Changes in the basic ionic composition and other parameters of the Aral Sea and the Dead Sea waters during their drying

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In terms of water mass, salt lakes occupy 104 000 km³ (47 % of the total water volume of all lakes on the Earth), which is only slightly below that of fresh water lakes - 125 000 km³ (53%). Their waters are of certain economic importance, since they are used as raw materials for the extraction of valuable components and for therapeutic purposes. They also have a great influence on climate formation in the region. The drying out of the lakes entails an increase climate continentality. It also leads to an increase of frequency of dust and salt storms and storms that carry toxic substances over long distances from the source. This negatively affects public health. The drying of the Aral and Dead Seas is one of the largest environmental disasters of the 20th century. The reasons for their drying out are both natural such as global warming and aridization and anthropogenic factors such as diversions of river flows for the economic needs of the population of the regions. A sharp decrease in river runoff leads to a rapid drop in sea level, as well as to sharp interannual changes in the thermohaline structure and chemical composition of water. The annual runoff of the rivers has long ceased to fulfill the water resources of these water bodies.

We report the results of water sampling campaigns conducted in the Aral Sea (2014-2019) and the Dead Sea (2017-2019). The main ionic composition, salinity, density and other parameters of the waters of the Aral and the Dead Seas were obtained. We compare the hydrochemical characteristics of these water bodies and their changes during with historical data and with each other. The studied natural water bodies are terminal lakes, characterized by high salinity of water, which is many times higher than the salinity of ocean waters. The ratios of the main ions in the studied sources differ significantly between water bodies, as well as from similar ratios in the oceans. We determined ionic composition of these water samples using potentiometric titrator Titrando 905 (Metrohm). The density of samples was determined by the density meter DMA 5000M (Anton Paar). Currently, the Aral Sea is a complex of separate residual lakes with diverging hydrological and hydrochemical characteristics. The Dead Sea today is divided into two basins, the southern part of which is used for industrial purposes. Significant changes of the ionic composition of water with time were registered in both lakes. However, in the waters of the Aral Sea, these processes are much more intense and rapid than those in than the waters of the Dead Sea.