What is the fate of permafrost-locked organic carbon (OC) in the rapidly warming Arctic?

End-member mixing models are used in many fields of science to investigate relative proportions of sources (end-members) in a mixed specimen. For example, in ecology it is used to investigate proportions of different food sources in an animals diet based on feces samples and in environmental sciences it is used to investigae various pollution souces (wood burning/traffic/coal combustionn/...). In the simplest case, we want to know the proportions of two sources, A and B, in a sample based on a tracer element X. If Xa, Xb and Xs denote the concentration of X in A, B and the sample respectively, chemical mass balance implies Xs=p*Xa+(1-p)*Xb, from which p, the proportion of source A in the sample, can be calculated. In practise, Xa and Xb are not known precisely though, but are assumed to vary according to probability densities. This project will study data from the Kolyma paleoriver transect, East Siberian Sea, where the aim is to estimate the relative proportions of riverine, erosional and marine contributions to surface sediment organic carbon (OC). The erosional component is largely due to thawing permafrost; a consequence of the the currently rapidly warming Arcitic climate. Estimating how much permafrost-OC that sediments into the Ocean floor provides bounds for how much of this carbon that may be released as climate warming greenhouse gases. Particular focus will be on comparing ways for describing statistical uncertainties involved in the calculations.

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