

## River corridors and the carbon cycle: floodplain organic carbon storage along boreal rivers

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### Abstract:

Rivers influence the global carbon cycle by delivering carbon to the oceans, providing sites for carbon processing, and storing carbon in floodplains for decades to millennia. However, the amount and residence time of organic carbon (OC) stored in river corridors (channels and floodplains) and the geomorphic influences on the spatial distribution of OC are not well understood. High latitude regions are experiencing rapid warming and permafrost thaw, and these regions contain large amounts of OC in the subsurface. Very little work has quantified OC storage in floodplains in the high latitudes. I present data on floodplain OC stocks in sediment in the Yukon Flats in interior Alaska, a region with discontinuous permafrost. The large spatial extent of floodplain soil OC samples collected across multiple rivers in the Yukon Flats allows for investigating the geomorphic controls on the spatial distribution of OC across spatial scales. Differences in soil OC occur across the large spatial scale of river basins ( $10^2$ - $10^6$  km) are likely due to geomorphic influences such as differences in planform characteristics, grain size, and soil moisture. However, larger variations in soil OC occur at the river reach scale ( $10^0$ - $10^1$  km) among geomorphic units (e.g., wetlands, bars, fill surfaces, and other floodplain surfaces), which can also be explained by geomorphic factors such as grain size, surface stability over time, and soil moisture. Fieldwork that recognizes floodplains as distinct environments relative to uplands can result in more accurate estimates of soil OC stocks in permafrost regions. I also compare data on soil OC stocks from the Yukon Flats to two additional boreal rivers in Sweden that have been altered via dams and landuse changes to discuss the potential influence of human activities on floodplain OC. Because of warming and permafrost thaw, geomorphic and biogeochemical processes may be significantly altered in high latitudes boreal regions. Determining floodplain OC stocks and the geomorphic influences on those stocks is important for accounting for carbon within the Earth system.