Thawing Permafrost - From Soil to Ocean

Arctic permafrost, i.e. perennially frozen ground, occupies about 23% of the exposed land area of the Northern Hemisphere and stores up to 50% of the global below ground organic carbon. Increasing temperatures in the Arctic presumably result in enhanced permafrost thawing and release of huge amounts of previously freeze-locked, old organic carbon that is further transported to the Arctic Ocean. The fate of organic carbon from soil to ocean, its degradation associated with the release of greenhouse gases and a possible positive feedback to climate change as well as its overall effect on the biogeochemical carbon cycle in the Arctic are still rather unknown.

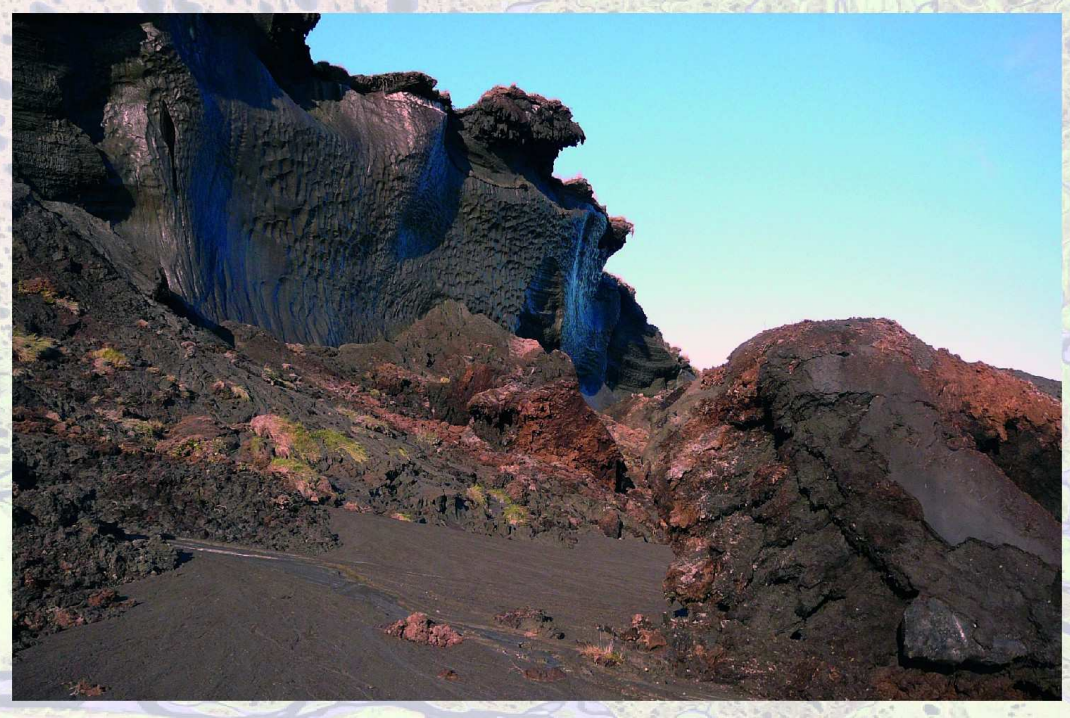

Photo: Coastal permafrost erosion on Muostakh Island, NE Siberia.
Background: Landsat 7 image of the Lena Delta. Source: NASA/JPL, http://earthasart.gsfc.nasa.gov/lena.html

Within the frame of my PhD research I use biomarkers to identify and characterize organic carbon sources in soils, river and marine sediments along a land-ocean transect in the Lena Delta and adjacent Laptev Sea, NE Siberia. Generally, biomarkers represent organic compounds that can be linked to molecules synthesized by specific organisms, e.g. terrestrial vascular plants or marine algae. In addition, I apply carbon isotope analysis ($\delta^{13}C$ & $\delta^{14}C$) of biomarkers to investigate their residence times in different carbon pools, turnover rates, and timescales of transport to the marine realm.

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