INVESTIGATION OF EASTERN MEDITERRANEAN TRANSIENT INFLUENCE IN THE IZMIR BAY

Canan Öztürk Eronat * and Erdem Sayin
Dokuz Eylül University, Institute of Marine Sciences and Technology Bakü Blv. No:100 İnciraltı/İzmir, Turkey - canan.ozturk@deu.edu.tr

Abstract
Recent changes in water mass characteristics of the Aegean Sea have considerably influenced the Eastern Mediterranean thermohaline circulation since 1990 and vice versa. A combination of salinity increase and temperature drop in the Aegean Sea has caused massive dense water formation, and a strong outflow towards the deep and bottom parts of the Eastern Mediterranean. In order to balance the dense water outflow, LSW (Levantine Surface Water) and LIW (Levantine Intermediate Water) enter into the Aegean Sea. The eastern coast of the Aegean Sea was mostly influenced by these newly entering warm water masses. The purpose of this study is to examine the warm and highly saline Levantine waters LWs (LSW and LIW) in the vicinity of the Izmir Bay, where LWs were observed especially in winter and spring.
Keywords : Circulation, Hydrology, Aegean Sea.

İzmir Bay is conventionally divided into three areas according to their physical characteristics: Outer, Middle and Inner Bays. The depth in the Outer Bay is about 70 m. It decreases significantly towards the Inner Bay to about 10 m depth. The northerly wind that blows for most of the year is a constant feature of the Izmir Bay area.

The Mediterranean circulation has shown changes due to climate changes in recent years. Therefore, it is studied in two periods, as before and after 1990. During the latter phase, Aegean Sea has become the source of a new type of Eastern Mediterranean Deep Water (EMDW) [1, 2, 3 and others]. Levantine Surface Water (LSW) occasionally entering into the Aegean Sea before 90's could be a main triggering mechanism for Eastern Mediterranean Transient (EMT). Increasing salt content results in rising density levels and therefore outflow of Aegean Sea Water through the straits at both sides of Crete over the sills. The resulting outflow from the deep layers is fed back again, and causes an intensification of the inflowing waters of Levantine origin (LSW and LIW). These water masses influence the Outer Bay water in the vicinity of Izmir Bay. Therefore the purpose of this study is to examine how the LWs change the water properties of the İzmir Bay. For this purpose, data sets from 16 cruises and hourly wind data between 1994 and 2005 are examined. A numerical model (Killworth's Ocean Model) is used to calculate the general circulation patterns.

In the bay, three distinct water masses exist: ASW (Aegean Sea Water), IBW (Izmir Bay Water) and IBIW (Izmir Bay Inner Water). They affect the thermohaline structure of the bay [4]. ASW is influenced especially in winter and spring by LWs. After EMT LWs enter into the Aegean through the Rhodes and Karpathos straits towards the north. Northward-flowing Levantine surface current, carrying warm, highly saline LWs, influences the coastal area along the western Turkish coast. LW masses can be observed mainly in winter and spring in the vicinity of Izmir Bay with a temperature of 16.3-16.5^{o}C and salinity 38.8-38.95 (Figure 1). In summer, the water mass that influences the Izmir Bay environment is the dense and cold upwelling water formed along the eastern coastal area of the Aegean Sea. This water mass is about 2^{o}C colder (about 19^{o}C) than the water mass observed near the western Aegean Sea coastal area [5]. The origin of the upwelling water is the area near Cape Baba and Edremit Bay. The northerly Etesians influence the waters off-shore of Cape Baba, causing upwelling. Southeasterly winds, which are prevalent through the year in the vicinity of Edremit Bay, force water masses to flow outwards through Müsellim strait, and these two effects cause a surface current to flow from Cape Baba towards the central Aegean Sea. This saline and cold water, especially formed in summer, has a salinity of 39.0 and temperature less than 19^{o}C. The upwelled water flows southwards influencing a big area from the west side of the Lesvos Island up to the Chios Basin, forming two cyclonic eddies. One eddy is formed in the western coastal area of Lesvos Island and the second one evolves in the Chios Basin off the western off-shore side of Chios Island.

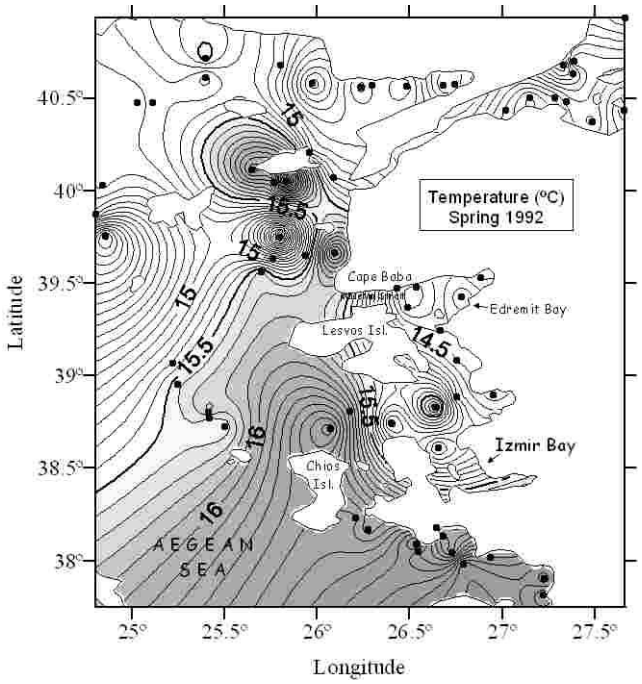

Fig. 1. Surface temperature contours in Spring 1992

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