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Modelling river discharge and wetland inundation across Africa in the present and the during mid-Holocene

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It is thought that the regional water budget over parts of Africa is linked to variability in inundated wetlands and lakes, the expansion and contraction of which is likely to significantly control regional rainfall. However, the parameterization of lakes and wetlands in current Earth System Models (ESMs) is poorly understood and generally non-interactive, and therefore needs improvement. Here, we use an early- to mid-Holocene scenario to test river discharge and wetland/lake inundation simulations in a land surface model (JULES-G2G). This is a time period during which North Africa experienced expansion of wetlands, river systems, and lakes, accompanied by 'greening' of the Sahara, providing a key test of the model's ability to simulate conditions very different to today. The results are compared to relevant synthesised palaeodata (e.g. palaeolake shorelines, fossil distributions, vegetation reconstructions). We also asynchronously couple the surface inundation model to a global climate model, HadGEM3.1, to examine the impact of feedbacks between surface water and atmosphere on Holocene African hydroclimate change.