



Fate of terrestrial colored dissolved organic matter (CDOM) in the Arctic Ocean: exported or removed?

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Colored dissolved organic matter (CDOM) was measured with hydrographic parameters (salinity, $\delta^{18}\text{O}$ and inorganic nutrients) across Fram Strait. East Greenland Current (EGC) surface waters showed a pronounced CDOM absorption maximum between 30 and 120 m depth associated with both river and sea ice brine-enriched water, characteristic of polar mixed layer water and upper halocline water. Lowest CDOM was found in the Atlantic inflow within the West Spitsbergen Current (WSC). Although applied elsewhere in the Arctic, we show that the salinity-CDOM relationship not suitable for evaluating the mixing behavior of CDOM (conservative vs. non-conservative) in Fram Strait. The strong correlation between meteoric water and optical properties of CDOM are indicative of the terrigenous origin of CDOM in the EGC and marine origin in WSC. Based on CDOM absorption in Polar Water and comparison with an Arctic river discharge weighted mean, we estimate that a 68% integrated loss of CDOM absorption across 250-600 nm has occurred, with a preferential removal of absorption at longer wavelengths reflecting the loss of high molecular weight material. Budget calculations of CDOM exports through Fram Strait using modeled volume transports indicate that the net southward export of CDOM in Fram Strait equals to 8 to 14% of the total riverine CDOM inputs to the Arctic Ocean, thus physical export is not a major sink of CDOM. We propose that CDOM can aid in discriminating glacial melt waters from Arctic riverine freshwater on the east Greenland shelf.