



The fate of terrigenous dissolved organic carbon on the Eurasian shelves and export to the North Atlantic

Karl Kaiser, Rainer Amon, and Ronald Benner
United States (kaiserk@tamug.edu)

Dissolved lignin phenols, chromophoric dissolved organic matter (CDOM) absorption, and fluorescence were analyzed along cross-slope mooring locations in the Barents, Laptev, and East Siberian Seas to gain a better understanding of terrigenous dissolved organic carbon (tDOC) dynamics in Arctic shelf seas and the Arctic Ocean. A gradient of river water and tDOC was observed along the continental shelf eastward into the East Siberian Sea. Correlations of carbon-normalized yields of lignin-derived phenols supplied by Siberian rivers with river water fractions and known water residence times yielded in situ decay constants of 0.18–0.58 per year. Calculations showed about 50% of annual tDOC discharged by Siberian rivers was mineralized in estuaries and on the Eurasian shelves per year indicating extensive removal of tDOC. Bioassay experiments and in situ decay constants indicated a reactivity continuum for tDOC. CDOM parameters and acid/aldehyde ratios of vanillyl (V) and syringyl (S) lignin phenols showed biomineralization was the dominant mechanism for the removal of tDOC. Characteristic ratios of p-hydroxy (P), S, and V phenols (P/V, S/V) also identified shelf regions in the Kara Sea and regions along the Western Laptev Sea shelf where formation of Low Salinity Halocline Waters (LSHW) and Lower Halocline Water (LHW) occurred. The efficient removal of tDOC demonstrates the importance of Eurasian margins as sinks of tDOC derived from the large Siberian Rivers and confirms tDOC mineralization has a major impact on nutrients budgets, air-sea CO₂ exchange, and acidification in the Siberian Shelf Seas.