W. Heemink, Rolf W. Hut, Sebastiaan N. Jonkman, Caroline A. Katsman, Mark van Koningsveld, Stef Lhermitte, Julie Pietrzak, Herman W.J. Russchenberg, A. Pier Siebesma, Susan C. Steele-Dunne, Riccardo Taormina, Philip J. Vardon, Jazmin Zatarain Salazar

Courtesy Port of Rotterdam

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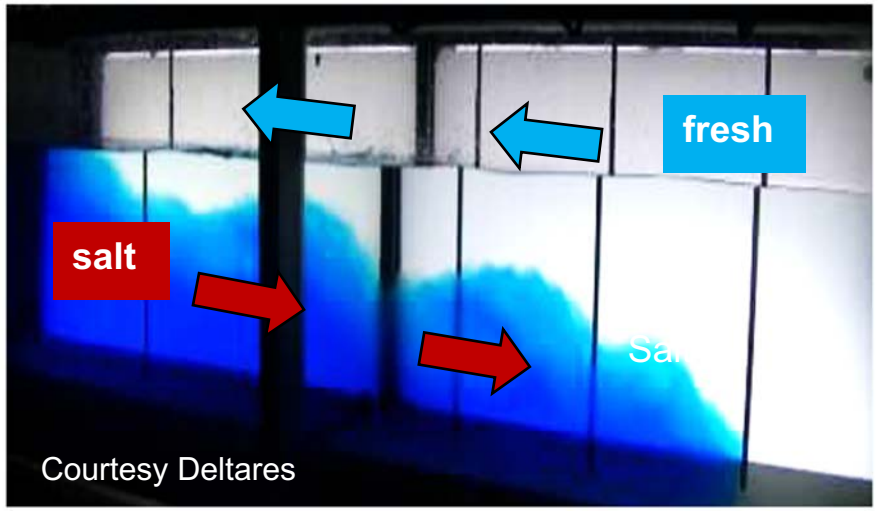
SALTISolutions: Monitoring salt intrusion in the Rhine-Meuse Delta



TU Delft
F.C.Vossepoel@tudelft.nl

Monitoring salt intrusion in the Rhine-Meuse Delta

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F.C.Vossepoel@tudelft.nl

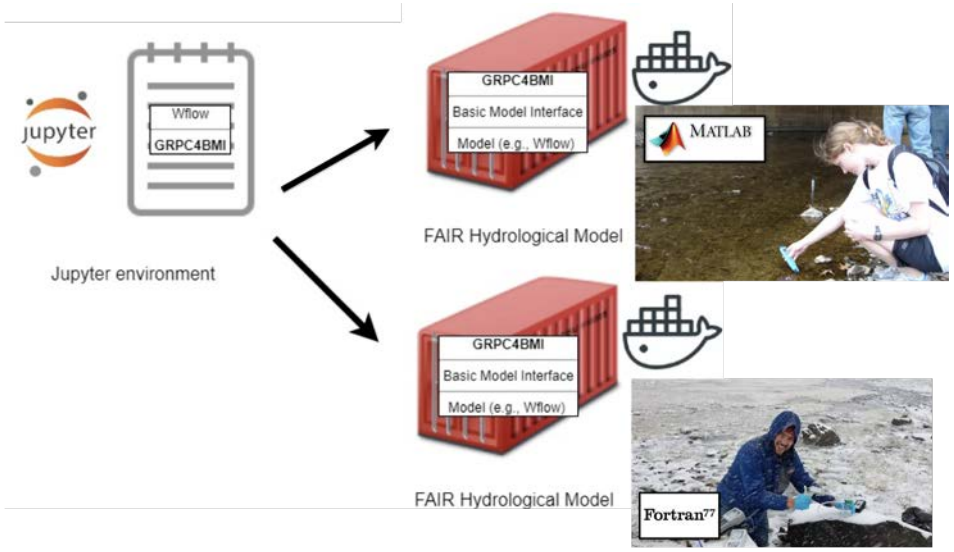
With Deltares, Dutch Ministry of Infrastructure and Water Management (Rijkswaterstaat)

SALTISolutions program leader: Julie Pietrzak

Purpose and potential use of eWaterCycle

Hydrology: many models describing processes

interact with existing models on common platform



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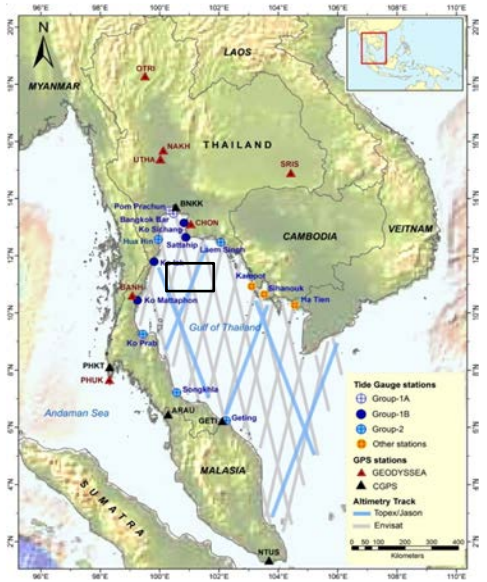
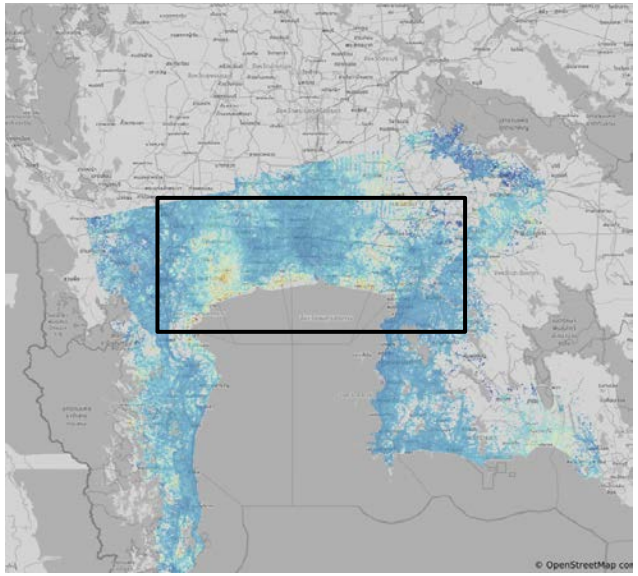
Rolf Hut, Nick van de Giesen et al., TU Delft

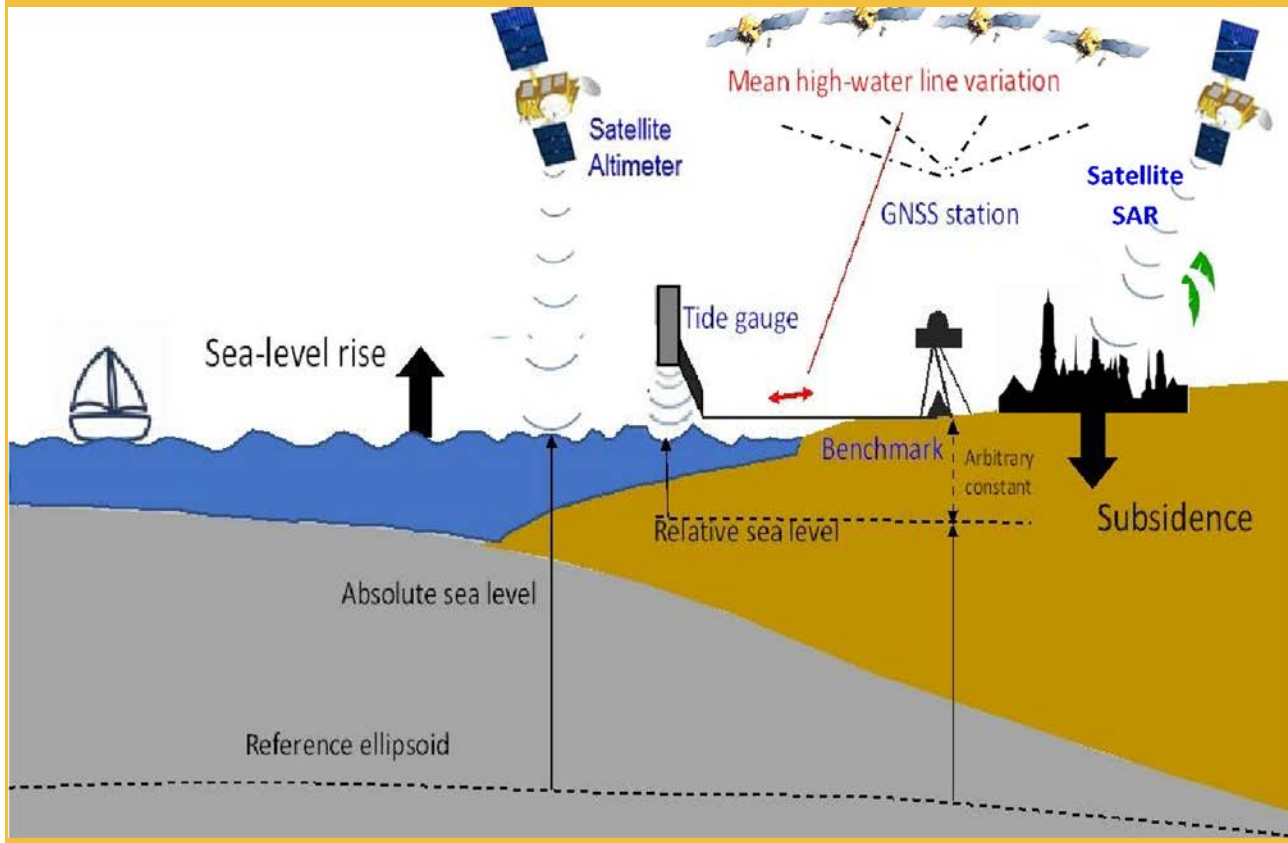
Lessons learned

- Original Data, Original Models
- Work across scales
- Context matters





Data assimilation of in-situ and satellite data for assessment of coastline changes in Bangkok



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F.C.Vossepoel@tudelft.nl

Femke Vossepoel et al., TU Delft with Leeds Univ, Kasetsart Univ, Thai Dept. Groundwater Resources, Thai Naval Academy

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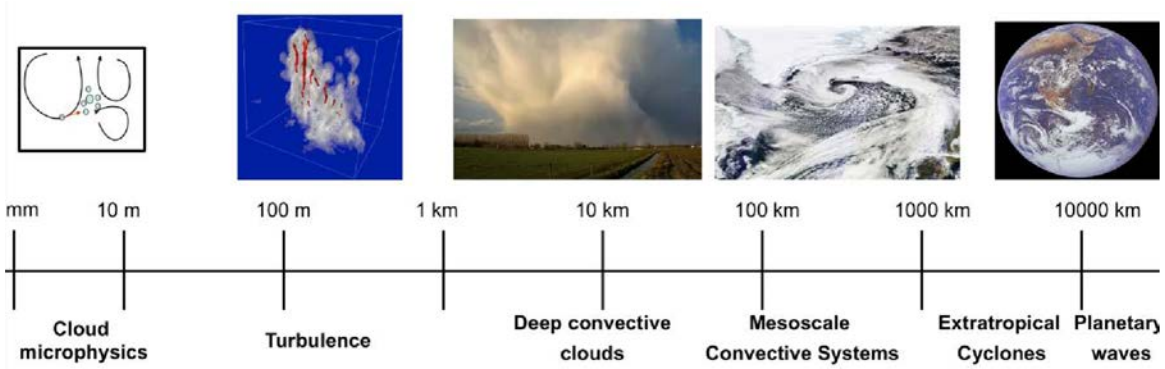
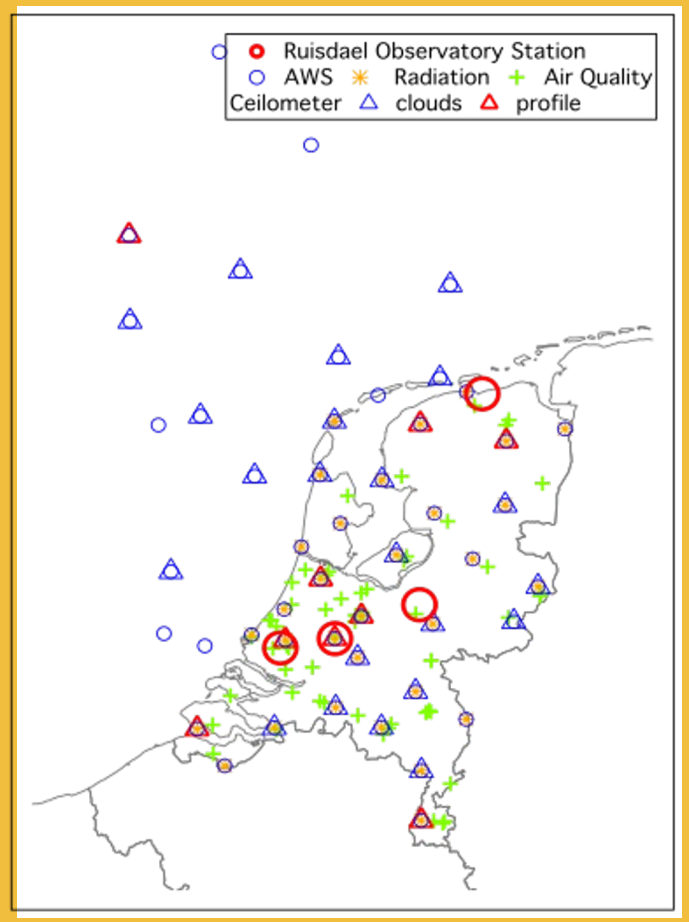


Ruisdael Observatory



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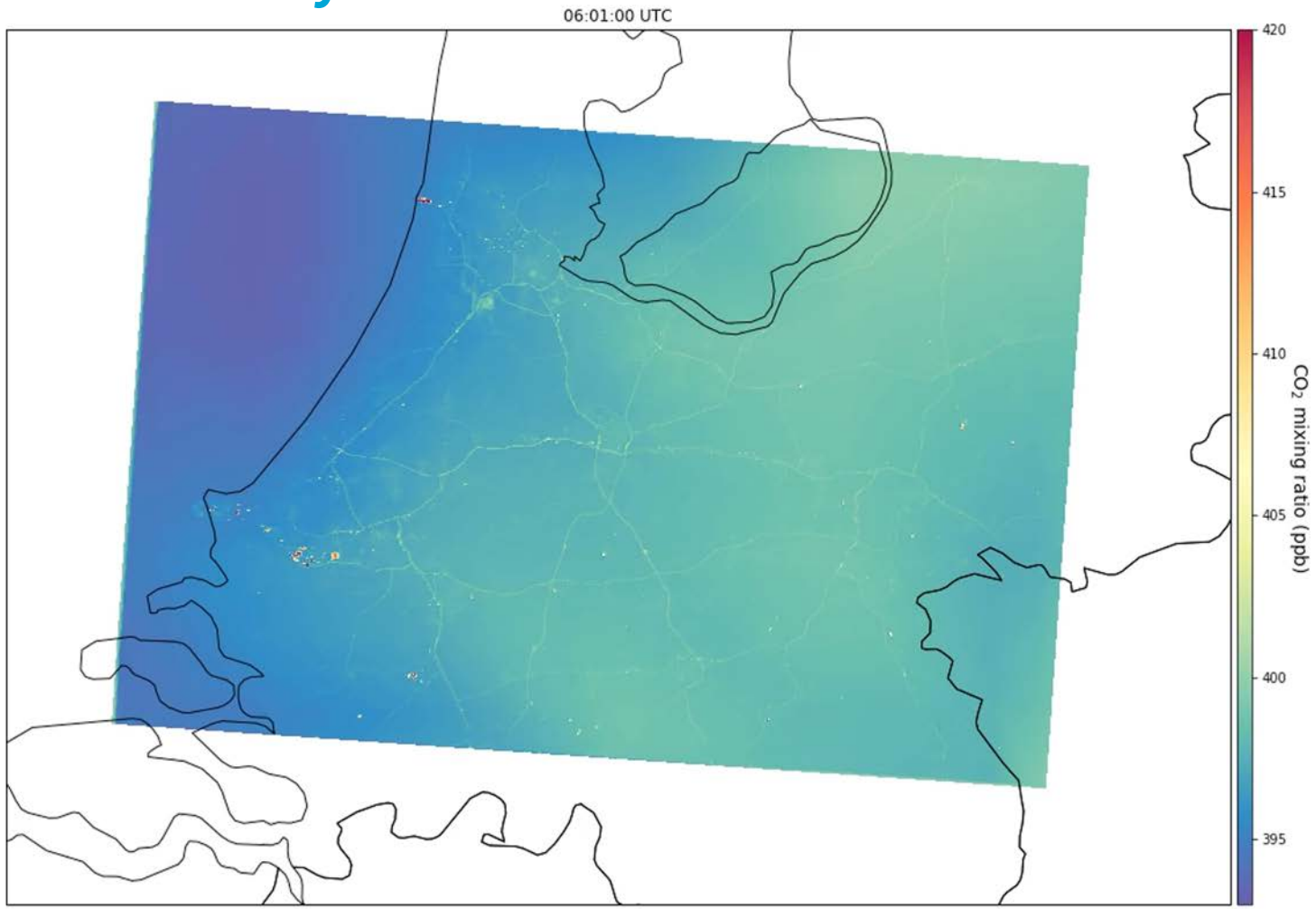

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F.C.Vossepoel@tudelft.nl

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Negotiation Simulation Lab in Zambia

TU Delft
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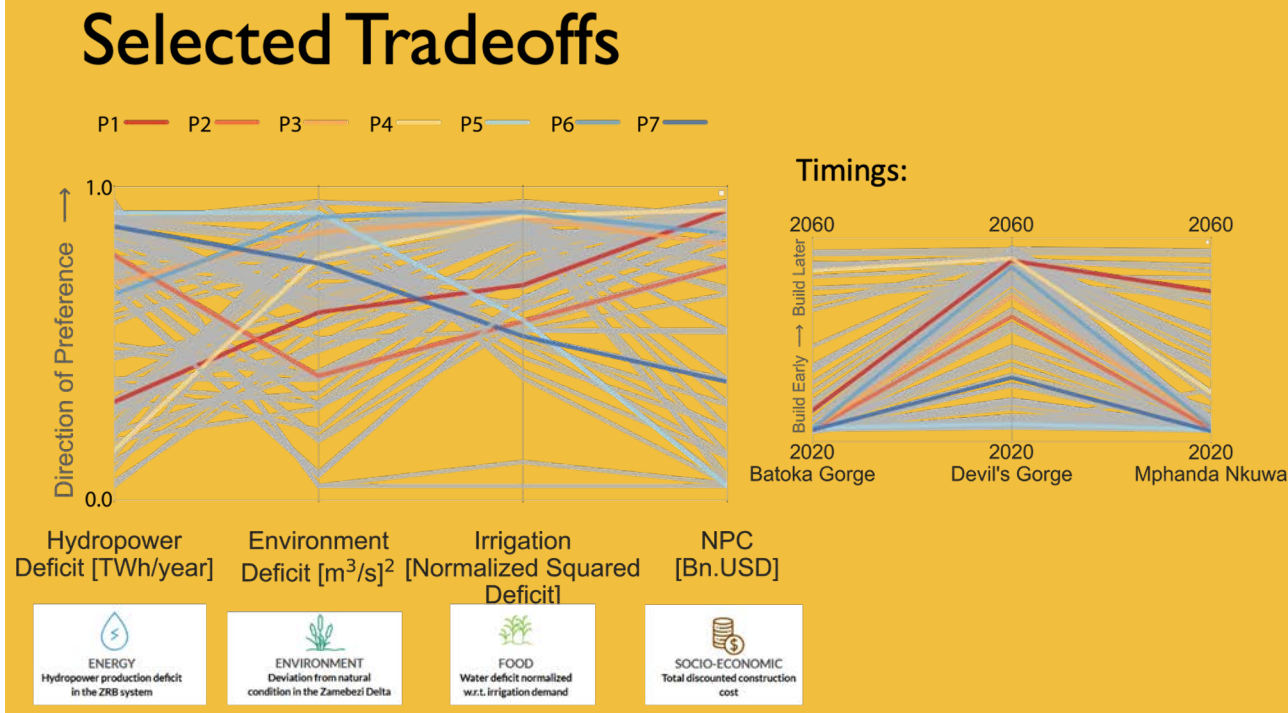

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F.C.Vossepoel@tudelft.nl

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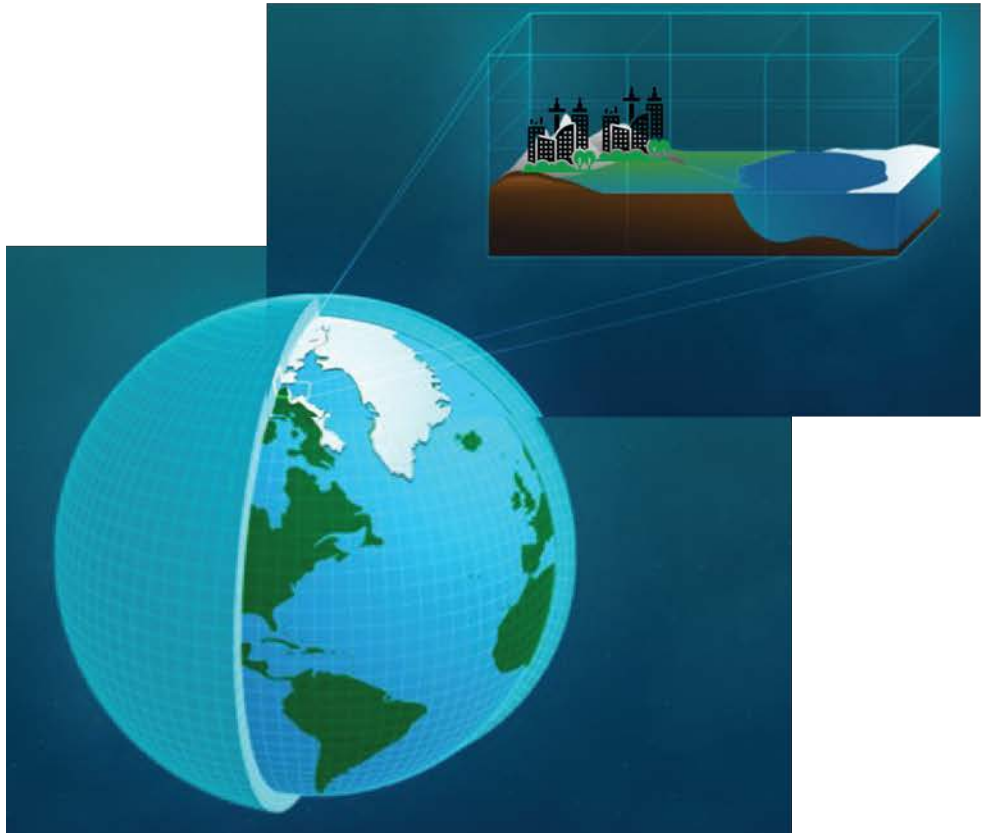
Co-creation labs with serious gaming for a safe Delta



- Context and dilemmas
- Domain expertise
- Model development
- Data collection
- Intended use
- …

Policymakers

Scientist

Model developers

Industry

- Localisation of risk
- Near real-time decision support
- Short-term planning, e.g., evacuation plan
- Long-term scenario-based planning
- …

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TU Delft
F.C.Vossepoel@tudelft.nl

Predictive maintenance

With Aveco de Bondt, Dutch Ministry of Infrastructure and Water Management (Rijkswaterstaat)

Bas Jonkman, Luc Ponsioen et al., TU Delft/Aveco de Bondt

Predictive maintenance

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Thank you

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Extras

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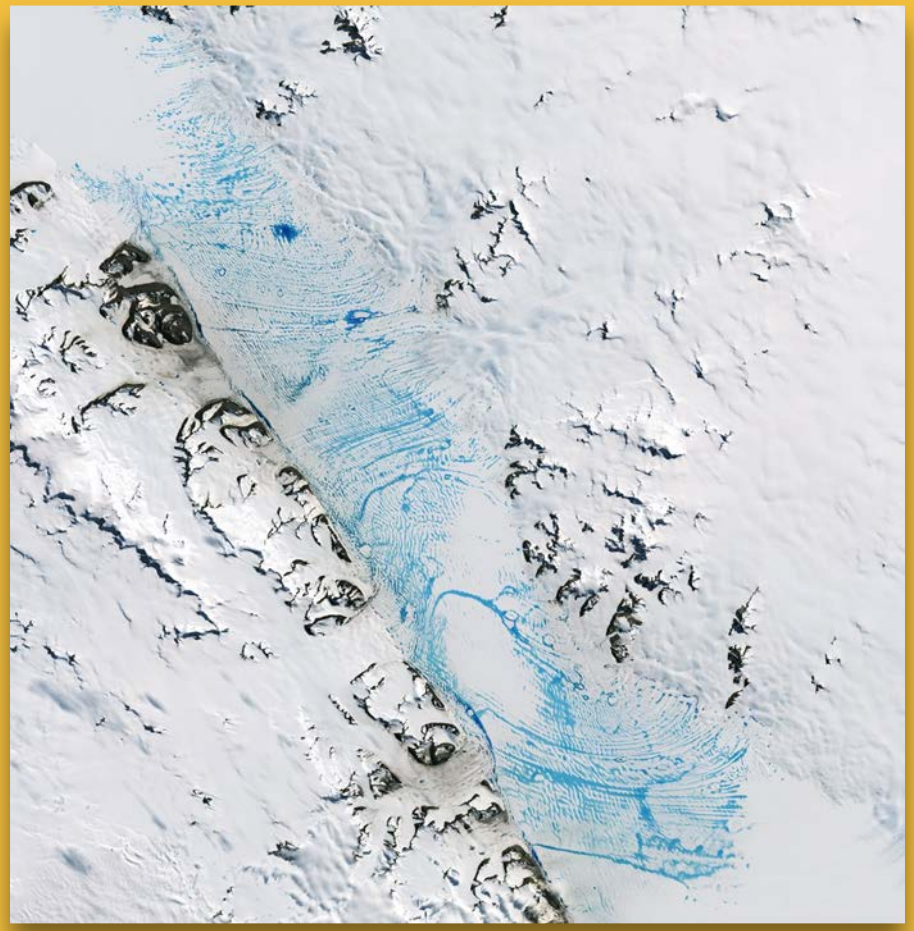
Machine Learning in climate models for ice sheet Antarctica



Banwell et al, 2021

TU Delft
F.C.Vossepoel@tudelft.nl

Stef Lhermitte et al., TUD, https://tc.copernicus.org/preprints/tc-2021-102/#discussion

Lessons learned

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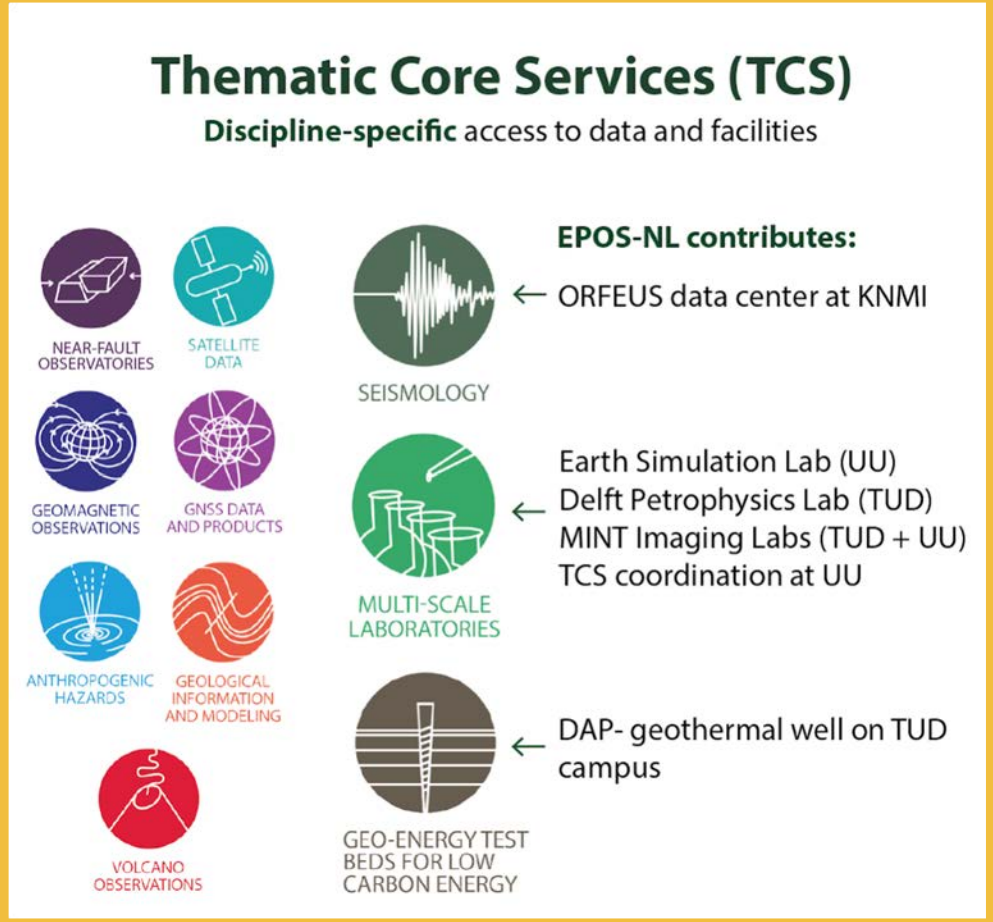
EPOS-NL data infrastructure



Kees Wapenaar, Phil Vardon et al., TU Delft

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F.C.Vossepoel@tudelft.nl

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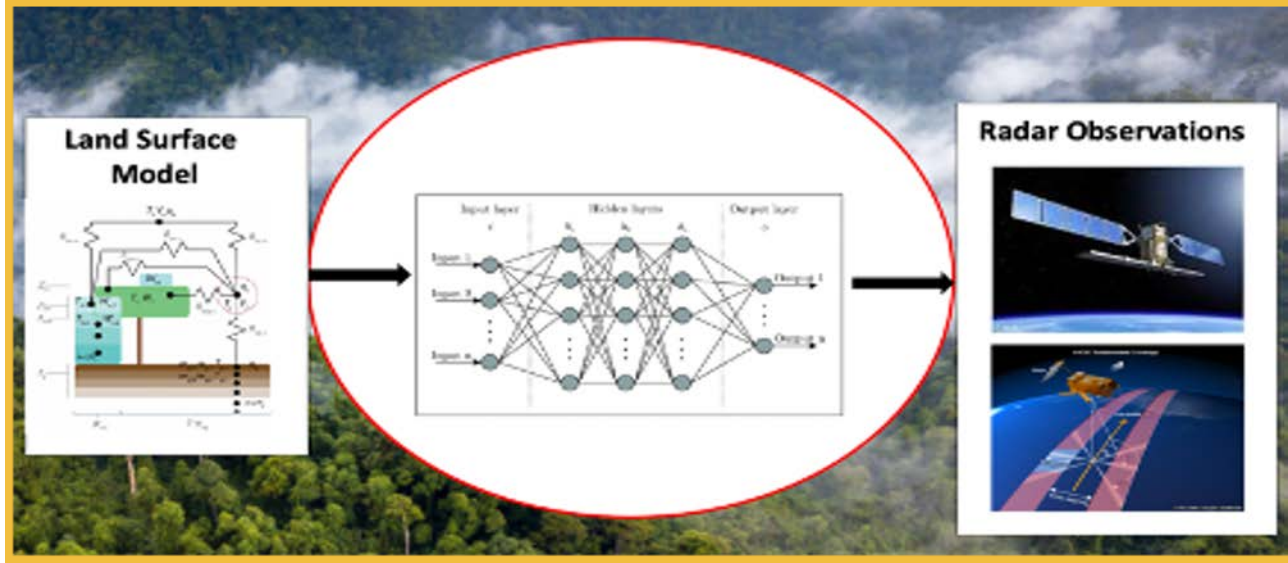
Data assimilation of Advanced Scatterometer (ASCAT) satellite radar data for soil moisture



Shan et al. (2021, in review)
Collaboration MeteoFrance, TU Wien, ESA

F.C.Vossepoel@tudelft.nl