

River bank erosion, lateral accretion of material, and overbank deposition contribute to the exchange of organic carbon (SOC) between alluvial rivers and floodplains. These exchanges, however, are not currently accounted for in the carbon budget of inland waters. We used satellite imagery and historical aerial photographs to quantify rates of bank erosion and floodplain accretion for eleven arctic rivers with drainage areas ranging from 12,000 km² to 2.5 million km². We extrapolated these measurements to compute the river/floodplain exchange of sediments across permafrost-dominated alluvial rivers in the Arctic and subarctic. We then used the Northern Circumpolar Soil Carbon Database to estimate the quantity of SOC carbon entering these rivers from the upper 3 meters of permafrost-dominated floodplain soils. Preliminary estimates indicated that bank erosion in the downstream-most 1,000 km of the Lena River contribute 2 Tg C and 68 Tg sediment per year to the river. These quantities are 2 and 3 times the fluxes C and sediment measured at the delta suggesting significantly more carbon is cycled along arctic river systems than is exported to their deltas.