



# *Inland waterways infrastructure- Competitive factor?*

*Finland Waterway Association  
Winter Congress 2016*

*20 January 2016, Lappeenranta*

*Kari Pohjola*



*a brand of*



## Supporting the sustainable use of sea and inland water areas

- Decades of professional experience
- Origin in Finnish Maritime Administration
- Turnover 30 M€, personnel 220 (2014)
- MeriTaito Ltd is 100% owned by state of Finland
- SeaHow is a brand used for international activities

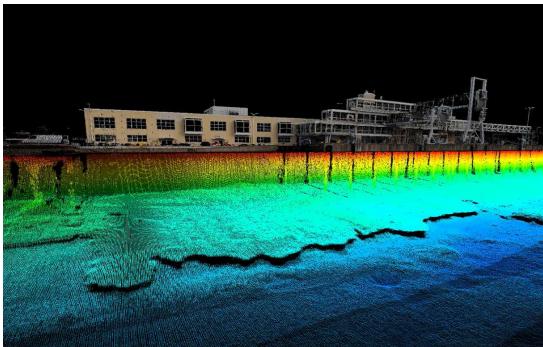




# MeriTaito

## SURVEYS AND PLANNING

### Underwater Investigations



### Hydrographic Surveys



## CONSTRUCTION

### Sea bed investigations



### Polyethylene buoys



**Wide range of services  
Domestic market leader  
Active operations abroad**

## MAINTENANCE

### Fairway Maintenance



### Oil Recovery Services and Equipment





## Inland waterway infrastructure:

What does we have and what does we not have?

- Fairway dimensions yes/no
- Sea bottom characteristics yes/no
- Aids to Navigation yes/no
- Harbour facilities yes/no
- Data collection and transmission yes/no
- Data storage and management yes/no
- Interactive interface for fairway users yes/no
- Database for continuous fairway system development yes/no
- Improved navigation safety and efficiency yes/no



**Buoy manufacturing,  
installation and maintenance:  
Experience over 35 years**

**Finland, Russia, Canada, Germany, Island, Ireland, Sweden, Norway, China...**



**D1000 steel buoys are being  
replaced with D800 PE-buoys in Finland**

**Finnish Transport Agency study:  
Life span cost of a PE-buoy is 50% less  
compared to steel**

**PV 800**

## Smart Navigation Buoys

- Combination of High Technology

### Smart Buoy Concept

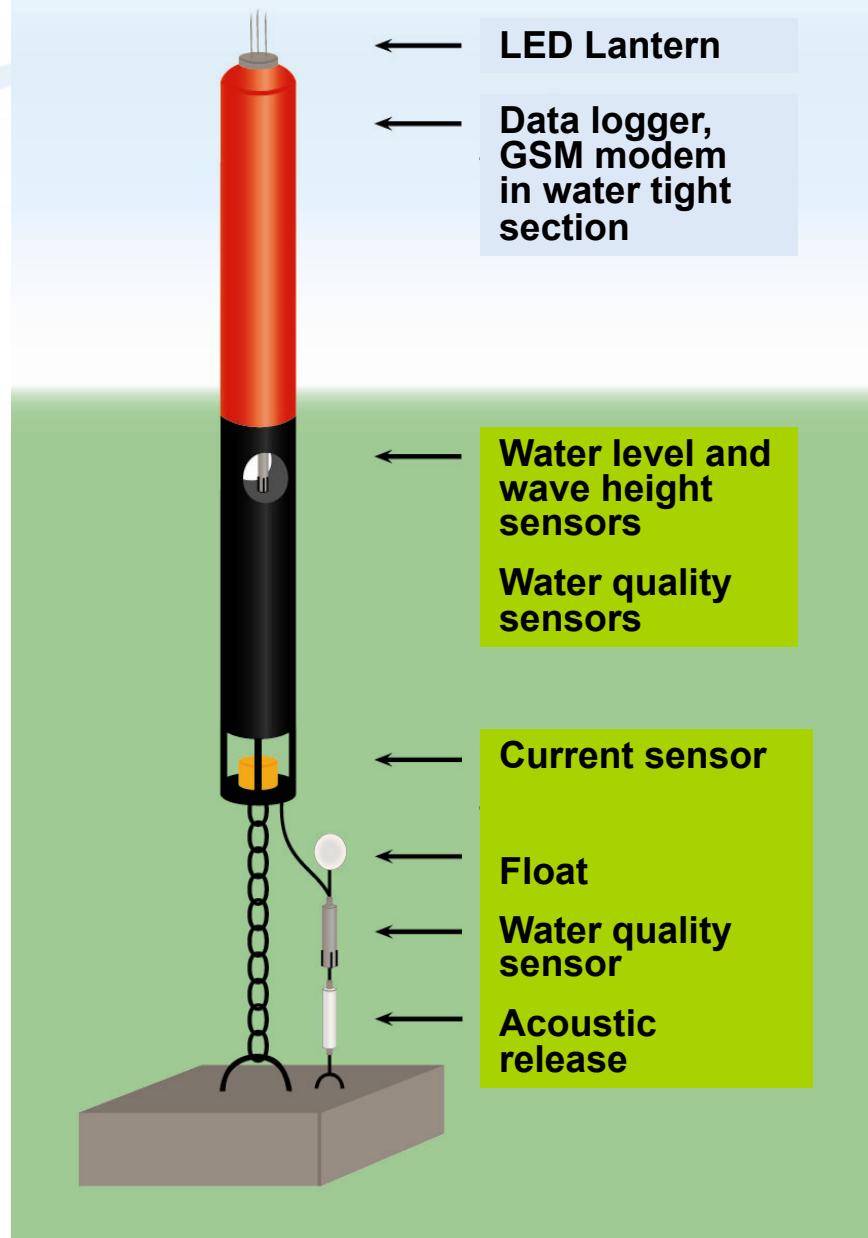
1. Robust PE-buoy  
    &
2. Monitoring devices  
    &
3. Wireless data transmission  
    &
4. Web-server  
    &
5. Data distribution



## Monitor data according needs

### Buoy data/ AtoN Remote Control

- Buoy positioning
- Status of the light
- Battery voltage
- Transmission signal
- Time
- Temperature
- Pressure





# AtoN remote control, SeaDatics interface

🕒 04.12.2013 14:29 📅 -65 dBm ⚡ ✓  
📍 21.55708 degrees  
63.08286 degrees 🛫 08:00 ☾ 16:32  
🌡️ Beacon 3 °C 🌦 Water 0.38 °C 💧 Water 0.23896 bar 🕒 +02:00



The map displays a coastal area with green landmasses and blue water. A yellow marker indicates the device's position near the shore of Vaasa. A dashed blue line extends from the device's location across the water. A scale bar in the bottom left corner shows 1 nmi and 2 km.

Voltage Location Signal Pressure



The graph plots Voltage (V) against time. The Y-axis ranges from 5.0 to 10.0 V. The X-axis shows dates and times: 04.12.13 12:16:00, 12:20:00, 12:24:00, 12:28:00, 04.12.13 12:18:00, 12:22:00, 12:26:00. The data series starts at approximately 12.5 V, fluctuates slightly, and then drops sharply to about 11.5 V at 12:20:00. It remains constant at this level until 12:26:00, where it rises slightly to around 12.0 V.

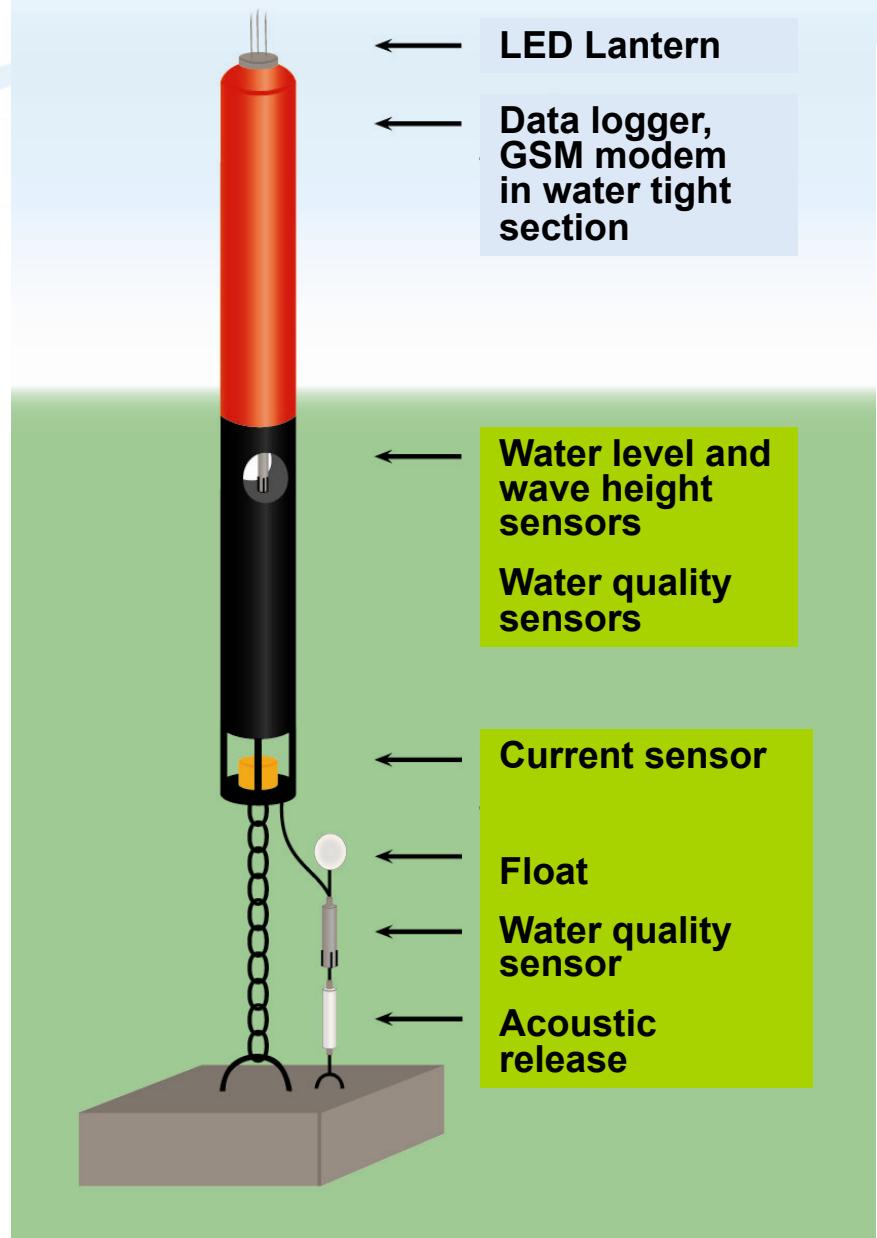
Date	Time	Voltage (V)
04.12.13	12:16:00	~12.5
04.12.13	12:18:00	~12.0
04.12.13	12:20:00	~11.5
04.12.13	12:22:00	~11.5
04.12.13	12:24:00	~11.5
04.12.13	12:26:00	~12.0



## Monitor data according needs

### Navigation data

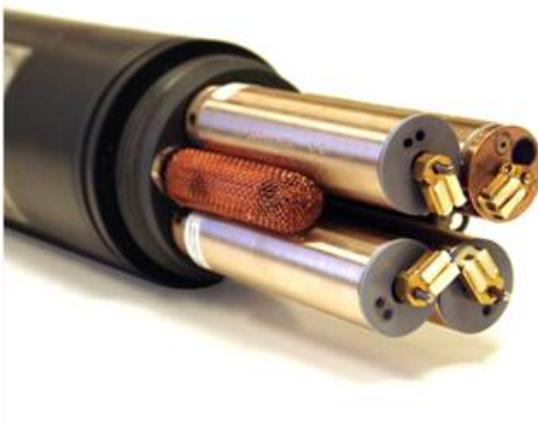
- Wave height
- Water level and tides
- Current direction
- Current strength
- Water temperature

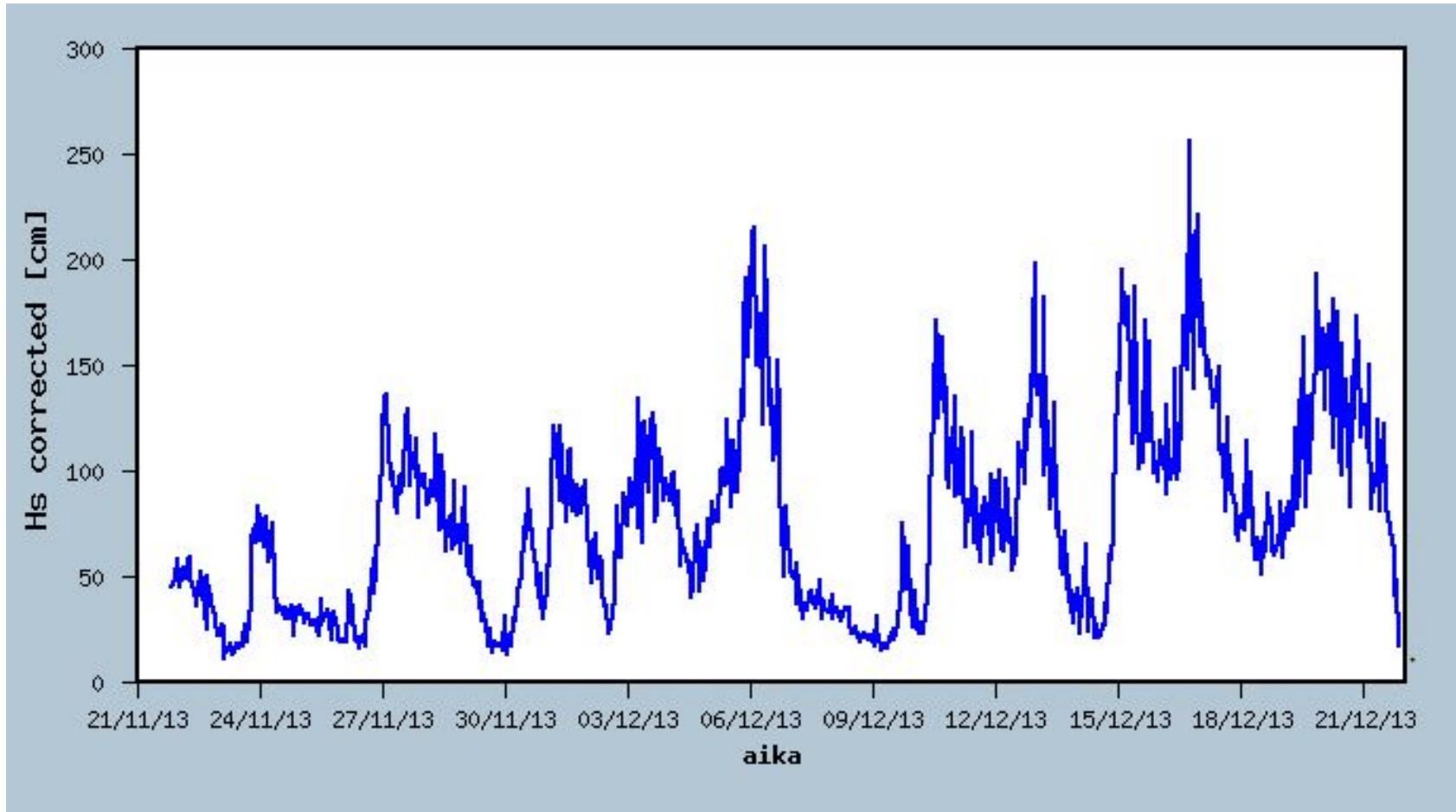




## Smart Buoy “Utö Light house” Prestressed Ice Buoy SMC 800-13

Focal height 5 meters  
Submerged section 8 meters  
Sensors: current & wave & water level & temperature



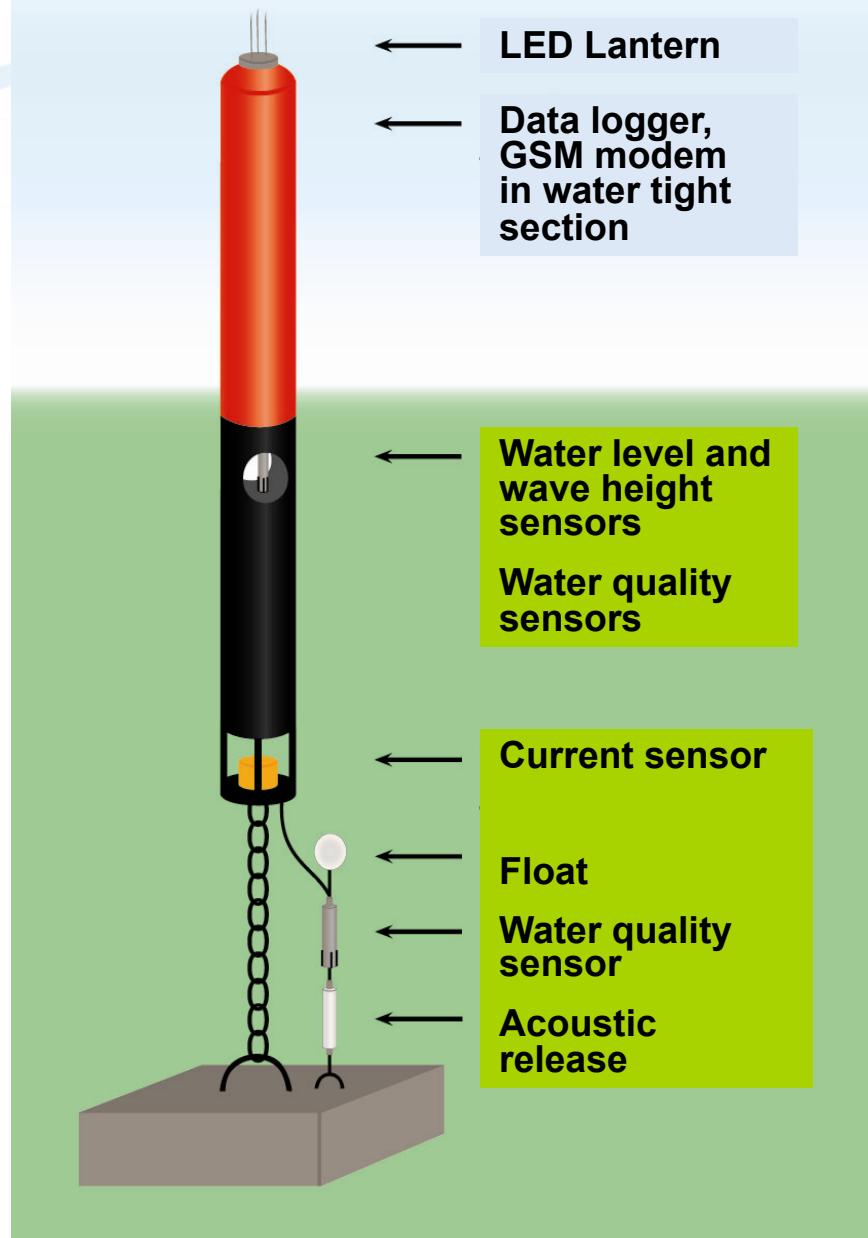




## Monitor data according needs

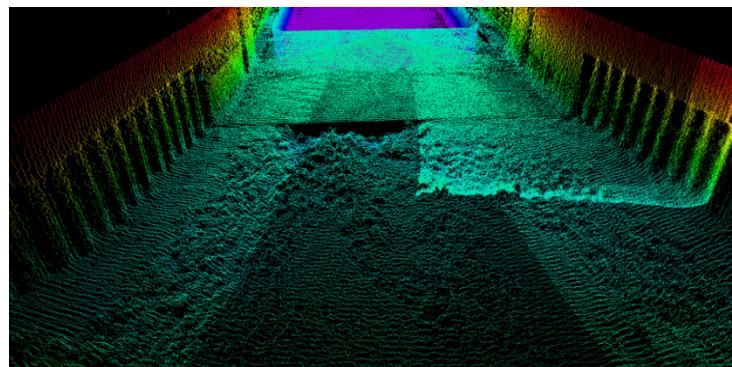
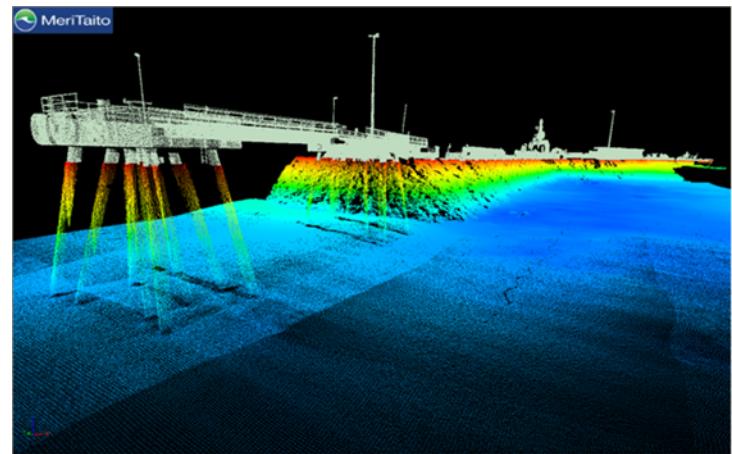
### Environmental data

- Oil spill detection
- Oxygen content
- Algae status
- Salinity
- Turbidity



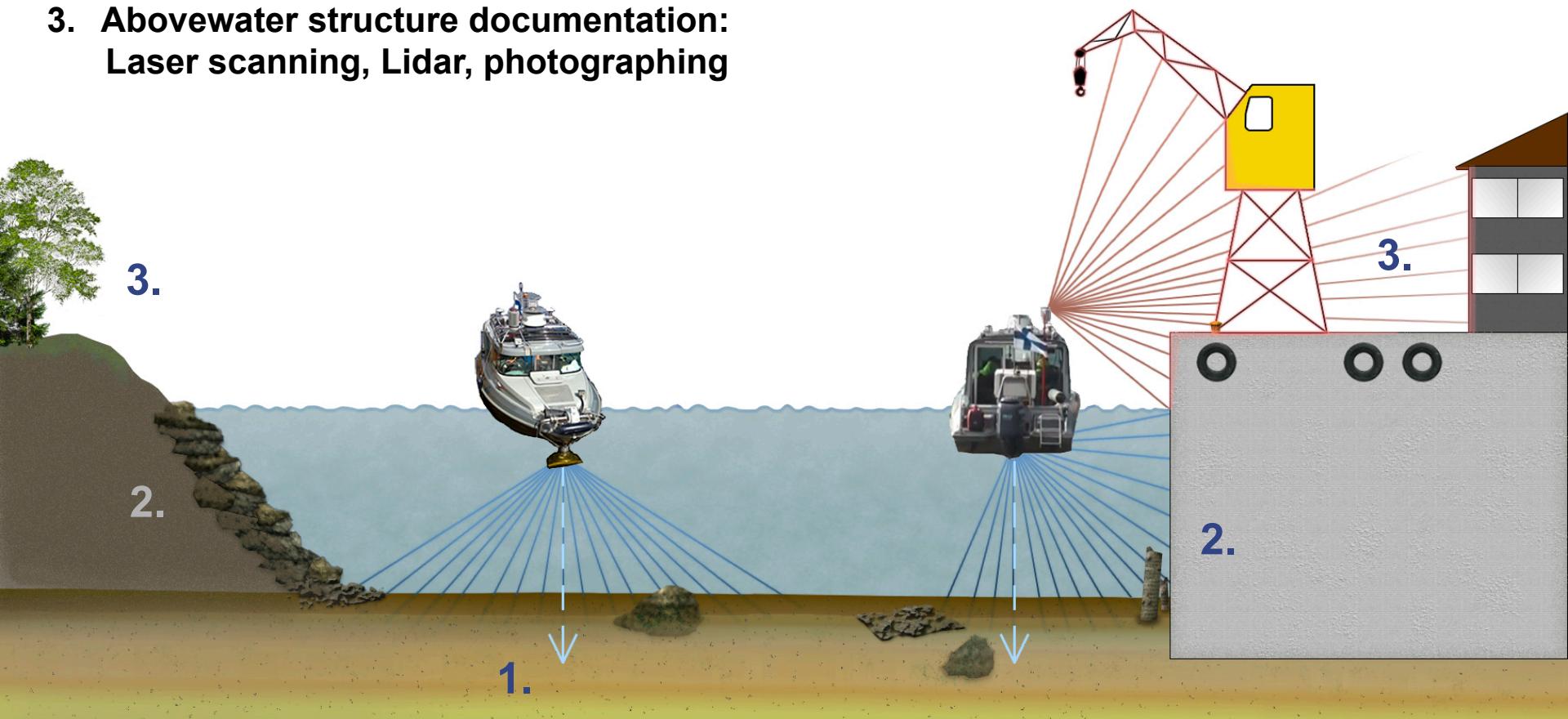
## 3D-Infrastructure model for navigation

- Data is based on 3D point cloud and other information
- Ship uses this model for positioning and navigation
- Ship uses this model for berthing operations
- International eNavigation information transmission standart for ECDIS-system
- Model can be used for development of fairway system



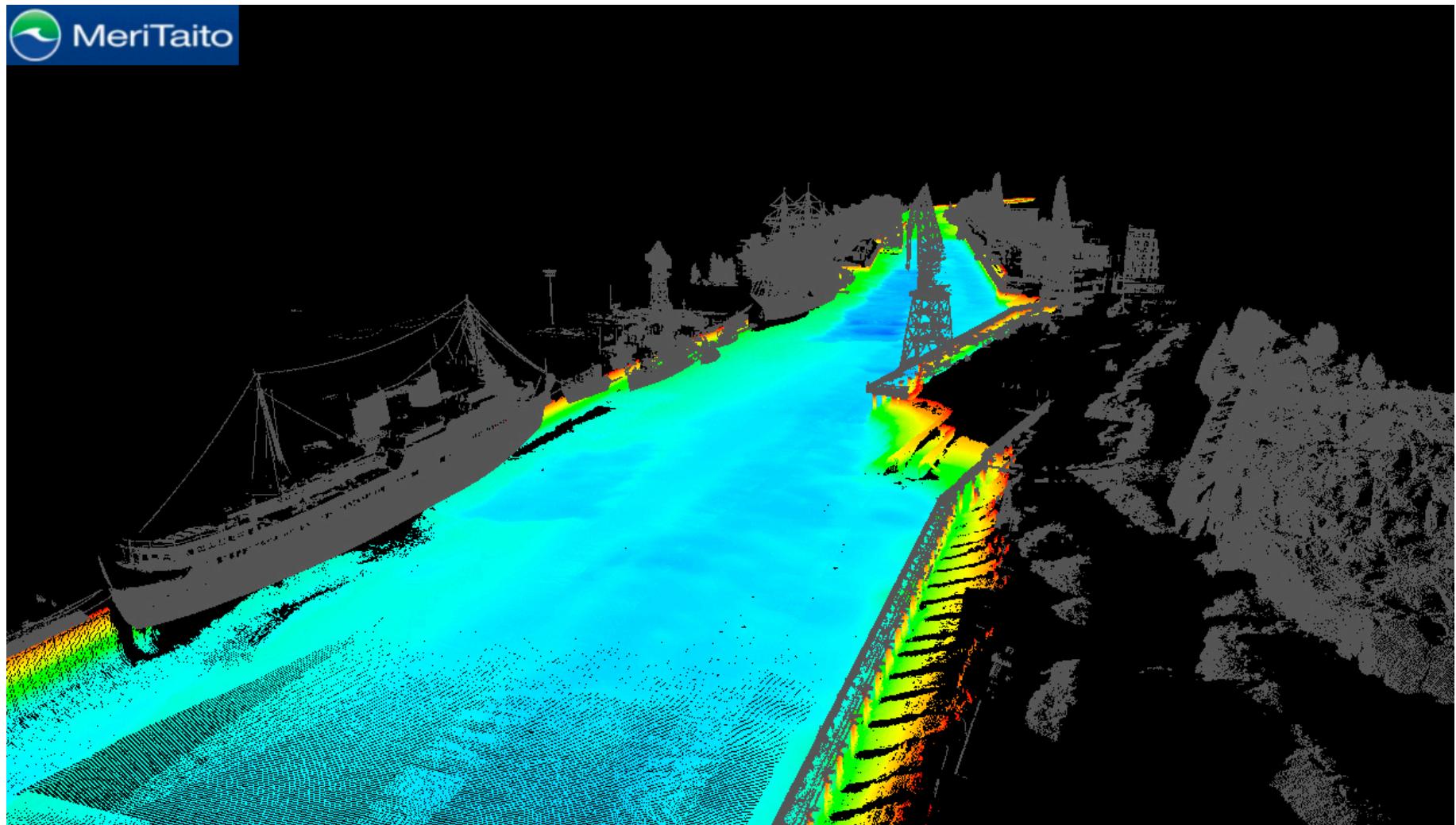
## Basic data collection for 3D-model

1. Multibeam (and low frequency) surveys in harbour basin
2. Underwater infrastructure survey with multibeam or/and scanning sonar
3. Abovewater structure documentation:  
Laser scanning, Lidar, photographing

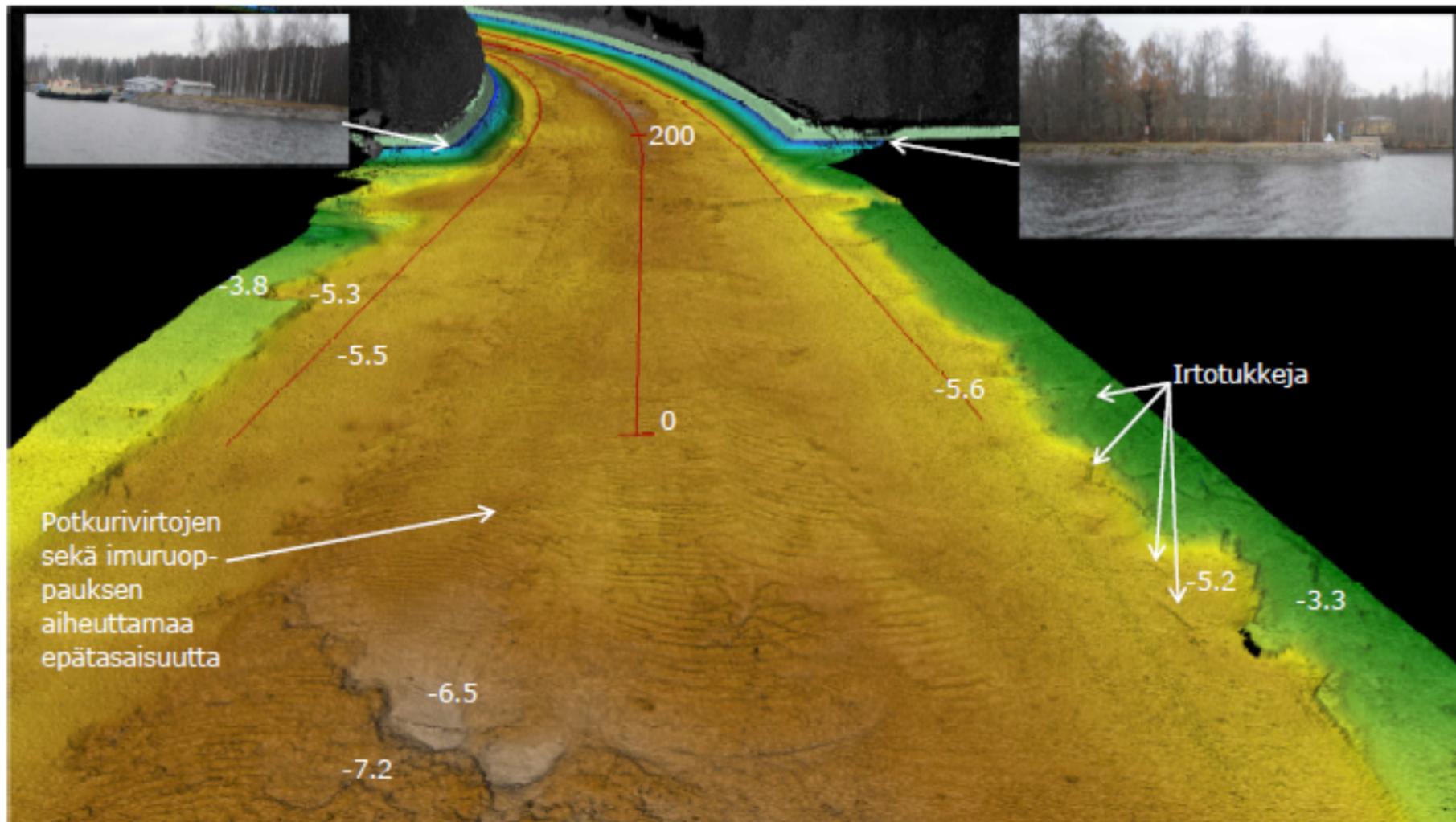




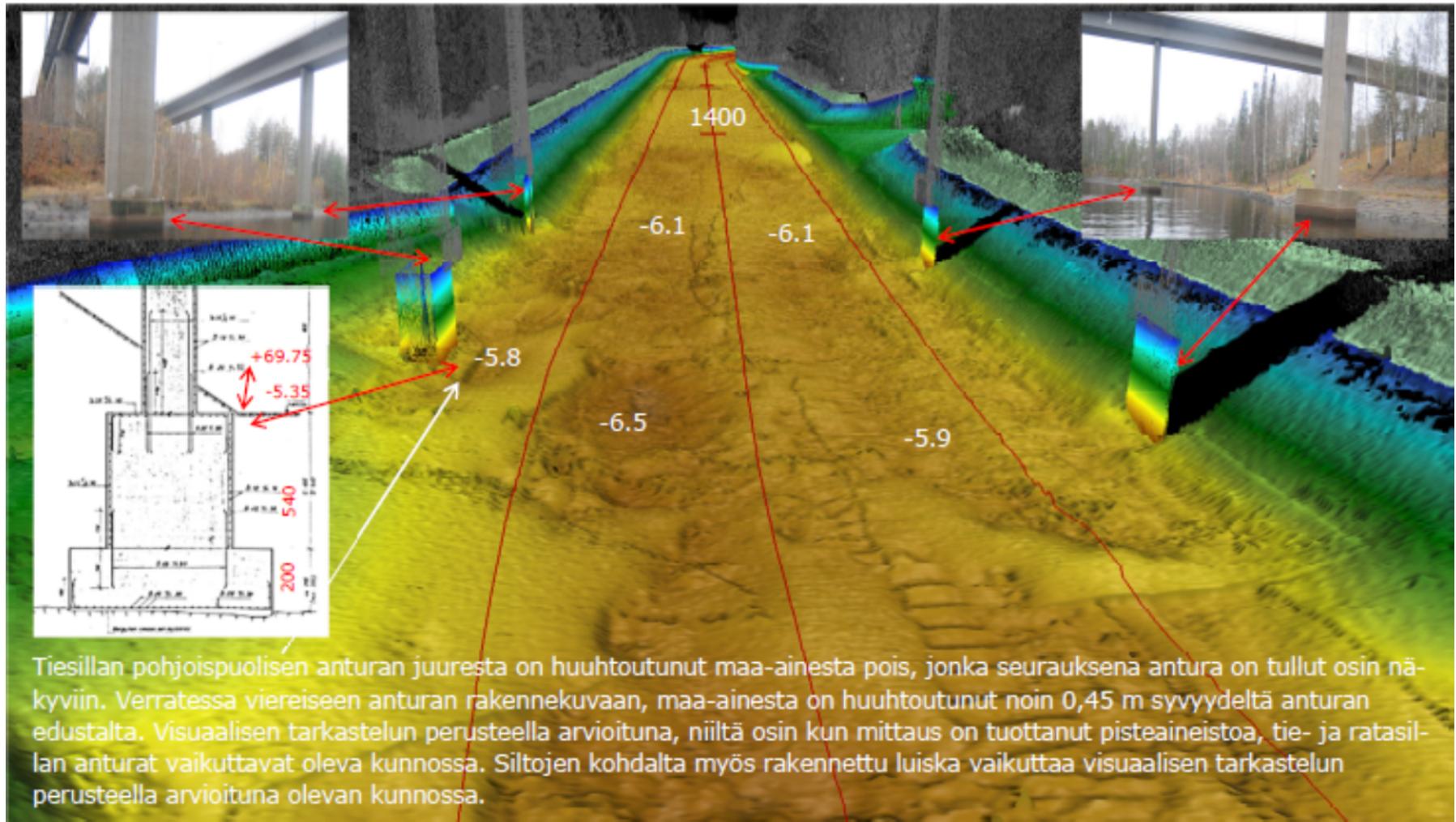
## Example; Aura river in Turku



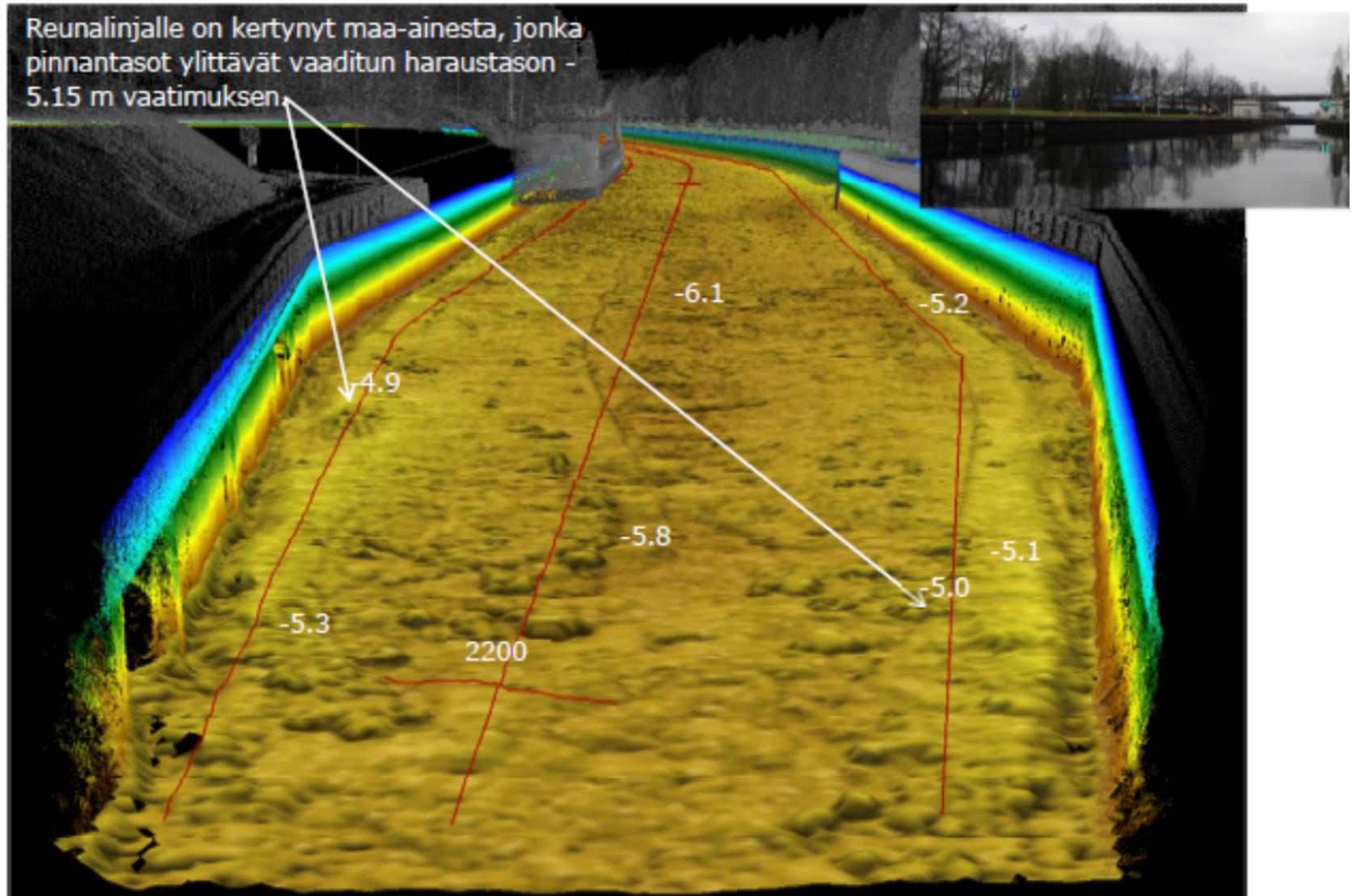
## Example; The canal of Saimaa, Mälkiä



## Fairway area, critical structures

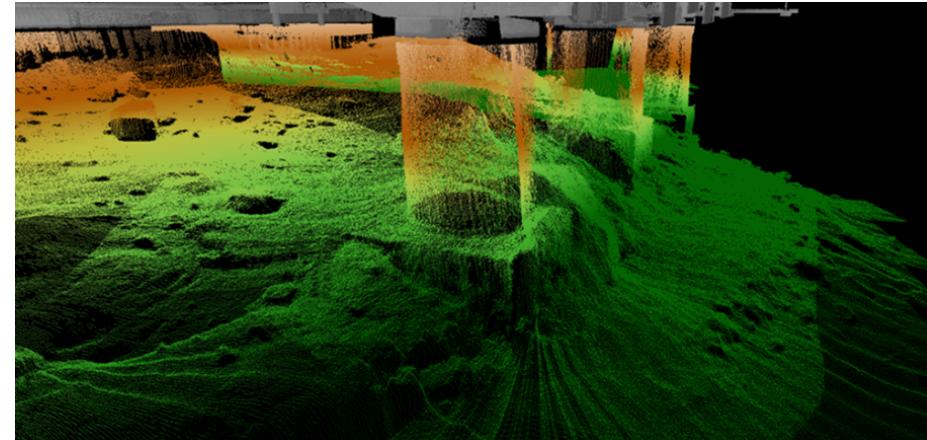
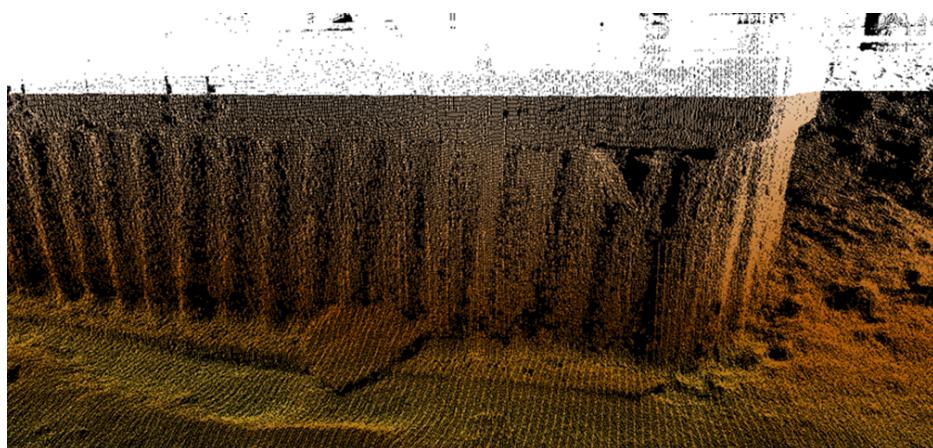
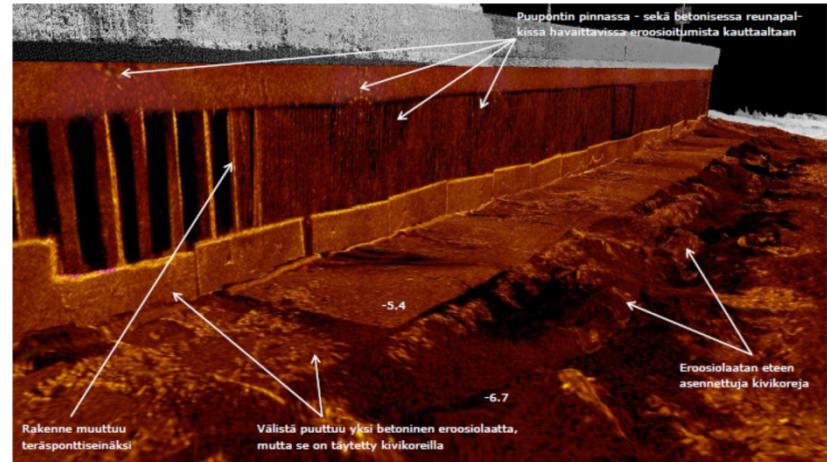
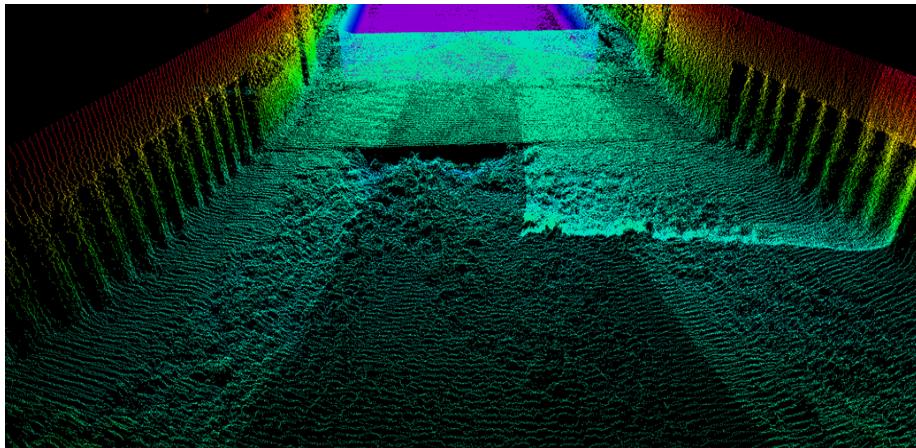


## Fairway area, water depths

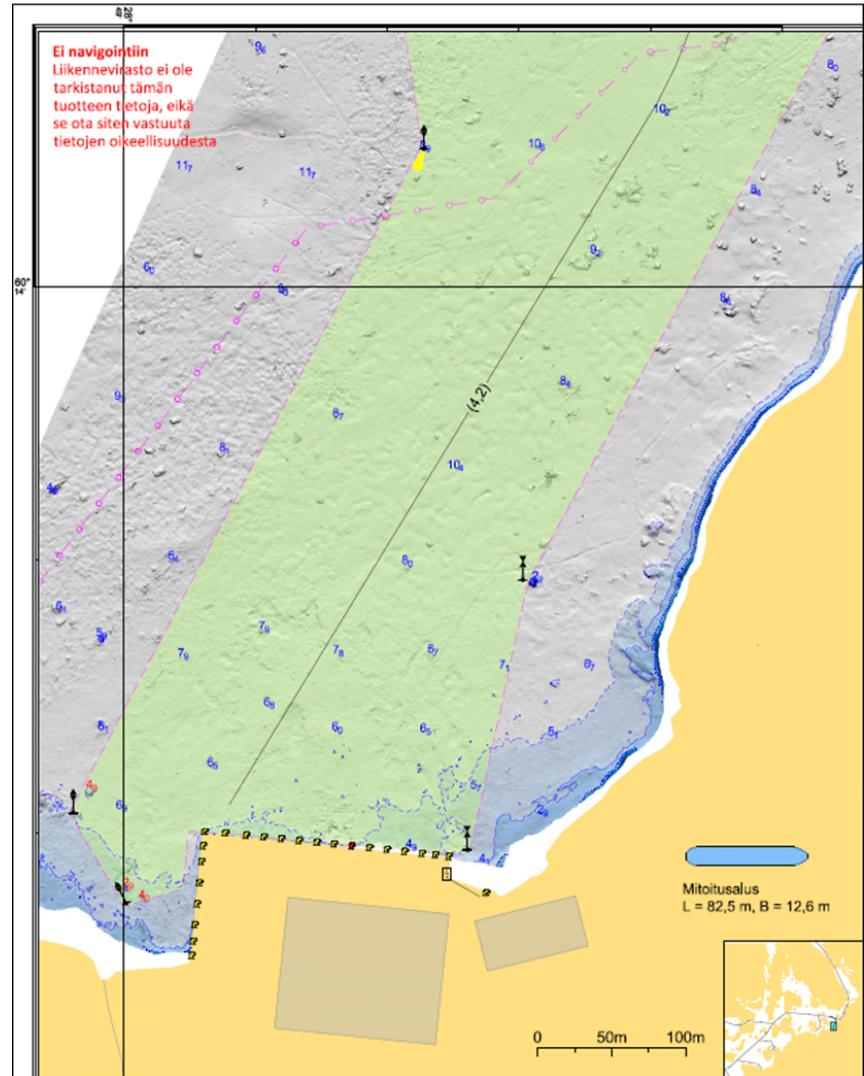
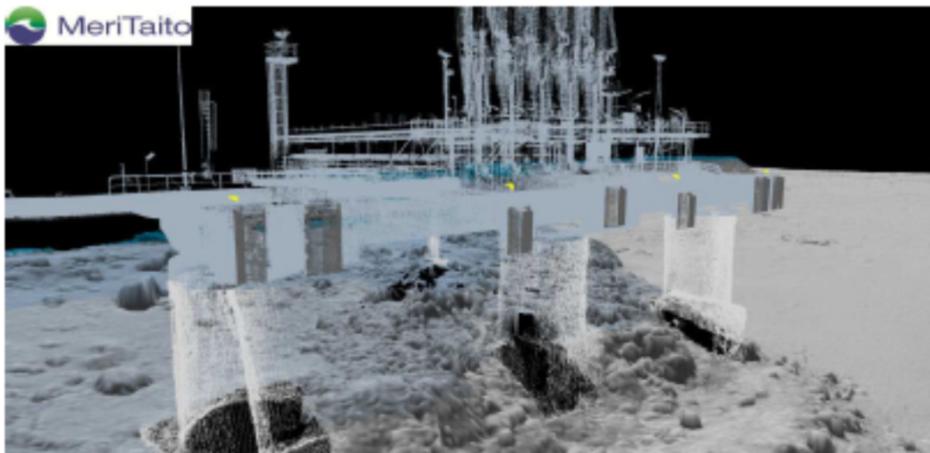




# Important information from structures



- Structures
- Bottom formations near quay
- Fenders
- Bollards
- Cargo handling Equipment
- Sewage
- Fresh water
- Shore electricity supply
- Other information





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- Database for continuous fairway system development
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**Intelligent inland waterway infrastructure –  
Competitive factor**



# Thank You!

This is not science fiction.

## DEMO

**SeaHow®**