Towards quantification of the global riverine carbon balance

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Quantification of the global carbon budget of rivers implies merging ecological, hydrological and chemical concepts. For a better understanding of the factors governing the carbon budget of rivers, a deterministic coupled transport model is set up to simulate the ecological and chemical behaviour of aquatic continua worldwide. Here we estimate the effects of hydrology, nutrient loading, land use and climate on the sources, sinks and the mechanics of carbon from low order streams to the ocean. The study elaborates on the increasing recognition of the importance of rivers in the global carbon budget. Hydrological boundary conditions are provided by a global hydrological model, nutrient river loading is provided by an external model and climate data is provided by an ESM. We demonstrate that our global, spatially explicit model provides a first-order understanding of variability of POC, DOC and DIC in rivers. The model approach allows a robust analysis of the short-term and long term response of aquatic continua to global environmental changes, such as climate change, land use change and human interference in the hydrology.