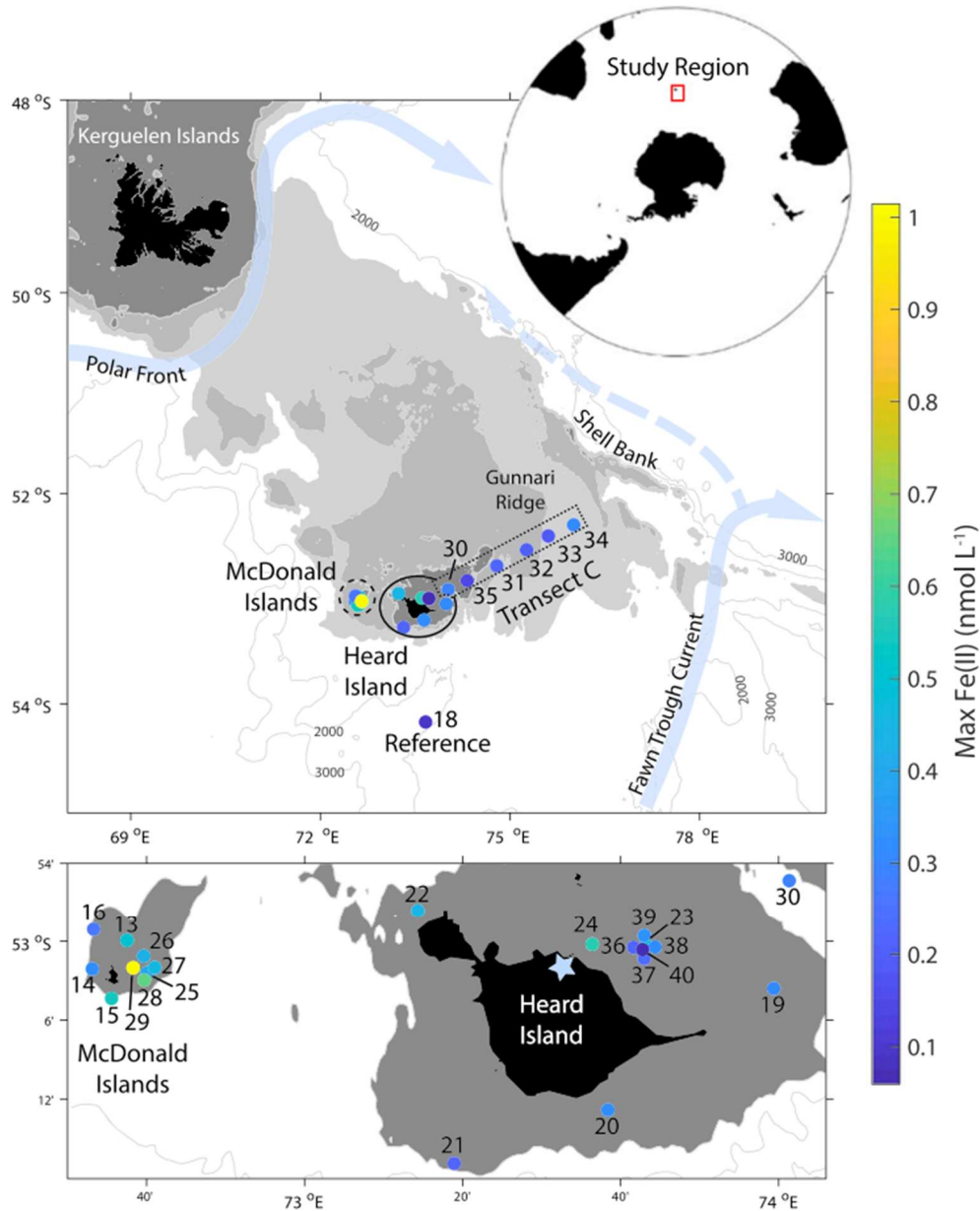


ANNUAL REPORT ON GEOTRACES ACTIVITIES IN AUSTRALIA

April 1st, 2019 to April 30th, 2021

New GEOTRACES or GEOTRACES relevant scientific results



New research by Holmes et al. (2020) highlights results of Fe(II) measurements from GEOTRACES process study (GIpr05) around Heard and McDonald Islands on the Kerguelen Plateau in the Southern Indian Ocean. The authors report very high concentrations of Fe(II) in the vicinity of the islands (see figure above from the paper), amounting to nearly 30% of total dissolved Fe at some stations. Based on a negative correlation with salinity, elevated Fe(II) north of Heard Island is attributed to a sea-terminating glacier on the island. Elevated Fe(II) around McDonald Islands is attributed to shallow diffuse hydrothermalism. These multiple sources of Fe(II), and the implied slower oxidation kinetics, may be an important source of iron to support the large bloom that occurs in the broader Kerguelen Plateau

GEOTRACES or GEOTRACES relevant cruises

- GIpr10: SOLACE (Southern Ocean Large Areal Carbon Export) Voyage, IN2020_V08. Southern Ocean (~140E; 47S to 55S), 04 December 2020 – 15 January 2021
- GIpr08: SOTS (Southern Ocean Time Series) Voyage, IN2021_V02, 14 April 2021 – 28 April 2021

Outreach activities conducted

The SOLACE voyage (GIpr10) website has blogs and other information: <https://aappartnership.org.au/solace/>

Other GEOTRACES activities

- The first 230Th, REE and Nd isotopic composition data from Australia have been submitted to the IDP2021.
- Hydrochemistry data have been submitted for all Australian GEOTRACES voyages.

New GEOTRACES or GEOTRACES-relevant publications (published or in press)

- Ellwood, M.J., Strzepek, R., Chen, X., Trull, T.W., Boyd, P.W. (2020). Some observations on the biogeochemical cycling of zinc in the Australian sector of the Southern Ocean: a dedication to Keith Hunter. *Marine and Freshwater Research* 71, 355-373.
- Holmes, T. M., Wuttig, K., Chase, Z., Schallenberg, C., van der Merwe, P., Townsend, A. T., & Bowie, A. R. (2020). Glacial and hydrothermal sources of dissolved iron (II) in Southern Ocean waters surrounding Heard and McDonald Islands. *Journal of Geophysical Research: Oceans*, 125(10), e2020JC016286. [4 ECRs]
- Ito, A., Perron, M.M.G., Proemse, B.C. et al. Evaluation of aerosol iron solubility over Australian coastal regions based on inverse modeling: implications of bushfires on bioaccessible iron concentrations in the Southern Hemisphere. *Prog Earth Planet Sci* 7, 42 (2020). <https://doi.org/10.1186/s40645-020-00357-9> [4 ECRs]
- Latour, P., Wuttig, K., van Der Merwe, P., Strzepek, R. F., Gault-Ringold, M., Townsend, A. T., Corkill, M. & Bowie, A. R. (2021). Manganese biogeochemistry in the Southern Ocean, from Tasmania to Antarctica. *Limnology and Oceanography*. [5 ECRs]
- Menzel Barraqueta, J. L., Samanta, S., Achterberg, E. P., Bowie, A. R., Croot, P., Cloete, R., ... & Roychoudhury, A. N. (2020). A first global oceanic compilation of observational dissolved aluminum data with regional statistical data treatment. *Frontiers in Marine Science*, 7, 468. [2 ECRs]
- Sieber, M., Conway, T.M., de Souza, G.F., Hassler, C.S., Ellwood, M.J., Vance, D. (2021). Isotopic fingerprinting of biogeochemical processes and iron sources in the iron-limited surface Southern Ocean. *Earth and Planetary Science Letters* 567, 116967. [1 ECR]
- Yoshida, K., Seger, A., Karsh, K., Corkill, M., Heil, P., McMinn, A., & Suzuki, K. (2021). Low Fe availability for photosynthesis of sea-ice algae: Ex situ incubation of the ice diatom *Fragilariopsis cylindrus* in low-Fe sea ice using an ice tank. *Frontiers in Marine Science*, 8, 221 [2 ECRs]

Completed GEOTRACES PhD or Master theses

- Luis Duprat - Role of Sea Ice as a Biogeochemically Active Reservoir of Iron and Other Trace Metals. PhD submitted in December 2020. Supervisors D. Lannuzel and K. Meiners. The University of Tasmania.
- Cristina Genovese - Role of iron-binding organic ligands in the distribution of dissolved iron in Antarctic sea ice. PhD accepted in July 2020. Supervisors D. Lannuzel, K. Wuttig, A. Townsend, S. Moreau, The University of Tasmania.
- Christopher Traill - Lithogenic particle flux to the subantarctic Southern Ocean: a multi-tracer estimate using sediment trap samples. Masters thesis. Supervisors M Perron, Z. Chase and A. Bowie. The University of Tasmania.

GEOTRACES presentations in international conferences

- Dust and pyrogenic iron boost phytoplankton blooms in sub-Antarctic waters of the Tasman Sea. Joan Llort, Richard J. Matear, Pete G. Strutton, Andrew R. Bowie, and Zanna Chase; EGU 2020

Submitted by Zanna Chase (zanna.chase@utas.edu.au).