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CONTROL ID: 1475992**TITLE:** Using GRACE and Landsat imagery to assess water balance change due to anthropogenic modification and climate change in the Aral Sea region: 2002-2012

ABSTRACT BODY: The Aral Sea watershed located in central Asia has seen significant anthropogenic modification since the mid 20th century, leading to the desiccation of the Aral Sea. The Aral Sea is a closed basin with a watershed area of almost 2 million square kilometers including the Amu Darya and Syr Darya river systems. A network of canals and channels has diverted a significant amount of flow from both rivers into various agricultural areas and reservoirs. Monitoring water resources within the region is of utmost importance to understanding how the region will be impacted by ongoing and future climate change. Using GRACE (Gravity and Climate Experiment) data from 2002-2012 water storage trends within the basin were determined using a linear model. The data was normalized and fit with an annual function to determine inter-annual variability. Anthropogenic modification has led to increased water storage in the central region of both watersheds, most notably within the Aydar-Amasay lakes after the Shadara irrigation dam was built in the 1960s. Gravity data within this region shows a positive trend of increased storage: 0.30 to 0.40 mm (equivalent water thickness) per year. However, the Aral Sea basin proper showed a negative trend of almost 1 mm (equivalent water thickness) per year. The entire watershed and basin showed an overall negative trend in water storage. To determine the possible cause of climate on these changes, 206 weather stations within the basin were analyzed for climate trends (precipitation and temperature). No significant trends were observed in basin-wide precipitation and average annual temperatures increased 1-2 degrees C over a century. Precipitation in close proximity to the Aral Sea showed a significant decrease after 1970. The effects of anthropogenic modification and climate trends on water surface area were determined using MODIS land use classifications (MCD12Q1) from 2001-2010, supplemented with Landsat imagery. Water surface area totals within the Aral Sea proper showed an overall decrease of 35% while water surface area within the drainage basin has shown an increase. Much of the water diverted from the Aral Sea is stored farther upstream within the basin in newly formed artificial lakes, but the sustainability of water resources within the region will deteriorate with current water storage trends on a basin-wide scale.

CURRENT SECTION/FOCUS GROUP: Global Environmental Change**CURRENT SESSION:** GC019. Environmental, Socio-economic and Climatic Change in Northern Eurasia and Their Feedbacks to the Global Earth System**INDEX TERMS:** [1640] GLOBAL CHANGE / Remote sensing, [1632] GLOBAL CHANGE / Land cover change, [1834] HYDROLOGY / Human impacts, [1855] HYDROLOGY / Remote sensing.**AUTHORS/INSTITUTIONS:** K.A. Zmijewski, R. Becker, Environmental Sciences, University of Toledo, Toledo, OH;**SPONSOR NAME:** Kirk Zmijewski**CONTACT (E-MAIL ONLY):** kirk.zmijewski@rockets.utoledo.edu**TITLE OF TEAM:**

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