Geophysical Research Abstracts
Vol. 18, EGU2016-17539, 2016
EGU General Assembly 2016

Determination of in situ density and absolute salinity measurements in the Northwestern Mediterranean: NOSS profiling floats observations

Damien Malardé (1), Arnaud David (1), Marc Le Menn (2), Patrice Brault (1), and Serge Le Reste (3)

(1) nke Instrumentation, Hennebont, France (dmalarde@nke.fr), (2) SHOM, Brest, France (marc.lemenn@shom.fr), (3) IFREMER, RDT/I2M, Plouzané, France (serge.le.reste@ifremer.fr)

In recent years, the Thermodynamic Equations of Seawater have been redefined and it has introduced the concept of absolute salinity in the calculation of seawater density. In contrast to practical salinity (depending on conductivity), absolute salinity is expressed in SI units and it includes the influence of the small spatial variations of seawater composition in the global ocean. The traceability of its measurement to the SI has become crucial and the development of absolute salinity measurement methods and tools are essential.
An in situ salinity-density sensor (called NOSS) based on refractive index measurement of the seawater has previously been characterized and qualified. Laboratory performances are compliant with the target in terms of measurements uncertainties. Two Argo profiling floats were equipped with NOSS sensors, in addition to the usual temperature, pressure and conductivity sensors fitting out these floats. They were deployed in the northwestern Mediterranean during spring 2015 in order to complete the evaluation of the NOSS sensor in real conditions. Time series of temperature, conductivity, pressure and refractive index were recorded, and absolute salinity and in situ density were calculated, at a high vertical resolution of about 2 m in the 0 - 2000 m layer. These data were analyzed to characterize the mixed layer depth and evaluate the potential anomalies of composition in the area. A specific calibration of the NOSS sensor was developed using Millard – Seaver relations, which accounted for the pressure and the temperature influence. A post calibration check at the end of the mission was performed to determine if the sensor signal drifted from the previous calibration because of the growth of biofouling on optical windows. Seawater samples from multi-bottle sampling array were extracted to evaluate biogeochemical and physicochemical measurements at float locations at the beginning of deployment and during the recovery of floats. Floats data were thus compared with reference density and salinity data observations.
In this study, the NOSS sensor is presented as one of the first underwater sensors for in situ refractive index measurement in the past years, opening up the scope of possibilities of direct access to density parameter. The NOSS floats will contribute to improve the knowledge of in situ density and absolute salinity of seawater across TEOS-10 by exploiting the potentiality of the coupled NOSS sensor and CTD observations.