The Global Water Monitor: Lake, Wetland, and River Reach Monitoring for Resource Management and Hazard Observation

The Global Water Monitor is a monitoring program offering surface water-related products for lakes, reservoirs, river reaches, and wetlands, https://blueice.gsfc.nasa.gov/gwm. These products are derived from multiple satellite-based altimetry and multispectral imaging platforms. The primary measurements are water level, slope, and extent, derived from a series of NASA and other agency instruments (Sentinel-3,-6, ICESat-2, SWOT, MODIS). The system serves stakeholders, the US Department of Agriculture Foreign Agricultural Service and the US Geological Survey, as well as various international, national, state, and intelligence agencies, engineers, ecologists, and hydrological researchers. Considering the sensitivity of ground-based data and the remote accessibility of many basins, the satellites offer global coverage, accuracy, and continuity of measurements. Observation of storage fluctuations in lakes and reservoirs provides users with knowledge of short and long-term drought conditions that can affect both water and energy resources. Emphasis is on changing climatic conditions, water sharing between nations, and regional stability. Measurements across a wetland complex can assist with efforts to assess hydrological dynamics with a focus on conservation efforts that aid both natural ecology and the sharing of precious water resources – the latter potentially being required in a basin across the municipal, crop irrigation, aquaculture, livestock, and power station spectrum. Observations of river reaches assists in the collection of basic hydraulic information, particularly in gauge-poor regions, for modelling efforts and the estimation of discharge, and at high-latitudes satellite-based river observations serve projects that warn of spring melts and flood hazards.

We look at how recent improvements in instrument technology and mission operations are assisting with acquiring true global coverage and cross-validation efforts, and how stakeholders interact with the project in terms of setting requirements, product format, and accessibility methods. Examples show the application of the products across a range of programs, and in addition to meeting operational requirements, how the multi-decadal surface water levels are creating a high-quality timeline of Earth Data Records.