

## **Water and land resources assessment using Landsat satellite data**

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*In* American Chemical Society National Meeting, Environmental Chemistry Division: Water Challenges and Solutions on the Global Scale, San Francisco, Cali, 10-14 Aug., 2014.

### **ABSTRACT**

Landsat data are used to inform local, regional, national, and international decisions regarding sustainability of world water and land resources. Since 2008, all Landsat data are freely available to anyone on Earth--our vision of "data democracy". As such, these data and information products are at the intersection of science, technology, innovation, and economic development in stewardship of limited resources. In 2013, the Landsat 8 Earth-observing satellite was launched, the latest in the Landsat satellite series that have provided global coverage of changes on Earth's surface since 1972. With Landsat 7 still in orbit, the two satellites acquire nearly 1,000 images per day, providing multi-spectral imagery at 10 to 100 meters, every eight days for any location on the Earth's land surfaces.

Landsat 8 carries an Operational Land Imager and a Thermal Infrared Sensor, new instruments which enhance a number of applications: 1. a 'deep blue' band enables optical water quality mapping, improving the understanding of sediment and carbon dynamics within estuaries and near-shore environments; 2. a 'cirrus' band improves the capacity to remove cloud from imagery, important for mapping forest extent and forest cover change in tropical and sub-tropical environments; 3. two thermal infra-red bands enable better characterization of evapotranspiration, plant water use and water stress, and improve the capacity to map patterns of water use and accuracy of water balance models; and 4. better signal to noise characteristics improve the capacity to map and monitor rangeland, wetlands, shallow water bathymetry and benthic substrates such as sea grass meadows and coral reefs. In studies of glacier movement, upgraded accuracy of the panchromatic band improves quantification of ice movement rates. Landsat 8 data have enhanced forest health monitoring by the U.S. Forest Service, burn severity mapping by the USGS, NASA, and the National Park Service, and cropland mapping by the USDA National Agricultural Statistical Service.