Seasonal variations of physical parameters and stratification of water cplumn in the southwestern deep water zone of the Caspian Sea

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Abstract

According to the importance of good knowledge and understanding about the southern basin of the Caspian Sea near the Iranian boundaries, monitoring of the oceanographic parameters and characteristic was considered. Seasonal variations of physical parameters and stratification in the western part of the southern coastal waters of the Caspian Sea was studied based on the field measurements. In addition, forming and destructure of thermocline and picnocline, and stability of water column were evaluated. Field investigations were carried out by CTD profiling in the western part of the southern boundary of the Caspian Sea off Anzali port. Measurements were conducted on fixed sampling stations down to a maximum 475 m depth. Data collections in all seasons during the year (in March, April, August, November 2008, June 2014 and February 2015) were performed.

Results showed that the stratification in the water column in the western part of the southern Caspian Sea starts early spring with gradual warming of the air in the region, and then it reached to the strongest situation in the middle of the summer season. Destruction of thermal stratification in water column was occurred during late autumn to winter. The most variations of physical properties of seawater were occurred across the upper 100 m layer. A seasonal thermocline was detected with 30 m thikness between 20 and 50 m depths in summer. Vertical density variation, considering small vertical salinity variations, was highly correlated with vertical temperature variations. Maximum vertical gradient of water temperature was 0.4815 C/m between 28-45 m depths in November and the minimum value was 0.05 C/m from sea surface to 25 m depth in March. For same time and location, the maximum vertical gradient of density was 0.1218 per meter and its minimum was around 0.009 per meter. The vertical salinity gradient with amounts of 0.0138 in August and 0.0215 per meter in November

were observed. The vertical variations of water density was agreed with the variations of temperature in water column, and a strong pycnocline layer was observed at the location of the thermocline layer. The maximum stability was calculated about 1.462×10^{-2} for thermocline layer in April and minimum value was around 4.163×10^{-8} for deep water area in March.

Keywords

Caspian Sea, Seasonal Variations, Physical Parameters, Stratification, Physical Structure, temperature, water column.