EGU2020-3094
https://doi.org/10.5194/egusphere-egu2020-3094
EGU General Assembly 2020

Detecting the signature and transformations of water from coastal permafrost thaw in the Beaufort Sea

Gwénaëlle Chaillou[1], Lauren Kipp[2], Frederik Bélanger[1], and Dustin Whalen[3]
[1]Institut des Sciences de la Mer de Rimouski, Université du Québec à Rimouski, Rimouski (QC), Canada (gwenaelle_chaillou@uqar.ca)
[2]Lamont-Doherty Earth Observatory of Columbia University, Palisades (NY), USA; Department of Oceanography, Dalhousie University, Halifax (NS), Canada (LKipp@dal.ca)
[3]Geological Survey of Canada Atlantic, Natural Resources Canada, Dartmouth (NS), Canada (dustin.whalen@canada.ca)

The Canadian Beaufort Sea is experiencing coastal erosion at unprecedent rates due to waves impacts and permafrost thaw. Water derived from permafrost thaw has profound impacts on coastal hydrogeology and carbon dynamics. The quality and volume of permafrost water (as surficial and groundwater) discharging to the ocean controls on coastal water chemistry and turbidity. These disturbances alter coastal ecosystems and endanger species with ecological, cultural, and economic value. Robust estimates of these solute and solid inputs are needed on a site-specific scale to obtain accurate regional and global estimations. However, the determination of appropriate endmembers to estimate these fluxes is not straightforward; and yet, little is known about the chemical composition and reactivity of carbon, nutrients and metals of water in coastal permafrost settings. The main objective here is to trace permafrost-derived solutes and study their transport and transformation to coastal water. Several coastal permafrost slumps were visited last summer in the Tuktoyaktuk Peninsula region. Melting-ice, surficial and groundwater were collected to systematically measure short-live isotopes (Rn-222, Ra-223, Ra-224), the stable isotopes of water ($\delta^{18}O$, δD), dissolved organic and inorganic carbon (DOC and DIC), chromophoric component of the organic matter (CDOM), total and non-carbonate alkalinity. In front of these systems, surface seawater samples were collected to 1 to 2 km from the shore to trace these chemical inputs to the coastal ocean. Preliminary results will be presented with a specific focus on the geochemical signature of waters at the nearshore. This project is a part of the WP4 Nunataryuk Program, in collaboration with Natural Resources Canada