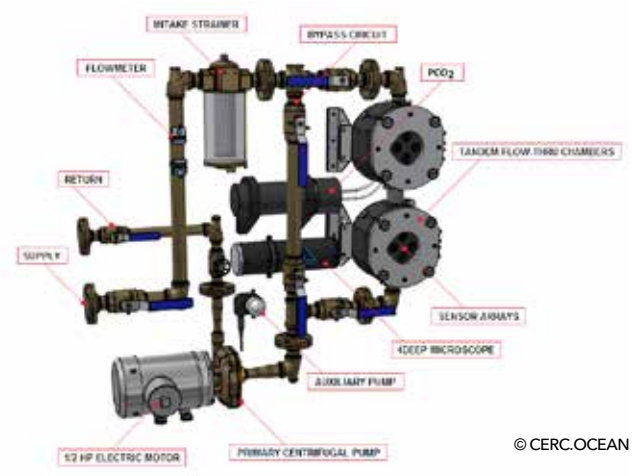
Surface Water Measurements from Mobile Platforms

The past decade has seen a steady increase in the use of ships of opportunity and roaming vehicles to conduct surface water measurements. The vehicles are equipped with versatile systems that can be integrated to collect a large amount of data. Aanderaa makes accurate, compact, stable, low power sensors, and flexible controllers/loggers that integrate sensors from other manufacturers. This application note provides examples of how such systems are used to collect and deliver environmental surface water information.

The CERC.OCEAN group at Dalhousie University focuses on performing measurements for better understanding of ocean processes in the NW Atlantic. To expand the surface water monitoring capabilities for their research projects, a pumped flow-through system was installed on the supply-vessel Atlantic Condor, in collaboration with Pro-Oceanus Systems Inc. and 4Deep (Canada). Some of the distinct features of this system are:

- *Coupled SooGuard chambers with Oxygen, Pressure, Temperature, Salinity, and Chlorophyll-a sensors (Fig.1). One of the chambers was designed to host a gas permeable membrane to measure pCO2 with an accurate and reliable CO2-PRO CV sensor*
- *Direct seawater intake which prevents smearing of the signal*
- *DNV certified and 5-bar rated. The system can easily be duplicated and meet compliance requirements of the similar vessels.*
- *Autonomous and unobstrusive; measures and regulates the flow, detects leaks and shuts down if there are significant problems; full access remotely via cell phone and/or Iridium*
- *Pipe material in Cu/Ni (Copper-Nickel) alloy for antifouling*



Design of the flow-through system onboard the Atlantic Condor.

Coupled SooGuard flow-through chambers. In the top chamber, open, the membrane of the modified CO2-Pro CV is seen with Aanderaa sensors mounted on the lid.

Fig. 2: Sensors to measure oxygen, salinity, temp, pH and pCO2 were installed on a stainless steel pole that was attached in the bow of S/Y Hrimfare. Data from the sensors and the position from the boats GPS were logged every 20sec by a SmartGuard sensor hub. The entire installation took about 2 hours.

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Fig. 3: SailBuoy with Aanderaa antifouling protected sensor package placed in the keel bulb

The sensors used in the flow-through system described above are standard off the shelf oceanographic sensors that serve in a wide range of applications. These sensors have often been used for targeted monitoring like on the Hrimfare sail yacht in the EU-Sheba project (Fig. 2) where the effects of shipping in the Baltic sea were studied.

Another type of vehicle used for water monitoring are the SailBuoys (Fig. 3). They are 100 % wind propelled, compact, economical platforms that are designed for autonomous offshore operation. They have served in a wide range of missions from the Arctic to the Gulf of Mexico. Sailbuoy platforms offer many advantages. They are easy to operate and navigate, easy to deploy and recover (the weight is 60 kg), and almost indestructible by big ships.

An expandable sensors package with inbuilt antifouling, GPS positioning, logging and real-time transmission was developed for Sailbuoys and other autonomous vehicles. In an Arctic project the vehicles sailed along the ice edge to do targeted studies of the carbonate system. They measured temperature, salinity, pH, pCO_2 and O_2 in the water and air. The figure below gives an overview of the components that have served for mobile platforms including two different loggers, different sensors, positioning devices, modems for data transmissions/ communication and real-time software.

Real-Time: Iridium, 3G/2G, AIS

Met Sensors

Position: GPS, Compass

Antifouling: UV, Cu/Ni pipes

Aanderaa Sensors

Other integrated UW sensors:
Chla, CDOM, Oil, pCO_2, pH, BGAlg, Turb

Controllers: SeaGuardII, SmartGuard

Software: Real-Time Collector, GeoView

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