

Abstract

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Long Term Variation of Water Exchange Through Gibraltar Strait Based on Sea Level Observations of Ceuta and Gibraltar: Building Information for Modeling Thermohaline Structure in the Mediterranean Basin

This paper study the exchange through the Gibraltar strait, which connecting the Mediterranean Sea and Atlantic Ocean, over a 53 years period. The modeling mainly depends on geodetically corrected sea level different across Gibraltar strait. Water exchange through Gibraltar strait is one of the main factors affecting the difference between Mediterranean Sea and Atlantic Ocean temperature, salinity and sea level. Vertical structure of temperature and salinity of Western and Eastern Mediterranean basins is simulated using the equation solver PROBE and available meteorological and hydrological data for the period 1958 to 2010 during different geodetically corrected scenarios. Direct comparison between modeled and observations of temperature and salinity is used to geodetically correct sea level datum across the strait. Finally, this paper gives an image of Mediterranean thermohaline structure during different scenario of water exchange through Gibraltar strait. Sea level different across the Gibraltar strait is ranging from 1 to 3.5 cm while the different along the strait is about 0.5cm. Submaximal exchange is dominated the exchange through Gibraltar strait. Around 7% of the year the surface flow through Gibraltar strait is reversed to outflow water from Mediterranean to Atlantic. The simple PROBE model is realistically described the Mediterranean Sea large features.