




BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Laser Bathymetry

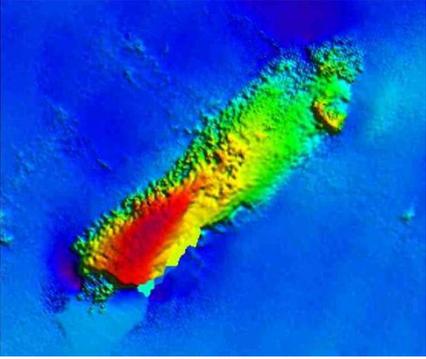
18 September 2013




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Laser Bathymetry 2




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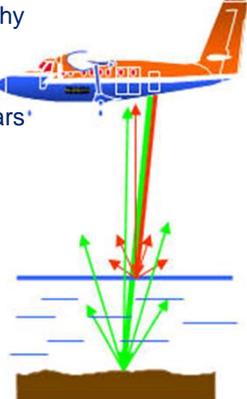
Project description

Laserbathymetry is in use in hydrography for quite some years especially in very clear waters.

A test in the german waters several years¹ led to insufficient results.

New developments in technology

- Full waveform analysis
- Higher resolution
- Single colour laser



Laser Bathymetry

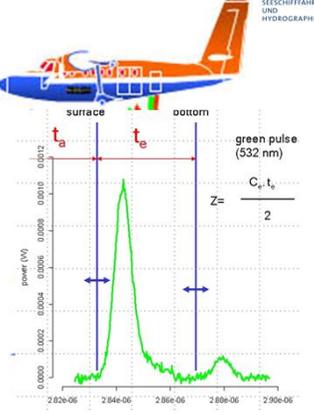



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Project description

Principle of LIDAR

- Two colour laser
 - NIR (wavelength = 1064 nm)
 - Green (wavelength = 532 nm)
- Time difference between the signals results in water depth
- One colour laser
 - Green
 - Full wave form analysis



surface bottom

t_a t_b

green pulse (532 nm)

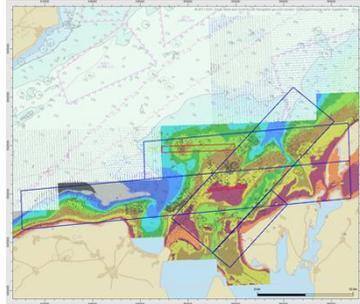
$$Z = \frac{c \cdot (t_b - t_a)}{2}$$

power (W)

Laser Bathymetry

Project description

- Duration from 2012 to 2014;
- Contracted partner is the Leibnitz University in Hannover (IPI);
- 3 independend flights (November 2012, September 2013, Spring 2014)
- Comparison with regular surveys;
- Associated partners support with their know-how;
- One test area;
- Different operating heights.

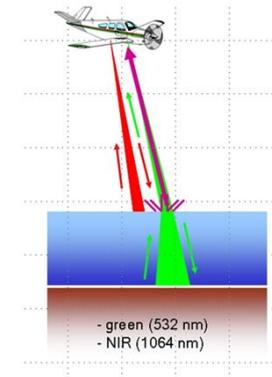


Laser Bathymetry

Project description

Technical aspects:

- Large footprints due to beam divergence,
 $\frac{1}{2}$ water depth
- High resolution versus high penetration of water column
i.e. 138 kHz – 4 kHz



Laser Bathymetry

Project goals

The main goals are (1)

- To derive clear and detailed figures of the quality depending on a.o.:
 - visibility
 - topography
 - sea floor conditions
 - time of year
 - weather conditions
 - influence of operating altitude



Laser Bathymetry

Project goals

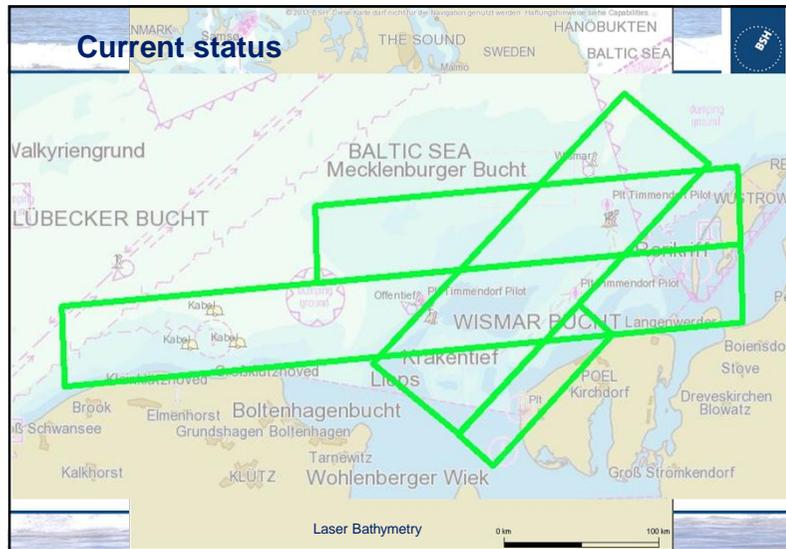
The main goals are (2)

- To what extend objects can be detected
- What are the maximum and minimum depth
- Whether a coastline can be derived
- To do a market survey
- How expensive is such a survey



Finally, to identify the areas in which that technology can be used economically, especially in cooperation with other agencies.

Laser Bathymetry

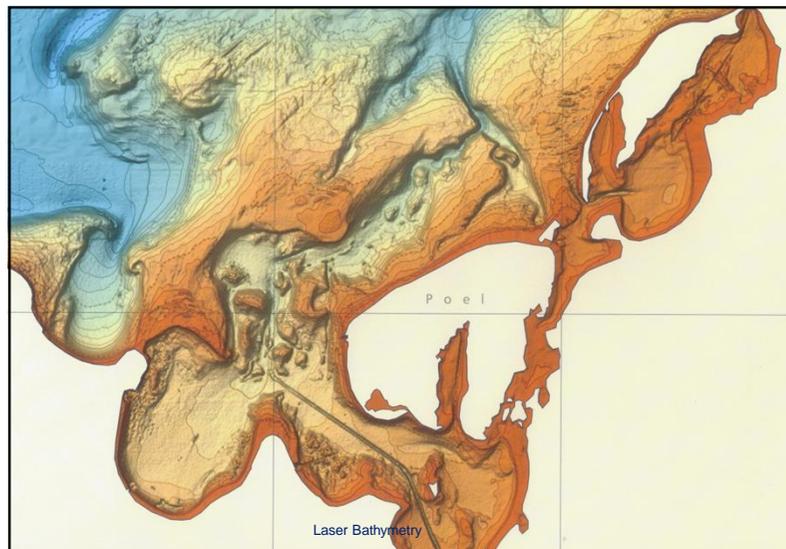


Projekt Laserbathymetrie

Test Site:

- 345 m²
- 4 overlapping areas
- Different directions
- Wrecks and obstructions
- Waterdepth 0 to 20 m
- Land area included
- Rough topography
- Boulders
- different sea floor characteristics
- Measured Secchi-depth

Trends in der Seevermessung



Current status

Systems used
A test site has been decided on. A first flight took place in November 2012, where the system Riegl VQ-820G was used.

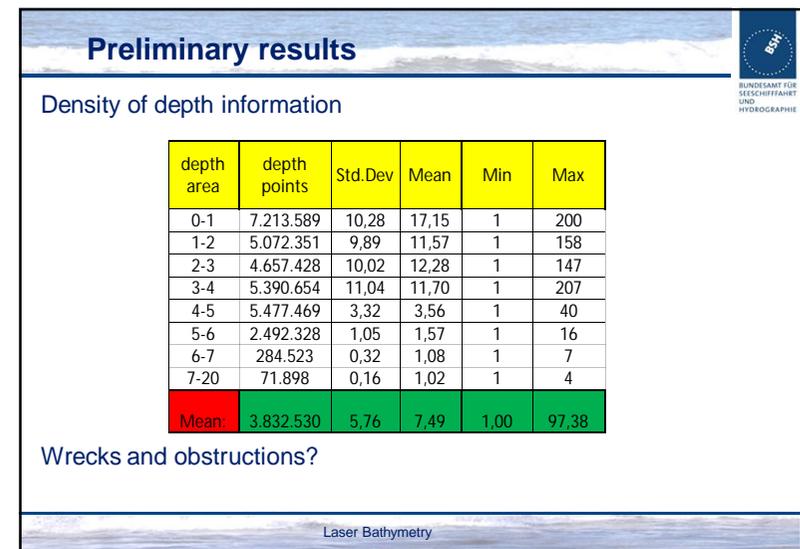
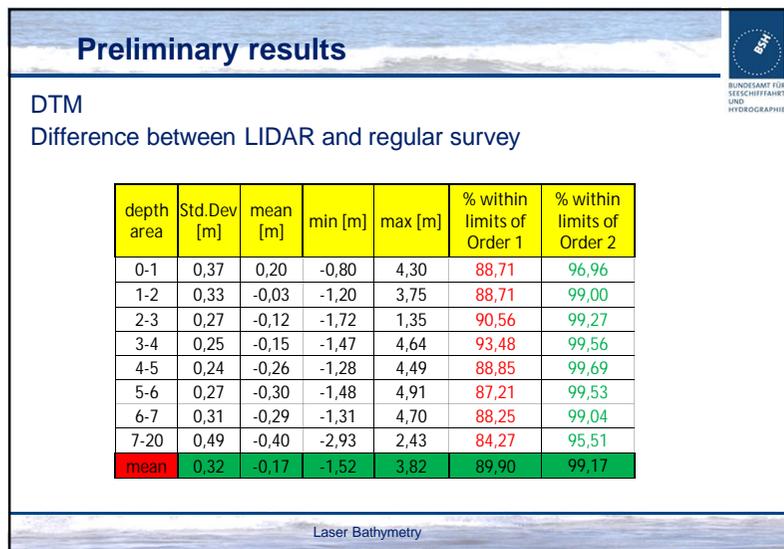
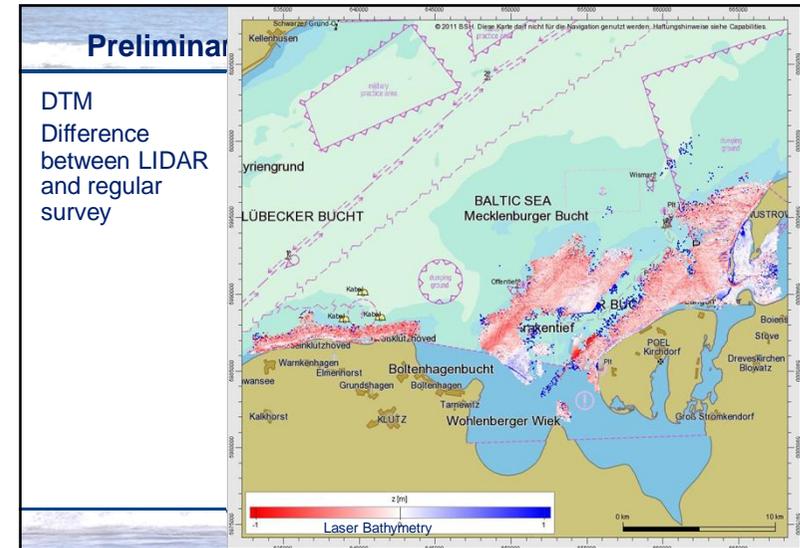
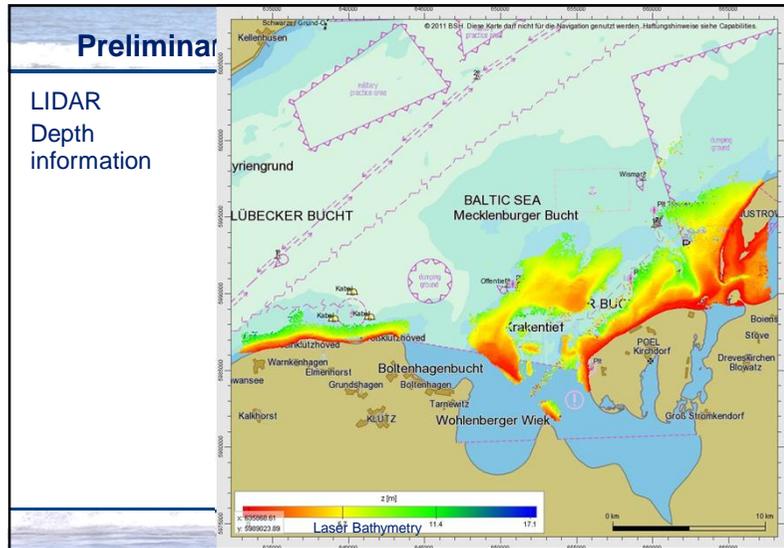
Flight altitudes:

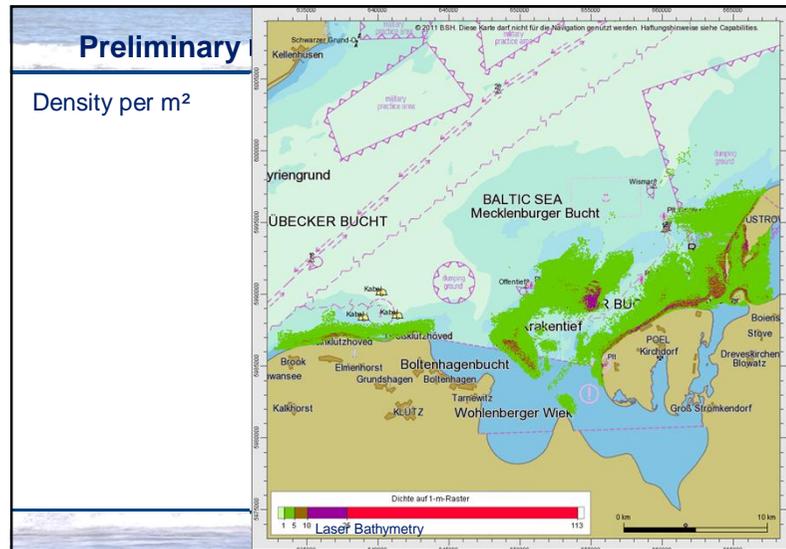
- Flights in 300, 400, 500, 600 and 700 meters
- Some limitations due to laser class

The next flight is scheduled for this month with AHAB Chiroptera and Hawk Eye II.

One more flight is planned for spring 2014.

Laser Bathymetry





Preliminary results

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The current findings are premature and can only give some hints.

- Secchi depths 5-6 meters. A good resolution has been obtained down to this depth (5 points/m²).
- Costs: depending on shape and size of the area, flight altitude and availability, in our case: roughly 300 to 350 €/km².
- It seems to be very difficult to detect objects on the sea floor.
- Anyway, for the investigated Western Baltic laser bathymetry can only be a supplement to the ship based hydrographic surveys in very shallow areas, where vessel operations are especially difficult.

Laser Bathymetry

Laser Bathymetry

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The Commission is invited to

- take note of the report;

Laser Bathymetry