



# CALHYPSO

**C**artographic **A**ssistant getting a **L**egible **HY**drographic **P**roduct through **S**implification **O**perations

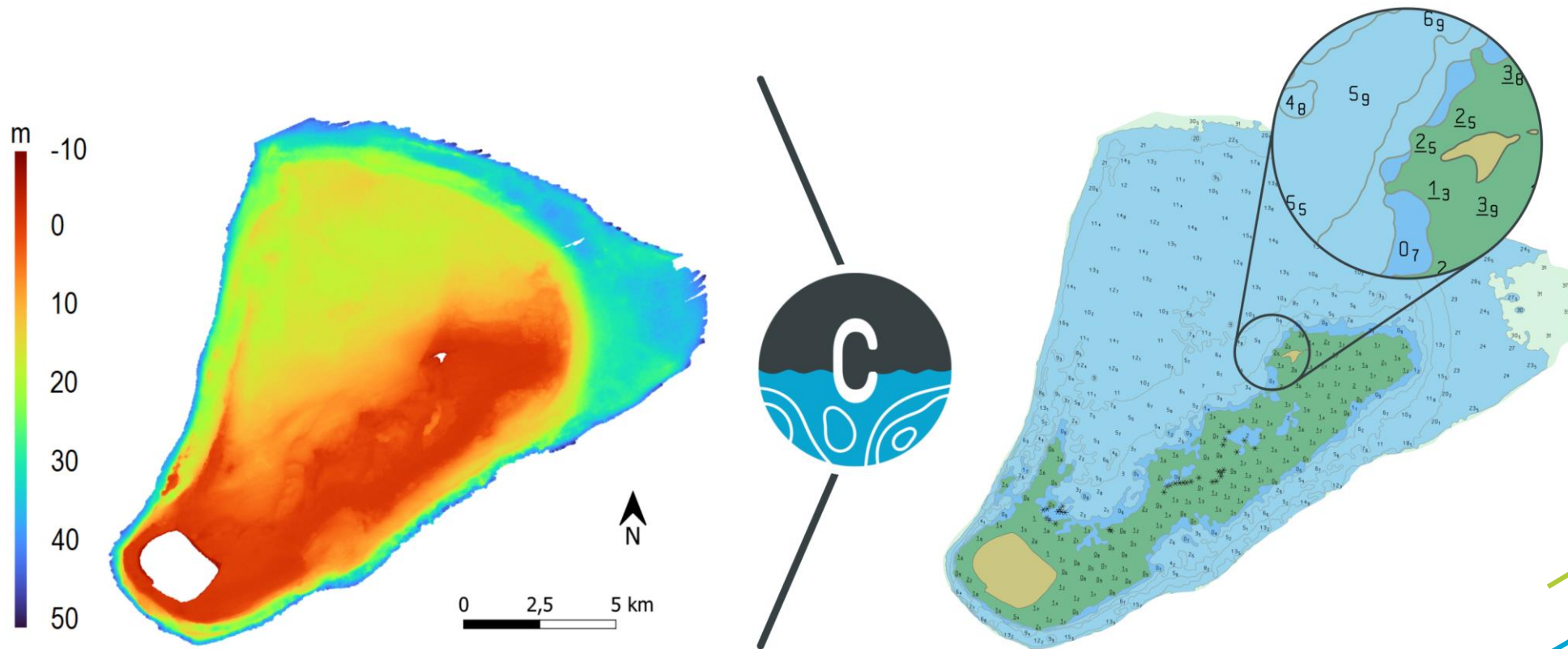
**an automated and safe solution  
for nautical charting**



Aelaïg COURNEZ & Yann CORLAY

# Overview

- ➔ Automated solution to assist cartographers on navigation chart generalisation



# Overview

## 1. About us

2. **Context:** a partnership with **SH**  **M**

3. **CALHYPSO process:** main steps and demo

4. **CALHYPSO benefits**

5. **Additional tools**

# About us



- French company specialised in **geomatics**
- Expertise in **marine geomatics** since 2004
- Joined **COEXYA** group in December 2021
- Partnership with :



# Context: a partnership with SHOM

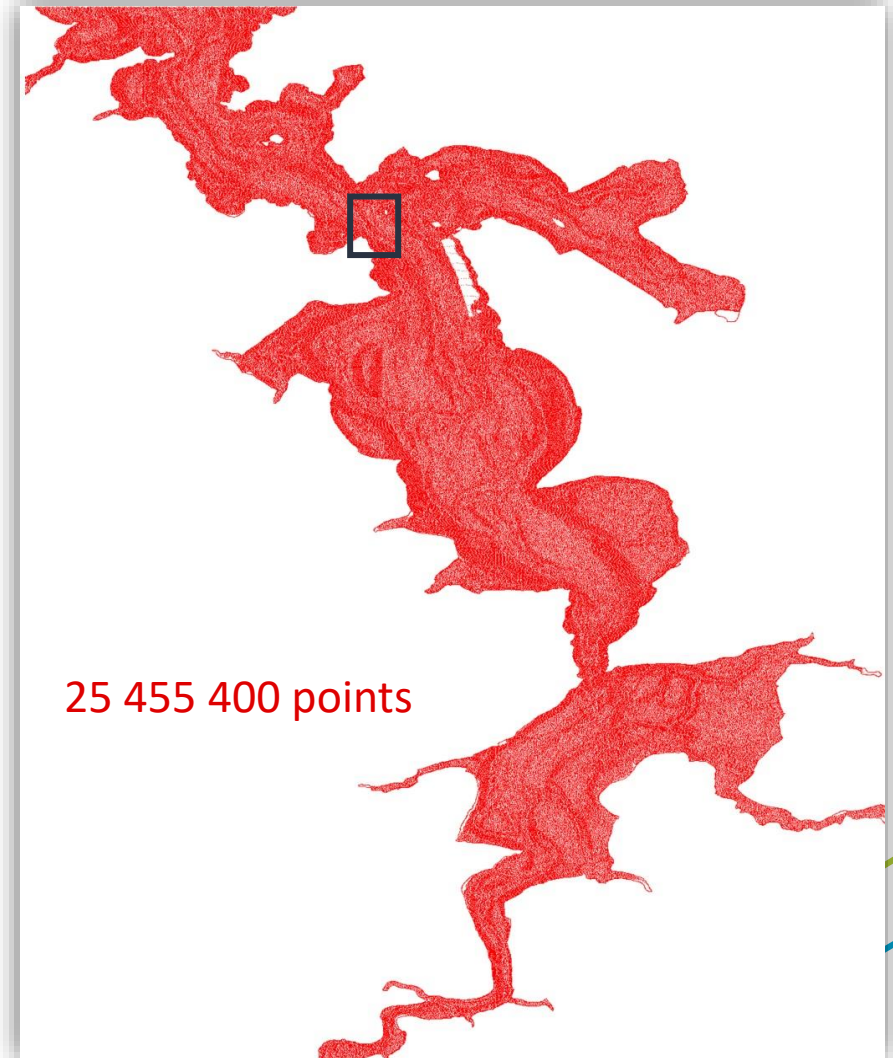
- **CARTONAUT** project started in October 2020
- SHOM cartographers **main issues**:
  - **High data density** (multibeam, lidar bathymetry)
  - **Wide amount of data sources** (community sourcing)
  - **Increasing working time**
- Purpose: **automatise** generalisation of **nautical charts** in keeping with **safety** and **readability** rules

# Context: a partnership with SHOM

- **CARTONAUT** project started in October 2020
- October 2022: first **operational solution**
- November 2022: launch of Geomod product: **CALHYPSON**
- To August 2023: **further development and tests** with SHOM to improve the solution

# CALHYPSON process: main steps

Input dataset SH  M





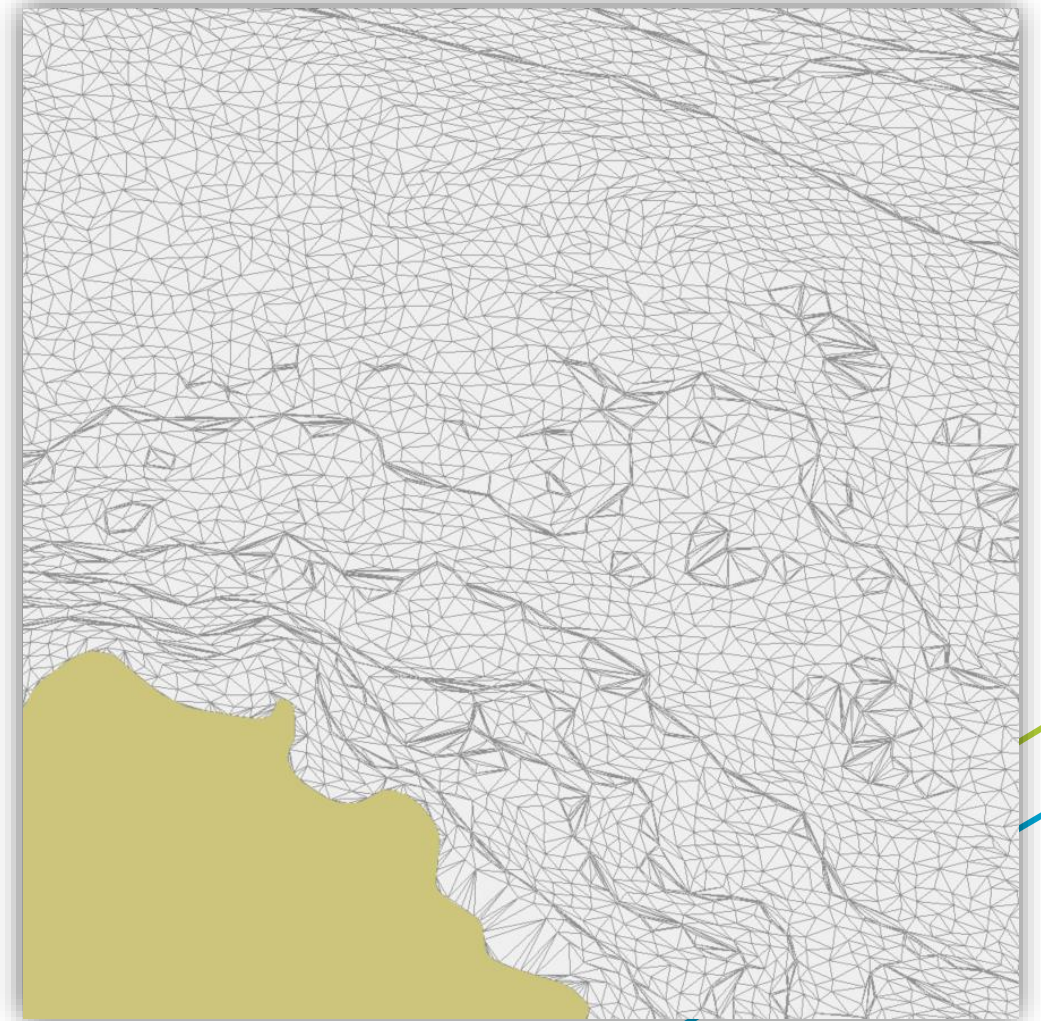
# CALHYPSON process: main steps

## 1. Data decimation and triangulation

25 455 400 points → 2 203 800 points

Save **shallower soundings** up to get adequate resolution

 Land area

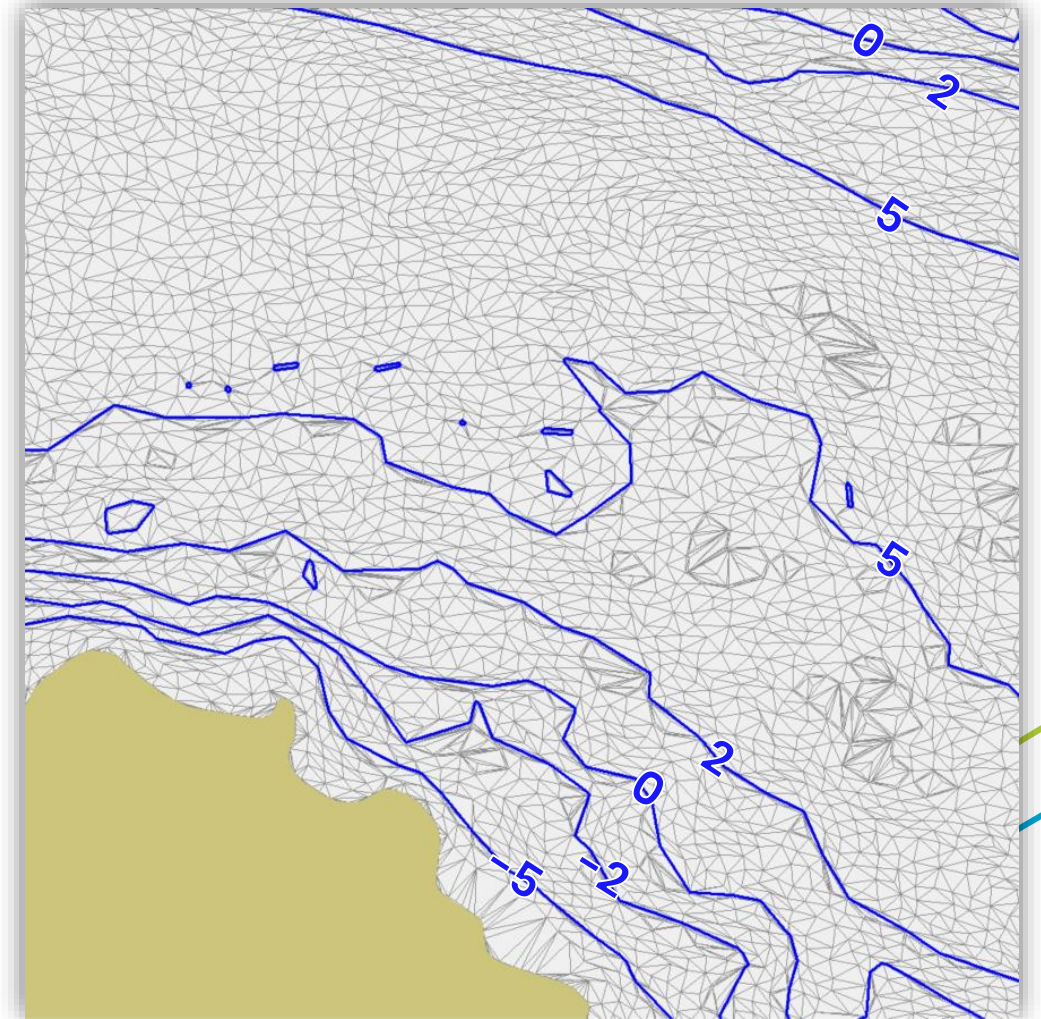
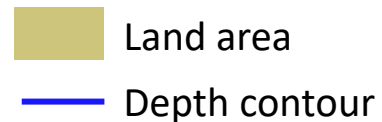




# CALHYPSON process: main steps

1. Data decimation and triangulation
2. Depth contours extraction

Identify isoline segments based on triangle edges

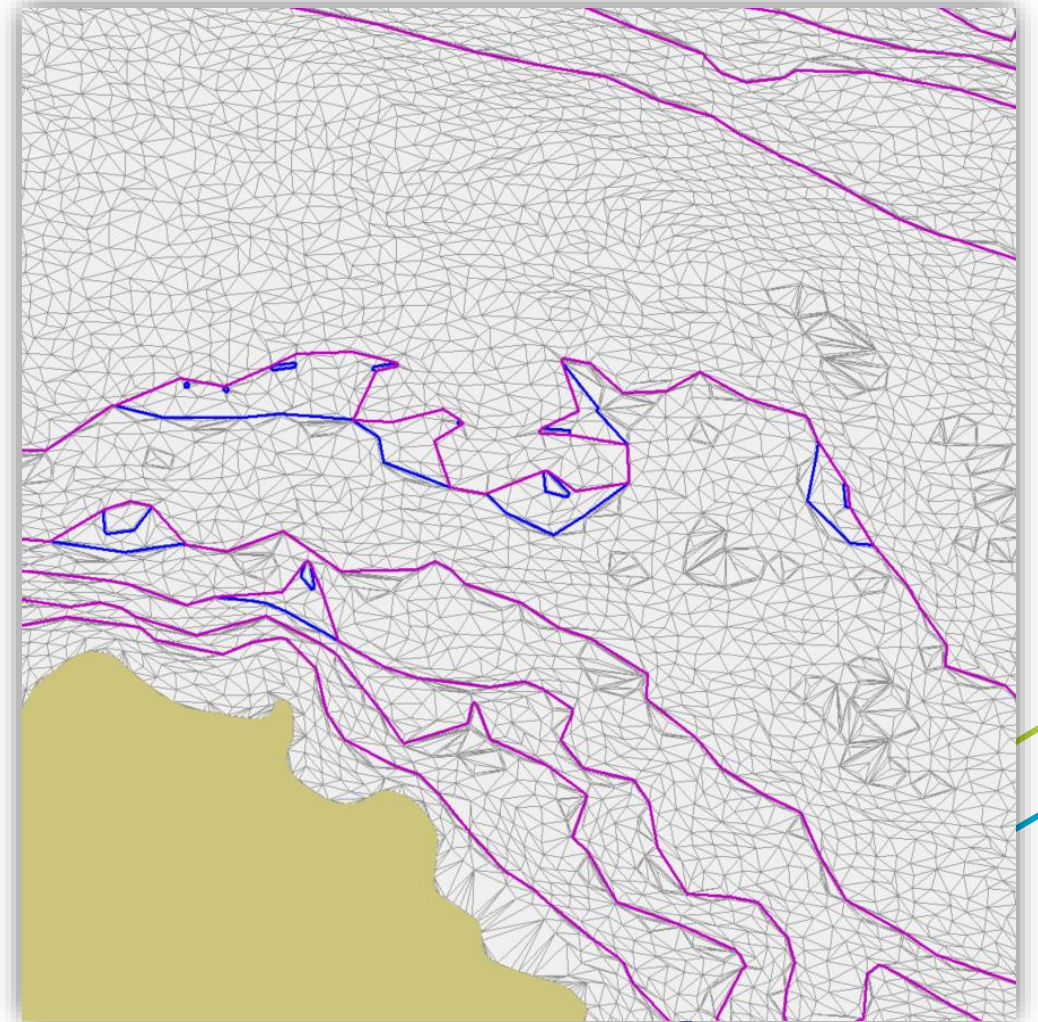


# CALHYPSON process: main steps

1. Data decimation and triangulation
2. Depth contours extraction
3. Recursive simplification and agregation

**Simplify curve geometry and join isolines as long as it meets closeness distance**

- Land area
- Before agregation
- After agregation






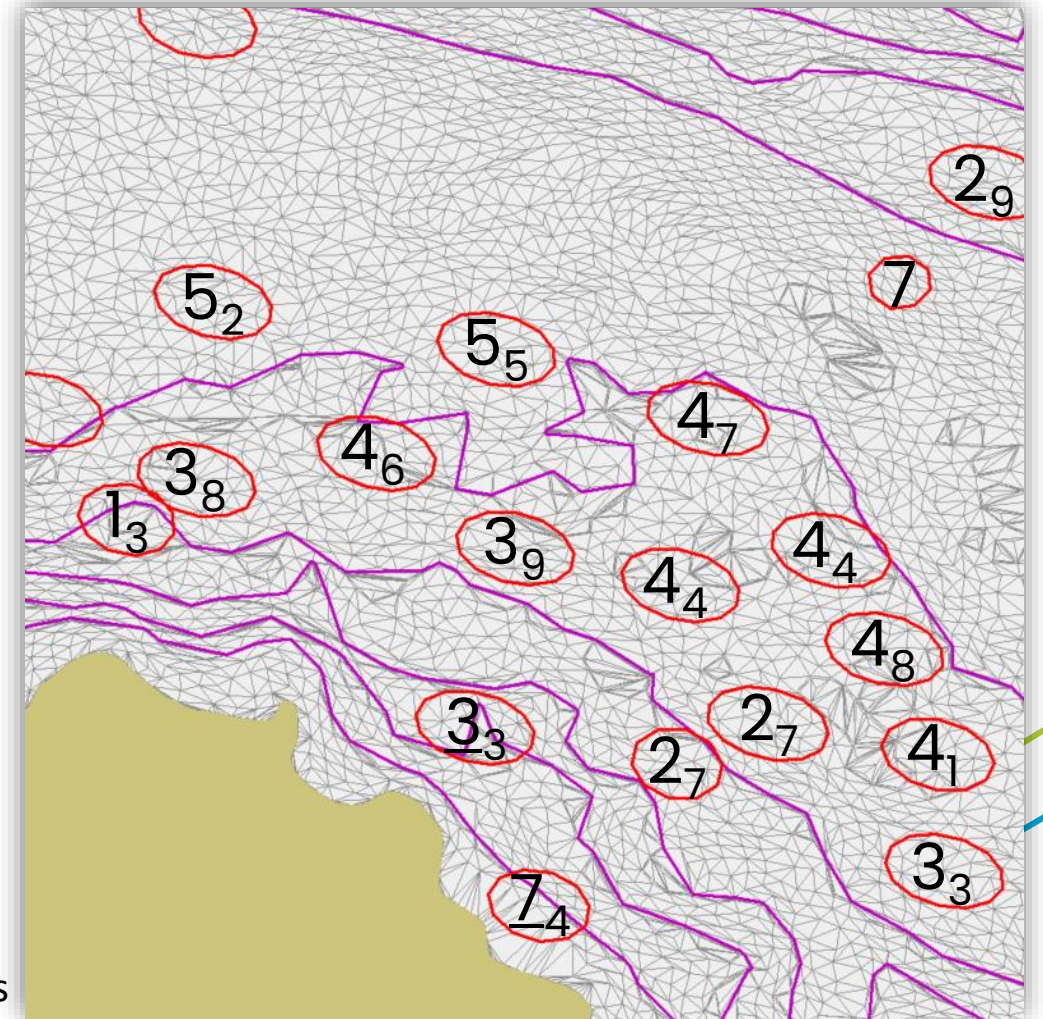


# CALHYPSON process: main steps

1. Data decimation and triangulation
2. Depth contours extraction
3. Recursive simplification and aggregation
4. Sounding selection and exaggeration

Identify **morphological items** and inflate surroundings to **push isolines off-shore**

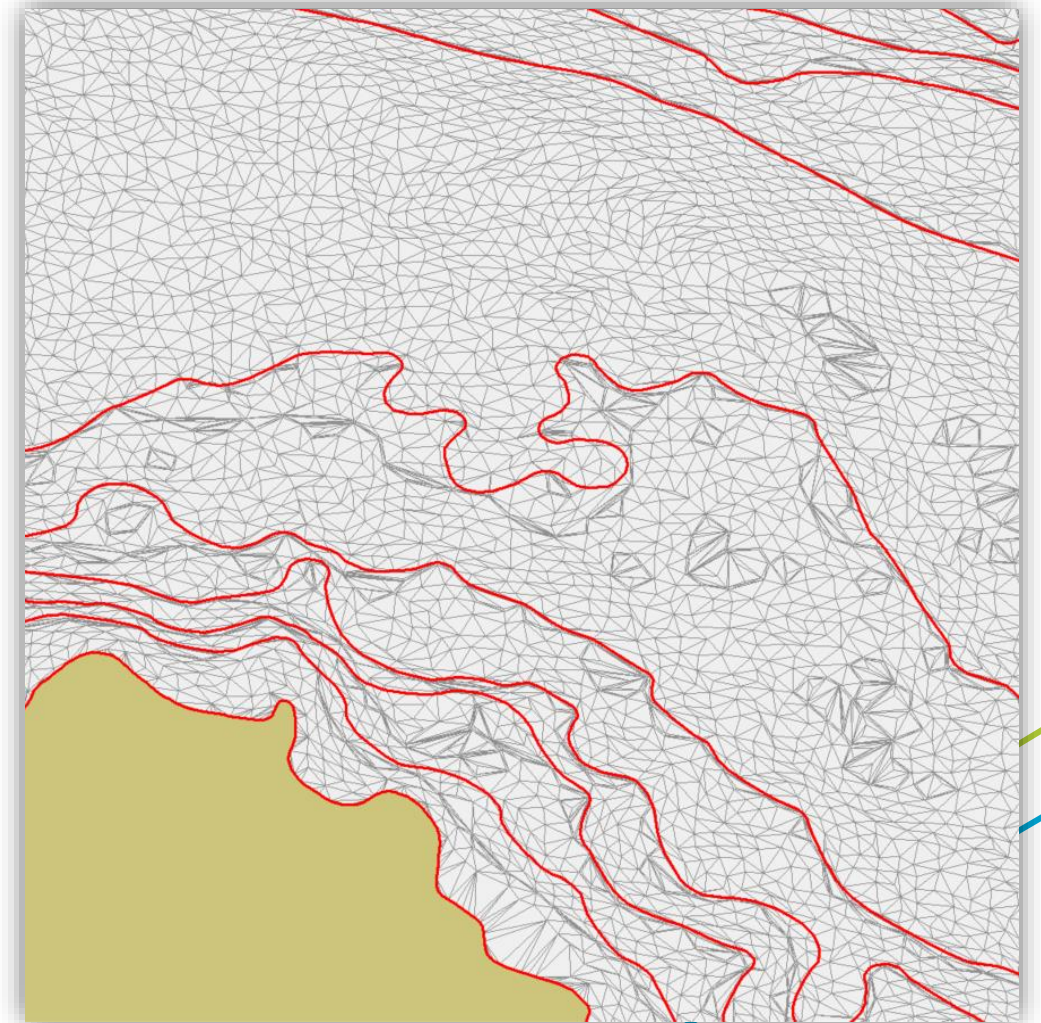
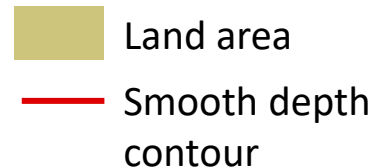
-  Land area
-  Depth contour
-  Exaggeration ellipses



# CALHYPSON process: main steps

1. Data decimation and triangulation
2. Depth contours extraction
3. Recursive simplification and aggregation
4. Sounding selection and exaggeration
5. Depth contours smoothing

**Off-shore smoothing with a minimal curvature radius**

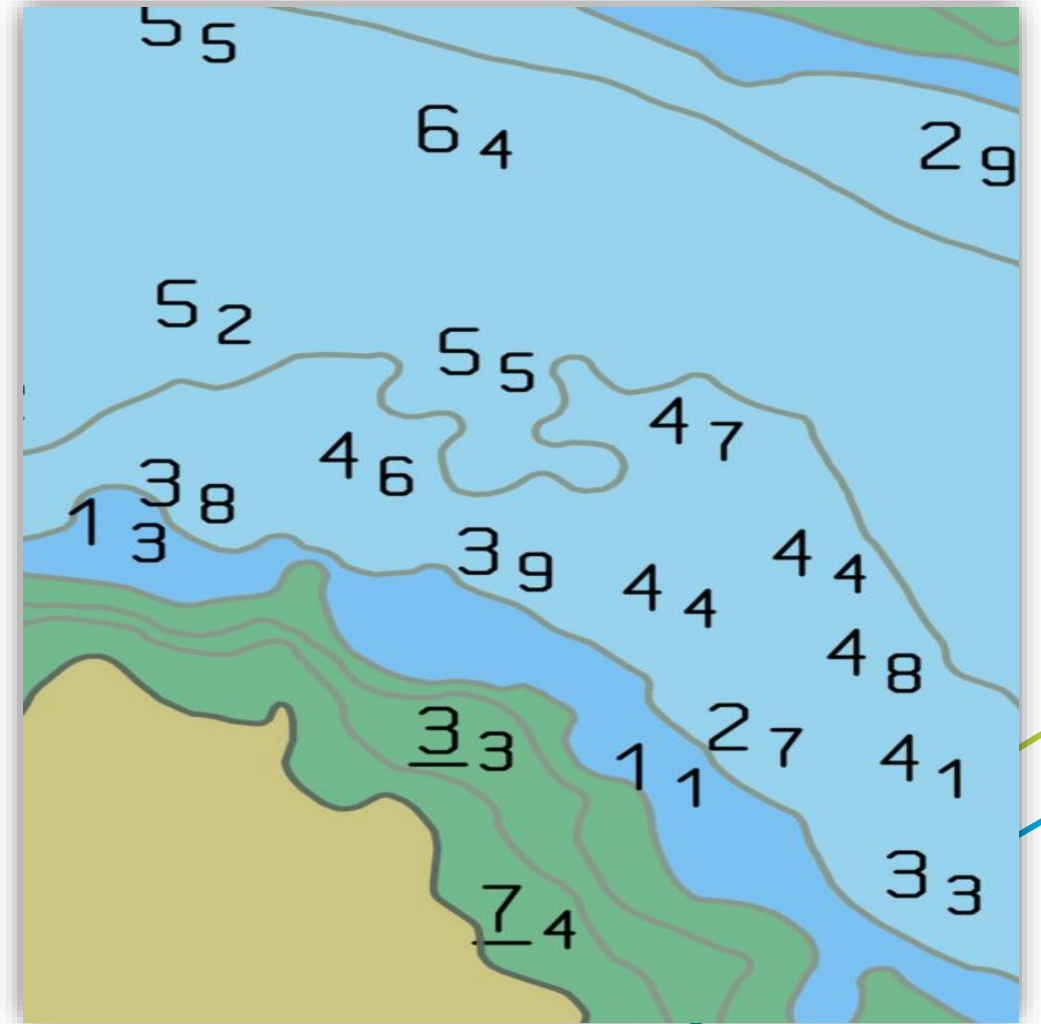




# CALHYPSON process: main steps


1. Data decimation and triangulation
2. Depth contours extraction
3. Recursive simplification and aggregation
4. Sounding selection and exaggeration
5. Depth contours smoothing
6. **S-57 ENC production**

Create a **standard S-57 ENC**




# CALHYPSO demo

CALHYPSO - Cartographic Assistant getting a Legible HYdrographic Product through Simplification Operations

 **CALHYPSO**


**Input**

Soundings:  

☒ ENC:  

Coastline elevation:  m

**Output**

Directory:  

Product:  File basename:

Producer:  Compilation scale:

Edition:

Usage:





**Parameters**

Map scale: 1 /

Depth contours:

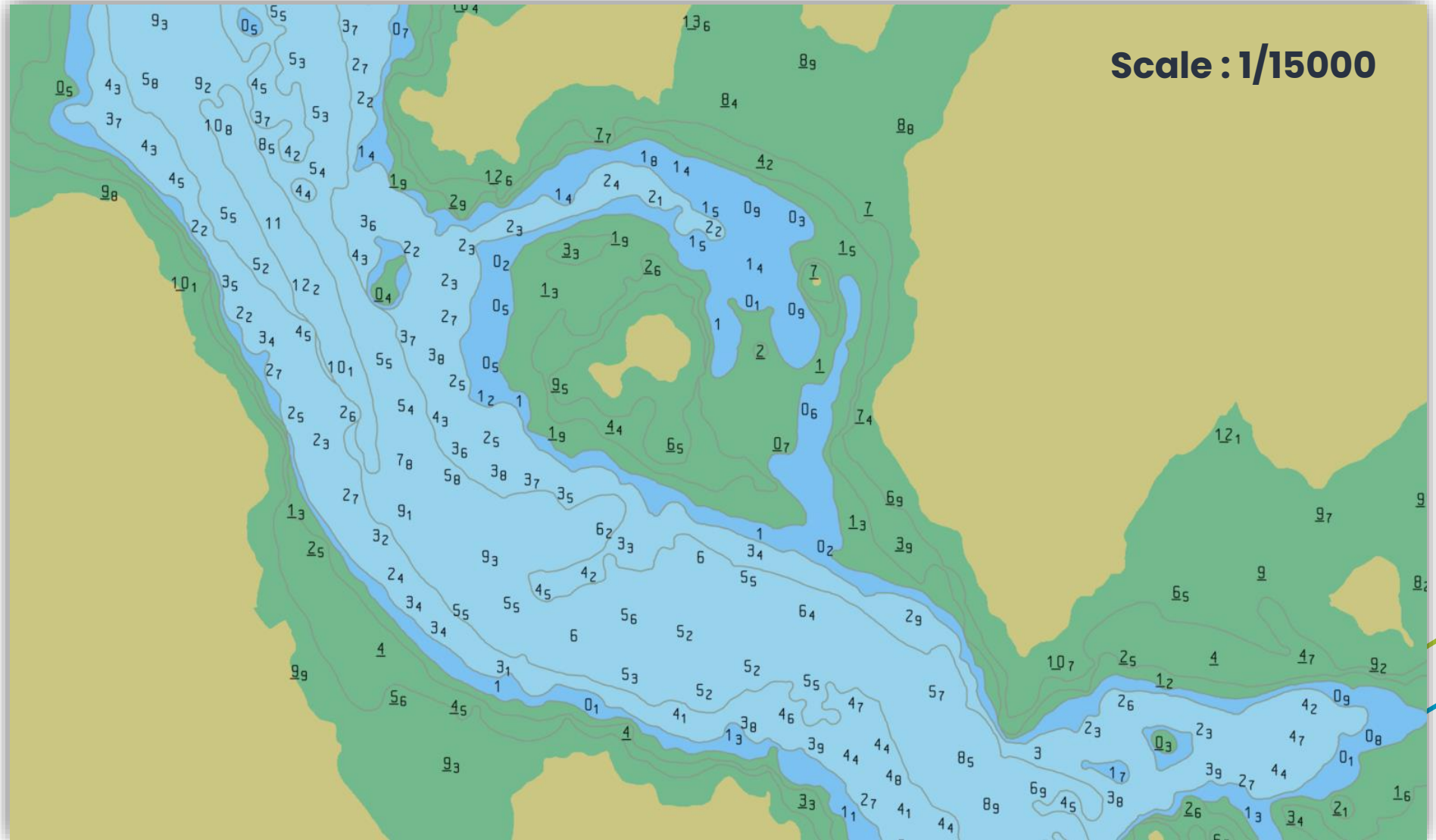
Minimal distance between soundings:

Min depth (m)	Max depth (m)	Distance (mm)
-10.0	0	10
0	5	4
5	10	6
10	20	10

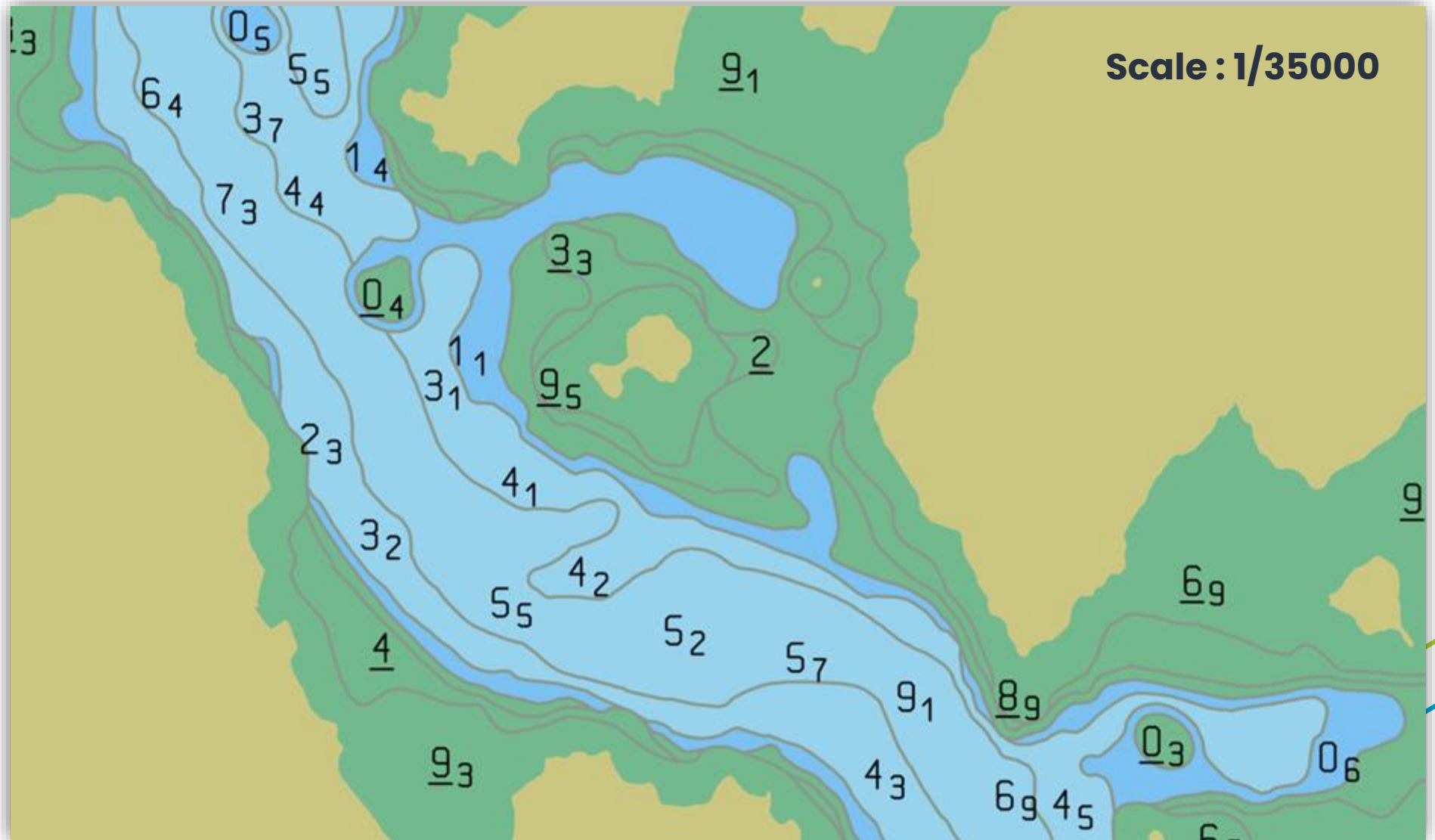
  Parameters  Launch  Close



# CALHYPSON demo

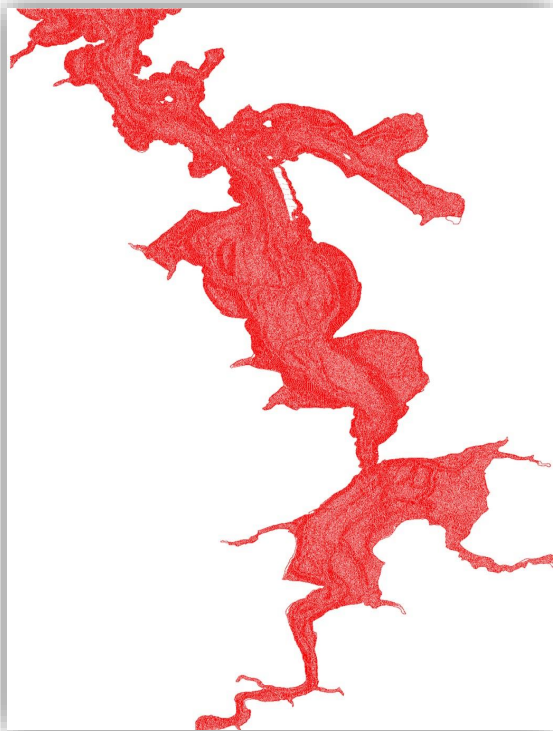


# CALHYPSON demo



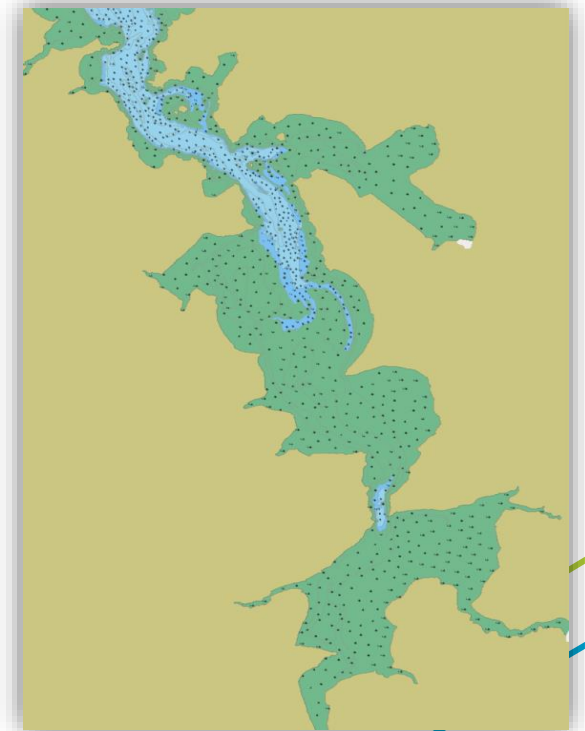
# CALHYPSONO benefits

## ► Time saving



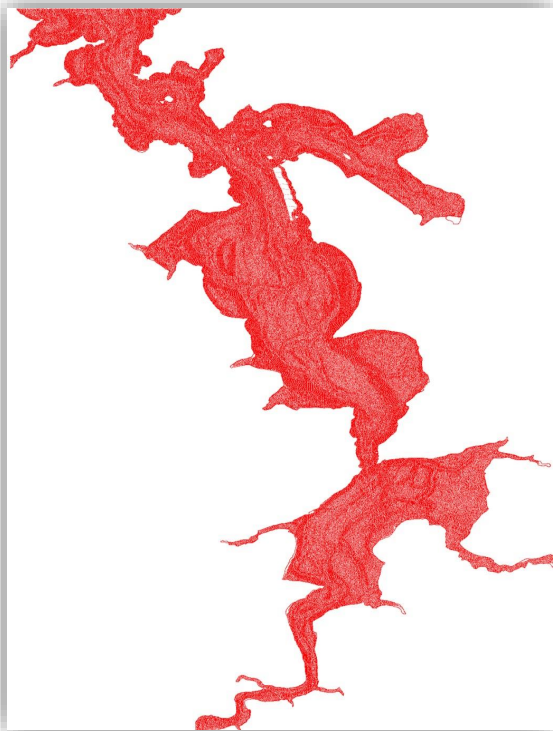
SH  M  
→  
≈ 15 man-days

15 min  
+ 4/5 man days for validation

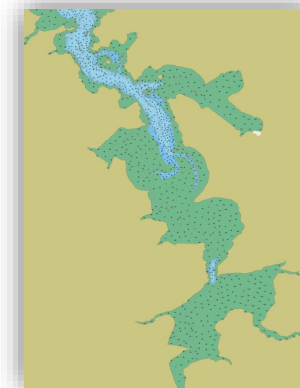
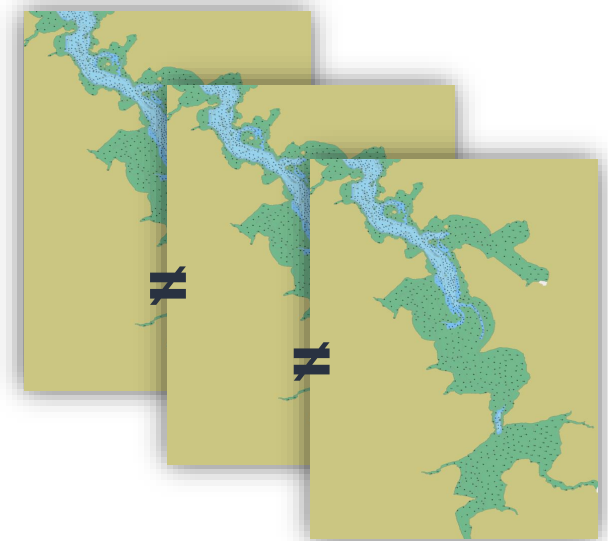


# CALHYPSON benefits

- Time saving
- Reproducibility

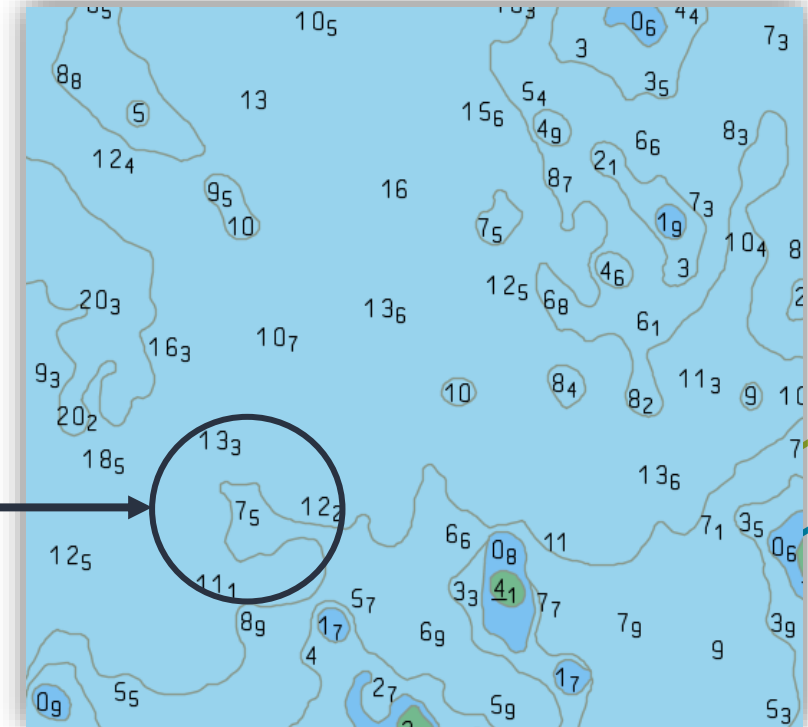
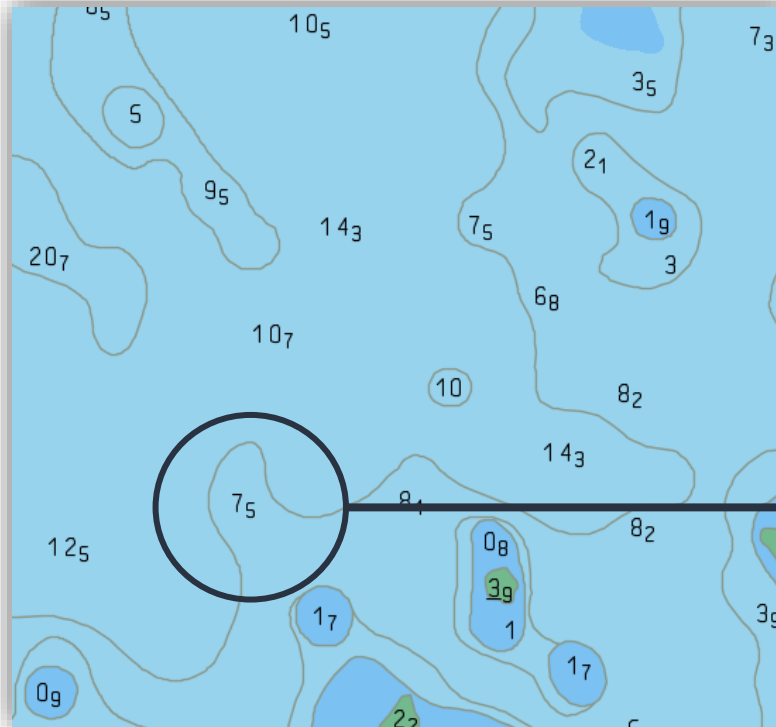


Always the same  
methodology



# CALHYPSONO benefits

- Time saving
- Reproducibility
- Higher precision



Iroise dataset  
scale = 1/22000

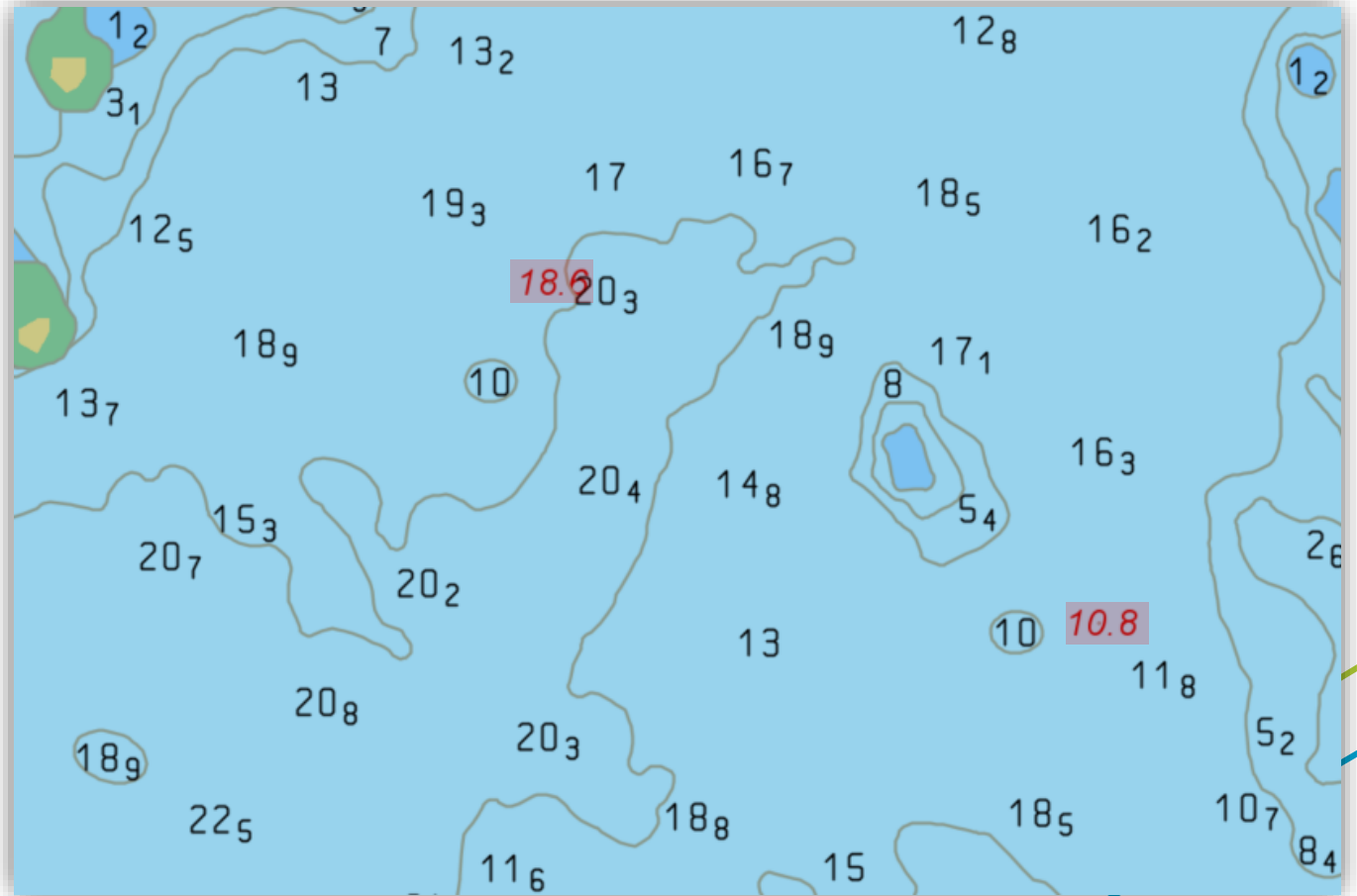


**Included tool:**

**Generalisation control**

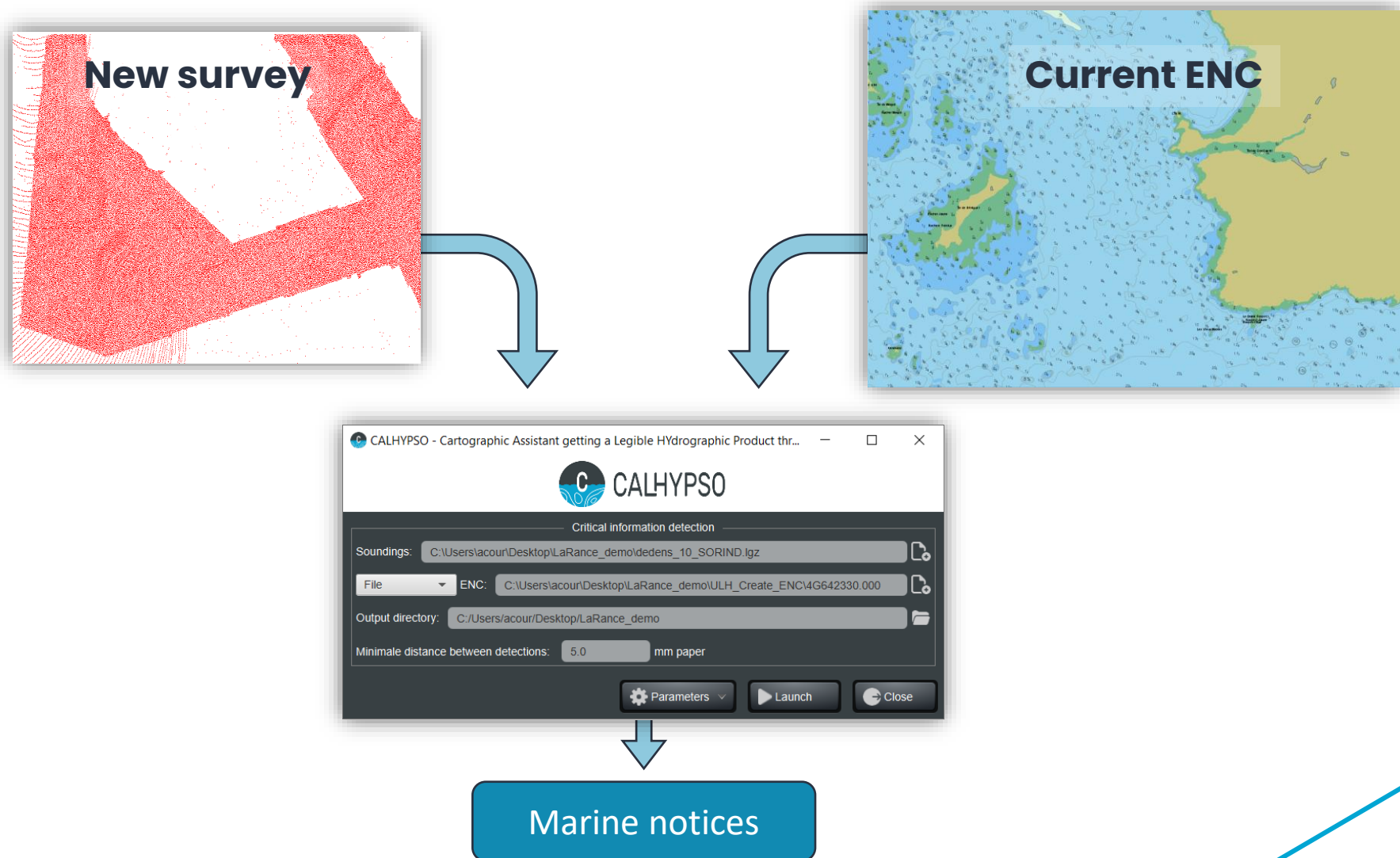
**Compare initial dataset with  
generalised result**

**To highlight uncertainties**





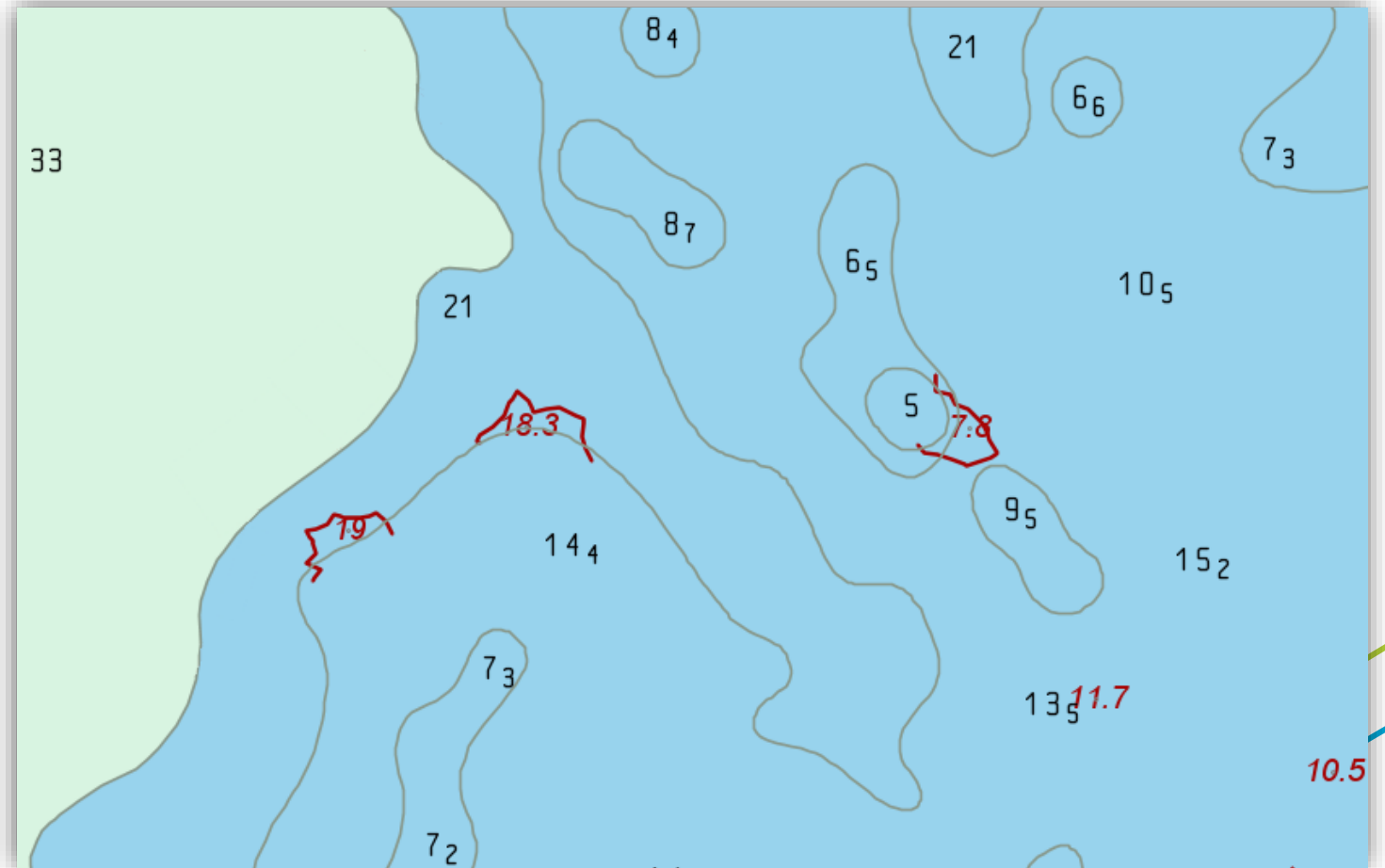
# Additional tool: Detection of new main dangers



# Additional tool: Detection of new main dangers

**Compare new survey with  
current nautical chart**

**To notice mariners**



# Conclusion

- **Innovative toolbox** to create **navigation chart in record time**  
and **detect automatically main new dangers**
- **Combined expertise** from **Geomod** and **SHOM**
- **Interested to test CALHYPSO?**

➤ **Contact us:**

**info@geomod.fr**



**CALHYPSO**

