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Post-confluence surface water and sediment distribution patterns of the Solimões-Amazon and Negro Rivers: a remote sensing-based geomorphic study of surface patterns at the large rivers confluences

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River channel confluences are recognized as critical features of the fluvial system, because both intensive and extensive hydro-physical and geo-ecological processes take place within this momentous interface. Despite the relevant findings on confluences as listed above, only a few cases concentrated on field measurements in large rivers. Along with improvements in hydrographic and geochemical surveying techniques, trials have been occasionally made to improve understanding of larger rivers confluences and their downstream hydro-morphodynamics, such as in some reaches of the Amazon, Brahmaputra, Jamuna, and Paraná Rivers. However, finite collections of point-based and cross-sectional measurements obtained from field using acoustic Doppler current profiler (ADCP), multi-beam echo sounder, global positioning system (GPS) or other geochemical applications (e.g. isotope tracing) around river confluences provide limited information of post-confluence hydro-geomorphologic behaviors. The identification of sediment routing through channel junctions and the role of confluence on downstream sediment transport is still poorly understood.
Into this context, satellite remote sensing is the most relevant and efficient mean to regularly monitor the river sediment discharge over the large (regional to continental) scale. In this paper, we aim to characterize the spatiotemporal patterns of post-confluence sediment transport by mapping the surface water distribution using the ultimate example of large river confluence on Earth, where distinct water types drain: The Solimões-Amazon (muddy-white water) versus Negro (black water) Rivers, exploring the seasonal and inter-annual variations of water types and the spatial distribution patterns of surface waters through the branches of the main stem.