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Investigation on the Caspian Sea Water Level Fluctuation and the Affecting Factors

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Investigation on water level fluctuations of the Caspian Sea, as the largest enclosed water body on the Earth, is an unavoidable necessity for the neighboring countries. This is due to the fact that not only these fluctuations have remarkable effects on the economic, social and climate conditions as well as environment issues, but also it is vital for hydrodynamics studies. For instance it is necessary for defining top level of breakwaters, quays and determining depth of navigation channels and harbor basins. There are various data sources for studies of water level changes including satellite altimetry, hydrological and statistical modeling, geological processes, and field measurements. In this paper water level changes of the Caspian Sea is investigated, using data on precipitation, evaporation, river discharge, wind, atmospheric pressure, and field measurements of the water level. The likely correlations between the factors is demonstrated. Moreover, the spectral analysis for water level records is carried out and the most significant tidal components are introduced. Finally, the energy spectrum of water level, wind and pressure data at Amirabad station is shown and it is concluded that there is peak of energy in the frequency corresponding to 12 hours and 24 hours that indicates the existence of small amplitude tides in the Caspian Sea as well as implying patterns of wind in the coastal regions.