

New perspectives in monitoring water resources in large tropical transboundary basins based on satellite imagery and radar altimetry

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Abstract The combined use of satellite imagery and radar altimetry offers entirely new perspectives for the monitoring of water resources in large tropical transboundary basins. We illustrate this point of view with results from a study conducted mostly in the region of the Llanos de Mojos, a large complex of wetlands located within the southernmost extension of the Amazon Basin, at the Brazilian border with Bolivia and Peru, and also from previous studies. First, despite the current limitations of the radar altimetry missions, which were designed primarily for ocean level or ice cap studies (essentially the revisit time, the size of the water bodies that can be monitored, and the lack of reliable data in the presence of relief), the data processing and the tools we developed to select the data appropriately, allow us to retrieve quite accurately the seasonal variability of the water elevation within the selected basin. For instance, the common altitudinal reference of the radar altimetry missions is offering new modelling opportunities, as the river slope is a key parameter for hydrodynamic studies. Second, the results emphasize the benefit of coupling these data with remote sensing images, to obtain information on surface water storage in this very complex system. Lastly, the spatial distribution that can be obtained nowadays, and the perspectives offered by future sensors, are moving towards a detailed global capability for monitoring wetlands and flood plains, as well as their relationship with the river flow. The application of these monitoring tools is of primary importance for tropical poorly-gauged basins in terms of infrastructure monitoring and planning, flood and drought monitoring and forecasting, fluvial waterway monitoring and transport planning, and the fluvial dynamics of the riverbed and discharge modelling.

Key words water resources; remote sensing; radar altimetry; transboundary basins; Amazon Basin