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Satellite data will be essential to future of groundwater, flood and drought management

UC Irvine, NASA researchers demonstrate need for national water management policy with map of U.S. ‘hotspots’

Irvine, Calif., June 10, 2013 – New satellite imagery reveals that several areas across the United States are all but certain to suffer water-related catastrophes, including extreme flooding, drought and groundwater depletion.

The paper, to be published in *Science* this Friday, June 14, underscores the urgent need to address these current and rapidly emerging water issues at the national scale.

“We don’t recognize the dire water situation that we face here in the United States,” said lead author Jay Famiglietti, a professor of Earth System Science at the University of California, Irvine, and Director of the UC Center for Hydrologic Modeling (UCCHM). Since its launch in 2002, Famiglietti and co-author Matt Rodell, Chief of the Hydrological Sciences Laboratory at NASA’s Goddard Space Flight Center, have been using data from the NASA Gravity Recovery and Climate Experiment (GRACE) satellite mission to track changing freshwater availability all over the world.

“Worldwide, groundwater supplies about half of all drinking water, and it is also hugely important for agriculture, yet without GRACE we would have no routine, global measurements of changes in groundwater availability,” said Rodell. “Other satellites can’t do it, and ground-based monitoring is inadequate.”

The report, entitled *Water in the Balance*, draws attention to water management as a national, rather than just a regional or statewide problem. The GRACE mission is able to monitor monthly water storage changes within river basins and aquifers that are 200,000 km² or larger in area, and, according to Famiglietti and Rodell, can contribute to water management at regional and national scales, and to international policy discussions as well.

Using GRACE data, the researchers were able to identify several water ‘hotspots’ in the United States, including its key food producing regions in 1) California’s Central Valley, and 2) the southern High Plains aquifer; a broad swath of the southeastern U. S. that has been plagued by persistent drought, including 3) Houston, Texas, 4) Alabama, and 5) the Mid-Atlantic region; and 6) the flood-prone upper Missouri River basin. They also noted that since 2003, the wetter, northern half of the U.S. has become wetter, while the drier, southern half has become drier.

According to Famiglietti and Rodell, without coordinated and proactive management, the aquifers supplying the Central Valley and the southern High Plains with water for irrigation will deplete their groundwater reserves, perhaps within decades, putting the nation’s food supply at considerable risk. Meanwhile, if sufficient measures are not taken, the upper Missouri River basin will experience extensive flood damage. The authors state that using GRACE, groundwater supplies can now be better managed, while the lead-time for flood and drought predictions could

be substantially increased, potentially saving hundreds of millions of dollars and countless lives in the process.

“GRACE data provide new insights into regions in the U.S. and around the world where water issues have already approached the crisis stage. Their potential for game-changing contributions to regional water management is just beginning to be realized,” says Famiglietti, who believes that maps like his and Rodell’s make a strong case for immediate action, and ultimately, for a comprehensive, national water policy in the United States.

The authors argue for greater investment to speed current GRACE data processing to ensure its availability for seasonal flood and drought forecasting, and for future gravity missions that can help water management even more than at present.

“A future mission that could monitor water storage changes every week or two, rather than on a monthly basis, and for river basins and aquifers that are tens of thousands of square kilometers, rather than hundreds, would be ideal,” notes Rodell.

According to USA Today, in 2012 flood damage from Hurricane Sandy and the Midwest/Great Plains drought cost the U.S. \$100 billion. The U. S. Geological Survey recently reported that since the beginning of the 20th century, enough groundwater has been depleted in the United States to fill Lake Erie twice.

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Special Note to Reporters:

A copy of the paper and supplementary online figure can be found at the Science press package at <http://www.eurekalert.org/jrnls/sci>. You will need your user ID and password to access this information.

About the UC Center for Hydrologic Modeling

The UCCHM is a University of California system-wide research center formed to address California’s water issues. Its mission is to develop state-of-the-art models, remote sensing analyses, data products and data management to support research and sustainable water management for California and the west. UCCHM findings inform state, regional, national and international leaders, and advise decision-makers at all levels, on the future of water availability. For more information, please visit www.ucchm.org.

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