Geophysical Research Abstracts
Vol. 15, EGU2013-11613, 2013
EGU General Assembly 2013

Spatial and temporal variability of thermohaline properties in the Bay of Koper (northern Adriatic Sea)

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In this study influence of fresh water discharge on the spatial and temporal variability of thermohaline (TH) conditions is explored for the Bay of Koper (Bay). The Bay is subject to different driving agents: wind stress (bora, sirocco), tidal and seiches effect, buoyancy fluxes, general circulation of the Adriatic Sea and discharge of the Rižana and Badaševica rivers. These rivers have torrential characteristics that are hard to forecast in relation to meteorological events (precipitation). Therefore, during episodic events the spatial and temporal variability of TH properties in the Bay is difficult to determine [1].

Measurements of temperature, salinity and turbidity were conducted monthly on 35 sampling points in the period: June 2011 - December 2012. The data were processed and spatial interpolated with an objective analysis method. Furthermore, empirical orthogonal function analysis (EOF) [2] was applied to investigate spatial and temporal TH variations.

Strong horizontal and vertical stratification was observed in the beginning of June 2011 due to high fresh water discharge of the Rižana (31 m^3/s) and Badaševica (2 m^3/s) rivers. The horizontal gradient ($\Delta T = 6°C$) was noticed near the mouth of the Rižana river. Similar pattern was identified for salinity field on the boundary of the front where the gradient was $\Delta S = 20$ PSU. Vertical temperature gradient was $\Delta T = 4°C$ while salinity gradient was $\Delta S = 18$ PSU in the subsurface layer at depth of 3 m.
Spatial analysis of the first principal component (86% of the total variance) shows uniform temperature distribution in the surface layer (1m) during the studied period. Furthermore, temporal variability of temperature shows seasonal variation with a minimum in February and maximum in August. This confirms that episodic events have a negligible effect on spatial and temporal variation of temperature in the subsurface layer.

Further analysis will include application of EOF on the salinity, density and total suspended matter. Additionally, we will investigate the cross correlations between the above mentioned parameters with singular value decomposition method.

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