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Understanding the hydrodynamics of the Congo River

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We present the results of the first hydrodynamic model of the middle reach of the Congo Basin, which helps our understanding of the behaviour of the second largest river in the world. In data sparse area, hydrodynamic models, utilizing a mixture of limited in-situ measurements and remotely sensed datasets, can be used to understand and identify key features that control large river systems.
Unlike previous hydrodynamic models for the Congo Basin, which concentrated on only a small area, we look at the entire length of the Congo's middle reach and its six main tributaries (Kasai, Ubangai, Sangha, Ruki, Lulonga and Lomami). This corresponds to: a drainage area of approximately two and a half million kilometres squared; over 5000 kilometres of river channels; and incorporates some of the largest and most important global wetlands.
The hydrodynamic model is driven by a mixture of in-situ and modelled discharges. In situ measurements are available at five locations. Two were obtained from the Global River Discharge Centre (GRDC) at Kinshasa and Bangui, and data for Kisangani, Ouesso and Lediba were obtained from local agencies in the Democratic Republic of the Congo and the Republic of Congo. Using the gauging station at Kinshasa as the downstream boundary, the remaining in-situ measurements account for 61 percent of the discharge and represent 72 percent of the total drainage area. Modelled discharges are used to account for the missing discharge and corresponding area.
Calibration and validation of the model was undertaken using a mixture of in-situ measurements, discharge and water level at Kinshasa, and water surface heights along the main reach obtained from both laser and radar altimeters.
Through the hydrodynamic model we will investigate: how important constraints, identified by a previous study, are to the behaviour of the Congo; what impacts the wetlands have on the Congo Basin; how the wetlands and main channel interact with each other. Our results will provide new insight into the behaviour of the middle reach of the Congo Basin which otherwise would not be possible without extensive field work.