

# SHILLER LAB ARCTIC GEOTRACES SYNTHESIS UPDATE

OSM February 16, 2020

Laura M. Whitmore, Alan M. Shiller

- Projects:
  - Vanadium
  - Gallium
  - Barium
  - Methane
- Recent Collaborations:
  - **US GEOTRACES:** *Tristan J Horner, Robert Rember, Yang Xiang, Phoebe J Lam, Peter Morton, Benjamin Twining, Angelica Pasqualini, Robert Newton*
  - **European GEOTRACES:** *Dorothea Bauch, H el ene Planquette, Loes Gerringa*
  - **Canada GEOTRACES:** *Helmuth Thomas, Chantal Mears, Frank Dehairs, Maite Maldonado, Jingxuan Li, Manuel Colombo, Kristin Orians*

# VANADIUM



Vanadium cycling in the Western Arctic Ocean is influenced by shelf-basin connectivity

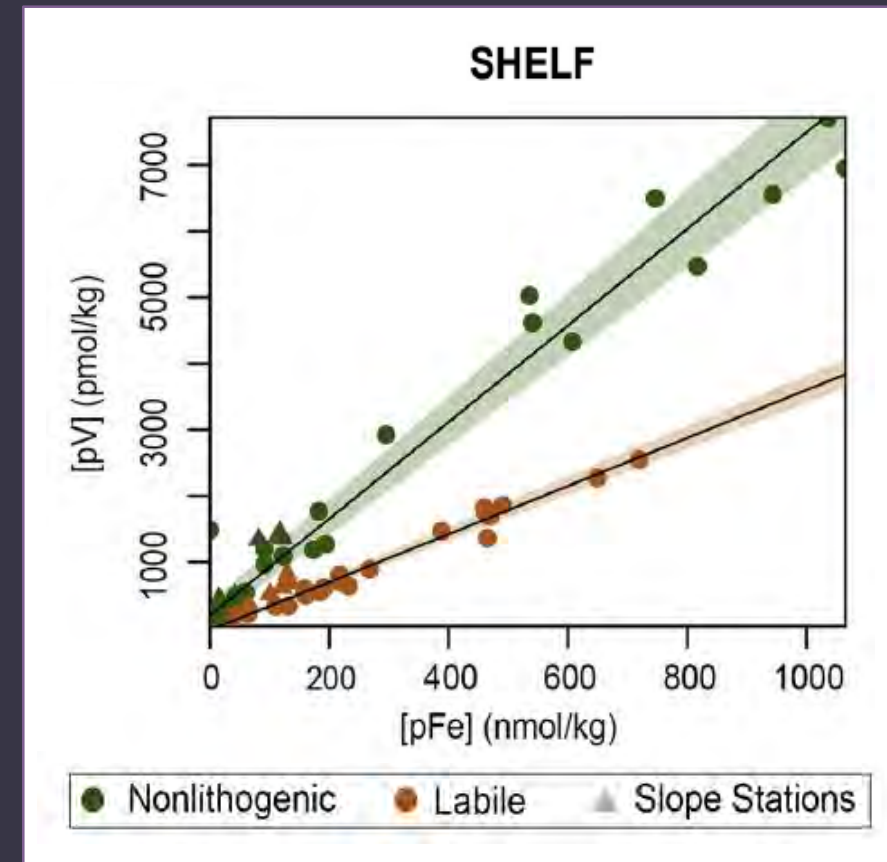
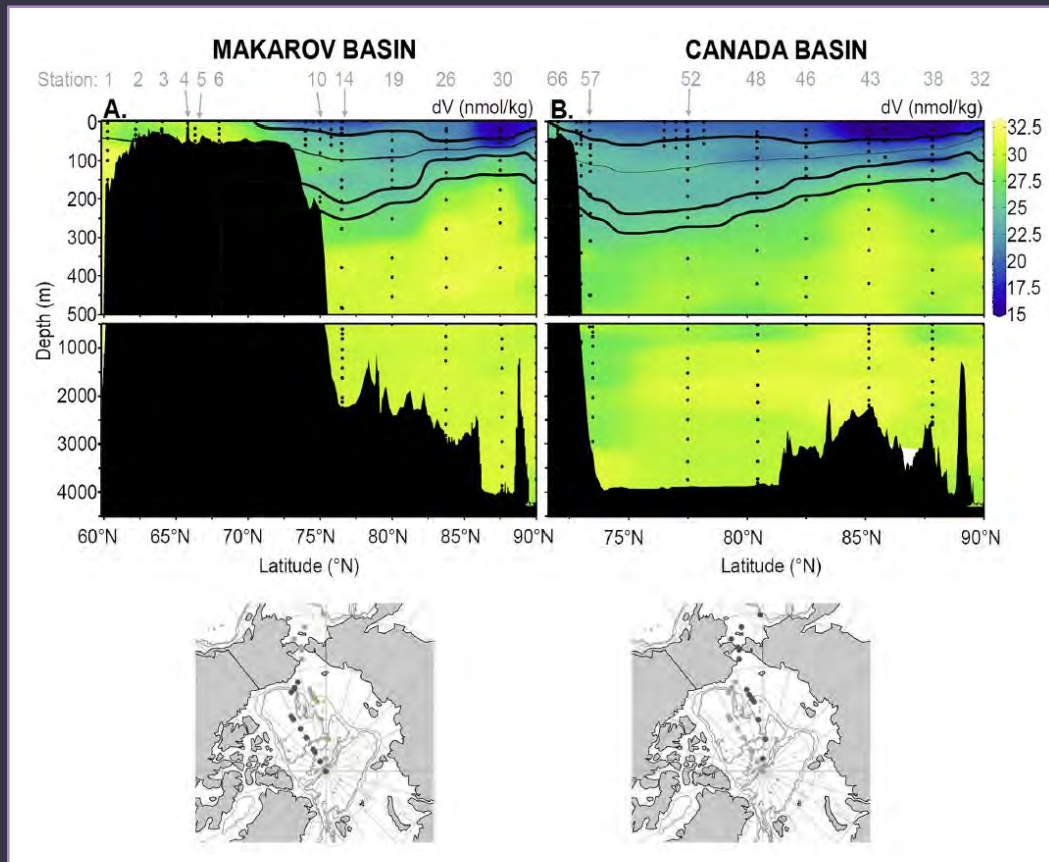


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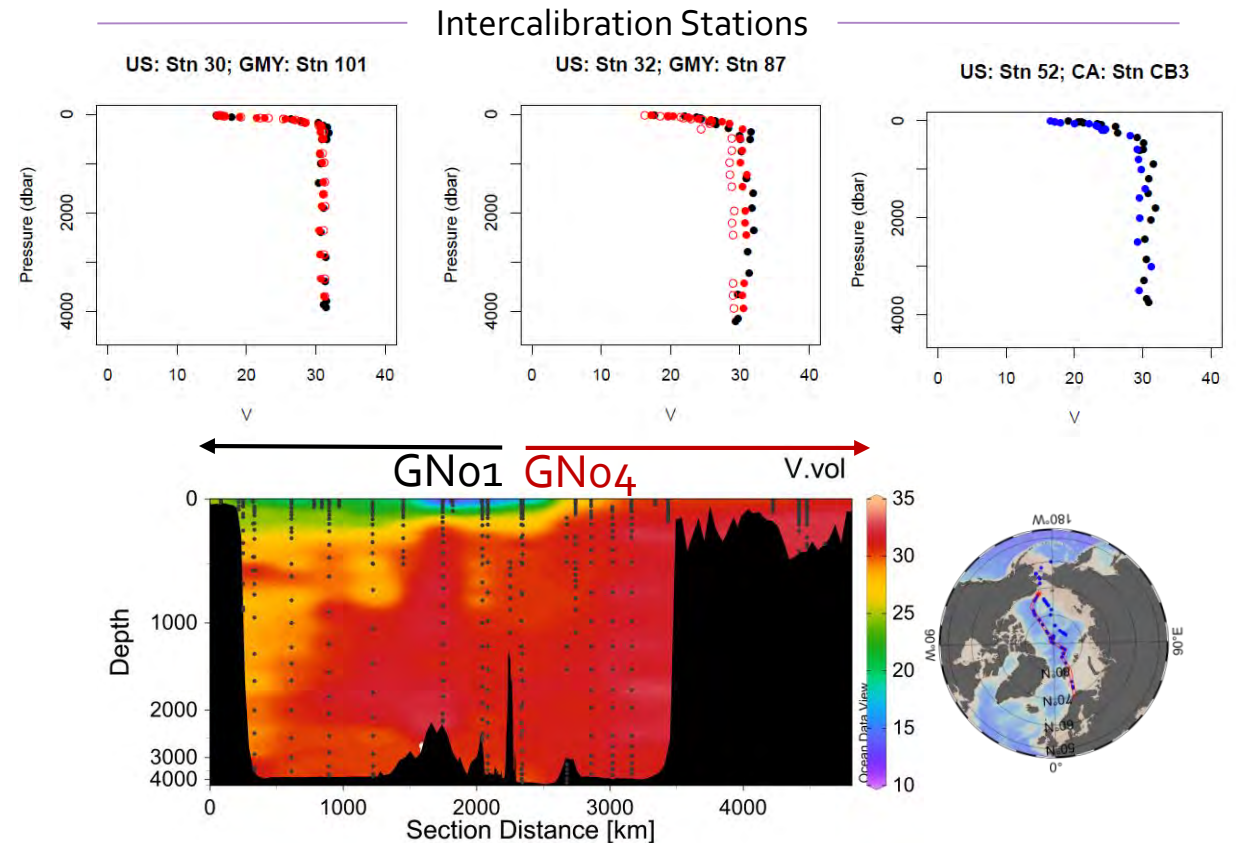


# VANADIUM: LOOKING FORWARD

In 2018/2019 we analyzed samples from GNo2/03 and GNo4.  
(*Loes Gerringa and Kristin Orians*)

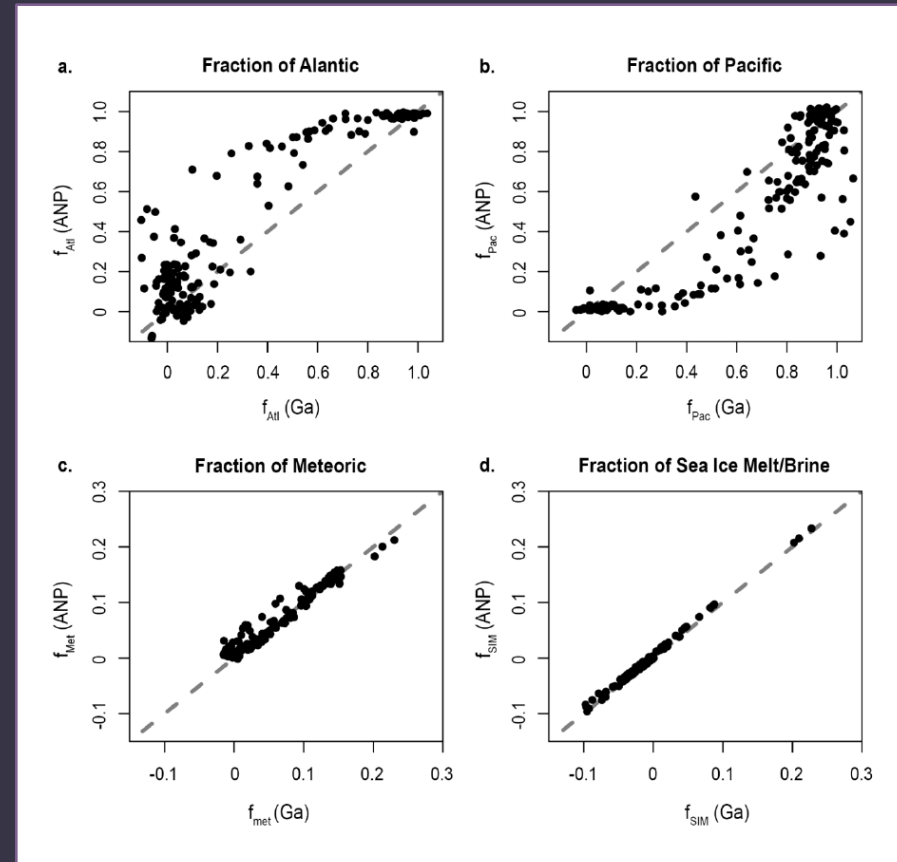
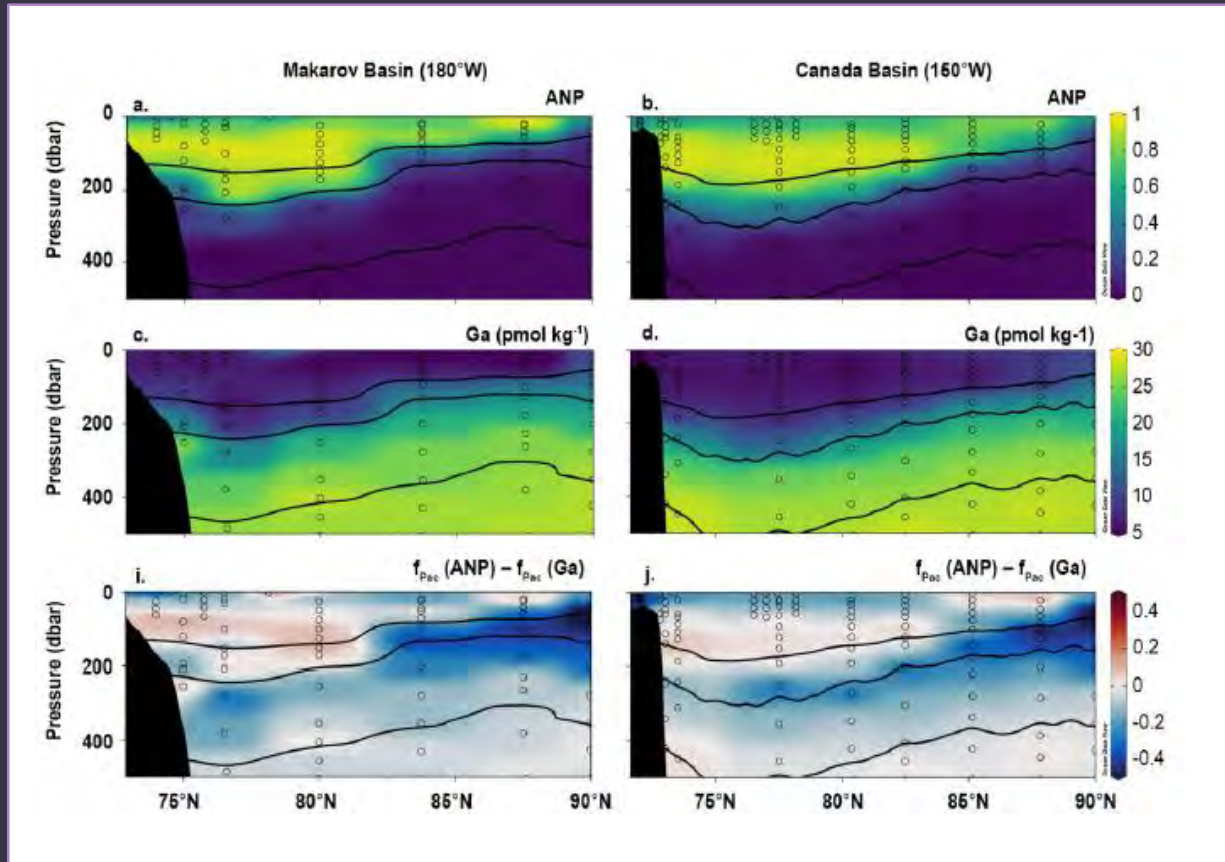
We also have additional V data from the Barents Sea in 2016.

**Comparison of Barents Sea shelf data to Bering Sea and Chukchi Sea data allows us to investigate the scope of shelf influence.**



# GALLIUM

Whitmore, L. M., Pasqualini, A., Newton, R., & Shiller, A. M. (2020). Gallium: A new tracer of Pacific water in the Arctic Ocean. *Journal of Geophysical Research: Oceans*, 124, e2019JC015842. <https://doi.org/10.1029/2019JC015842>



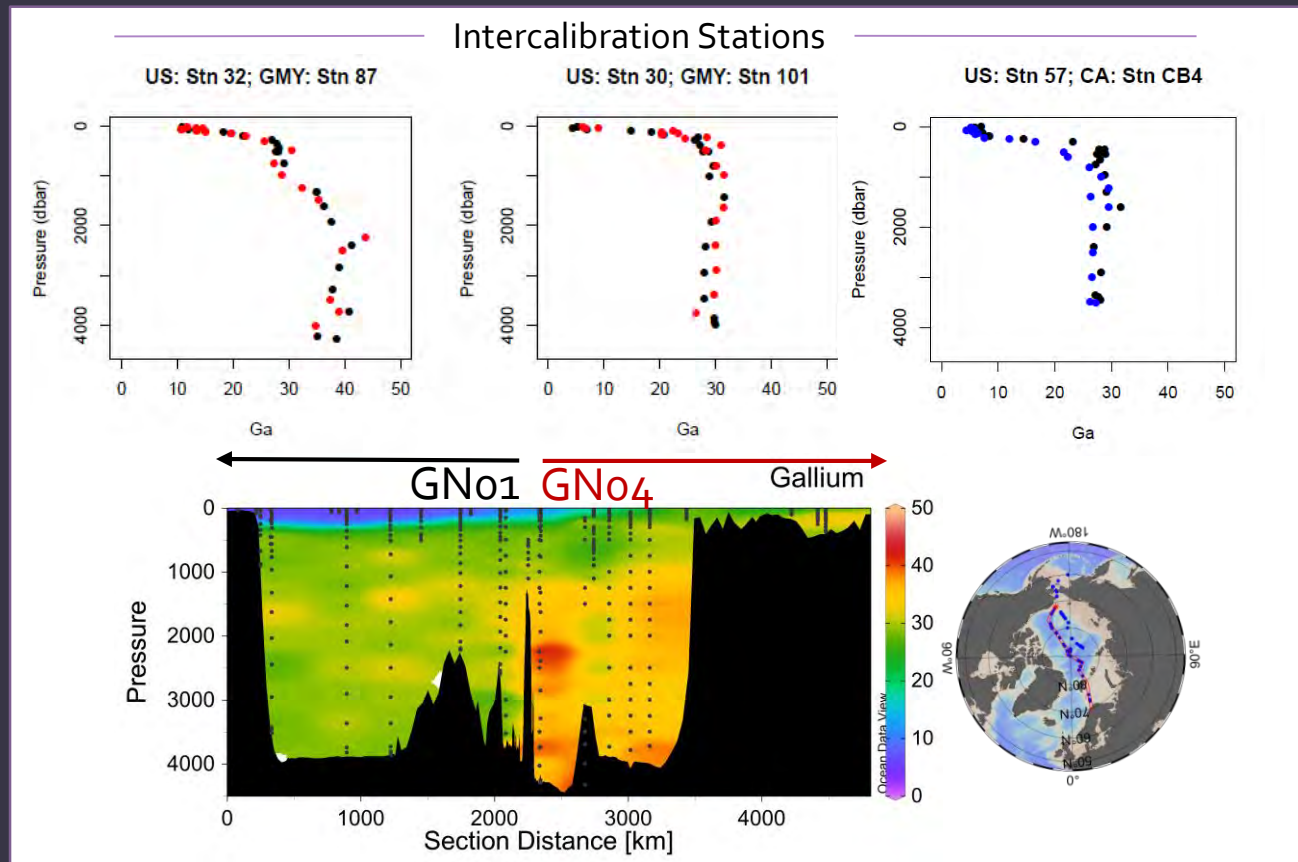
# GALLIUM: LOOKING FORWARD

We are currently analyzing samples from the GNo<sub>4</sub> expedition.  
(Loes Gerringa)

Columbo & Orians have Ga from the GNo<sub>2/03</sub> expeditions.

**With this data, we can press the limits of using Ga as a tracer and identify the scope of potential non-conservative behavior.**

*Measures and Hatta Al Data?*



# BARIUM: Submitted

Ocean Sciences Presentation: CT12A-o8

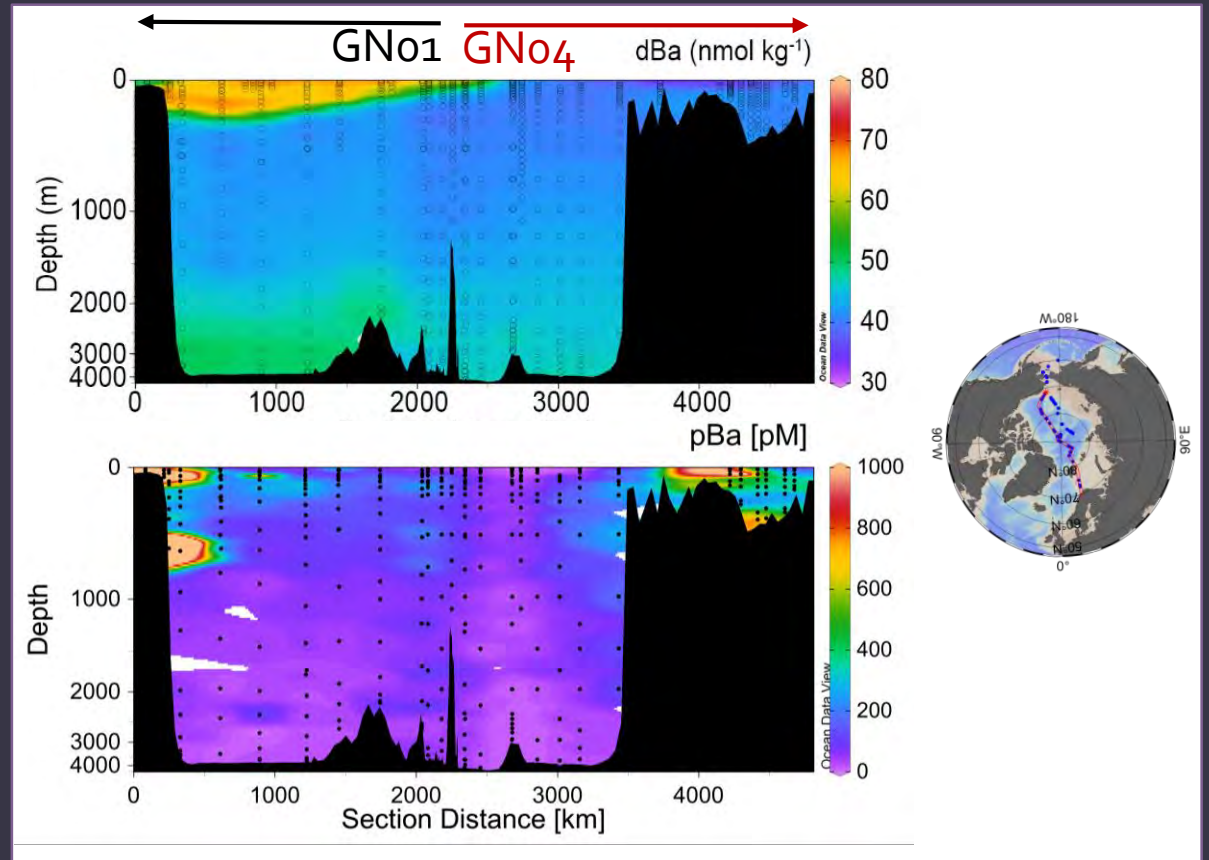
Whitmore, L.M.\*, A.M. Shiller\*, T. Horner, Y. Xiang, M.E. Auro, D. Bauch, F. Dehairs, P. Lam, J. Li, M. Maldonado, C. Mears, R. Newton, A. Pasqualini, H. Planquette, R. Rember, H. Thomas. Strong margin influence on the Arctic Ocean barium cycle revealed by Pan-Arctic synthesis. Submitted to Journal of Geophysical Research-Oceans: 2021JCo17417. Preprint: doi.org/10.1002/essoar.10506680.1

GNo1: Alan Shiller, Phoebe Lam, Yang Xiang, Angelica Pasqualini, Bob Newton, Tristan Horner

GNo2/3: Helmuth Thomas, Frank Dehairs, Chantal Mears, Maite Maldonado, Jingxuan Li

GNo4: Rob Rember, Dorothea Bauch, H el ene Planquette

**Shelf inputs are a substantial part of the Ba budget in the Arctic Ocean.**



# THINKING FORWARD

- Halocline
- Deep Water

**JGR Oceans**

Research Article | [Full Access](#)

**Shelf-Basin Interactions and Water Mass Residence Times in the Western Arctic Ocean: Insights Provided by Radium Isotopes**

Lauren E. Kipp , David C. Kadko, Robert S. Pickart, Paul B. Henderson, Willard S. Moore, Matthew A. Charette

First published: 26 April 2019 | <https://doi.org/10.1029/2019JC014988> | Citations: 1

 **Geochimica et Cosmochimica Acta**   
Volume 258, 1 August 2019, Pages 258-273

**Dissolved cadmium and cadmium stable isotopes in the western Arctic Ocean**

Ruifeng Zhang <sup>a, b</sup> , Laramie T. Jensen <sup>c</sup>, Jessica N. Fitzsimmons <sup>c</sup>, Robert M. Sherrell <sup>d</sup>, Seth John <sup>b</sup>

**Global Biogeochemical Cycles**

Research Article | [Full Access](#)

**Biogeochemical Cycling of Dissolved Zinc in the Western Arctic (Arctic GEOTRACES GN01)**

L. T. Jensen, N. J. Wyatt, B. S. Twining, S. Rauschenberg, W. M. Landing, R. M. Sherrell, J. N. Fitzsimmons 

First published: 15 February 2019 | <https://doi.org/10.1029/2018GB005975> | Citations: 1

**Geophysical Research Letters**

Research Letter | [Full Access](#)

**Discrepancy in the Identification of the Atlantic/Pacific Front in the Central Arctic Ocean: NO Versus Nutrient Relationships**

Matthew B. Alkire , Robert Rember, Igor Polyakov

First published: 21 March 2019 | <https://doi.org/10.1029/2018GL081837> | Citations: 2



**JGR Oceans**

Research Article | [Full Access](#)





**On the Properties of the Arctic Halocline and Deep Water Masses of the Canada Basin from Nitrate Isotope Ratios**

Julie Granger , Daniel M. Sigman, Jonathan Gagnon, Jean-Eric Tremblay, Alfonso Mucci

First published: 17 July 2018 | <https://doi.org/10.1029/2018JC014110> | Citations: 4

 **Marine Chemistry**   
Volume 216, 20 October 2019, 103686

**Distribution of mercury species in the Western Arctic Ocean (U.S. GEOTRACES GN01)**

Alison M. Agather <sup>a, b, c</sup> , Katlin L. Bowman <sup>b, c</sup> , Carl H. Lamborg <sup>b, c</sup> , Chad R. Hammerschmidt <sup>a, c</sup> 

...and more (+ submitted)