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Numerical Modelling of the Mesoscale Sea Level Variability in the Caspian Sea

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The barotropic 2D-version of the Princeton Ocean Model (POM) was used to study the temporal and spatial properties of the mesoscale sea level variability in the Caspian Sea. Sea surface atmospheric pressure and wind reanalysis data (NCEP/CFSR) for period from 1979 to 2010 were used as the forcing in POM diagnostic numerical model. Numerical simulation of tidal oscillations in the closed Caspian basin was based on the gravitational tidal forcing only. The spatial and magnitude structure of the eigen modes of the Caspian Sea was revealed by the spectral analysis of numerical modeling results. Noticeable decadal variation of characteristics of tidal and eigen oscillations could be explained by significant change of the mean sea level (MSL) of the Caspian Sea in the XXth century. Numerical experiments indicate that the MSL variations from -26 m to -29 m (below zero of the Kronstadt gauge) have significant effect on the frequencies and amplitudes of the eigen modes of the Caspian Sea. In the shallow Northern Caspian gravitational tides and seiches practically don't develop, but the influence of this area is important for formation of eigen modes in the Middle and Southern Caspian. Numerical results were compared with results of analysis of the sea level data from 12 tide gauges in the different areas of the Caspian Sea with time coverage from 5 to 38 years.