

Carbon cycling in high latitudes – Ramped pyrolysis ^{14}C results from the Colville River delta and Svalbard

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Stores of old carbon in permafrost and yedoma are being released as a positive feedback into the climate system. Here we summarize studies from the Colville River delta in the Beaufort Sea off of Alaska, and soils from a coastal plain of Svalbard showing the spectra of radiocarbon ages of organic carbon contained with these systems. Despite different glacial histories, both recently buried riverine sediments in the Colville River delta and soils accumulating on Svalbard show wide age spectra indicating a mixture of organic carbon from modern sources and from fossil sources. In the Colville River sediments, the age spectra between different density fractions of the sediments indicate permafrost breakdown and coastal erosion are main processes supplying carbon to these sediments. In Svalbard, carbon age spectra increase in average age rapidly down-trench. While there is a presence of lignite coals, they do not seem to contribute to the ramped pyrolysis pyrograms of the sediment in a large enough proportion to drive the ages of the sediment older. The old ages and wide spectra here indicate storage of old carbon in components different than coal, and/or processing of coal carbon by soil biota. Our findings also indicate important differences between the two sites, demonstrating the possibilities of applying a pseudo-bulk organic chemical technique to problems of high latitude carbon storage.