

The composition and sources of DOC and POC during a spring freshet in a Canadian Arctic River

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Arctic Rivers transport vast amounts of terrestrial organic material to the Arctic Ocean each year. The spring freshet period is comprised of not only a strong and dynamic period of exportation of dissolved organic carbon (DOC), but also a significant amount of terrestrial particulate organic carbon (POC). The Great Whale River, in northern Quebec in North America, delivers up to 700 metric tons of DOC per day to the Hudson Bay during peak discharge, confirming the vast majority of the yearly export of DOC happens during this freshet period. Total terrestrial DOC and POC, as measured by polymeric lignin phenols ($\Sigma 8$), increase with increasing discharge throughout the spring freshet. The composition of terrestrial organic matter in the dissolved and particulate phases vary significantly before and during the freshet period, showing a shift in the quality of organic matter sources to the river throughout the freshet period (from highly degraded to relatively fresh). The terrestrial sources of dissolved and particulate organic carbon are distinctive throughout the freshet, suggesting a mobilization of two unique pools of carbon. POC polymeric lignin comprises an average of 22% of total lignin input into this river during the freshet period. Free lignin phenols, around 2% of total lignin in the river, are comprised of the exact same source signatures as polymeric lignin in the POC, signifying that they are mostly likely derived from dissolution of the particulate organic matter into the dissolved phase.