Controls on Riverine Carbon Export along a Latitudinal Transect

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The riverine export and burial of organic matter produced by the terrestrial biosphere on continental margins is an important mechanism to sequester atmospheric carbon. Controls on carbon mobilization and transport within fluvial systems are not fully understood, although precipitation-driven erosion is considered to dominate biospheric carbon export [1].

This study examines the influence a strong natural climatic and geomorphic gradient along a latitudinal transect on organic carbon export from a suite of ~ 40 Chilean watersheds. In course of two field campaigns in 2017 and 2018 more than 40 rivers between 46°S and 30°S were sampled, covering a range in mean annual precipitation of 100 mm to more than 2000 mm, and a mean annual temperature gradient from 3°C to 13.5°C. Stable ($\delta^{13}C$) and radiocarbon ($\Delta^{14}C$) compositions of bulk particulate organic carbon (POC), dissolved organic carbon (DOC) and dissolved inorganic carbon (DIC) were measured and revealed highly variable isotopic signatures: while the radiocarbon signature of DIC is constrained to modern values, POC $\Delta^{14}C$ values range from -600 to 30 ‰. DOC covers a comparable range with values between -450 and 200 ‰ and $\delta^{13}C$ between -30 and -22 ‰.

The mean climatic conditions of the catchments do not appear to control the bulk isotopic signature of the anaylzed carbon pools to a significant degree. Instead, dominant landcover in the watershed emerges as a more decisive catchment characteristic to explain the differences in the exported carbon among rivers. Additionally, some of the isotopes feature strong interannual variability, highlighting the importance of long-term observations to quantify biospheric carbon export of a river.

Measurements of compound-specific isotopes of the collected sediment are underway to further constrain the sources and residence times of specific biospheric carbon components within catchments along the transect.

[1] Hilton (2017), *Geomorphology* **277**, 118-132.