

Field studies of subduction phenomenon in the Black Sea

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Until recently, it was considered that cold intermediate waters of the Black Sea are formed due to winter convection on the shallow northeast and northwest shelves of the basin. Field Studies during early 80-th provided evidence for the fact that cold waters are formed also over the domes of cyclonic gyres in the central part of the basin (OVCHINIKOV & POPOV, 1984; LATUN & YASTREB, 1986).

In 1991-92, several cruises were conducted in the northern part of the Black Sea in order to study the process of CIW formation and of their further transformation. In March, there were three regions, sources of CIW that could be distinguished due to the properties of the cold layer. At the N-W, water temperatures were about $5.5 \times C$ and E was less than 14.0 due to low salinities. Waters with minimum temperatures (about $5.0 \times C$), starting from Kerch strait, formed a thin stripe along the coast of the Crimea.

Over the domes of cyclonic gyres, minimum temperatures were about $6.1-6.3 \times C$ (lower temperatures were observed in the east). Density of these waters reached 14.6 E units due to high salinities. Thus, the final CIL is formed by waters with different properties due to subduction.

Waters were well ventilated down to 14.5 E interface in cyclonic gyres and on the left side of the Rim current. In anticyclonic feature, west off the Crimea, newly generated waters reached only 14.3 E interface. In this pattern, the traces of the former CIL were observed within the main pycnocline. Temperatures of this former CIW were about $7.5-7.6 \times C$ and dissolved oxygen concentrations reached 5.0 m/l . Comparing these results with autumn data, we obtain an estimate of CIW transformation and the rate of downwelling (the rate of subduction) in the observed anticyclonic pattern (about 10 m per month).