











## Presented by Mr. Stig B. Øen:

1.Hydro meteorological system used in ports, examples2.Pollution monitoring of hazardous wrecks, examples















# ViVa system

- Developed and maintained by the Swedish Maritime Administration
- <u>http://sjofartsverket.se/sv/Snabblankar/Kartviewers/ViVa</u>
- About 100 real time stations
- Centralized data collection
- Open access on the internet and as free cellphone app
  Data on AIS available on ships electronic chart (message
  8). ViVa uses virtual AIS, no beacons are installed at the sites

# Real-time data versus modeled



2016-04-22 18:27

Models & forecast can not replace real measurements

Different winds for the region on April 22, 2016.



2016-04-22 18:27





#### Cable connection to land station

#### SeaGuardll sensor hub

- Current in different layers
- Significant wave height
- Water level
- Salinity, Density & Temp
   Option: Oxygen, Oil, Turbidity, etc.

# 24h forecasting for Gothenburg archipelago



02-05-2016 20:00:00

http://gothenburg.waterforecast.com/animation

## Latest installation in ViVa was in Helsingborg Harbor (Sweden)



#### Why?

- Strong (+3 knt) & rapidly shifting currents
- More efficient handling of ships
- Expanded port activities
- More cruise ship arrivals





# Systems

## Two Pier Mounted Side Looking SL 500:

 Currents 2 m below surface in port entrance about 40 m from pier



Water LevelWater Temperature



### One buoy system with:

- Single point Doppler Current Sensor, side looking, about 1 m below surface
- Doppler Current Profiling Sensor gives currents at 7 levels down to 18 m
- Water Temperature
- SmartGuard logger, expandable with more sensors







## Systems SL500

6 m long retractable (wheels) mounting "ladder" built by harbour workshop. Installed by divers. Cables on land protected with metal tubes











Cabinet with cell phone modem and power supply





## Systems Buoy



# Xylem has delivered many turn-key harbor systems globally



https://www.youtube.com/watch?v=o-8oAYJhK0A









### Turbidity 3612A



<u>Comments</u>: Short Turbidity peaks related to bottom trawling in the area. Not all trawling vessels are caught on AIS. Signal strength - Column1



Time range: 2015.03.21 - 17:41 to 2015.04.13 - 02:41

<u>Comments</u>: Signal strength (acoustic reflections) gradual increase, could be related to spring bloom arrival to the sea floor. Longer periods of higher in signal strength often reflected also in turbidity.



150

180

210

Uddevalla Kungalv As, Cat 2 Cat 3: Significant Skagen As, Cat 1 Cat 4: Large Cat 5: Very Large As, Cat 5 Goteborg



- Aanderaa have offered turn key hydro-meteorological solutions for ports and harbors globally
- Side Looking instruments suitable for pier mounting
- New buoys combine single point and profiling Doppler current sensors to cover the entire water column
- Multiparameter instruments like SeaGuard and SeaGuard II are suitable for leak detection and pollution spreading studies from wrecks.



## Ideal solutions for non-ideal environments

# Thank you

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