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Ongoing Changes of the Aral Sea's Physical Regime as Observed in Recent Field Campaigns (2002-2006)

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The Central Asia's Aral Sea, once the fourth largest inland water body on Earth, has been subject to severe desiccation since 1960. It is believed that the Sea shrinking has been triggered by unsustainable water diversions for irrigation from the tributary rivers. In consequence, the volume of the lake has decreased by 90% and its salinity increased accordingly by a factor of 10. Nonetheless, the Aral Sea remains a significant (roughly 15,000 km2 in area and 100 km3 in volume), marine-type water body that exhibits unique physical and chemical processes, apart from highly peculiar biological communities. Presently, the Aral Sea is going through rapid changes of its physical regime. The salinity in the western, deep basin of the lake has increased from 82 g/kg in November, 2002, to 109 g/kg in October, 2006. Moreover, the vertical stratification patterns before and after 2004 seem to be qualitatively different. A detailed account of the changes is given in this paper based on observational data obtained in 7 field surveys of the lake over the period 2002 through 2006 (CTD and ADCP profiling, moored current meters and level gauges, meteorological measurements). The data of the most recent survey of October, 2006, are presented for the first time. Furthermore, a hypothesis is put forward explaining the ongoing changes of the vertical structure in connection with an interplay between the 2 mechanisms maintaining vertical stratification of the lake, namely, the advective and convective mechanisms.