



Quantifying suspended sediment discharge in the Mahakam river and distributary channels

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Large-scale deforestation enhances the rates of suspended sediment discharge (SSD) in tropical rivers, which leads to siltation of delta channels and degradation of fluvial, estuarine and coastal ecosystems. Despite those worldwide concerns, methods to continuously monitor and quantify SSDs are virtually absent. Recent developments have offered the possibility to monitor water discharges continuously by means of an acoustic Doppler current profiler, deployed horizontally (H-ADCP). This contribution presents an attempt to expand that field of research, aiming to develop a method to obtain year-round estimates of SSD in a large tropical river and its main distributary channels. Continuous, fixed station measurements of flow velocity and turbidity were taken with an H-ADCP and an optical backscatter sensor (OBS) in the Mahakam tidal river, spanning over six months. At several sites in the river and its distributary channels, boat surveys were carried out to collect simultaneous vertical profile measurements with an ADCP, an OBS and a Laser In Situ Scattering and Transmissometer (LISST). Each of the latter surveys covered a full tidal cycle. The mass concentration from about one hundred water samples was determined, which allowed to investigate the ADCP backscatter response to variation in suspended mass concentration, and changes in particle size distributions as inferred from the LISST data. Those measurements allowed to develop a method to obtain continuous estimates of SSD, and the division of SSD over the main distributary channels. The proposed method combines acoustic and optical means to monitor suspended sediment concentration, which are complementary because of the different measurement principles.