Bioavailabiilty and chemistry of Arctic soil carbon

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Arctic soils contain vast quantities of carbon. Recent warming is amplified in the Arctic, deepening the active layer and making previously frozen carbon available for remineralization. The bioavailability of Arctic soils is typically assessed via time consuming incubations or *in situ* manipulations. However, these types of studies can be both time consuming and lead to unnatural conditions. In an attempt to bridge the gap between microbial ecology and soil chemistry, we present data illustrating that n-alkane distributions are diagnostic of microbial bioavailability of Arctic soil carbon. Low carbon mineral soils from the Canadian high Arctic and organic rich soils from near Barrow, Alaska were analysed for n-alkanes, the radiocarbon heterogeneity of the organic matter as a function of polarity and the radiocarbon content of the viable microbial community. Mineral soils contained n-alkanes that were highly reworked and ranged in radiocarbon content by 700 ‰, yet contained microbes with modern radiocarbon. Conversely, organic soils contained n-alkanes representative of recent vegetation, were more isotopically homogenous ($\Delta\Delta^{14}C \sim 200$ ‰) and contained microbes that were radiocarbon deplete. Our results indicate that carbon in highly reworked soils, which have a low odd over even preference, is far less bioavailable to the microbial community and n-alkanes distributions are diagnostic of bioavailability.