Geophysical Research Abstracts
Vol. 16, EGU2014-1515-1, 2014
EGU General Assembly 2014

The age of river-transported carbon: new data from African catchments and a global perspective.

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The role played by river networks in regional and global carbon (C) budgets is receiving increasing attention. Despite the potential of radiocarbon measurements (Δ^{14}C) to elucidate sources and cycling of different riverine C pools, there remain large regions from which little or no data are available. Also, there have been no comprehensive attempts to synthesize the available information and examine global patterns in the ^{14}C content of these organic and inorganic riverine C pools. Here, we present new ^{14}C data on dissolved (n = 25) and particulate (n = 67) organic C from six river basins in tropical and subtropical Africa, and also compile >1000 literature ^{14}C data and ancillary parameters from rivers globally. Across the African basins, the new riverine data span a Δ^{14}C range of -126‰to 155‰(average Δ^{14}C of 67 $\pm$ 51 ‰) and -869 ‰to 93‰(average ^{14}C of -60 $\pm$ 158‰) for DOC and POC, respectively. These C radioisotope signatures represent radiocarbon ages of approximately 1000 BP to modern (post-1950) for DOC and approximately 16000 BP to modern for POC. Our data show that, excluding freshwaters strongly perturbed by anthropogenic practices, the DOC fraction exported by African rivers is always dominated by modern carbon. Globally, a consistent pattern emerges of older C in systems carrying high loads of organically poor sediments. In contrast to oceanic environments, riverine DOC is typically (>90%) more recent in origin than POC. While our analysis does not allow to directly assess the (controversial) importance of ancient C supporting bacterial respiration in river systems, the distribution of Δ^{14}C data for dissolved inorganic C (DIC) favors the hypothesis that, in most cases, more recent organic C is preferentially mineralized.