

DATA PROCESSING, STORING AND PUBLISHING FOR THE AUTONOMOUS MOORED PROFILER AQUALOG

Vladimir Solovyev, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia),
sol@ocean.ru

Tamara Shiganova, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia),
shiganov@ocean.ru

Alexander Ostrovskii, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia),
osasha@ocean.ru

Andrey Zatsepin, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia)

Dmitry Shvoev, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia)

Andrey Tsybulsky, P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences (Russia)

Aqualog is an observational platform that moves down and up along a mooring line, which is taut vertically between a subsurface flotation and an anchor (Fig. 1).

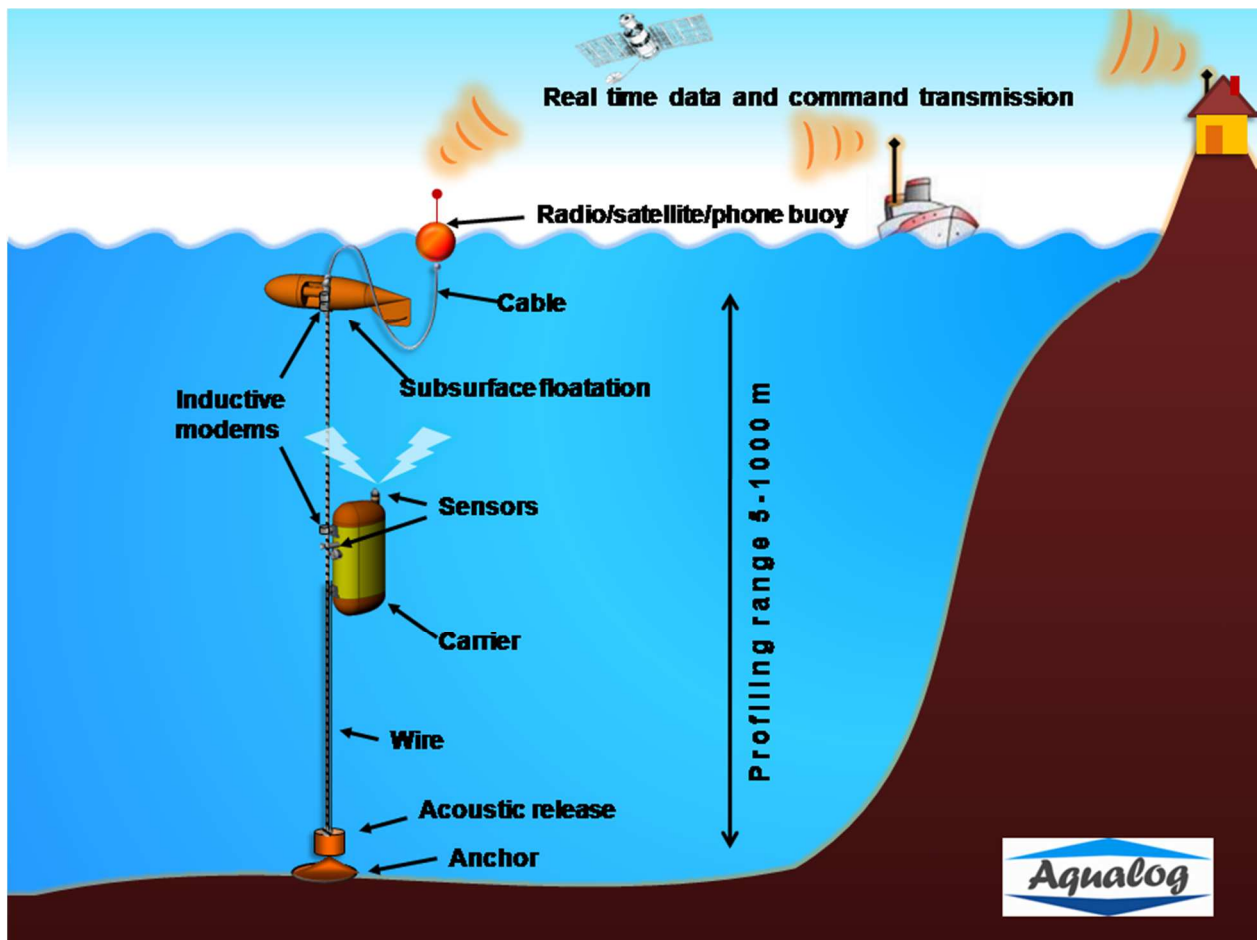


Fig 1. The autonomous moored Aqualog profiler observation platform.

The profile was developed in the Shirshov Institute of Oceanology, RAS.

The Aqualog comprises a carrier with a load of oceanographic instruments. The sensors include but are not limited to Teledyne RDI Citadel CTD-ES probe, Nortek Aquadopp-3D current meter, and AANDERAA fast Oxygen Optode4330F. The acoustic Doppler current meter is a horizontal beam single-frequency 2-MHz instrument remotely sensing the water volume in the range of about 0.35–1.85 m from the profiler with a sampling frequency of 23 Hz. When the carrier is moving with the speed of 0.25 m/s, the vertical

profiles are measured with a vertical resolution of 0.1 m for pressure, conductivity, and temperature; 0.2 m for acoustic backscatter signal and horizontal current speed; and 1 m for dissolved oxygen.

Besides the cost optimization, the tethered multisensory profiler has other advantages. Unlike conventional mooring where the equipment is placed on fixed depths, Aqualog conducts continuous measurements of vertical profiles applicable for assessing both integral and differential characteristics of the ocean fine structure. By combining pressure, conductivity, temperature, and horizontal current velocity data, it is possible to evaluate vertical mixing. The joint analysis of dissolved oxygen data and the strength of the acoustic backscatter signal give a better understanding of the variability of the marine ecosystem vertical structure at multiple time scales.

There are slots in the profiler reserved to expand the set of sensors by installing additional probes such as the AQUAscat (by Aquatec Group Ltd.) for observations of the particulate matter and biota at multiple acoustic frequencies.

Shirshov Institute of Oceanology has three permanent working the Aqualog profilers. One Aqualog works in the Black Sea since 2010 and two profiler in the Baltic Sea since 2012.

The data obtained by Aqualog profilers are described using the SensorML standard was transferred to the data center of the Shirshov Institute of Oceanology. In the data center, quality control was carried out to verify the following: all the data was in the regional parameter range, ascending and descending profile data variance remained within the predefined limits, pressure and density inversions were eliminated, spikes were tested, proper visual QC was obtained, and etc. After QC check the data store in the oceanographic data warehouse OceanDB.

The oceanographic data warehouse OceanDB has been developed in P.P. Shirshov Institute of Oceanology Russian Academy of Sciences.

OceanDB provides the structured storage of diverse oceanographic data on the following scientific sections: physics of ocean, ocean chemistry, marine biology and ecology and geology. CDI indexes and records for Download manager coupling table are automatically processed for data publish in EMODnet and SeaDataCloud system.