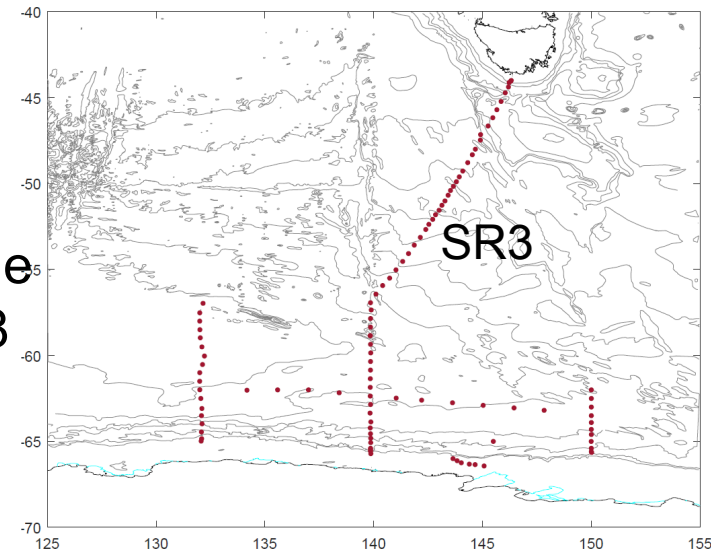


Australia 2017-2018 report

Cruises:

1. Two transit voyages completed around Australia under the project “Natural iron fertilisation of oceans around Australia: linking terrestrial dust and bushfires to marine Biogeochemistry” (PI Bowie) provided GEOTRACES compliant aerosol data. 2017
2. Australian SR3-GEOTRACES section voyage in the Southern Ocean, GS01. Jan/Feb 2018 (GEOTRACES PI Bowie)
3. SOTS time series “Subantarctic Biogeochemistry of Carbon and Iron, Southern Ocean Time Series site”, Gprl08. March 2018. GEOTRACES PIs Boyd, Bowie and Ellwood



Australia 2017-2018 report

Outputs:

- 17 publications

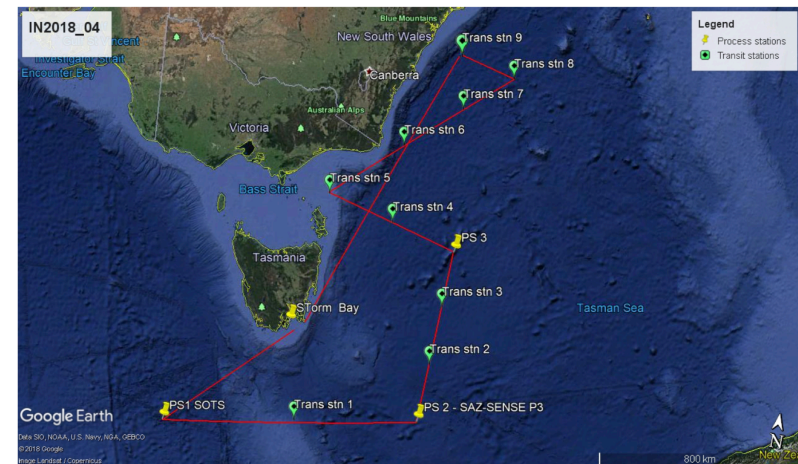
New projects and/or funding:

- Ellwood M, Boyd PW, Bowie AR, Chase Z, Abbot A, Constraining external iron inputs and cycling in the southern extension of the East Australian Current, Southern Ocean Time Series site, CSIRO Marine National Facility, \$2875k (in kind)
- van der Merwe, Bowie Trull, Integration and testing of clean water sampler on ARC Antarctic Gateway Partnership Autonomous Underwater Vehicle (AUV) 'nupiri muka' (\$8256 cash)
- Chase, Meissner, Bostock, Ren and Sikes. The Southern Ocean's response to abrupt climate change, Australian Research Council \$385,650

Australia 2017-2018 report

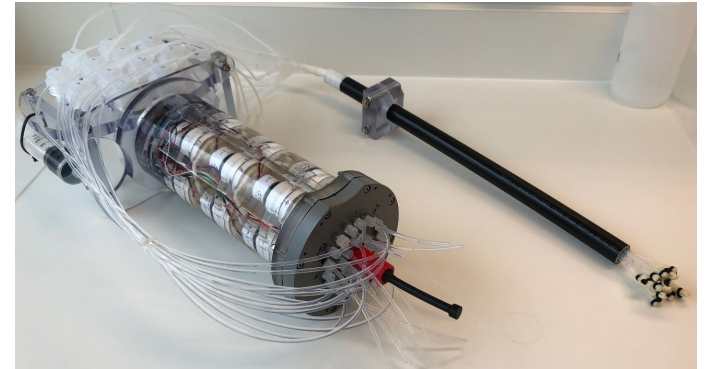
Up coming voyages (next 12 months, all on R/V Investigator):

- Constraining external iron inputs and cycling in the southern extension of the East Australian Current. IN2018_V04. GPpr13. Sept/Oct 2018 Michael Ellwood, GEOTRACES PI.
- The availability of Antarctic krill to large predators and their role in biogeochemical recycling in the Southern Ocean. IN2019_V01. January 2019. PI Stephen Nicol
- Southern Ocean Time Series, Glpr08. IN2019_V02. March 2019. Philip Boyd, GEOTRACES PI



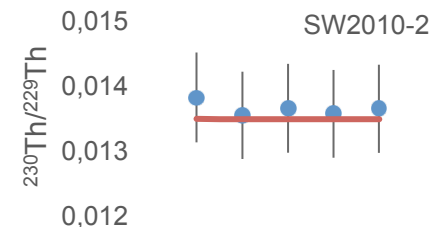
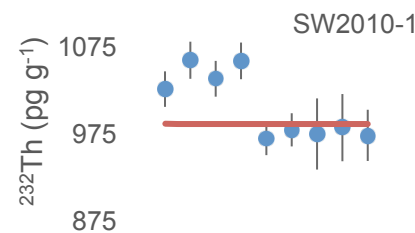
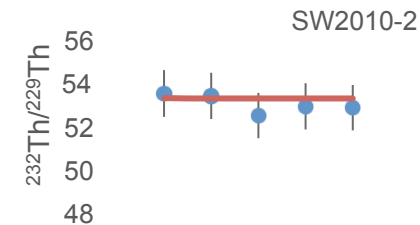
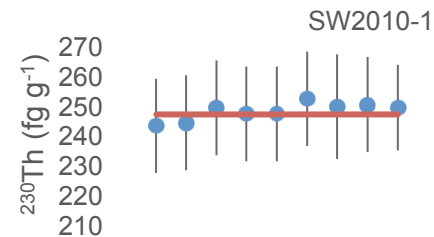
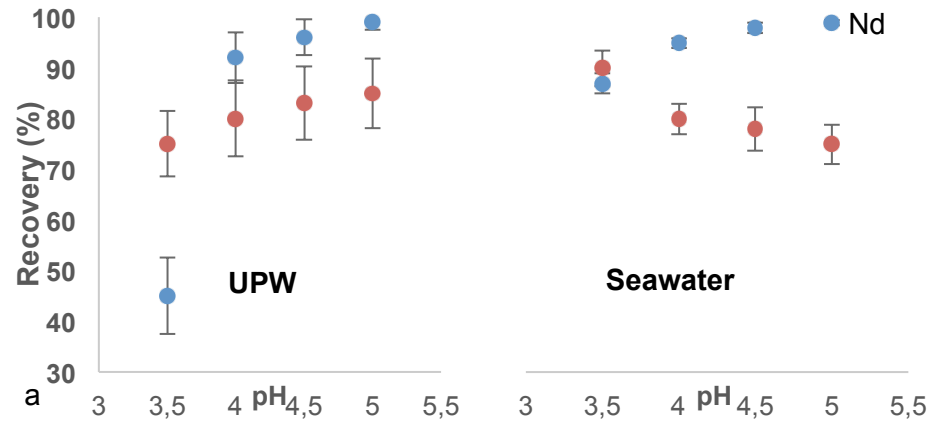
Trace metal clean seawater sampler

- Developed by Pier Van Der Merwe, Andy Bowie and colleagues
- All-teflon sample path
- Can collect 12, 65mL samples at any time interval
- Suitable for 1-year deployments on moorings
- 1m intake tubes
- Non-contaminating unit made of polycarbonate, Teflon and titanium
- Testing in the Southern Ocean showed no difference between the unit and samples collected by TMR
- A modified version currently being tested on Australia's new AUV in preparation for Antarctic deployments



Simultaneous pre-concentration of Th and Nd isotopes from seawater using the NOBIAS® resin

- Pre-concentration is performed using NOBIAS resin.
- Further separation and purification of Th and Nd is based in existing methods.
- Time-saving method, easy to apply on-board, low blank levels.



New Zealand 2017-2018 report

Outputs:

- 4 publications
- 1 PhD thesis
- Submission of datasets for the GP13 Southwest Pacific and GA04N Mediterranean Sea and Black Sea GEOTRACES expeditions to the 2017 International Data Product.

Meetings:

- Keynote address: Stirling, Rolison, George, Middag, Clarkson, Gangl, in the 'Non-conventional stable isotopes in the ocean: Novel applications, technological advances, and future applications' session, 2017 *Goldschmidt Conference*, August 13-18, Paris, France.

New Zealand 2017-2018 report

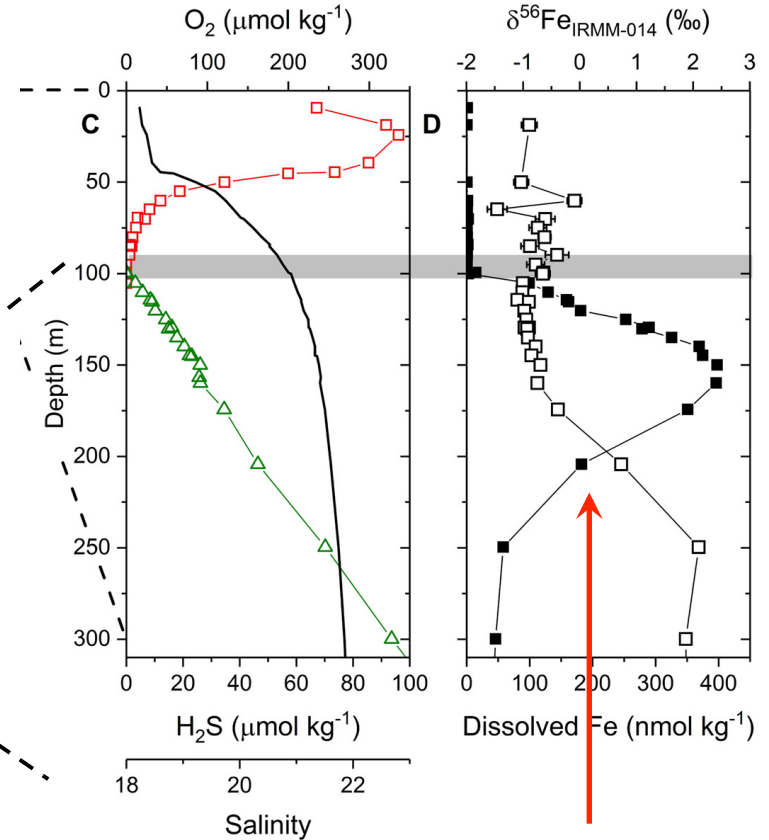
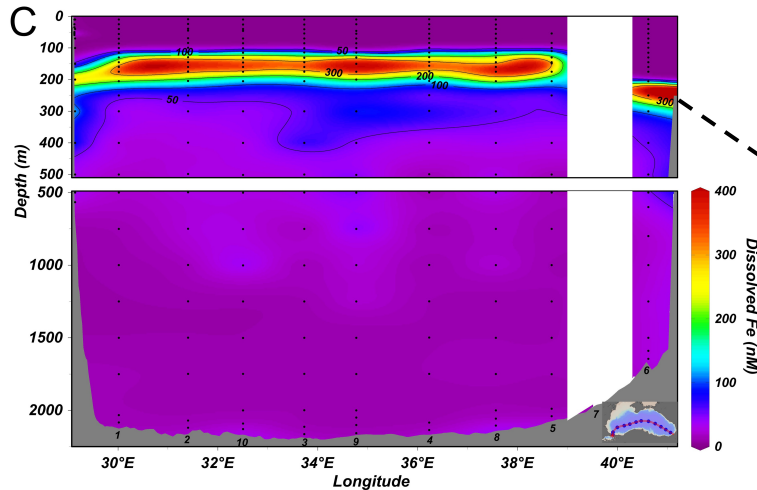
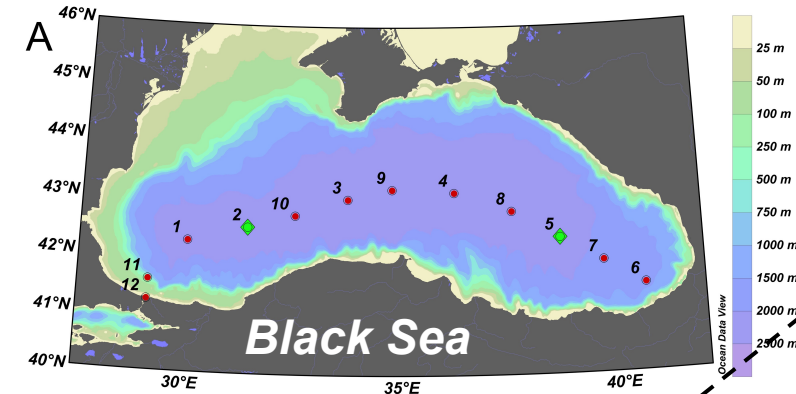
New Scientific Results:

- Uranium (U) stable isotope fractionation in the euxinic (anoxic and sulfidic) Black Sea allows for modern calibration of the emerging $^{238}\text{U}/^{235}\text{U}$ 'paleo-redox' tracer, facilitating reliable reconstruction of the rise and fall of oxygen in the past ocean-atmosphere system (Rolison et al., 2017, GCA 203, 69-88).
- Permil-level iron (Fe) stable isotope fractionation during pyrite formation in the euxinic Black Sea. This is the largest isotopic shift yet reported for a non-redox reaction involving Fe, and has important implications for reconstructing the rise in oxygen on Earth during the 'Great Oxidation Event', 2.3 billion years ago (Rolison et al., 2018; EPSL 488, 1-13).
- Permil-level cadmium (Cd) stable isotope fractionation in the euxinic Black Sea implies that Cd isotopes offer significant potential as a paleo-redox tracer. This may complicate the use of Cd isotopes as a paleo-nutrient tracer, as has been proposed recently for zinc isotopes (George et al., in prep.).
- Cadmium isotope systematics for the Southwest Pacific ocean uniquely constrain the biogeochemical cycling of Cd in the South Pacific subtropical gyre, the most oligotrophic gyre of the global ocean (George et al., in submission).

NZ



New Zealand 2017-2018 report



>3‰ iron isotope shift
during pyrite formation in
the deep euxinic water
column of the Black Sea

New Zealand 2017-2018 report

New Scientific Results (Ongoing):

- Iron, zinc and cadmium isotope datasets for waters collected in the Mediterranean Sea during the MedBlack GEOTRACES expedition are currently being acquired and interpreted.
- The concentrations of a suite of bioactive metals have been obtained for waters collected in the Southern Ocean, west of the Antarctic Peninsula, based on the GEOTRACES process study Phantastic II, and are currently being interpreted (collaboration between NIOZ & U. Otago).
- An inter-comparison exercise of dissolved trace metal (Fe, Zn and Cd) isotope profiles at a GEOTRACES crossover station in the Southwest Pacific has been conducted and the results are being prepared for publication; NZ PI: C. Stirling.
- A surface water Cd isotope inter-comparison exercise in the North Pacific is planned for late 2018 to assess analytical performance in ultra-low Cd samples; NZ PI: C. Stirling