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Latest Observations of Thermohaline Structure and Circulation of the Dying Aral Sea

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The results of the latest expedition (summer 2010) of the Shirshov Institute to the Aral Sea are reported. Here we analyze the hydrological structure of the basin and its variability. The recently collected data enabled us to describe the response mechanism of the basin to the wind forcing. Assessment of the on-going changes holds promise to help predicting the subsequent state of the Aral Sea region.

The survey encompassed 23 field days in September, 2010. An interdisciplinary oceanographic study in the western basin of the sea was conducted during the expedition. Vertical profiles of temperature and salinity were obtained using a CTD profiler at 6 stations across the western basin, as well as at 2 additional stations along the basin. Three mooring stations equipped with current meters and pressure gauges were deployed for 5 days in the deepest portion of the western basin. Two mooring stations were installed at the western slope of the basin, while the third one was positioned at the eastern slope of the basin. A portable automatic meteorological station, continuously recording the variability of wind and principal meteorological parameters, was installed near the mooring sites.

The vertical structure of the thermohaline fields exhibited a 3-layered pattern, with local salinity maxima in the upper mixed layer and at the bottom. The intermediate layer was characterized by a core of minimum salinity and temperature. Such a pattern is the result of combined action of two forming mechanisms, known as convective and advective.

Analysis of the current measurements data along with the meteorological data records demonstrated that the mean basin-scale surface circulation of the Large Aral Sea is likely to have remained anticyclonic, whilst the near-bottom circulation appears to be cyclonic. The current velocity and level anomalies responded energetically to winds. Correlation analysis of the velocity series versus the wind stress allowed to quantify the response of the system to the wind forcing.

The sea level decreased by 60 cm since the summer of 2009 and attained the value 26,7 m. a.o.l.