ANNUAL REPORT ON GEOTRACES ACTIVITIES IN CANADA

May 1st, 2024 to April 30th, 2025

New GEOTRACES or GEOTRACES relevant scientific results

- Anderlini et al. (PhD thesis, UVic) showed that trace metal signatures of sediment-water interactions over the Chukchi shelf are preserved over the Mackenzie shelf, through the Beaufort Sea, and into the Amundsen Gulf. While this signature is lost in the shallow and turbulent waters of the Canadian Arctic Archipelago, evidence of it is found in the northern- and western-most regions of Nares Strait, indicating the transit of this Pacific-derived Arctic water mass across the high Arctic.
- Bannon et al, in press, showed that cobalamin co-limits springtime phytoplankton growth in the Northwest Atlantic and that microbial interactions prevent cobalamin co-limitation in the Fall.
- Jabre et al, submitted, Nature Geoscience, showed that metaproteomics and particulate metal measurements can be combined to quantitatively apportion metal use to specific microbial metabolisms in the Southern Ocean. Collaboration between Bertrand Lab, Dalhousie and Middag Lab, NIOZ, Netherlands

GEOTRACES or GEOTRACES relevant cruises

- Canadian Antarctic Expedition, HMCS *Margaret Brooke*, March 2025. How regional warming affects the mobility of trace metals in, particularly in relation to glacial melt and coastal erosion, in the South Shetland Islands. Contact: J. Cullen, T. Anderlini
- REFUGE-ARCTIC, a large international consortium of researchers in Canada and France, including collaborations with the USA and Denmark, studying how changing sea ice and the hydrological cycle in the Canadian Arctic Archipelago from Baffin Bay to the Lincoln Sea is affecting physical, chemical and biological fields. First field work occurred on CCGS Amundsen in Summer and Fall 2024. Contact and Chief Scientist: Mathieu Ardyna. Cruise report: https://amundsenscience.com/wp-content/uploads/2025/04/Expedition-Report-2024-Final2.pdf
- The Transforming Climate Action Canada First Research Excellence (TCA- CFREF) program is examining carbon and climate processes, including the roles of metals, in the North Atlantic and Arctic Gateway as part of its efforts to reduce uncertainty in the North Atlantic and Arctic Gateway carbon sink from 2024-2029. Contacts: Jean-Éric Tremblay, Erin Bertrand.
    - First field work occurred in Oct 2024 aboard CCGS Amundsen (Baffin Bay), chief scientist J.E. Tremblay, and April-May 2025 aboard R/V L'Atalante (Labrador Sea), chief scientists M. Ringuette and E. Bertrand

New GEOTRACES or GEOTRACES-relevant publications (published or in press) *(If possible, please identify those publications acknowledging SCOR funding)*

R. Mangahas, A. Bertram, D. Weis, J. T. Cullen, M.T. Maldonado. Spatiotemporal trends of aerosol provenance and trace metal concentrations in the northeast subarctic Pacific Ocean\. Science of the Total Environment. March 2025 https://doi.org/10.1016/j.scitotenv.2025.178885

M Mills, JT Cullen, J Spence, PA Rafter, S Mihaly, LA Coogan. Tracking hydrothermal particles from the ridge axis to the sediment column along the Endeavour segment of the Juan de Fuca Ridge. Marine Geology 478, 107432

B. Rogalla, S. E. Allen, M. Colombo, P. G. Myers, K. J. Orians. Modelling Dissolved Pb Concentrations in the Western Arctic Ocean: The Continued Legacy of Anthropogenic Pollution JGR Oceans, April 2025 https://doi.org/10.1029/2025JC022415

S. A. Rose, B. M. Robicheau, J. Tolman, D. Fonseca-Batista, E. Rowland, D. Desai, J. M. Ratten, E. J. H. Kantor, A. M. Comeau, M. I. G. Langille, J. Jerlström-Hultqvist, E. Devred, G. Sarthou, E. M. Bertrand, J. LaRoche. Nitrogen-fixation in the widely distributed novel marine γ-proteobacterial diazotroph Candidatus Thalassolituus haligoni. Science Advances, July 2024 DOI: 10.1126/sciadv.adn1476

C. Bannon, P. White, E. Rowland, K. More, A. Gleason, M. Roberts, E. Devred, L. Beazley, J. LaRoche, E. Bertrand. Seasonal patterns in B-vitamins and cobalamin co-limitation in the Northwest Atlantic. In Press, Limnology and Oceanography

P.L. White, E. M. Bertrand, J. S Spence, M. A Cavaco, C. Parrott, S. Waterman, E. Rowland, M. E Roberts, T. Noah, T. Mellett, D. Hallé, A. K Hamilton, R. M Bundy, D. Didier, M. P Bhatia. Shifting phytoplankton ecological strategies along a continuum of tidewater glacier retreat. March 2025. ISME Communications.

I. Baconnais, C. Holmden. Shelf-to-basin shuttle of highly fractionated chromium isotopes in the Arctic Ocean. Geochimica et Cosmochimica Acta. Volume 387, 15 December 2024, Pages 83-97

Burgers, T. M., Azetsu-Scott, K., Myers, P.G., Else, B. G. T., Miller, L. A., Rysgaard, S., et al. (2024). Unraveling the biogeochemical drivers of aragonite saturation state in Baffin Bay: Insights from the west Greenland continental shelf. Journal of Geophysical Research: Oceans, 129, e2024JC021122. https://doi.org/10.1029/2024JC021122

Completed GEOTRACES PhD or Master theses *(please include the URL link to the pdf file of the thesis, if available)*

Anderlini, Tia. March 2025. A characterization of trace metal distributions in Canada's Pacific and Arctic marine waters. University of Victoria. Supervisor: J. Cullen https://dspace.library.uvic.ca/items/a4940b35-30cd-442a-b1bc-390c9de643c6

Bannon, Catherine. June 2024. COBALAMIN AND OTHER B-VITAMINS IN THE NORTHWEST ATLANTIC OCEAN. Dalhousie University. Supervisor: E. Bertrand

Submitted by Erin Bertrand erin.bertrand@dal.ca