

Transport of old Terrigenous Organic Matter across the Arctic Land/Ocean Interface under a changing Climate

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The Arctic terrestrial ecosystems have accumulated vast amounts of soil organic carbon throughout much of the Holocene as organic carbon preservation exceeded decomposition. It is estimated that up to 25-45% of the world's soil organic carbon is stored in the north as poorly decomposed plant remains. Climate in the Arctic regions has warmed appreciably in the past 30 years and climate models all predict an amplified warming in the polar region. Evidence of the biogeochemical responses of arctic ecosystems to the climate/environmental changes includes: increasing river runoffs and material fluxes, accelerated permafrost degradation, and increased coastal erosion along the arctic coastal line. Under a warming condition, organic carbon currently stored in peatlands and permafrost zones in the high latitude regions could be remobilized and transported across the land/ocean interface through rivers and coastal erosion, altering carbon budget and biogeochemical processes in the Arctic Ocean. However, the quantities, transport mechanisms, and biogeochemical cycles of old terrigenous organic matter in the northern ecosystems under a changing climate remain poorly understood. The impact and biogeochemical consequences of on-going climate and environmental changes are still largely unknown. Knowledge of the fate and transport processes/mechanisms of the newly released old terrestrial organic carbon is required to quantify the role of rivers and coastal erosion in global carbon cycle and land/ocean interactions, and to provide better parameterizations of biogeochemical processes in carbon cycle and climate models. Using biogeochemical tracers, including stable isotope and radiocarbon, the source and transport of terrestrial organic carbon across the arctic land/ocean interface have been investigated. Results from rivers and coastal zone of Alaska and Siberia region and implications for global carbon cycle and environmental change will be presented.