SOUTH ADRIATIC GLIDER MEASUREMENT DURING NOVEMBER 2015

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Abstract
A glider operated in the South Adriatic Pit (SAP) in November 2015, revealed a salinity structure along the water column with two maximum: a subsurface layer with salinity larger than 38.9 and a deeper one between 400 and 600 m with salinity around 38.8. The origin of the salinity double maxima, not seen in previous years, seems to be due to the deepening of the Levantine Intermediate Water (LIW) in the last 3 years and to an intrusion of saltier water mass in a shallower layer whose origin might be found in the Eastern Ionian Sea area.

Keywords: Salinity, Adriatic Sea

Introduction
The SAP is influenced by the general Adriatic circulation carrying water masses with different characteristics: the modified LIW is the saltiest water entering from the South through the Otranto Strait; the Western Adriatic Current (WAC) brings less salty waters originated from the Po River in the North-East [1]. The SAP is also affected by both coastal and open sea winter convection processes. The coastal convection in the North Adriatic Sea produces the Northern Adriatic Dense Water (NAdDW) that sinks to the bottom flowing to the South along the Italian shelf break [2]. The open water convection can annually vary significantly [3]. In some years the vertical mixing affects only the shallowest surface layers, in others, the mixing can be much deeper reaching 800 m. In the last 3-4 years, floats and gliders have been deployed in the South Adriatic Sea to better study the physical and biogeochemical characteristics and their changes and evolution. We hereby focus on the November 2015 measurements which happen to show interesting and novel structures.

Material and Methods
Gliders are autonomous underwater vehicles with no propulsion; their motion is due to buoyancy change. They follow an up-and-down, sawtooth-like profile through the water from the surface to a maximum depth of about 1000 m, collecting data at a selected frequency. The 2-way Iridium satellite communication allows sending new commands to the gliders and receiving the collected data each time they are at surface. Gliders can reach a forward horizontal velocity of about 30 km/day and they have autonomy of up to four months. The glider used for this work is a Teledyne deep Slocum glider equipped with a Sea-Bird pumped CTD, an AAnderaa Optode 4831 oxygen sensor, a WetLab ECO Triplet FLBBCD-SLK. The glider route followed the Bari-Dubrovnik transect (and back) recording data during downcast and upcast reaching a maximum depth of 950 m. The full dataset were edited in order to eliminate outliers. Oxygen concentration must be interpreted with caution due to possible problems with sensor calibration. Ancillary temperature and salinity data were provided by 3 Argo floats in the South Adriatic and other floats in the Ionian.

Results
The glider operated in the SAP in November 2015, sampled a typical late fall stratified condition with maximal temperature of 17 ºC at the surface and a minimum of about 13 ºC at depth. The salinity structure along the water column exhibits two maxima: a subsurface layer with salinity larger than 38.9 and a deeper layer between 400 and 600 m with salinity around 38.8 (Fig. 1). The oxygen concentration maximum layer is located on top of the salinity maximum layer (Fig. 1). The temporal evolution of the salinity captured by floats, deployed in the SAP in 2013 and lasting for over 3 years shows the evolution the deepest maximum salinity layer. At the end of summer 2013, the salinity maximum of about 38.9 was around 250 m, in the 2014 a deepening of the core was detected at around 300 m and in 2015 the core moved to 500 m with a slightly lower salinity. In fall 2015 a layer of higher salinity values (over 38.9) was measured at about 100 m. The glider missions conducted in the SAP in late spring 2013, spring 2014 and 2015 give coherent snapshots of the salinity structure and confirm its evolution.

Conclusions
The double layer of salinity maximum observed in November 2015 in the SAP seems to be due to the deepening of the LIW in the last 3 years and to an intrusion of saltier water mass in a shallow layer whose origin might be found in the Eastern Ionian Sea area.

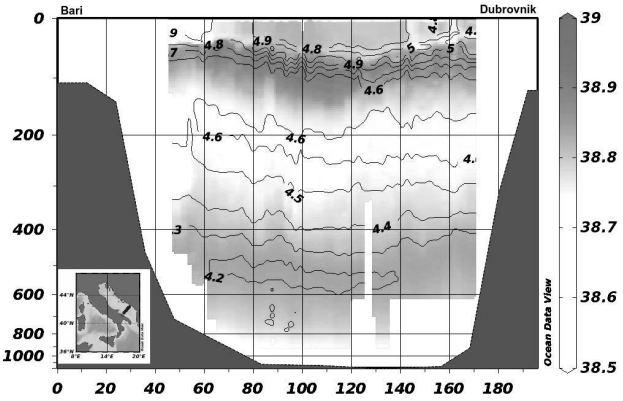

Fig. 1. Colour coded salinity distribution along the Bari-Dubrovnik glider track on top. In the left, oxygen concentration (ml/l) contours are overlaid on top. On the left bottom corner the map of the investigated area with the glider transect.

References
1 - Poulain, P.-M. (2001), Adriatic Sea surface circulation as derived from drifter data between 1990 and 1999. Journal of Marine Systems, 29, 3-32.
2 - Bignami, F., E. Salusti and S. Schiarini (1990), Observation on a bottom vein of dense water in the Southern Adriatic and Ionian Seas. J Geophys Res 95(C5), 7249–7259.
3 - Ovchinnikov IM, Zats VI, Krivosheya VG, and Udodov AL. 1985. A forming of deep eastern Mediterranean water in the Adriatic Sea. Okeanologyja **25**(6): 911–917.