CHANGING OF THE DENSITY LEVELS OF IZMIR BAY, EASTERN AEGEAN SEA

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Abstract

The temporal variability of the density is studied by analyzing last decadal CTD data of the Izmir bay, Eastern Aegean Sea. The data show the period of rising isopycnals due to cooling in 2007, 2008 and 2012 as seen in literature about Aegean Sea. As a result, the Izmir Outer Bay area where Aegean origin surface water enters the bay, show similar interanual variability with Aegean Sea according to the water characteristics.

Keywords: Aegean Sea, Izmir Bay, Time series, Density

Izmir Bay, which is situated at the eastern part of the Central Aegean Sea, exchange water with Aegean Sea in the northern part of the bay (Figure 1). It is an "L" shaped geometry with the leg of the "L" about 20 km wide and 40 km long, It is divided into three areas according to their physical characteristics: Outer, Middle and Inner Bays. More than 50 hydrographic cruises have been conducted in the bay for last 30 years. The air sea interactions are more effective over the Izmir Bay area because of the shallowness (max. 70 m). Especially the local wind force is the main mechanism influencing the water characteristics of the bay.

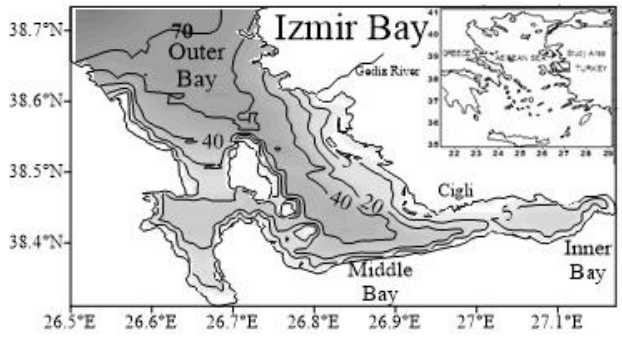

Fig. 1. The location and bathymetry of the Izmir bay.

In the Izmir Bay area, rising of the isopycnals could be resolved with the data collected during many cruises in the Outer Bay area. In this study after anlysis data, covering last 10 years, the increasing densities can be traced from the isopycnal level σ_θ = 29 kg/m^3 easily in the Izmir Outer Bay (Figure 2). This level reached up to surface in 2007, 2008, 2009 and 2012. These periods can be characterized by cooling events which are shown in Figure 2 for the same years.

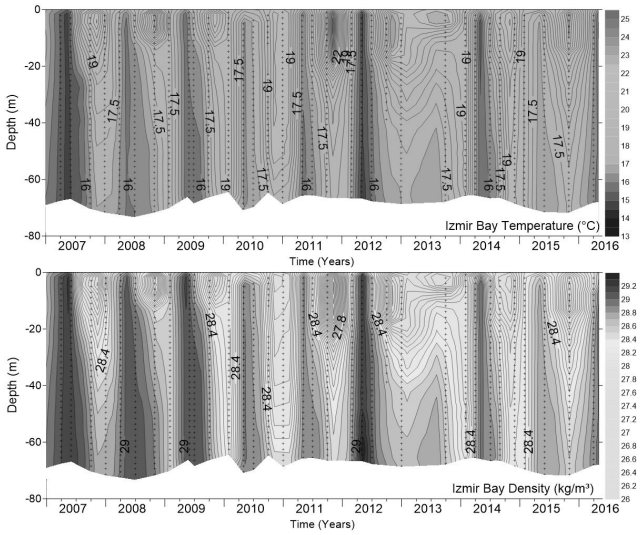

Fig. 2. Temporal evaluations of temperature and density fields of Izmir Bay Area

Eronat and Sayin, 2014 [1], emphasize that 2007 is the first time after 1993 (EMT Period) there have been a new severe deep–water producing episodes in the Aegean. Velaoras et al. 2014 [3] find that the dense Cretan Sea outflow occurs during 2007, 2008, and 2009 as called "EMT-like" event. Georgiou et al. (2014) [2] showed that the period of 2006–2012 is characterized by two strong cooling events (2008–2009 and 2012) in the south Aegean Sea and by a significant increase (2010–2011). These information obtained from the Aegean Sea and the present study of Izmir Bay is complementary to each other to explain the density levels in the last decade.

References

1 - Eronat, C., Sayin, E. (2014) "Temporal evolution of the water characteristics in the bays along the eastern coast of the Aegean Sea: Saros, Izmir, and Gökova bays" Turkish J. Earth Sci., 23, 53-66, 2014.

2 - Georgiou, S., Mantziafou, A., Sofianos, S., Gertman, I., Özsoy, E., Somot, S., & Vervatis, V. (2015). Climate variability and deep water mass characteristics in the Aegean Sea. Atmospheric Research, 152, 146-158.

3 - Velaoras, D., G. Krokos, K. Nittis, and A. Theocharis (2014), Dense intermediate water outflow from the Cretan Sea: A salinity driven, recurrent phenomenon, connected to thermohaline circulation changes, J. Geophys. Res. Oceans, 119, doi:10.1002/2014JC009937.