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Aral Sea desiccation and breeze air circulation over the lake

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Aral Sea, a large salty lake located in Kazakhstan and Uzbekistan, Central Asia, was once the fourth largest inland water body on the Earth. As known, presently the Aral sea has lost about 75% of its surface area and 90% of its volume, and has become an environmental disaster area, as a result of human impact in the basins of its river tributaries. It is generally believed that the Aral Sea desiccation has had a significant impact on the weather and climate in the surrounding areas.

We present a series of hourly pilot balloon observations at the western bank of the dying Aral Sea to describe the characteristics of the diurnal scale atmosphere-sea circulations. The pilot balloon observations were conducted during an interdisciplinary field surveys in October, 2003, and August, 2004, in the Uzbekistan part of the western Aral Sea basin. The background synoptic conditions are derived from hourly observations at a nearby ($\sim$4km) meteorological station. We also address background large-scale patterns using NCEP/NCAR reanalysis data. Analyzing vertical profiles of meridional and zonal component of the wind speed, we describe, in particular, the magnitude and vertical extent of the breeze circulation caused by diurnal surface temperature contrasts between the sea and the surrounding terrain. The onshore flow of the breeze appears after 11 LST at lower levels ($\sim$500 $\sim$800 m) and quickly expands in the vertical reaching depths above $\sim$1.2 $\sim$2.2 km at 14 LST. The depth of the flow starts to decrease after 1600 LST. The return flow associated to the breezes is also detected in vertical wind profiles and occurs between 1 and 3 km. A weak offshore breeze can be observed in early morning hours. The depth of offshore breeze in early morning hours observations was 200-500 m. We discuss how the observed diurnal variability pattern compares with that described in the literature for the pre-desiccation period, as well

as that predicted by models.