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First assessment of the biogeochemistry of the Congo River and tributaries

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The Congo River is the second largest river in the World in terms of catchment and discharge after the Amazon River. Yet, there is surprisingly little or no information on carbon (C) cycling in this river. Here, we report a preliminary assessment of the biogeochemistry of the Congo River and tributaries based on $>$40 variables related to C cycling obtained at 53 stations along a transect of $\sim$400 km in the upper reaches of the river (downstream of Kisangani) obtained from early May to early June 2010. Principal component analysis and combined cluster analysis allows to identify 3 main clusters of data corresponding to Cluster 1 - the Congo main stem (white waters), to Cluster 3 - black water tributaries and to Cluster 2 - intermediate tributaries (mixing of black and white waters). There was a decreasing trend from Cluster 1 to Cluster 3 in water temperature, dissolved O_2, pH, total alkalinity (TA), total suspended mater (TSM), particulate organic carbon (POC), particulate nitrogen (PN), δ^{13}C dissolved inorganic carbon (DIC), δ^{13}C POC, δ^{13}C dissolved organic carbon (DOC), nitrate. There was an increasing trend from Cluster 1 to Cluster 3 in partial pressure of CO_2 (pCO_2), %POC/TSM, DOC, Colored dissolved organic matter, dark pelagic O_2 consumption, ammonia. In the Congo main stem, along the 400 km transect, distinct decreasing trends were observed in TA, conductivity and dissolved O_2 and an increasing trend in pCO_2. This data set highlights very marked dynamics of C and N in the different sub-systems of the Congo River, and strong horizontal gradients in the main stem. Driving mechanisms are briefly discussed.