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Transport fluxes and emission of greenhouse gases of the Middle Niger River (west Africa): disproprotionate importance of the recent red floods in the Niamey region

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The Niger River is Africa's third longest river and drains an area of ~2,120,000 km^2. It encompasses six hydrographic regions and crosses almost all possible ecosystem zones in West Africa. Since few decades, the Middle Niger River presents a two flood hydrograph, the local flood, or red flood, occurring during the rainy season being the more pronounced one. Here, we report initial results of a monitoring campaign whereby 2-weekly samples were collected at Niamey (Niger) [2.01°E 13.57°N] between April 2011 and March 2013 for a suite of physico-chemical and biogeochemical characteristics, including total suspended matter (TSM) concentrations, concentration and stable isotope composition of particulate organic carbon (POC and δ13C-POC) and particulate nitrogen (PN and δ15N-PN), chromophoric dissolved organic matter (CDOM), dissolved organic carbon (DOC and δ13C-DOC), dissolved inorganic carbon (DIC and δ13C-DIC), concentration of greenhouse gases (GHGs) (CO_2, CH4 and N2O), as well as major elements, total alkalinity, and oxygen isotope signatures of water (δ18O-H_2O). This dataset allows us to construct seasonal budgets for particulate and dissolved carbon fluxes, nutrient exports, as well as a first seasonally resolved characterisation of the GHGs emitted to the atmosphere by the Middle Niger River. The red flood, concentrated on 2 months (August-September), contributed to more than 80% of the annual transport fluxes of TSM and POC and to approximately 30% of the annual transport fluxes of DIC and DOC.