**Decadal Changes of Water Properties in the Aral Sea Observed by MODIS-Aqua**

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**ABSTRACT**

Twelve-year MODIS-Aqua observations (2002–2013) are used to quantitatively assess the water property changes in the Aral Sea. The shortwave infrared (SWIR) atmospheric correction algorithm is required and used to derive normalized water-leaving radiance spectra *nLw*(**) in the region. A simple bottom effect index algorithm is developed to identify and discriminate the pixels with the benthic contributions using satellite-derived *nLw*(**) in the red and near-infrared (NIR) wavelengths. We used radiance ratio *nLw*(555)/*nLw*(443) as a surrogate to characterize the spatial and temporal variations of chlorophyll-a (Chl-a) in the Aral Sea. Both seasonal variability and significant interannual changes were observed when the Aral Sea desiccated between 2002 and 2013. All three regions of the Aral Sea show increased *nLw*(555)/*nLw*(443) ratio and the diffuse attenuation coefficient at the wavelength of 490 nm (*Kd*(490)) during the fall season. Of the three regions, the North Aral Sea has had the least interannual variability, while South-East (SE) Aral Sea experienced drastic changes. Waters in the SE Aral Sea are the most turbid with significantly higher *Kd*(490) than those in the other two sub-regions. *Kd*(490) gradually increased from ~2 m–1 in 2002 to ~3.5 m–1 after 2008 in the SE Aral Sea. In comparison, both radiance ratio *nLw*(555)/*nLw*(443) and *Kd*(490) were relatively stable for the North Aral Sea. In the South-West (SW) Aral Sea, however, *nLw*(555)/*nLw*(443) values reached peaks in the fall of 2007 and 2010. A possible link between the Aral Sea water property change and the regional climate variation is also discussed.