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## Some features of the early and late phase of the deep water formation in the Adriatic Sea\*

*Mira Zore-Armanda<sup>+</sup>, Miroslav Gačić<sup>+</sup>, Ante Smirčić<sup>++</sup>, and Zoran Vučak<sup>++</sup>*

*<sup>+</sup>Institute of Oceanography and Fisheries, Split, Yugoslavia*

*<sup>++</sup>Hydrographic Institute of the Yugoslav Navy, Split, Yugoslavia*

With respect to topographic characteristics Adriatic Sea can be divided into three distinct regions: North, Middle and South Adriatic. Each of these areas are sites of deep water formation. Deep water formation processes take place during the cold part of the year. Favourable conditions are present during the cold air outbreaks connected with the bora wind.

North Adriatic is the shallowest part (maximum depth 70 m) and it is the area of the formation of the densest Adriatic water. High density is mostly due to the low winter temperature of the area. It was observed that the important sinking and mixing of water take place in the North Adriatic frontal zone whose position depends on the bora wind frequency. The densest North Adriatic water spreads southward by advection in the bottom layer and replenishes the Jabuka Pit. This water only occasionally spreads over the Palagruža Sill into the South Adriatic Pit.

Another important area for the formation of deep water is the South Adriatic Pit. This water is formed in the center of the South Adriatic cyclonic gyre and it spreads into the Eastern Mediterranean.

In the early phase of the dense water formation process when the stratification is still present, the dense water does not reach the bottom but is advected in the layer below the thermocline by the mean current. The seasonal cooling starts in the coastal area of the Adriatic where the salinity is generally lower than at the open sea and consequently the presence of this water below the thermocline can be observed from the secondary subsurface salinity minimum.

The subsurface salinity minimum was observed in the Middle Adriatic from the POEM data collected in October 1985. The thickness of the layer was about 10 m and salinity was about 38.3 while the sea water on both sides of that layer had salinity of about 38.6. The subsurface salinity minimum was explained in terms of the surface cooling caused by the bora wind in the period prior to the cruise. It was shown from the wind data for the period of about ten days before the cruise that the bora was the prevalent wind. This salinity minimum is a short-lived phenomenon and can be detected only

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in situations after the bora events when the stratification is still present. Under homogeneous conditions this salinity minimum is destroyed by vertical mixing.

Consequently this phenomenon is also present during the spring when the stratification develops and the bora forcing is still strong. The subsurface salinity minimum is documented also from the salinity data for April/May 1975 in the area of North and Middle Adriatic which is also discussed with respect to meteorological conditions. The salinity minimum was observed also in the Otranto at the end of February 1972 where colder and fresher water of the South Adriatic origin sank while it met the Ionian Sea water. The Ionian water was more saline but warmer and advected in the surface layer northward. This subsurface salinity minimum has no connection with the Atlantic water as suggested by I. M. Ovchinikov and his collaborators in a recent paper.