



NordPIANC 2015 Finland

*Smart Buoy concept for enhanced AtoN
management and oceanographic monitoring*

September 23rd 2015

Seppo Virtanen



a brand of



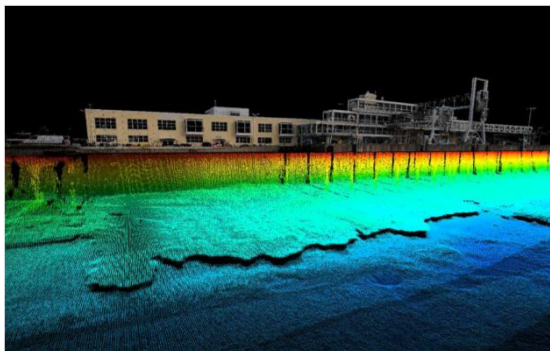
Supporting the sustainable use of sea and inland water areas

- *Former department of the Finnish Maritime Administration*
- *Turnover 31 M€, personnel 220 (2014)*
- *MeriTaito Ltd 100% Finnish state owned*
- *SeaHow is a brand used for international activities*



SURVEYS

Underwater Investigations



CONSTRUCTION

Sea bed investigations



MAINTENANCE

Fairway Maintenance



Hydrographic Surveys



Seppo Virtanen 23.9.2015

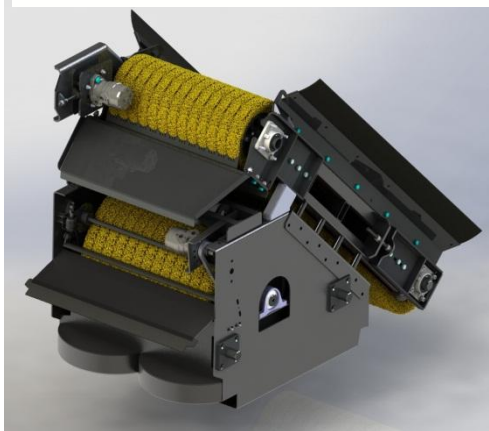
Polyethylene buoys



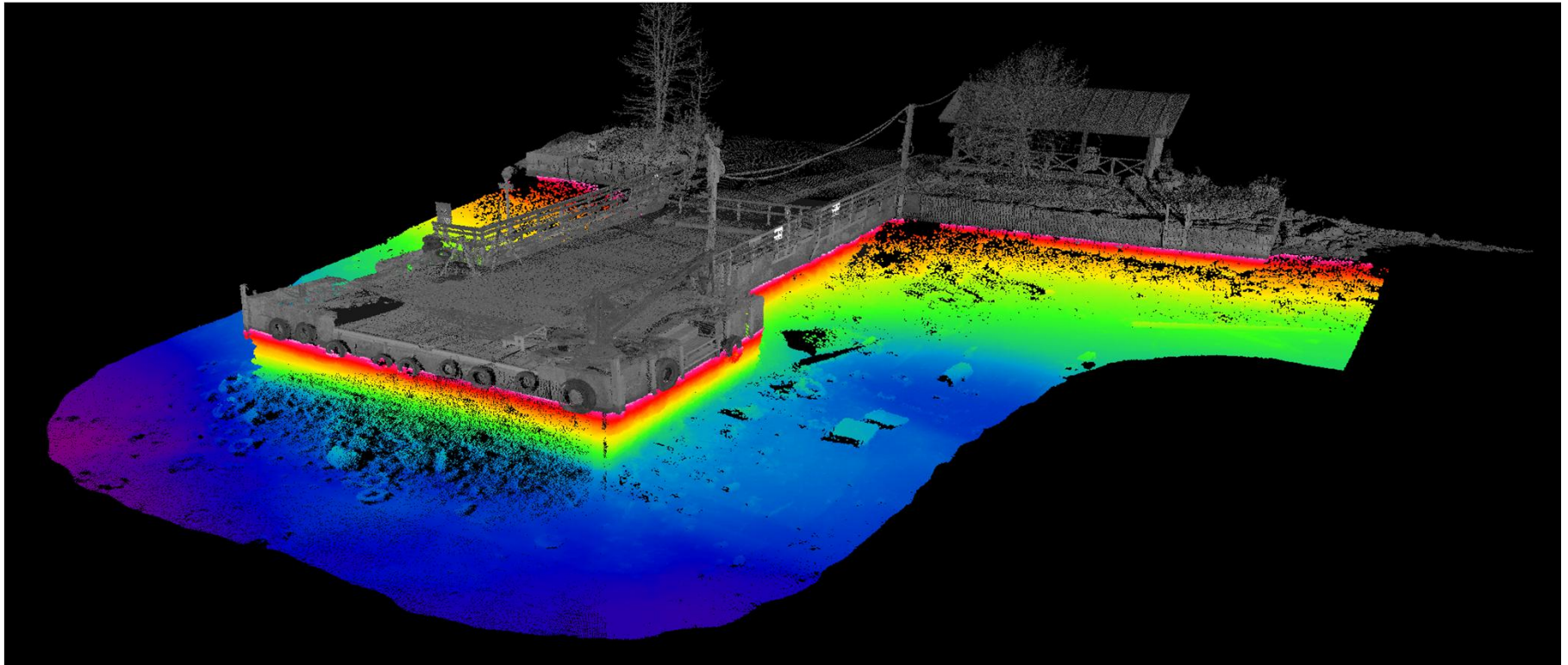
www.seahow.fi

Oil Recovery Services





Combination of High Resolution Multibeam Survey & Mobile Laser Scanning



Annual production over 1 500 units



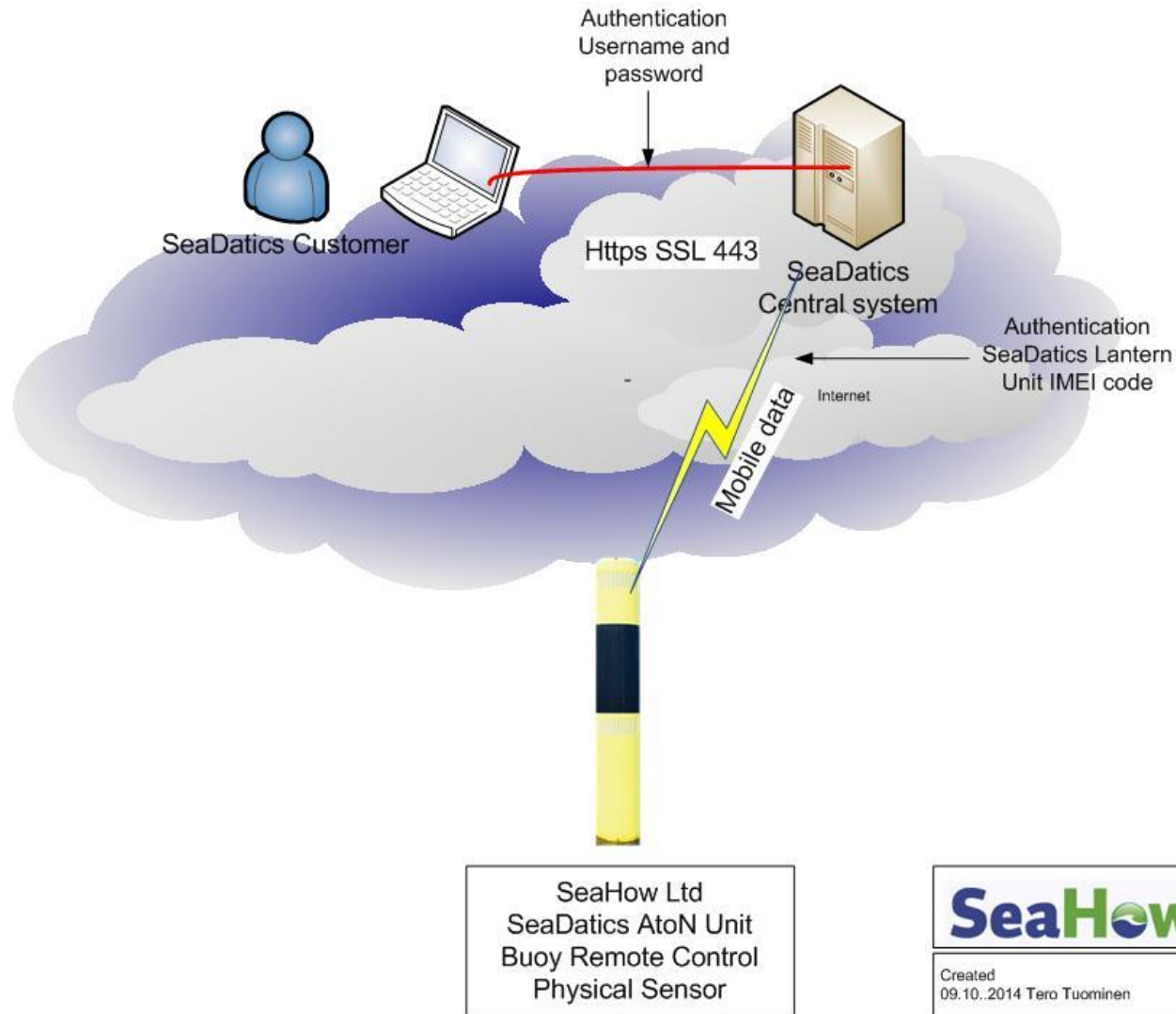
Smart Buoy Concept

Navigation buoy with:

- *Monitoring sensors*
- *Datalogger*
- *GSM connection*
- *Battery for power supply*







Smart Buoy Concept

Sensors available

Parameter	Sensor	Range	Resolution	Accuracy	Measure interval	Maintenance interval	Monitoring depth
Temperature I	YSI	-5 .. +50°C	0.01°C	+/-0.15°C	0.5 Hz	Annually	2 .. 7 m
Temperature II	Aanderaa	0 .. 36°C	0.001	+/-0.4°C		Annually	2 .. 7 m
Temperature III	Aanderaa	-10 .. 43°C	0.05	+/-0.1°C		Annually	2 .. 7 m
Conductivity	YSI	0 .. 100 mS/cm	0.001 mS/cm 0.1 mS/cm	+/-0,5% or 0.001 mS/cm	0.5 Hz	2-3 times per year	2 .. 7 m
Salinity	YSI	0 .. 70 ppt	0.01 ppt	+/-1% or 0.1 ppt	0.5 Hz	2-3 times per year	2 .. 7 m
Dissolved Oxygen	YSI	0 .. 50 mg/l	0.01 mg/l	+/-2%	0.5 Hz	2-3 times per year	2 .. 7 m

Smart Buoy Concept

Sensors available

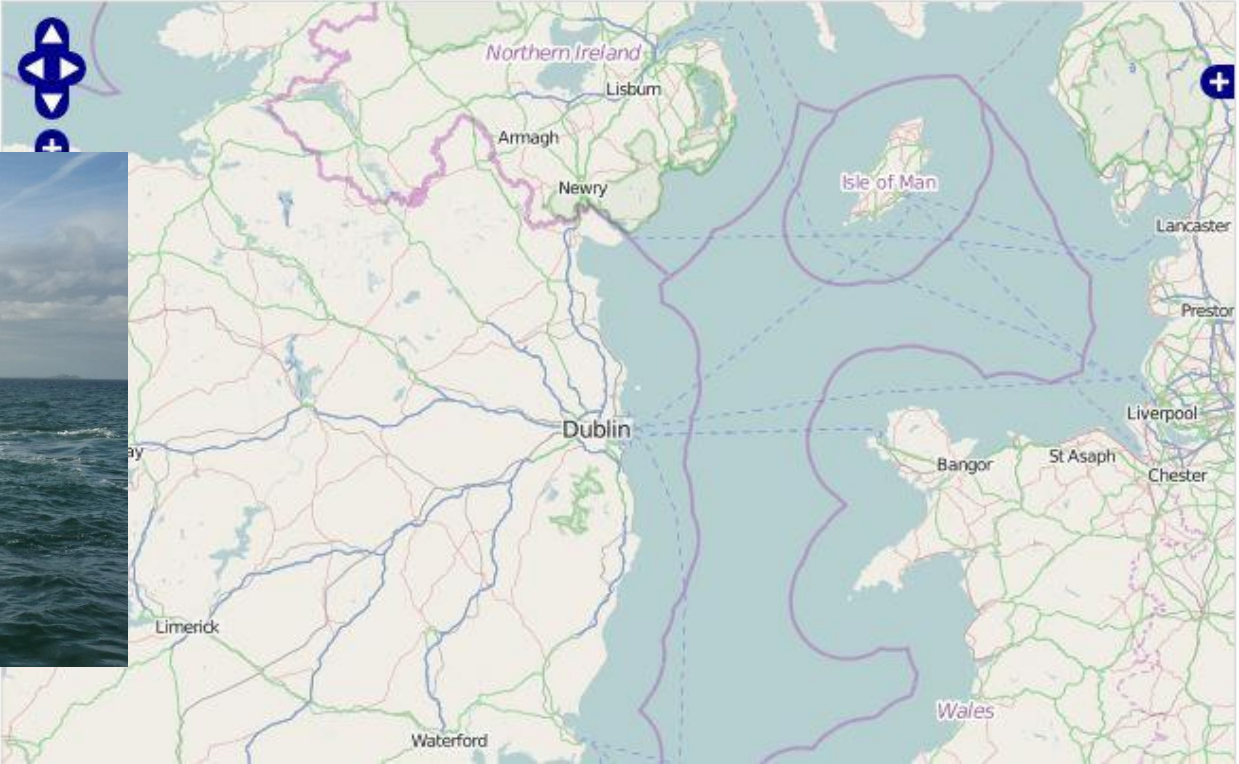
Turbidity	YSI	0 .. 1000 NTU	0.1 NTU	+/-2% or 0.3 NTU	0.5 Hz	2-3 times per year	2 .. 7 m
Algae chl-a	YSI	0 .. 400 µg/l	0.1 µg/l	-	0.5 Hz	2-3 times per year	2 .. 7 m
Algae Cyanobacterial	YSI	0 .. 280 000 cells /ml	1 cell/ml	-	0.5 Hz	2-3 times per year	2 .. 7 m
Water level	Aanderaa	0 .. 30 m	<0.0001%	+/-0.02%	2 Hz 4 Hz	factory calibration when needed	2 .. 7 m
Wave height	Aanderaa	0 .. 30 m	<0.0001%	+/-0.02%	2 Hz 4 Hz	factory calibration when needed	2 .. 7 m
Current speed	Aanderaa	0 .. 300 cm/s	0.1%	1% or +/-0.15 cm/s	2 Hz	factory calibration when needed	2 .. 7 m
Current magnitude	Aanderaa	0 .. 360°	+/-0.35°	+/-5°	2 Hz	factory calibration when needed	2 .. 7 m

**MeriTaito** **SeaHow**[®]
SeaDatics

English | Hello seppo.virtanen@meritaito.fi | Log off

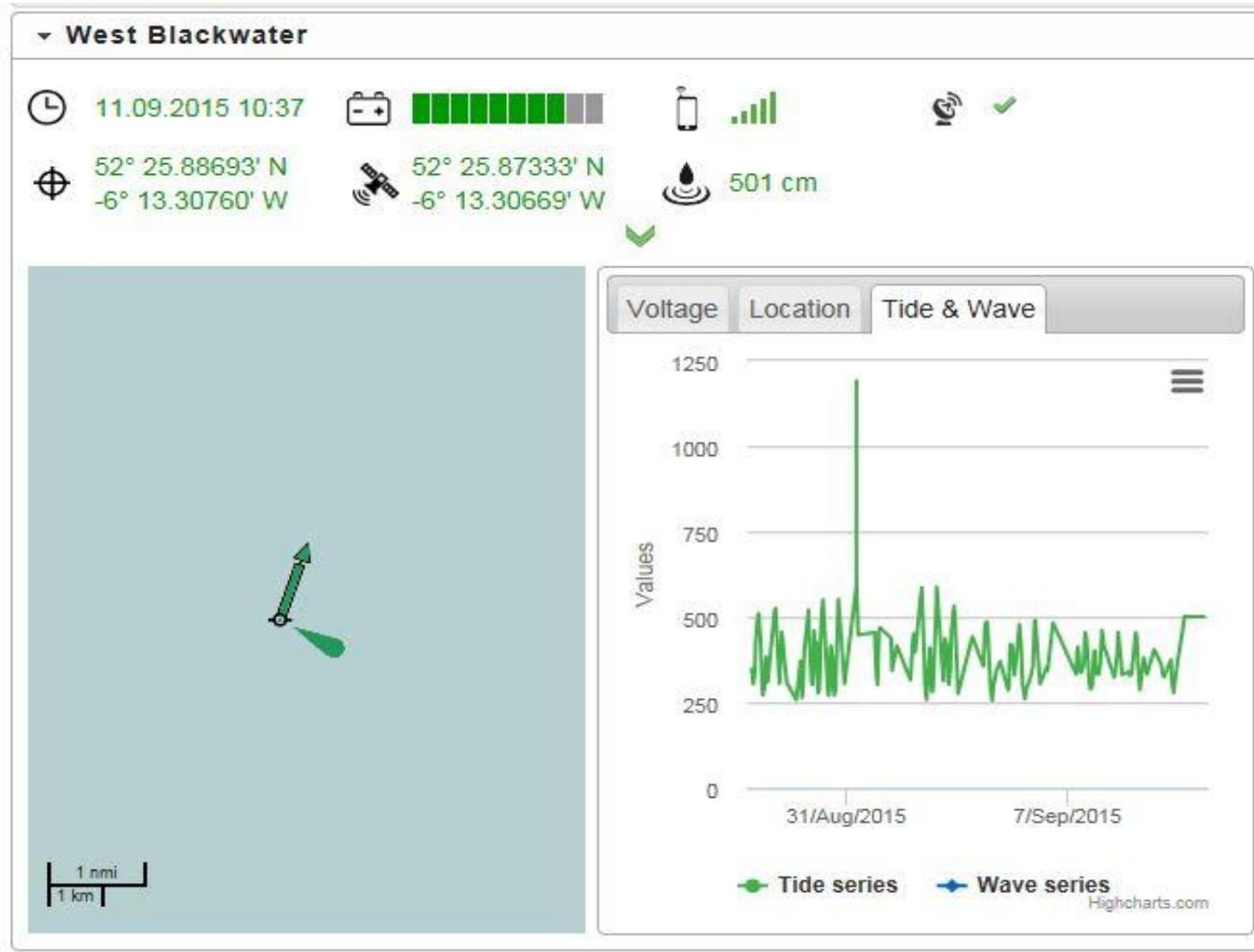
 **Global map**  AtoN units  Alarms  Reports  Settings  User profile

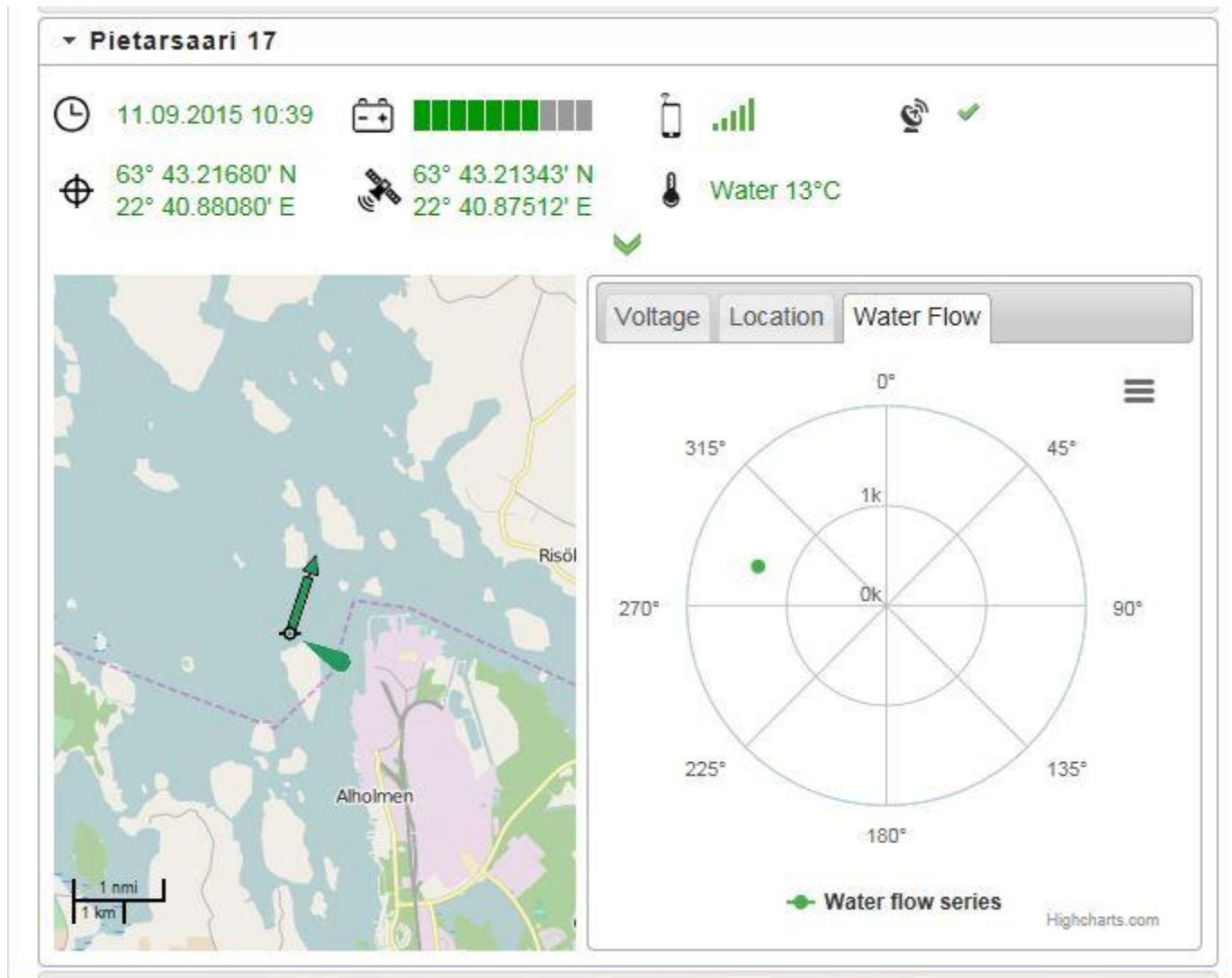
Map areas
Vaasa
Pietarsaari
Dublin

Map



West Blackwater
Bennet Bank





Leading Finnish experts

- *Finnish Transport Agency*
- *Finnish Meteorological Institute*
- *Finnish Environmental Institute*
- *Border Guard*
- *Ministry of Transport*



Need for real-time oceanographic data ?



Number of Answers:

Ship Masters 56

Pilots 31

VTS-operators 14

Ports 8

Ship Owners 8

Total 121

Important & extreme important

	<i>Wave height</i>	<i>Water level</i>	<i>Current</i>
<i>Ship Masters</i>	92 %	80 %	58 %
<i>Pilots</i>	82 %	100 %	44 %
<i>VTS-operators</i>	92 %	100 %	64 %
<i>Ports</i>	15 %	100 %	40 %
<i>Ship Owners</i>	62 %	100 %	50 %

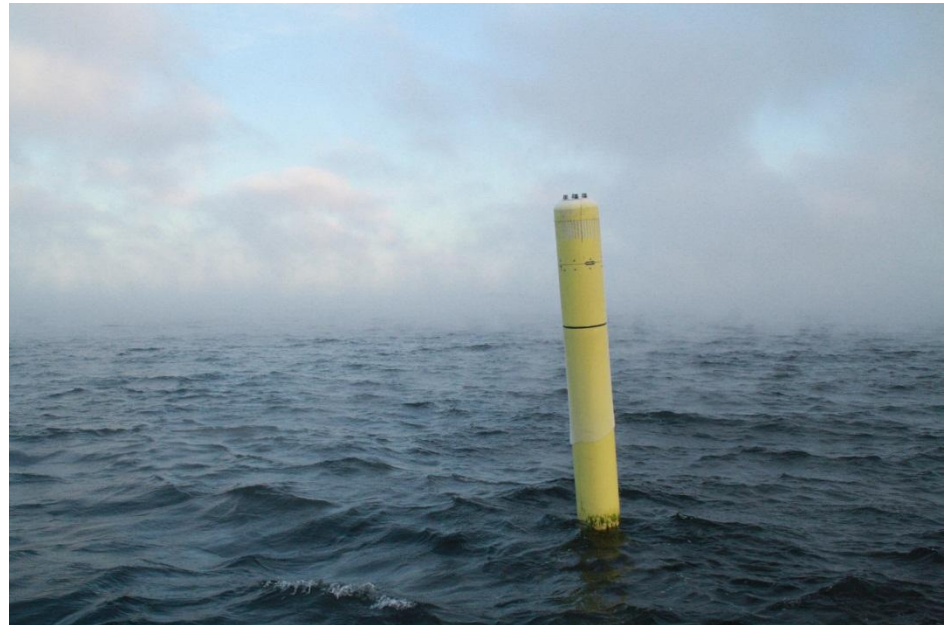
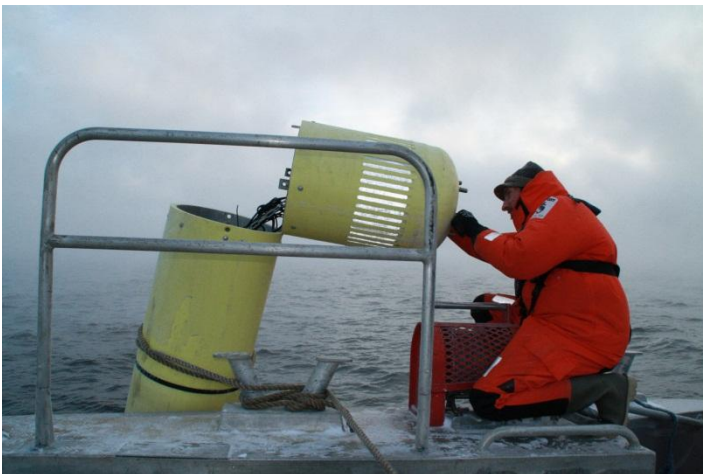
Top three locations for Smart Buoys

- *Along entrance fairways*
- *Pilot boarding positions*
- *Open sea*

Smart Buoy *Prestressed Ice Buoy SMB 500-10*



*Focal height 4 meters
Submerged section 6 meters
Sensors: wave & water level & temperature
Top section opens for maintenance*



Smart Buoy *Prestressed Ice Buoy SMC 800-13*

Focal height 5 meters

Submerged section 8 meters

Sensors: current & wave & water level & temperature



Thank You

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