

GC31B-0458 Environmental Changes and Dust Emission in the Dried Bottom of the Aral Sea

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Dust storms are common events, and one of the most important manifestations of desertification occurring in the drylands of Middle Asia. This area is characterized by strong winds, scarcity of vegetation cover, continental and Mediterranean type of climate with long dry summers, frequent soil and atmospheric droughts, susceptibility of soils to erosion – all these serves as a basis for formation of dust storms (DS). Additionally to the natural pre-conditions of dust storms development, the large-scale anthropogenic land cover and land use changes favor development of DS in this region. The drastic desiccation of the Aral Sea led to the intensive development of desertification processes and formation of a new desert, the Aralkum. The temporal and spatial distribution of DS for three periods: 1936-1960, 1936-1980, and 1970-2005, based on the data from meteorological network, showed decrease in DS frequency and changes in the source areas. Temperature and rainfall trends also showed significant changes across the region. At the same time in the last few decades the dried bottom of the Aral Sea became the new “hot spot” of dust and salt storms. Dust storms and their source areas have been determined and analyzed by the NOAA AVHRR, TOMS and OMI models. The analysis showed that the Aralkum Desert is one of the most active dust sources in the region, responsible for high aerosol concentrations in the atmosphere. Dust plumes that sweep up from the dried bottom of the Aral Sea have become larger, and dust storms have become more powerful, since the bottom exposure. The land-cover changes in the dried bottom of the Aral Sea were determined by Landsat TM images for 1987 and 2009. The monitoring algorithm have been developed and validated by ground truth data. The main change occurred in the land cover of the dried bottom was the considerable reduction of vegetation and small water bodies, while the areas of solonchaks (salty pans) and sandy massifs increased significantly.

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