A big tour sampling the North Atlantic ocean

In march 2013 an international experiment, the Salinity Processes in the Upper ocean Regional Study (SPURS), was carried out with the goal of performing a wide range of mesoscale and submesoscale measurements to understand the mechanisms of formation and permanence of the largest ocean salinity maximum in the centre of the North Atlantic subtropical gyre. Several standard and prototype instruments were used in measuring the Sea Surface Salinity (SSS) and other ocean variables. Among many activities developed during the SPURS-MIDAS cruise, the ICM contribution to SPURS, a set of new Lagrangian drifters to measure the SST and SSS were deployed. These were part of a total set of 114 similar drifters deployed during the whole experiment (Centurioni et al, 2015). Now almost three years later, three of these units are still providing data after performing a big tour around the North Atlantic.

Since 2007, DOFT-ICM engineers (Agustí Julià, Pere Fernández and Joaquin Salvador) in collaboration with the BEC team started to develop an ICM-SVPS buoy to measure temperature and salinity at 60 cm from the sea surface (fig. 1). Such drifter was specifically designed to fill the gap between the skin depth sampled by remote sensing (1 cm penetration depth) and the uppermost reliable measures from Argo profiles (between 5 and 10 m below the surface), necessary for cal/val activities of the SMOS and AQUARIUS missions. The body of the ICM-SVPS buoy consists on a spherical hull within the WOCE-SVP standard size range containing the batteries and the electronics and an external connector to communicate with additional sensors. The

electronics has a modular structure, with a system of capacitors designed to minimize the energy expenditure. The electronic system is included in a single printed circuit board with an 8-bit micro controller being able to handle external instruments with RS232 and 24 bits DA converters.

For the SPURS experiment the buoys were attached to a holey-sock drogue centered at 15 m to move with the characteristic ocean surface velocity fields and were deployed in the region of maximum SSS for the North Atlantic Ocean, an area where salinity was expected to be very stable. Measurements, however, have displayed an unexpected high salinity variability due to the advection by strong currents in the southwestern part of the domain and the active eddy field near the centre (Reverdin, et al., 2015).
Salinity sensors from such buoys tend to be affected by the own sensor drift, temporary obstruction of objects and by the action of biofouling on conductivity cells producing biases in salinity values. Besides the difficulties to have reliable long term measurements of salinity with these devices, the SPURS experiment has also served to test the efficiency of the ICM-SVPS design in terms of durability and energy efficiency (figure 3). All the units have performed under operation above 900 days with an averaged lifetime of 980 days (2.6 years) emitting every 90 s and providing SSS measurements hourly.

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