



## **Global scale process-based modelling of the origins and fates of carbon in the aquatic continuum**

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Here, we present the implementation of the riverine C cycle in the Dynamic In-stream Chemistry module (CARBON-DISC), which is part of the Integrated Model to Assess the Global Environment (IMAGE) Dynamic Global Nutrient Model (IMAGE-DGNM). The model explicitly resolves the mass and fluxes of DIC, DOC, terrestrial POC, autochthonous POC from headwaters to mouth (hydrology, climate and biogeochemical sources) on a global scale. This approach accounts for the spatio-temporal variability in dynamic physical conditions in the aquatic continuum. This is a major step forward in basin scale modelling of freshwater systems. We present model estimates of the delivery, retention, biogeochemical transformations, export and emissions to the atmosphere of carbon in the form of DIC, DOC and POC at the global scale.