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Submitted on October 16, 04:57 PM
for agu-cc12rs

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CONTROL ID: 1258318

TITLE: Characterization of terrestrial water dynamics in the Congo Basin using GRACE and satellite radar altimetry

PRESENTATION TYPE: Assigned by Committee

CURRENT CATEGORY: Surface Water Storage

AUTHORS (FIRST NAME, LAST NAME): Hyongki Lee1, R. Edward Beighley2, Douglas Aalsdorf3, Hahn Chul Jung4, C. k. Shum3, Jianbin Duan3, Junyi Guo3, Dai Yamazaki5, Konstantinos Andreadis6

INSTITUTIONS (ALL): 1. University of Houston, Houston, TX, United States.
2. FM Global, Norwood, MA, United States.
3. Ohio State University, Columbus, OH, United States.
4. NASA Goddard Space Flight Center, Greenbelt, MD, United States.
5. University of Tokyo, Tokyo, Japan.
6. Jet Propulsion Laboratory, Pasadena, CA, United States.

Title of Team:

ABSTRACT BODY: The Congo Basin is the world's third largest in size (~3.7 million km^2), and second only to the Amazon River in discharge (~40,200 cms annual average). However, the hydrological dynamics of seasonally flooded wetlands and floodplains remains poorly quantified. Here, we separate the Congo wetland into four 3° x 3° regions, and use remote sensing measurements (i.e., GRACE, satellite radar altimeter, GPCP, JERS-1, SRTM, and MODIS) to estimate the amounts of water filling and draining from the Congo wetland, and to determine the source of the water. We find that the amount of water annually filling and draining the Congo wetlands is 111 km^3, which is about one-third the size of the water volumes found on the mainstem Amazon floodplain. Based on amplitude comparisons among the water volume changes and timing comparisons among their fluxes, we conclude that the local upland runoff is the main source of the Congo wetland water, not the fluvial process of river-floodplain water exchange as in the Amazon. Our hydraulic analysis using altimeter measurements also supports our conclusion by demonstrating that water surface elevations in the wetlands are consistently higher than the adjacent river water levels. Our research also highlights differences in the hydrology and hydrodynamics between the Congo wetland and the mainstem Amazon floodplain.

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