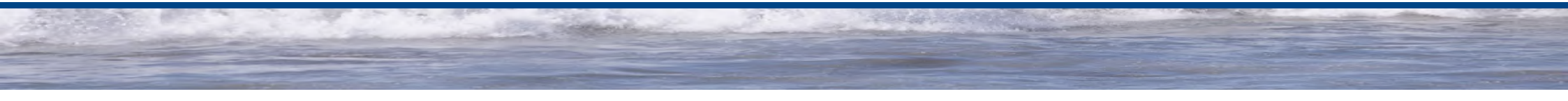
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Use of laser bathymetry at the German Baltic Sea coast

9 November, 2016



Content

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

- Initial situation and aim of the project
- Organization and implementation
- Conclusions and next steps

Initial situation and aim of the project

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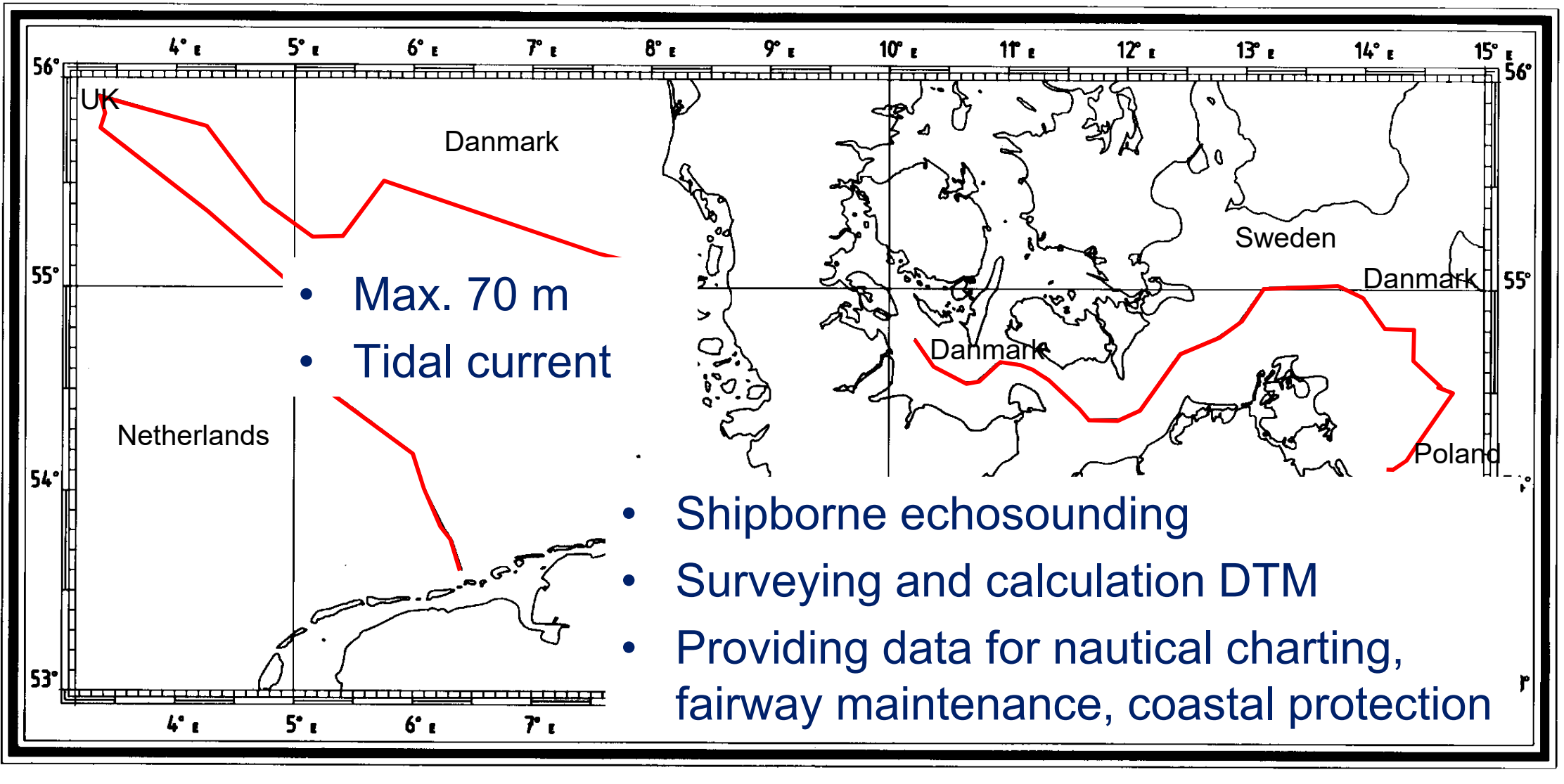
Hydrographic Surveying



- Max. 70 m
- Tidal current

- Shipborne echosounding
- Surveying and calculation DTM
- Providing data for nautical charting, fairway maintenance, coastal protection

Initial situation and aim of the project

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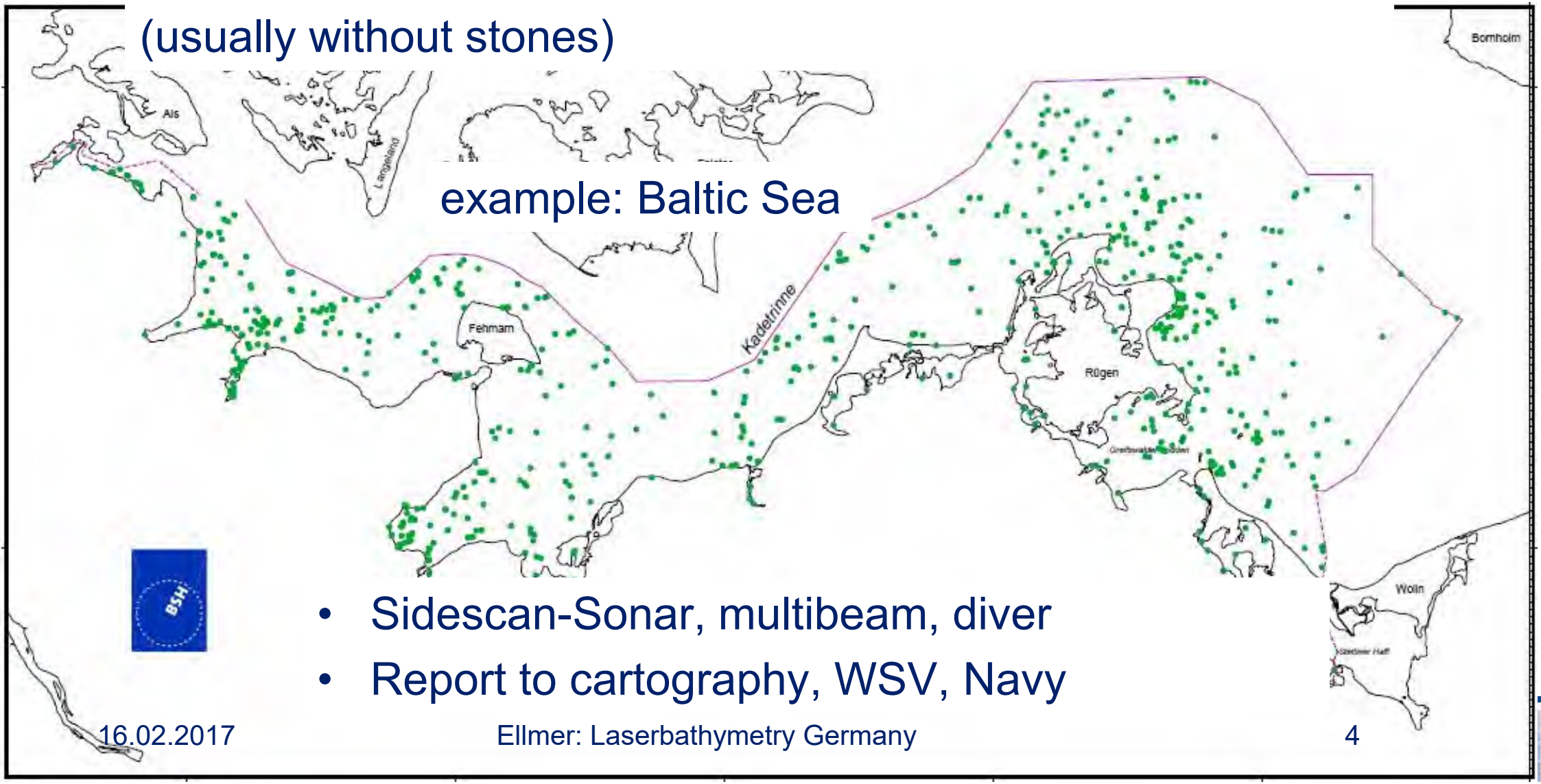
Wreck search

In database: 2500 UWH (wrecks, containers, ammunition,…)
(usually without stones)

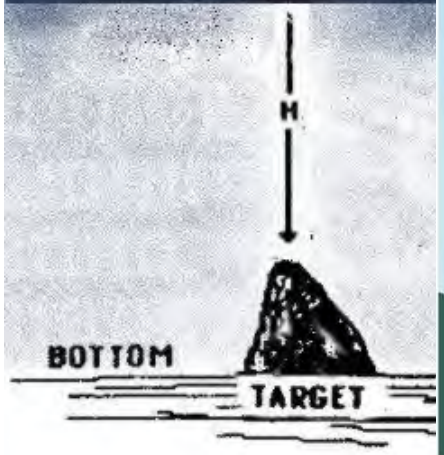
example: Baltic Sea

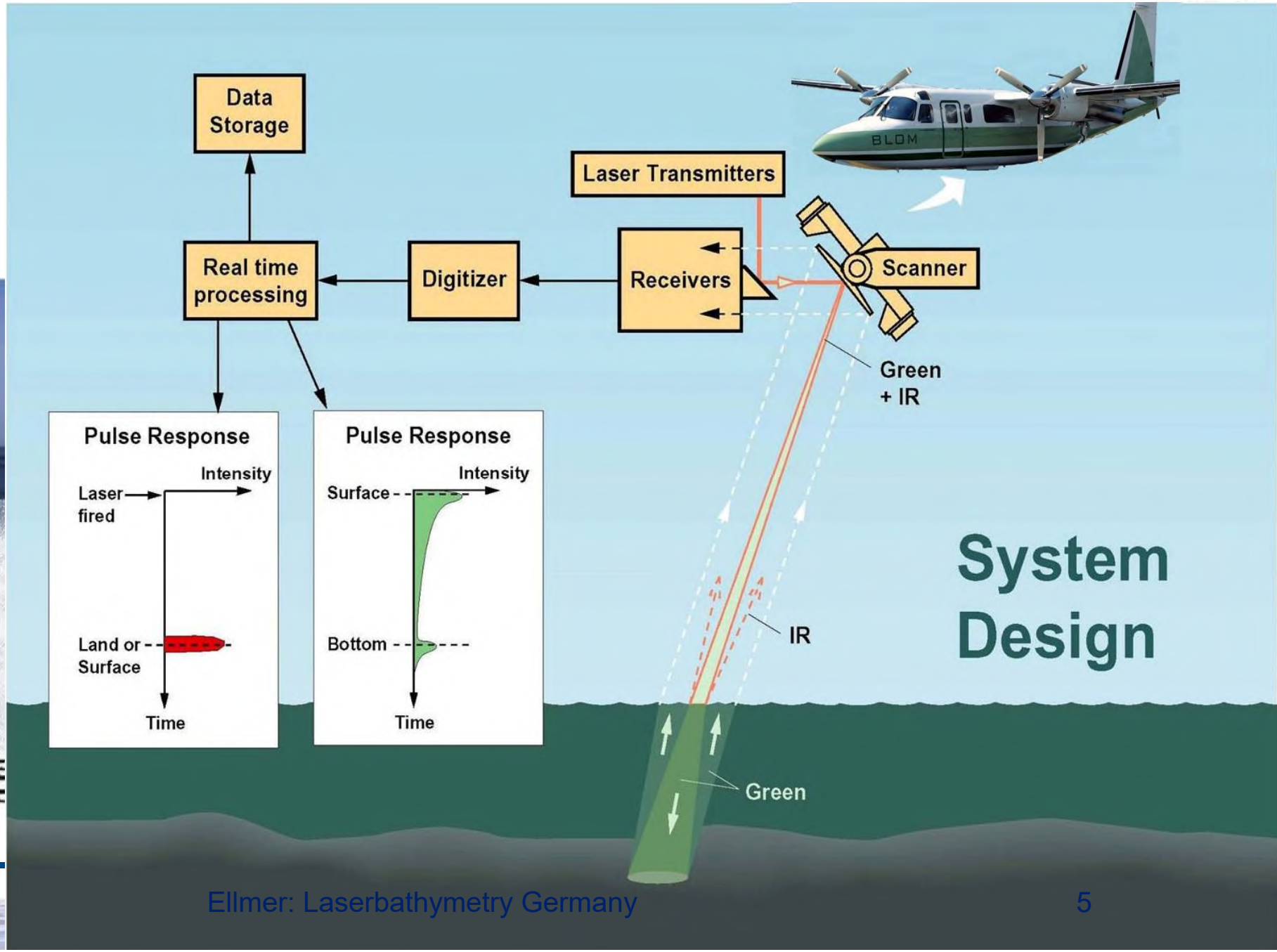


- Sidescan-Sonar, multibeam, diver
- Report to cartography, WSV, Navy

Initial situation and aim of the project

Method





Initial situation and aim of the project

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- Not to lose track of important actual developments
- **How much money do I need for surveying the relevant areas ?**
- Many questions in detail:
  - Which areas are relevant for laserbathymetry?
  - Where is laserbathymetry cheaper than shipborne measurements?

Initial situation and aim of the project

Measurement in shallow water

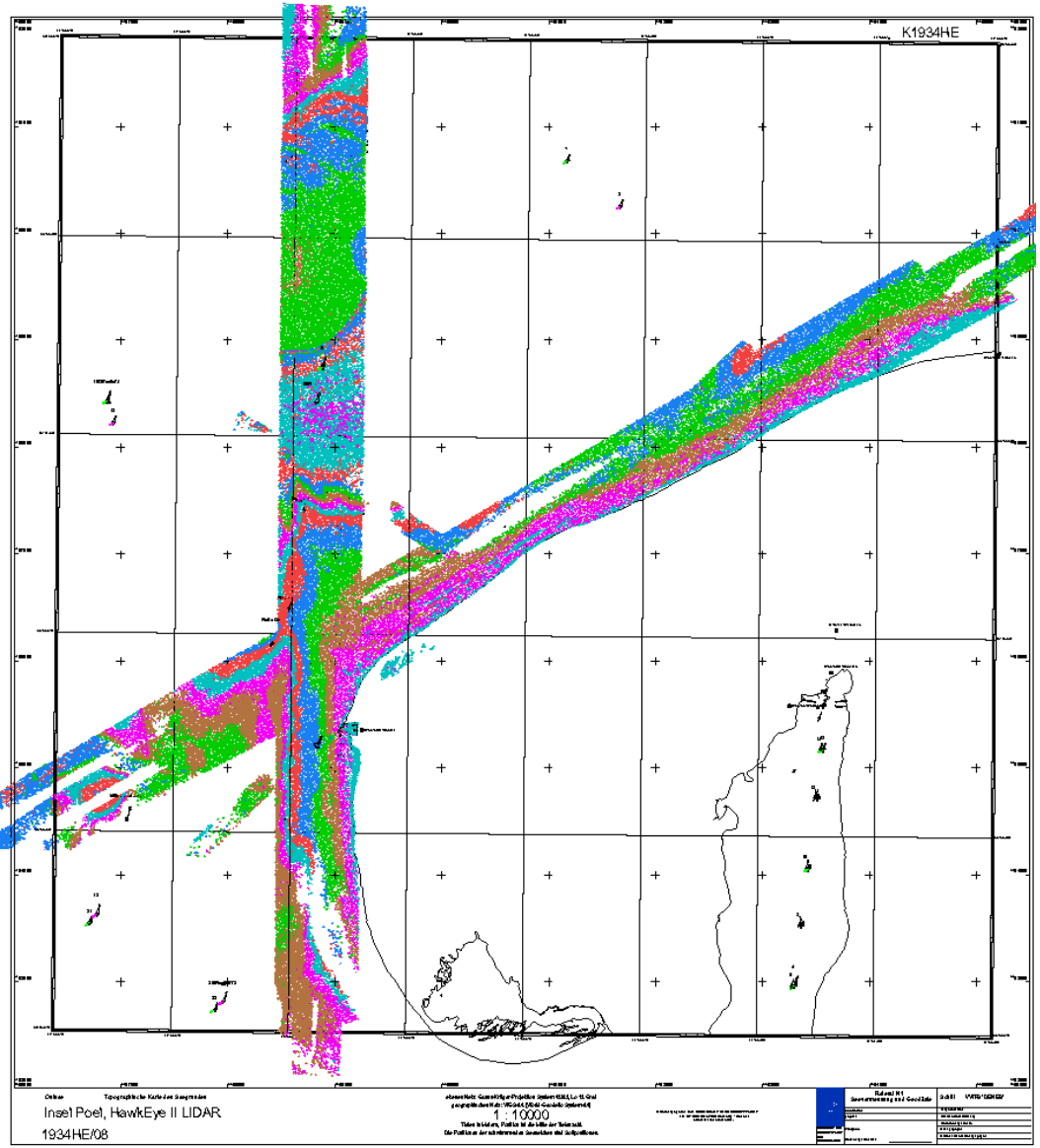
- Environment (depth of visibility, seagrass…)
- Max. depth?
- „Bodden“ and lagoon
- …

Wreck search

- Objects with 2m (IHO S-44)?
- What size is reliable detectable?
- Depending on the depth?

Coastline?...

Parameters for tender?



Organisation and implementation

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

- 3 years project 2012 - 2014
- Scientific Cooperation
  - Leibnitz Universität Hannover
  - 1 scientist

- 3 flights autumn 2012, 2013, spring 2014
- Frequent meetings with different interested organizations
  - BSH and Uni
  - Water and shipping administration (federal)
  - Coastal protection (states)
  - Navy (federal)
  - Land survey (states)

WSV.de Wasser- und Schifffahrtsverwaltung des Bundes

THÜNEN

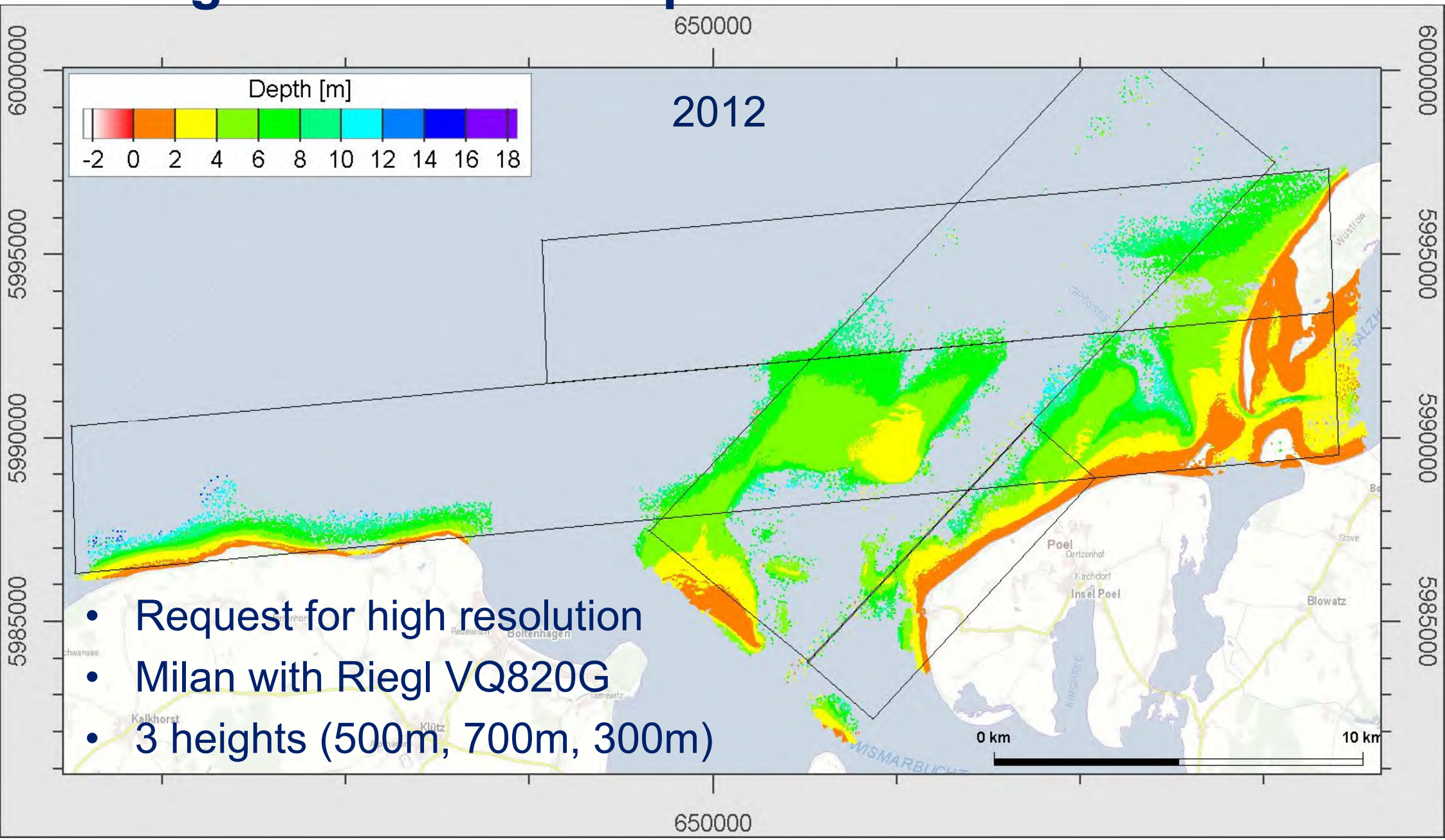
Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein

Leibniz-Institut für Ostseeforschung Warnemünde

Mecklenburg Vorpommern MV tut gut.

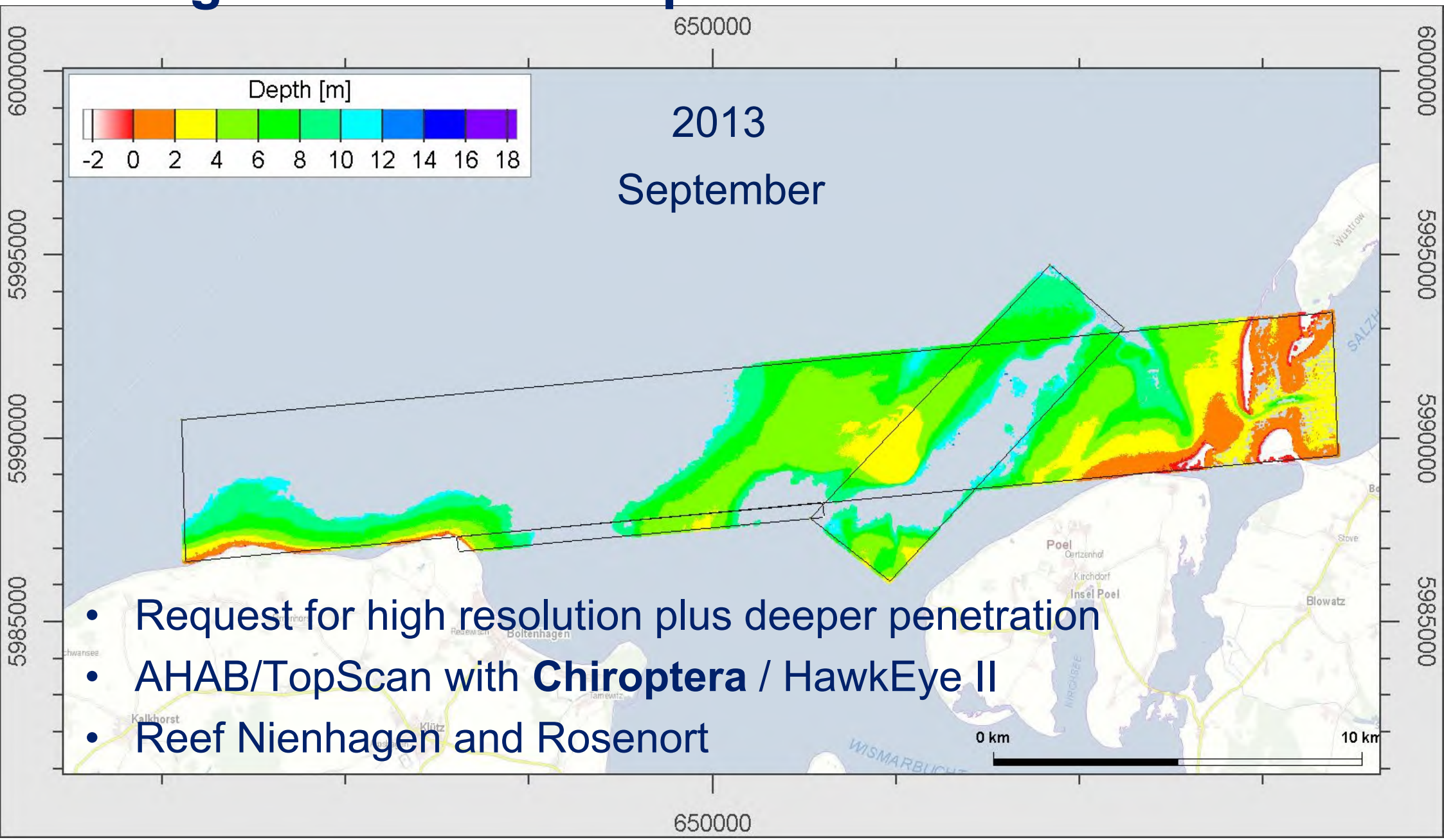
Bundeswehr

Organisation and implementation



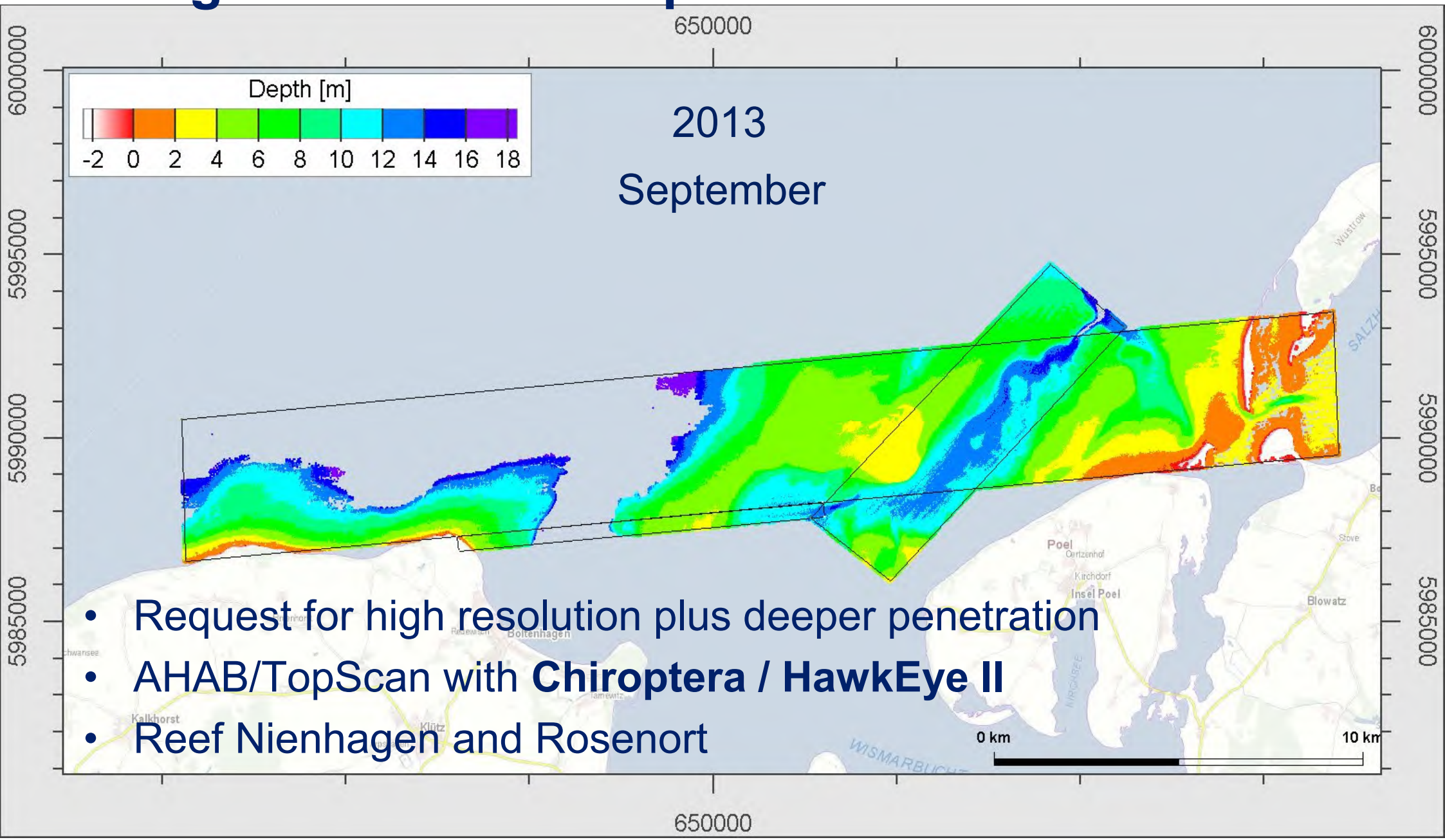
- Request for high resolution
- Milan with Riegl VQ820G
- 3 heights (500m, 700m, 300m)

Organisation and implementation



- Request for high resolution plus deeper penetration
- AHAB/TopScan with **Chiroptera** / HawkEye II
- Reef Nienhagen and Rosenort

Organisation and implementation



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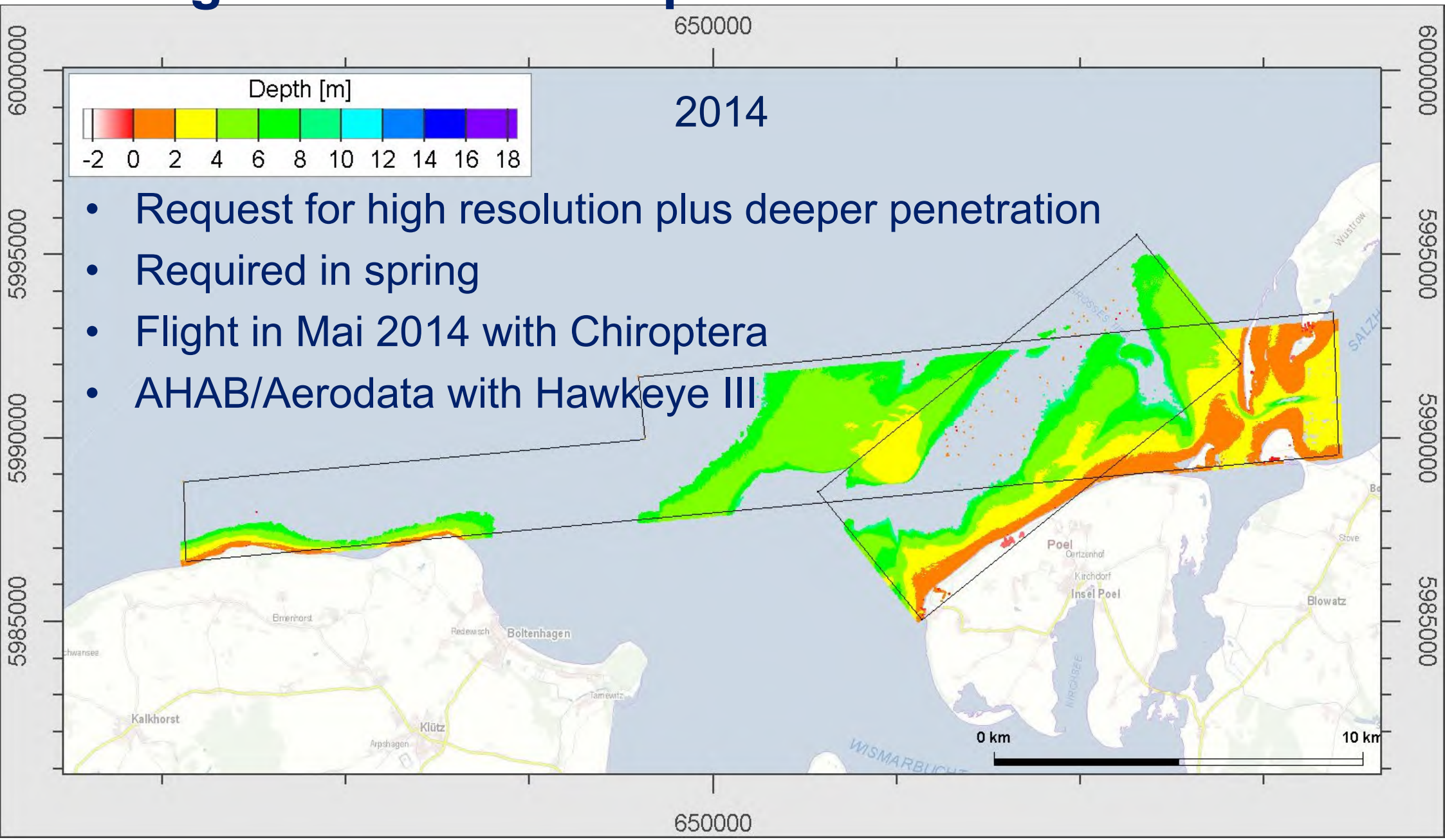
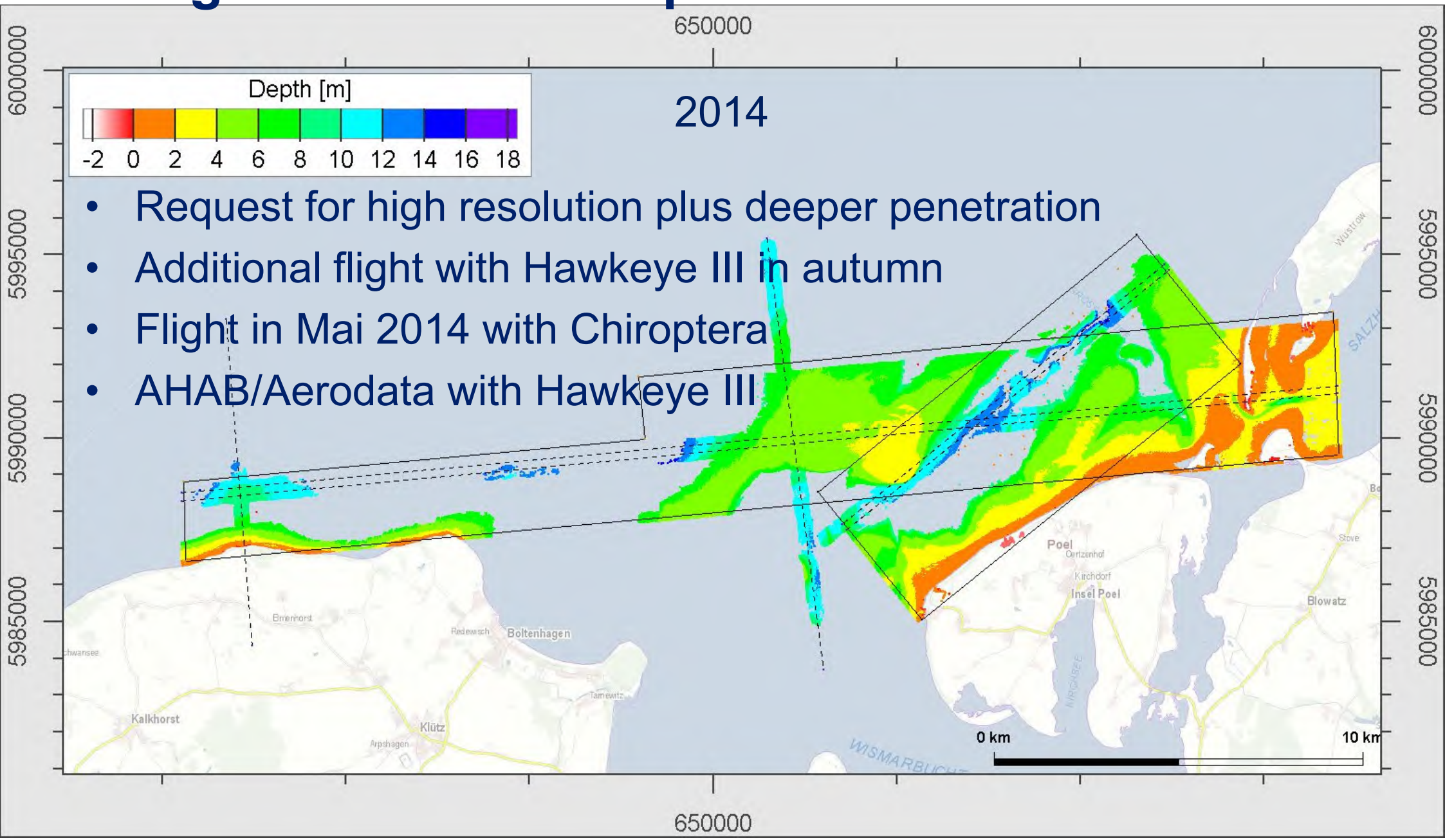
Organisation and implementation



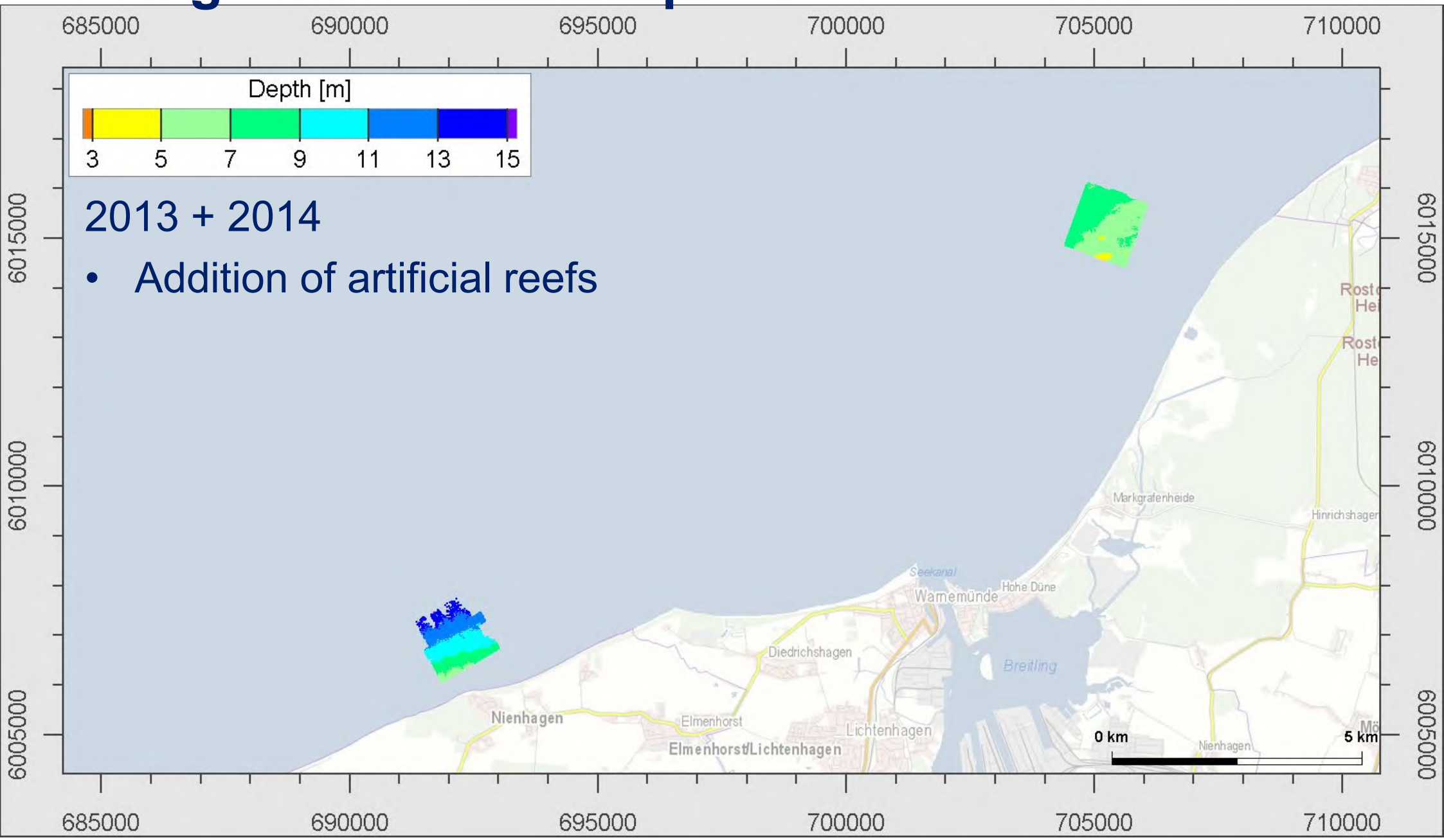
- Request for high resolution plus deeper penetration
- Required in spring
- Flight in Mai 2014 with Chiroptera
- AHAB/Aerodata with Hawkeye III

Organisation and implementation



- Request for high resolution plus deeper penetration
- Additional flight with Hawkeye III in autumn
- Flight in Mai 2014 with Chiroptera
- AHAB/Aerodata with Hawkeye III

Organisation and implementation



Organisation and implementation

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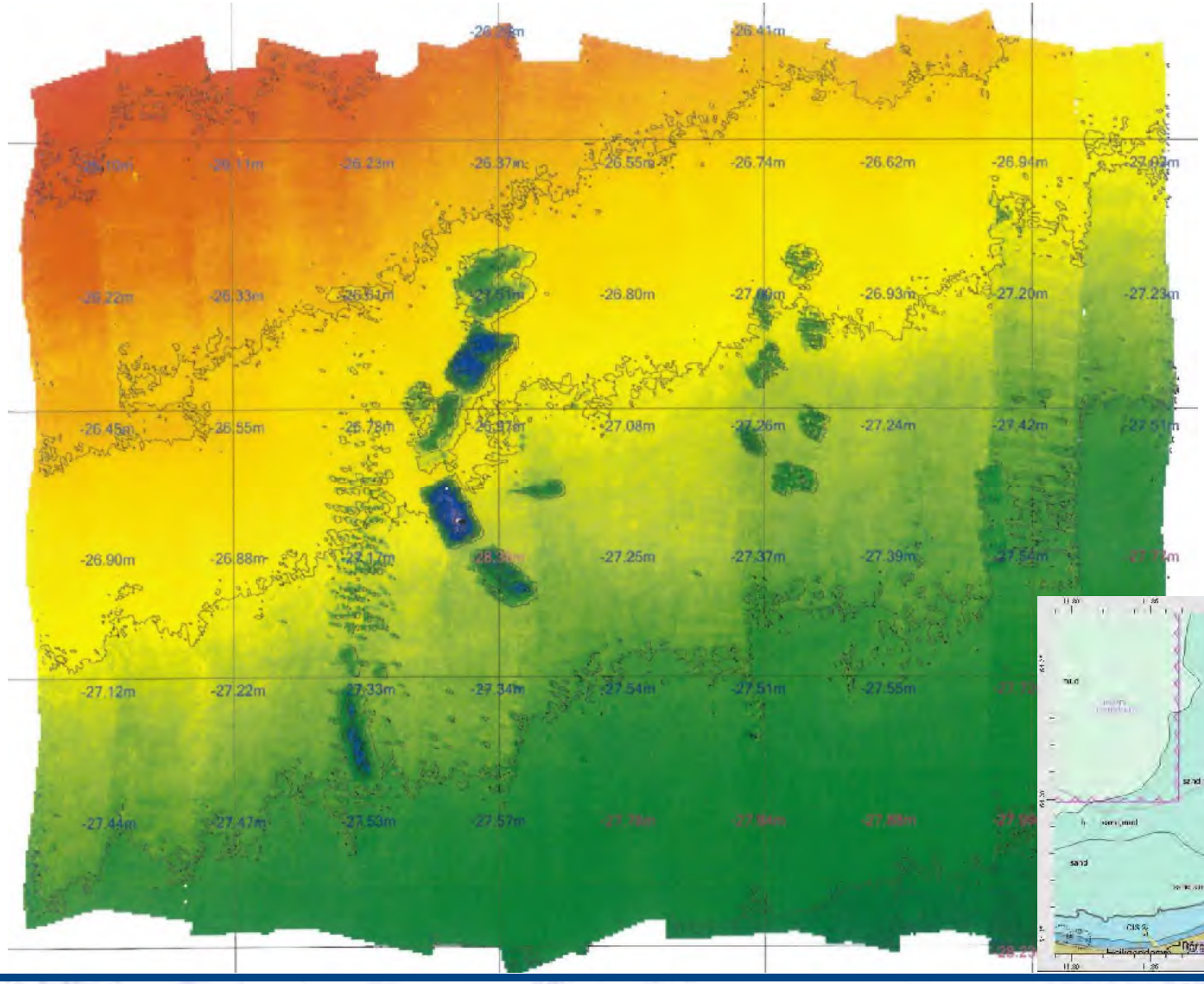
Reef Nienhagen



Artificial reefs

- Good for checking the accuracy
- Located close to Rostock
- Accurately surveyed by multibeam

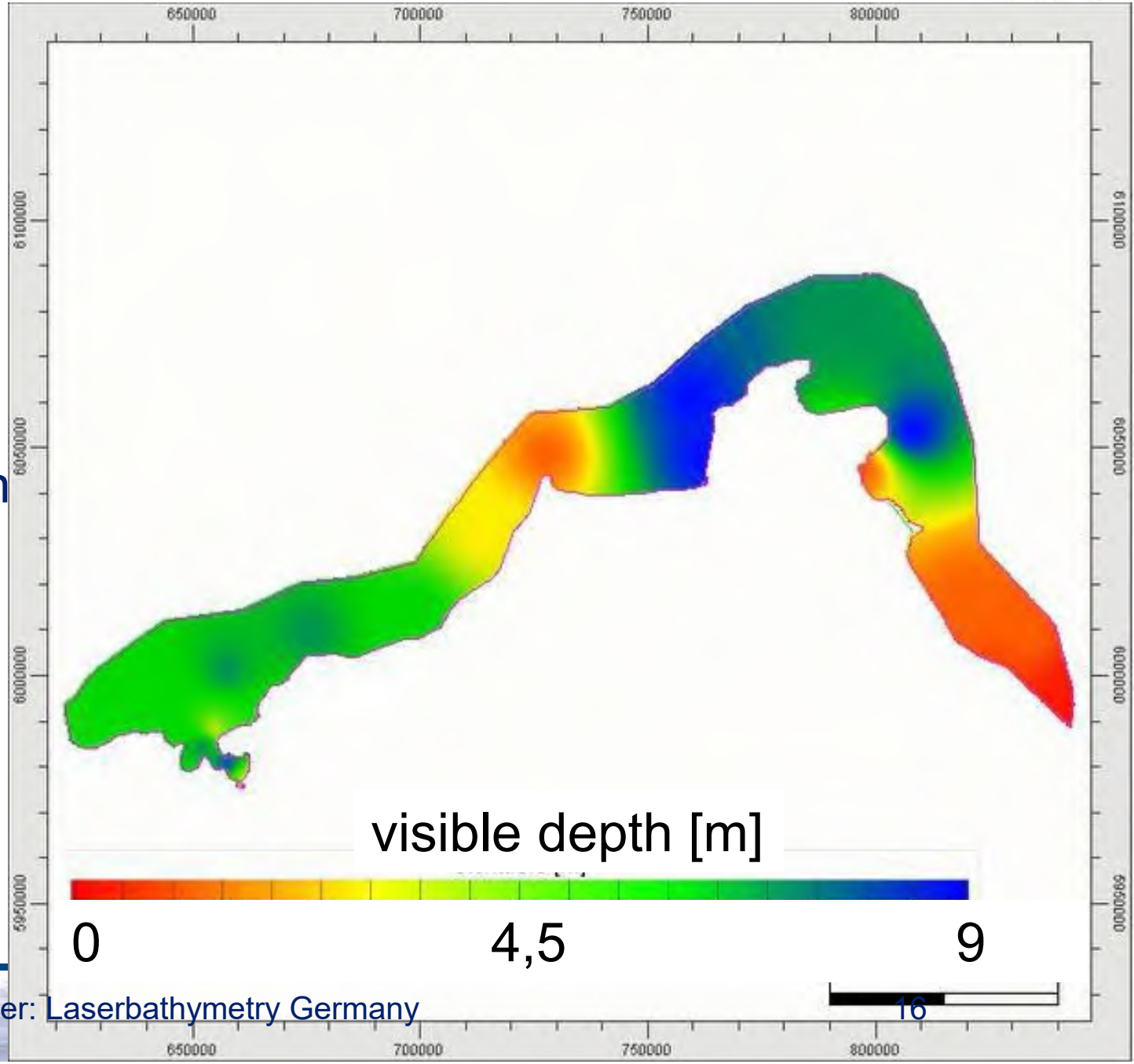
reefs

Organisation and implementation

Secchi-depths

variable

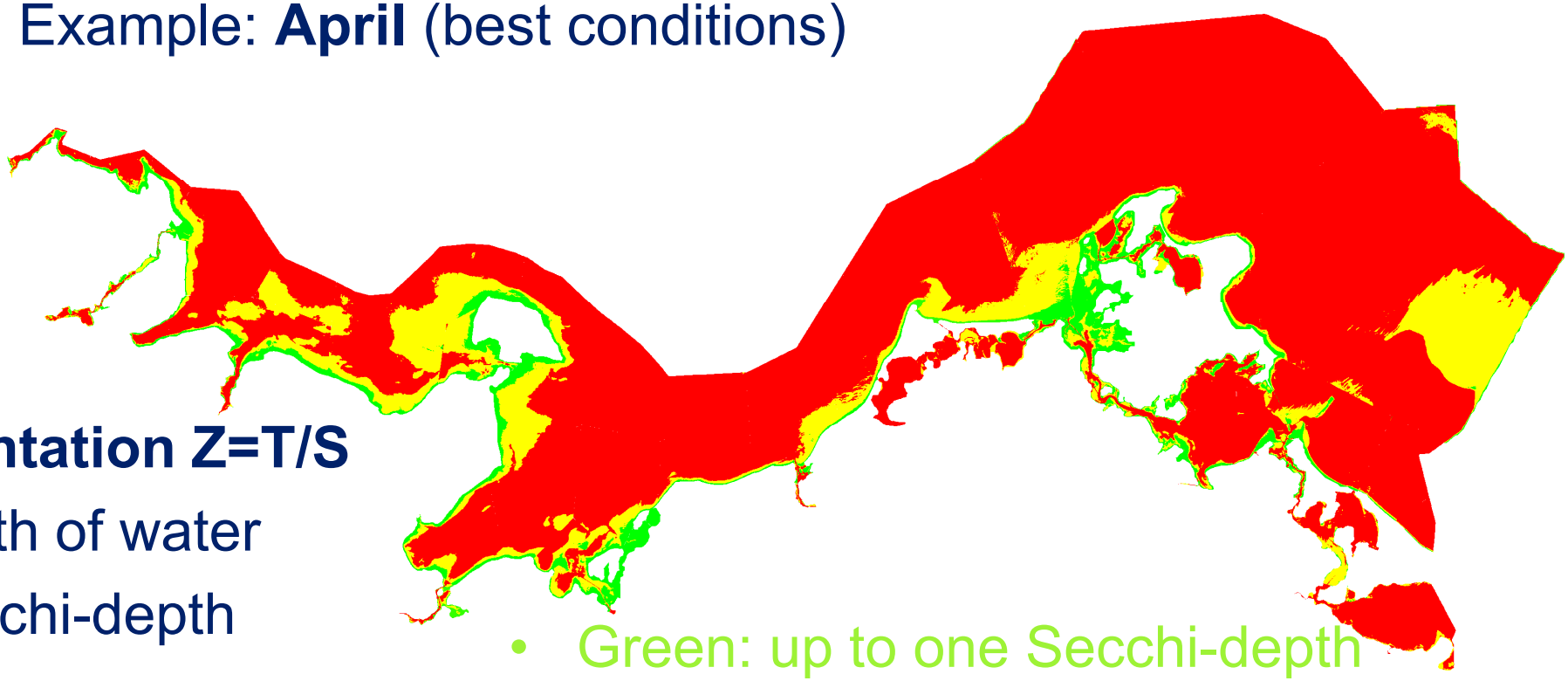
- Area:
  - 0,5 to 9 m
- Time:
  - April, October down to 9 m
  - In summer significantly worse



Organisation and implementation

Secchi-depths

Example: **April** (best conditions)



Presentation Z=T/S

T=depth of water

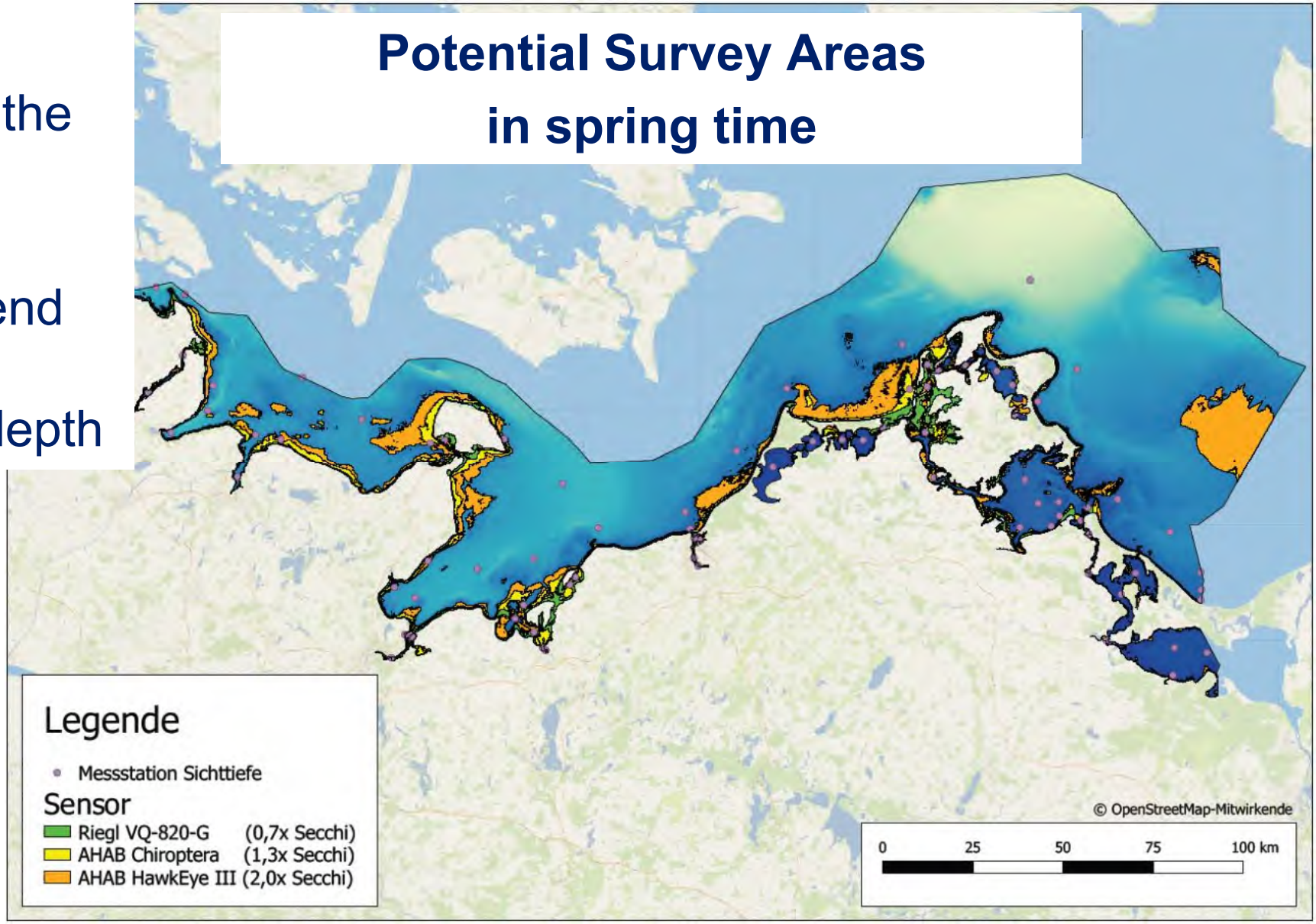
S=Secchi-depth

- Green: up to one Secchi-depth
- Yellow: up to 2 Secchi-depths
- Red: more than 2 Secchi-depths

Conclusions and next steps

Technical

- **Accuracy** not the main problem
- **Area** to be surveyed depend on relation depth/secchi-depth
- Dependent on careful processing
  - How to check?



Conclusions and next steps

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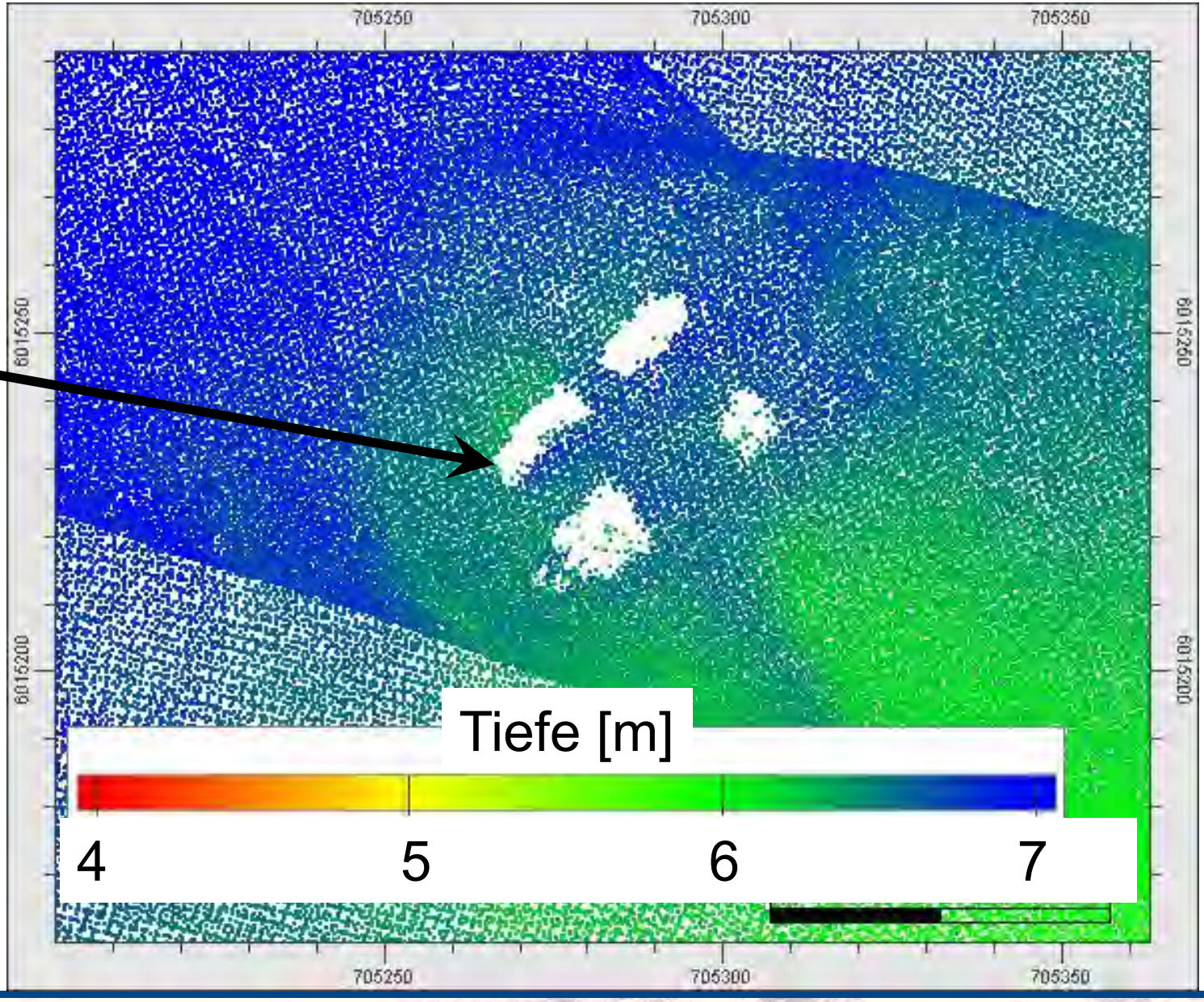
Data gaps

- Data very inhomogeneous
  - From >5 points/m² to >5 m²/point
  - Which density is too low for S-44? Is 5m*5m enough?
- Gaps even in shallow areas

Conclusions and next steps

Wrecks, Obstructions

- At this time not reliable to detect
- Reef Rosenort data from Chiroptera 2013



Conclusions and next steps

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Résumé:

- LIDAR is a very interesting development for shallow waters;
- Traditional methods have disadvantages in shallow areas:
  - Single-beam data provide too large gaps in-between;
  - Multi-beam surveys need too many survey lines;
- LIDAR does not provide an alternative but a complement;
- Combination of land and sea data becomes **more** important
- Collaboration necessary with all relevant institutions necessary
- A wider scope of the use and users of the data is necessary:
  - Not only safety at Sea (nautical charting)
  - Not only coastal protection

Hydrography – much more than nautical charting

Conclusions and next steps

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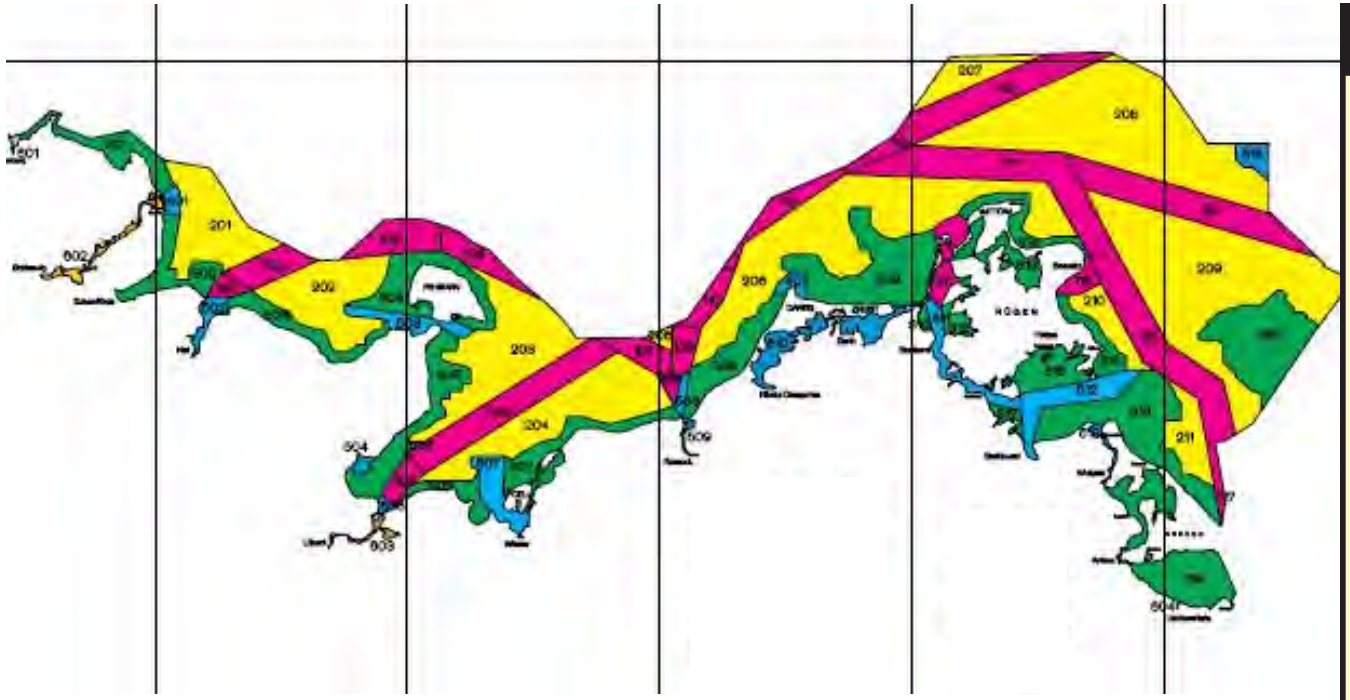
Next steps:

- Revision of the general plan of surveys;
- Measurement program in consultation with other institutions



Legende

Maßstab 1:	Häufigkeit in Jahren
2000	25
2500	10
2500	25
5000	5
5000	10
5000	25
10000	10
10000	25
25000	25

Hydrography – much more than nautical charting