



Highly saline surface waters observed in the Adriatic during 2017

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Record-breaking surface salinities were observed in the south and middle Adriatic during summer and autumn 2017, with values surpassing 39.15 at station offshore Dubrovnik in October 2017 and reaching 39.25 at ARGO float 6901822 in the south Adriatic in late summer and early autumn. The formation of highly saline Adriatic surface waters started in early June 2017, probably due to high evaporation rates within the South Adriatic Pit and continued throughout the summer. Surface waters from the south Adriatic spread towards the middle Adriatic, where surface salinities higher than 39.0 were detected in the central part of the Palagruža Sill transect in the second half of July 2017. The highly saline layer was restricted to the first 10-15 m of the water column, deepening toward the end of summer and autumn. Simultaneously, similar evaporation processes and even stronger formation of highly saline surface waters were occurring in the north Ionian Sea. These waters entered the Adriatic in late summer, accumulating salt in the surface layer, with sharp halocline observed at depths around 30-35 m.

We hypothesize that several processes occurred in the Adriatic-Ionian system resulting in this uncommon formation of highly saline waters: (1) the inflow of saline and relatively warm Levantine Intermediate Water in subsurface layer in the second half of 2016; (2) strong vertical mixing during December 2016 and January 2017 in the north Ionian and south Adriatic and dense water formation in the north Adriatic in January 2017; (3) enhanced inflow of highly saline north Ionian surface waters in spring 2017, compensating the outflow of the Adriatic Deep Water; (4) extremely dry conditions, with low river discharges in the Adriatic and north Ionian area during 2017, accompanied with extremely warm summer that generated a sharp thermocline and enhanced evaporation, which was restricted to the near-surface quasi-isolated saline layer; (5) small-scale cyclonic circulation in the north-eastern Ionian, close to the north-western Greek coast, which intensified stratification and evaporation effect there during the summer.