



Mapping spatial-temporal suspended sediments and hydrodynamics of Amazon rivers and floodplains

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Hydrodynamics and water composition river-floodplain systems play a key role in ecological and biogeochemical processes. While the hydrodynamics and sediments dynamics of large river-floodplain systems as the Amazon basin is not fully understood, the current collection of satellite imagery offers opportunities to study these processes. This paper presents the first mapping of the dynamics of suspended sediments in rivers and lakes ($> 0.25 \text{ km}^2$) of central Amazon, considering different water types. This study also describes some river-lake systems in terms of their spatial-temporal pattern of sediments and water flows. Time series between 2003 and 2017 of red and infrared reflectance of Moderate Resolution Imaging Spectroradiometer (MODIS) images were temporally filtered to retrieve incomplete and low-quality data. These images were assessed as a proxy of the surface suspended sediments concentration; and maps of the spatial-temporal variation of sediments were created, such as the class frequency map. This map represents a 15-year frequency at which each pixel remains in one of the surface suspended sediments concentration classes: high, moderate, and low, with an overall accuracy of 71%. Our findings allowed to observe the variation of sediment concentration along the Solimoes-Amazonas River, such as, for instance, its increase from the confluence with the Tapajos River to the mouth. Some hydrological processes were also observed in lakes of the middle reach, such as overbank flow and resuspension of sediments in depression lakes. In some ria lakes, the main water source comes from local basin with the backwater promoting sediment input in these lakes during the low-water period. The analyses reveal way to use water quality observed by remote sensing to understand hydrodynamic processes and the datasets are available for supporting hydrological, biogeochemical and ecological studies.