

SUPPLEMENTARY MATERIALS FOR

ADVANCES IN UNDERSTANDING THE MARINE NITROGEN CYCLE IN THE GEOTRACES ERA

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TABLE S1. Newly published data sources for Figure 2.

OCEAN BASIN	APPROX. LATITUDE	APPROX. LONGITUDE	CRUISE ID (YEAR)	REFERENCE
Indian Ocean	35°S	27°E	ASCA (2016)	Marshall et al., 2023
Indian Ocean	35°S	27°E	ASCA (2018)	Marshall et al., 2023
Indian Ocean	17°S	35°E	IIOE-2 (2017)	Marshall et al., 2023
Indian Ocean	35°S	40°E	GEOTRACES-SWINGS (2021)	Marshall et al., 2023
Atlantic Ocean	10°S	12°E	MET131 (2007)	Marshall et al., 2022
Atlantic Ocean	31°S	18°E	IEP (2017)	Flynn et al., 2020
Atlantic Ocean	34°S	9°E	SAMBA (2017)	Granger et al., 2023
Atlantic Ocean	28°N	90°W	NF1704 (2017)	Knapp et al., 2021
Atlantic Ocean	28°N	90°W	NF1802 (2018)	Knapp et al., 2021
Atlantic Ocean	28°N	90°W	PE18-23 (2011-2018)	Knapp et al., 2019
Atlantic Ocean	28°N	25°W	GA11 (2010)	GEOTRACES IDP Group, 2023
Atlantic Ocean	65°N	60°W	GN02 (2015)	Lehmann et al., 2019
Atlantic Ocean	65°N	60°W	GN03 (2015)	Lehmann et al., 2022
Southern Ocean	65°S	55°E	WSE (2019)	Flynn, 2022
Southern Ocean	50°S	95°E	ACE-1 (2016)	Thomas, et al. 2023
Pacific Ocean	20°S	165°W	OUTPACE (2015)	Knapp et al., 2018
Pacific Ocean	20°S	175°W	TONGA (2019)	Forrer et al., 2023
Pacific Ocean	20°S	165°W	TONGA RECUP (2020)	Forrer et al., 2023
Arctic Ocean	60°–90°N	160°W	HLY1502-GN01 (2015)	Hastings and Granger, 2019

REFERENCES

- Flynn, R.F., J. Granger, J.A. Veitch, S. Siedlecki, J.M. Burger, K. Pillay, and S.E. Fawcett. 2020. On-shelf nutrient trapping enhances the fertility of the southern Benguela upwelling system. *Journal of Geophysical Research: Oceans* 125:e2019JC015948, <https://doi.org/10.1029/2019JC015948>.
- Flynn, R.F. 2023. *Phytoplankton's Role in the Biological Pump During the Growth Season Across the Atlantic Southern Ocean*. Doctoral dissertation, University of Cape Town.
- Forrer, H.J., S. Bonnet, R.K. Thomas, O. Grosso, C. Guieu, and A.N. Knapp. 2023. Quantifying N₂ fixation and its contribution to export production near the Tonga-Kermadec Arc using nitrogen isotope budgets. *Frontiers in Marine Science* 10:1249115, <https://doi.org/10.3389/fmars.2023.1249115>.
- GEOTRACES Intermediate Data Product Group. 2023. The GEOTRACES Intermediate Data Product 2021v2 (IDP2021v2). The GEOTRACES Intermediate Data Product 2021v2 (IDP2021v2). NERC EDS British Oceanographic Data Centre NOC, <https://doi.org/10.5285/ff46f034-f47c-05f9-e053-6c86abc0dc7e>.
- Granger, R., S.M. Smart, A. Foreman, A. Martínez-García, A. Auderset, E. Campbell, T. Marshall, G.H. Haug, D.M. Sigman, and S.E. Fawcett. 2023. Southeast Atlantic nitrate isotope data from winter 2017 [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7648606>.
- Hastings, M., and J. Granger. 2019. Nitrate (NO₃⁻), ammonium (NH₄⁺), and oxygen & deuterium isotopic composition from snow collected on the US GEOTRACES Arctic cruise (HLY1502) from August to October 2015. Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version 1, Version Date 2019-01-22. <https://www.bco-dmo.org/dataset/753356>.
- Knapp, A. 2019. Water column nitrate + nitrite δ¹⁵N and δ¹⁸O from samples collected during R/V *Pelican* and R/V *F.G. Walton Smith* cruises in the Gulf of Mexico and Florida Straits between 2011 and 2018. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2019-11-21. <https://doi.org/10.1575/1912/bco-dmo.782518.1>.
- Knapp, A.N., and M.R. Landry. 2021. Nutrients, nitrate isotopes, and DON isotopes data from samples collected in the Gulf of Mexico on R/V *Nancy Foster* cruises NF1704 and NF1802 in May 2017 and May 2018. Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version 1, Version Date 2020-12-31. <https://doi.org/10.26008/1912/bco-dmo.834984.1>.
- Knapp, A., K. McCabe, O. Grosso, N. Leblond, T. Moutin, and S. Bonnet. 2018. Water column nitrate + nitrite δ¹⁵N measurements from R/V *L'Atalante* in the southwest Pacific Ocean between New Caledonia and Tahiti from February to March 2015. Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version 2018-04-11, Version Date 2018-04-11, <https://doi.org/10.1575/1912/bco-dmo.733303>.
- Lehmann, N., M. Kienast, J. Granger, A. Bourbonnais, M.A. Altabet, and J. Tremblay. 2019. Remote western Arctic nutrients fuel remineralization in deep Baffin Bay. *Global Biogeochemical Cycles* 33(6):649–667, <https://doi.org/10.1029/2018GB006134>.
- Lehmann, N., M. Kienast, J. Granger, and J. Tremblay. 2022. Physical and biogeochemical influences on nutrients through the Canadian Arctic Archipelago: Insights from nitrate isotope ratios. *Journal of Geophysical Research: Oceans* 127:e2021JC018179, <https://doi.org/10.1029/2021JC018179>.
- Marshall, T.A., J. Granger, K.L. Casciotti, K. Dähnke, C.-K. Emeis, D. Marconi, M. McIvin, A. Noble, M. Saito, D.M. Sigman, and S.E. Fawcett. 2022. The Angola Gyre is a hotspot of dinitrogen fixation in the South Atlantic Ocean. *Nature Communications Earth & Environment* 3(151), <https://doi.org/10.1038/s43247-022-00474-x>.
- Marshall, T.A., D.M. Sigman, L.M. Beal, A. Foreman, A. Martínez-García, S. Blain, E. Campbell, F. Fripiat, R. Granger, E. Harris, and others. 2023. The Agulhas Current transports signals of local and remote Indian Ocean nitrogen cycling. *Journal of Geophysical Research: Oceans* 128:e2022JC019413, <https://doi.org/10.1029/2022JC019413>.
- Thomas, R.K., A.N. Knapp, and S.E. Fawcett. 2023. Nitrate plus nitrite isotopic compositions from Leg 1 of the Antarctic Circumnavigation Expedition (ACE) research cruise onboard the R/V *Akademik Treshnikov* from December 2016 to January 2017. Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version 1, Version Date 2023-07-18, <https://doi.org/10.26008/1912/bco-dmo.904358.1>.