

Automatic isobath generalisation

By optimizing cartographic constraints in a surface-based approach

Willem van Opstal

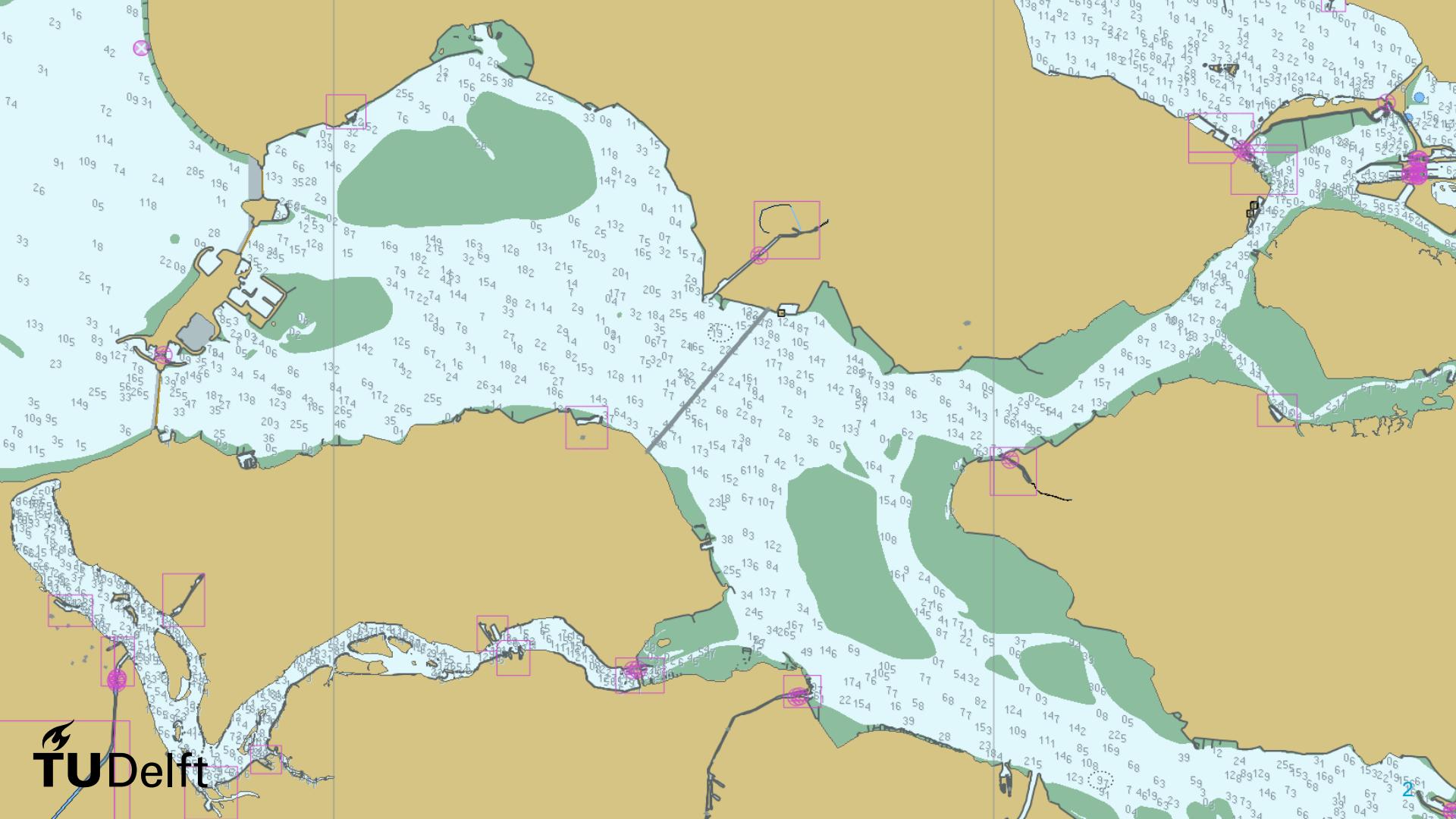
Martijn Meijers

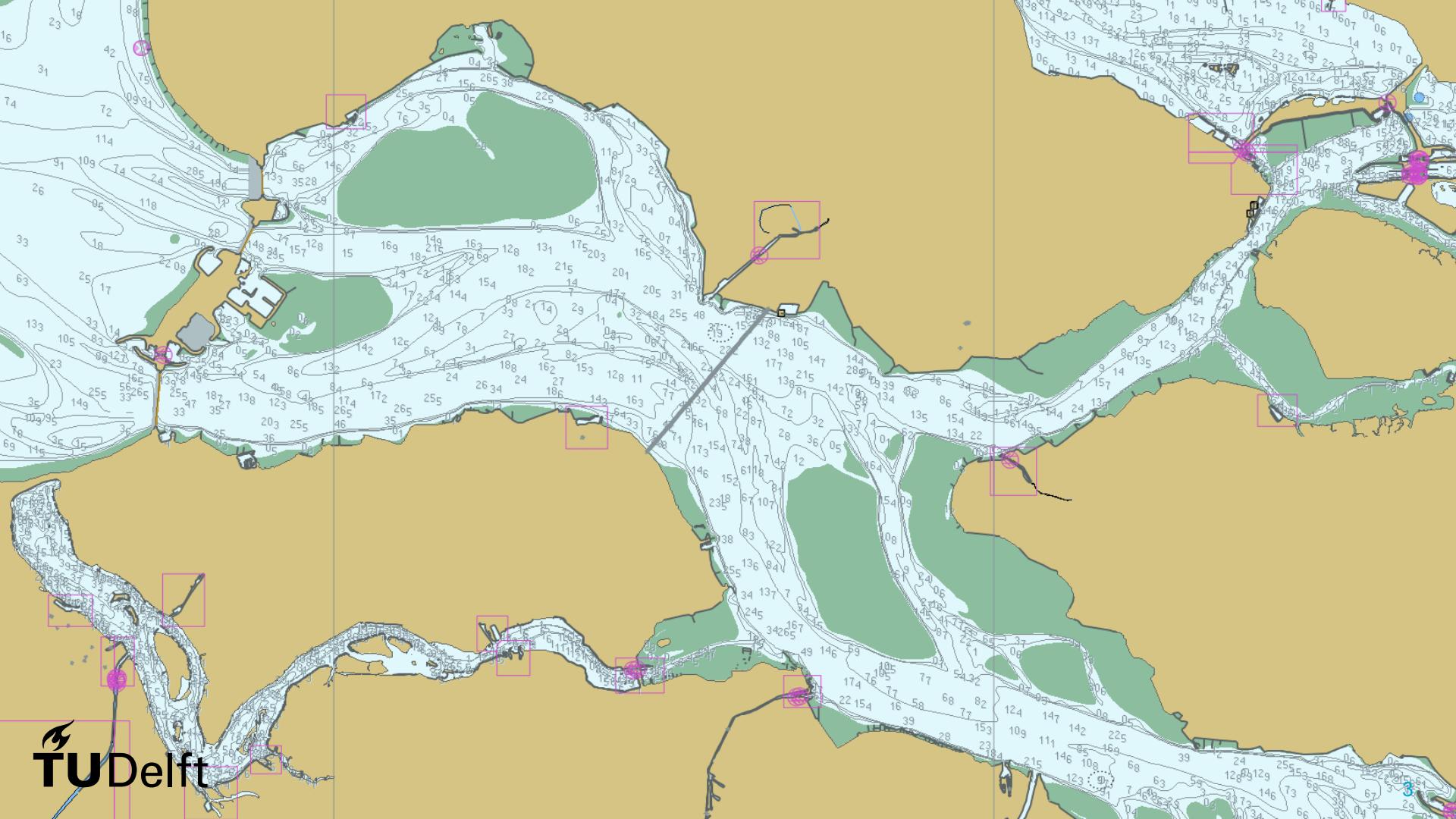
(1st mentor)

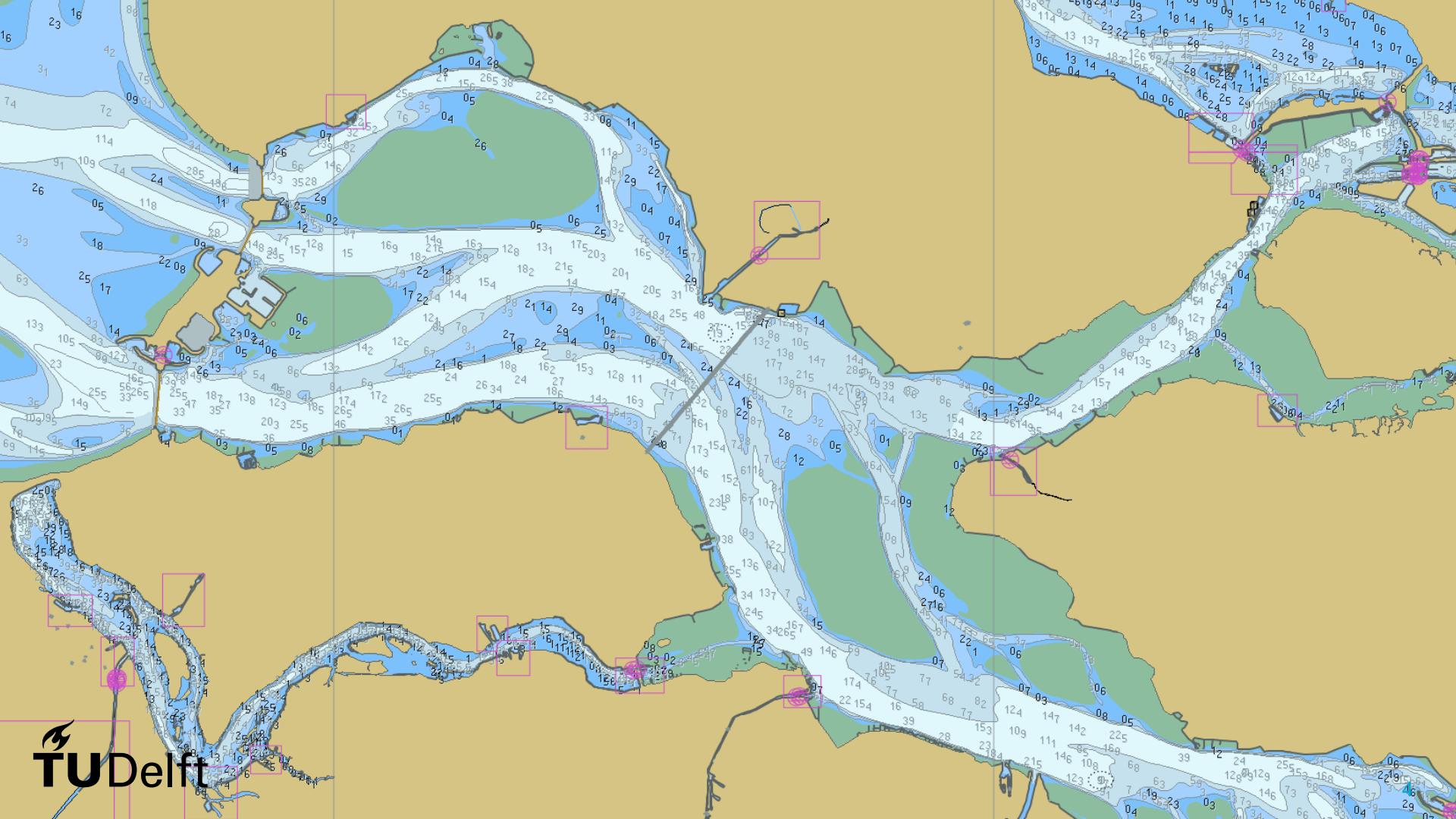
Ravi Peters

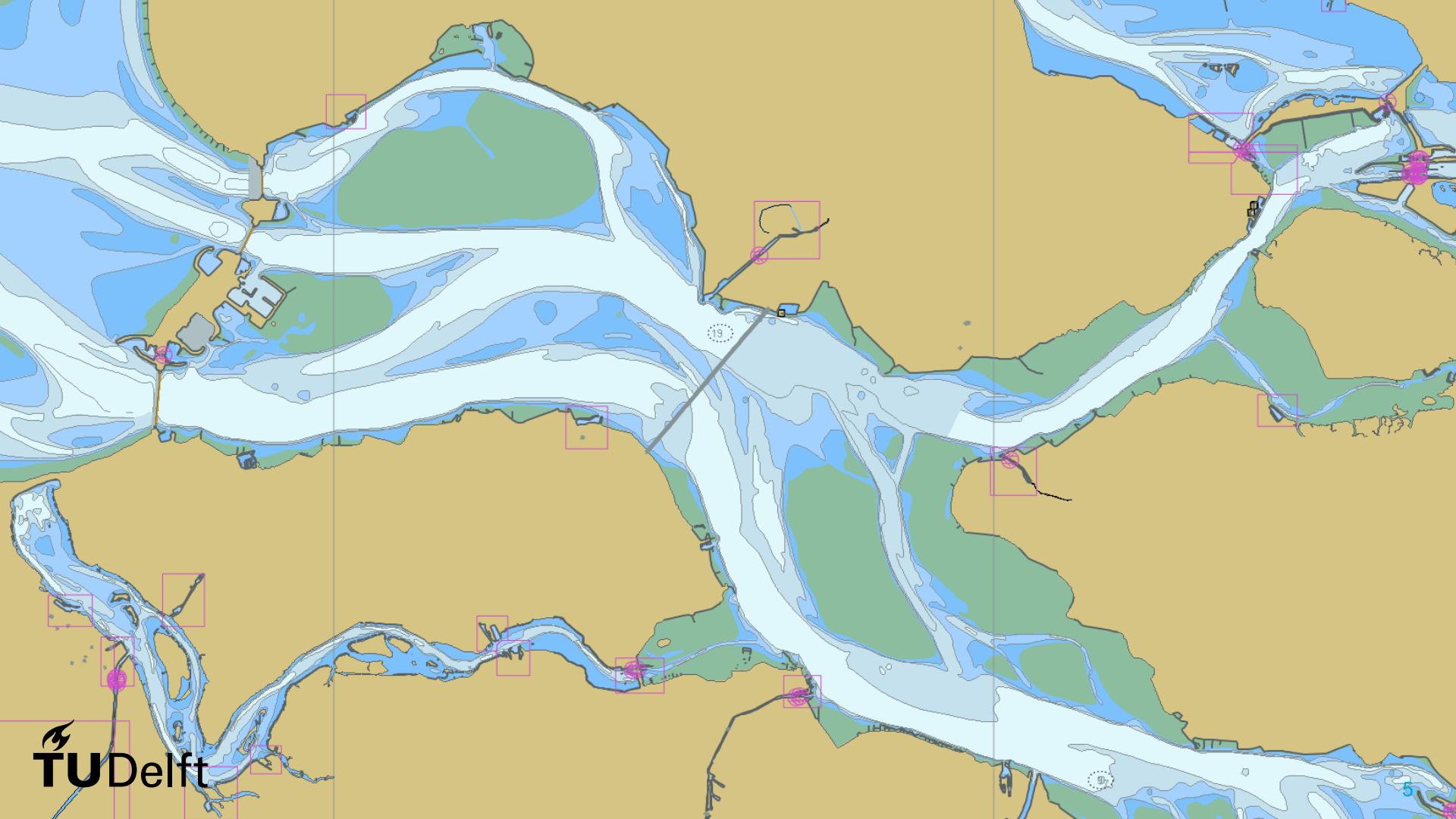
(2nd mentor)

November 11th 2019



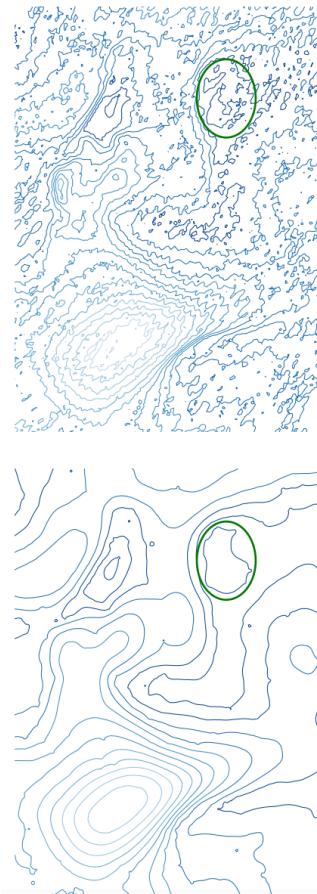






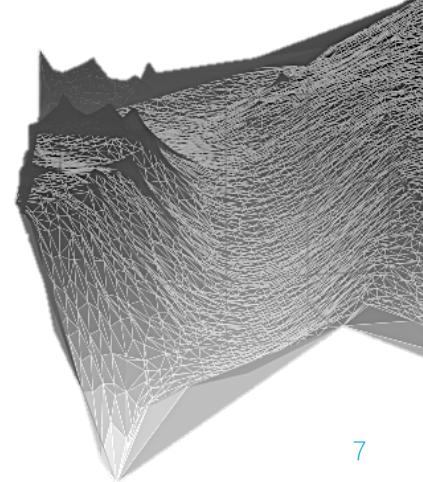
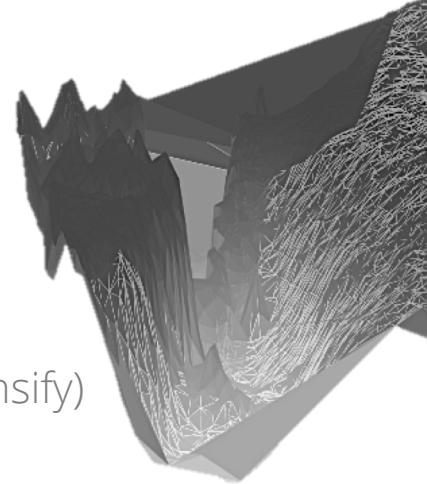
Motivation

- Cartographic constraints
 - Morphology Seabed shape
 - Legibility Readability
 - Functional Safety
 - Topology Topology
- Legibility vs. Morphology
 - Chart scales
 - Smoother lines > less morphology
 - Increasing line separation > less morphology
 - Optimal compromise?



Related Work

- Surface-based approach
 - Triangulated surface of the measurements
 - *Safely* alter this surface (operators: smoothen, densify)
 - Contours extracted directly
- Each iteration on entire dataset
- Human assesses the result (after n iterations)
- Cartographic constraints
 - IHO regulations
 - Scales, line thicknesses, line separation, etc..
- Other generalization methods
 - Hydrographic (line-based, surface-tension, manual)
 - Topographic / Terrain

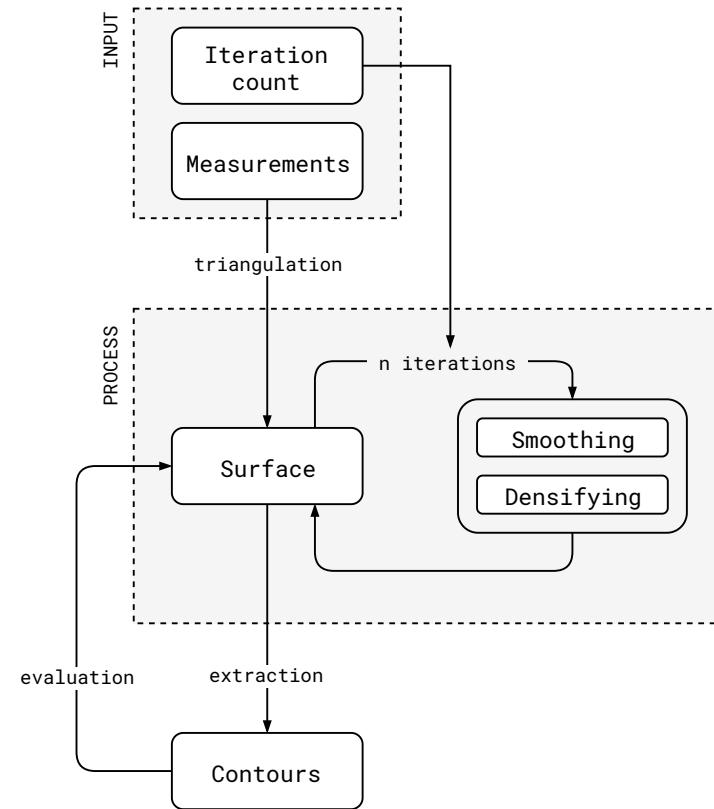


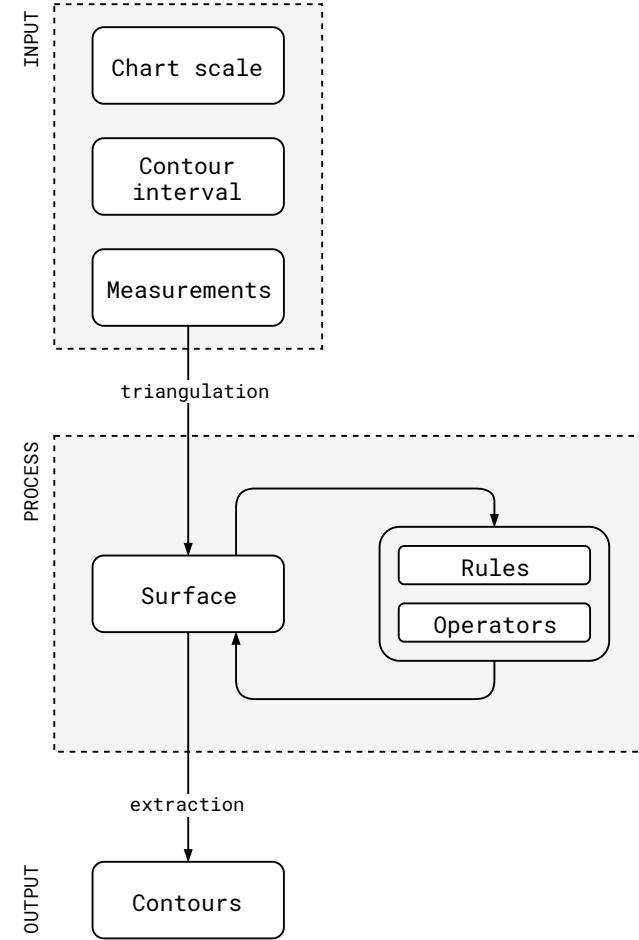
Research Questions

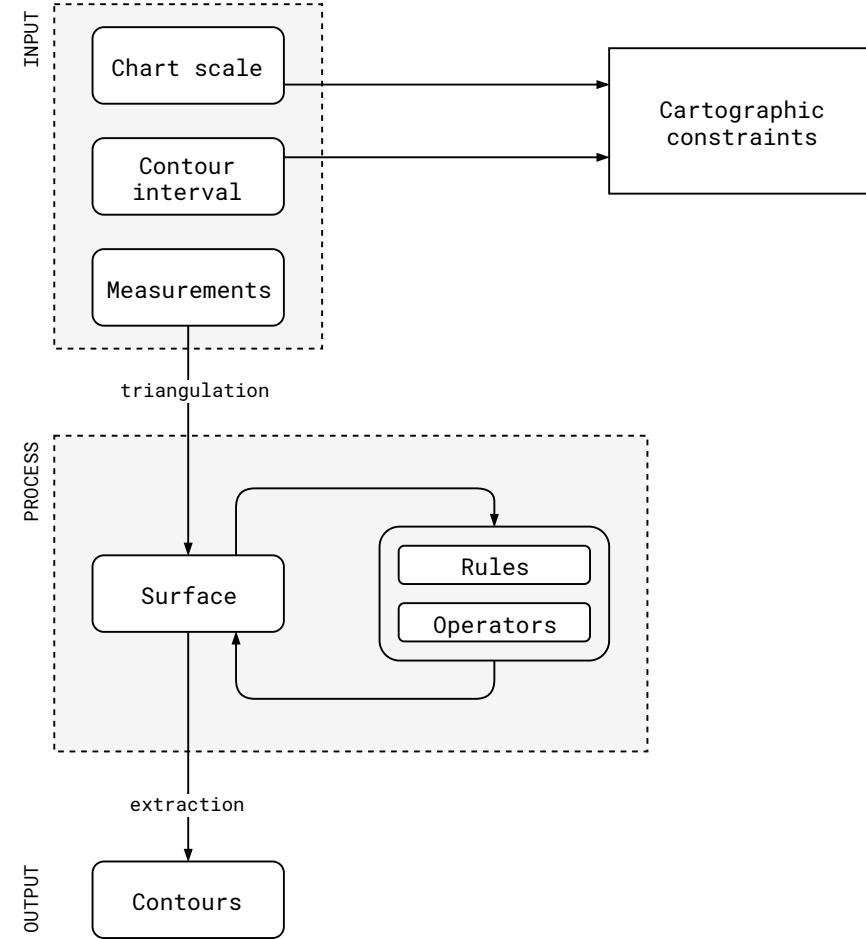
- To what extent can we steer generalisation operators to account for cartographic constraints, in a surface-based isobath generalisation method?
 - What are the **minimum legibility constraints** for navigational isobaths, cartographic and legally at different chart scales?
 - How can we quantify the cartographic constraints into **local surface metrics**?
 - What is the effect of applying different **local operators** on the global surface, and how can this be exploited?
 - What are valid and realistic assumptions on **input data** in the field of application?
 - How can the extracted features be **validated** and does the method perform better than available alternatives?

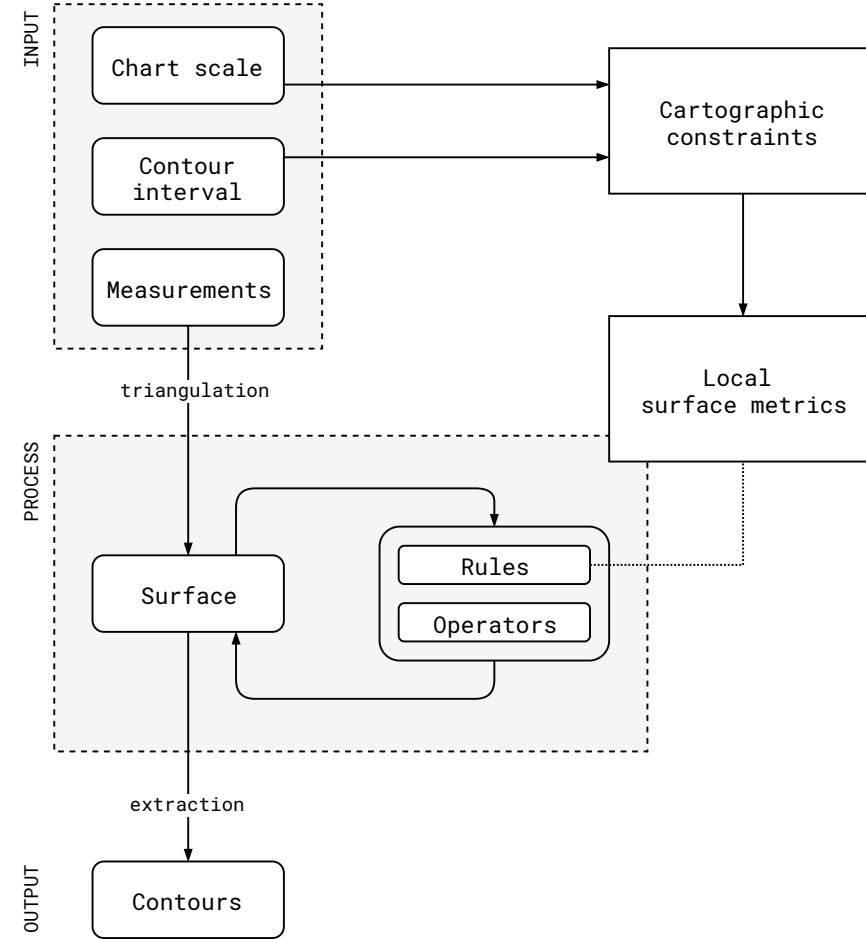
Methodology

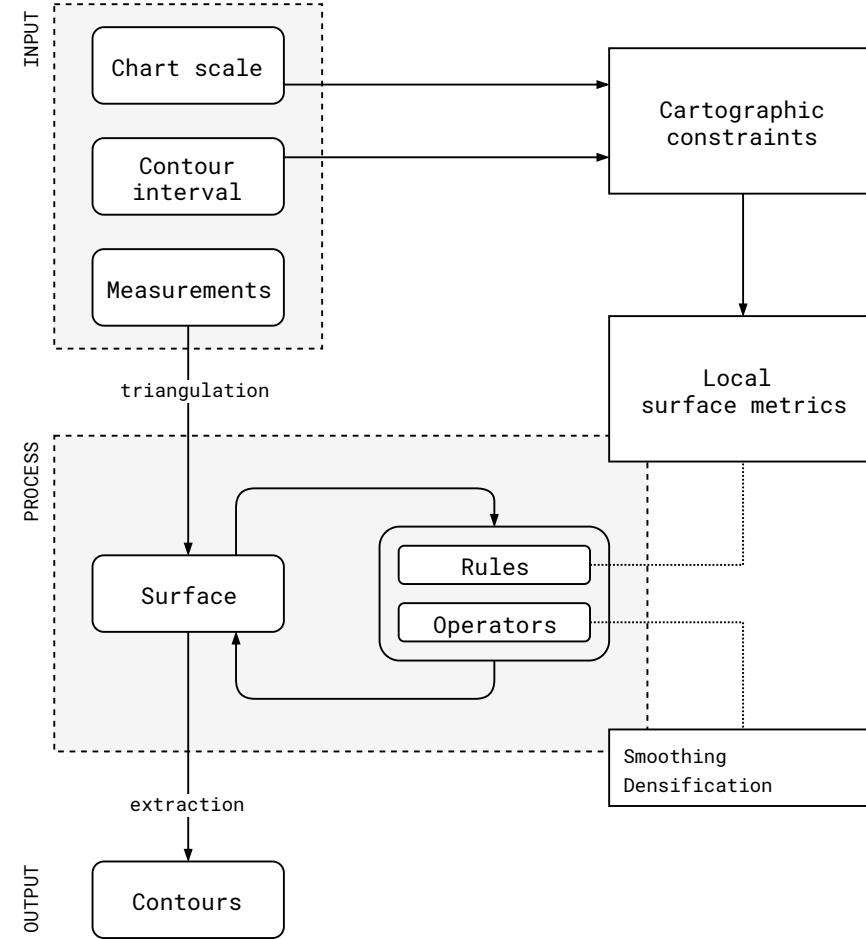
- Objectives
 - Eliminate human interference
 - Integrate cartographic constraints
 - Apply operators locally











Tools and Data

- Current implementation in C++
 - Probably migrate to Python
 - Data storage in database
- QGIS for visualization
- Data in [x, y, depth]
 - (sparse) data available as open data
 - Request from RWS, Hydro
 - Simulated data for testing the metrics

Thank you!

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Martijn Meijers

(1st mentor)

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(2nd mentor)

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