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## From pre-freshet to pre-freeze: a field survey of the fate of organic matter remobilized from the thawing permafrost to the coastal waters of the Mackenzie Delta region

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Thawing of permafrost in the Mackenzie Delta region of northern Canada, coupled with an increase in river discharge, prompts the release of particulate and dissolved organic matter from the largest Arctic drainage basin in North America into the Arctic Ocean. While this ongoing process is well-recognized and its rate is accelerating, the fate of the newly-mobilized organic matter as it transits from the watershed through the delta and into the marine system remains poorly understood. In the framework of the H2020 Nunataryuk project, and in partnership with ArcticNet and Sentinel North, we conducted intensive field expeditions in the Mackenzie Delta from April to September 2019. The temporal sampling scheme of this project allowed the investigation of ambient conditions in the coastal waters under a full ice cover prior to the spring freshet, during the ice break-up, in summer, as well as in fall prior to the freeze-up period. In order to capture the fluvial-marine transition zone and with specific challenges related to shallow waters and changing seasons, the field sampling was conducted using several platforms: helicopters, snowmobiles and small boats. Water column profiles of physical and optical variables were measured on site, and water and sediment samples were collected and preserved for the determination of the composition and sources of particulate and dissolved organic matter, as well as its biogeochemical cycling in the coastal environment. Beyond improving our understanding of the origin and fate of this re-mobilized organic matter, the data gathered will serve as a new basis for the ground truthing of remotely sensed images in a changing arctic environment. Finally, the tuned satellite data will be incorporated into numerical models, providing better predictions of the impacts of permafrost thaw on local biogeochemical cycling and ultimately on sea-air fluxes of carbon dioxide and global climate.

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