Australia 2014-2015 report

AUS GEOTRACES

GEOTRACES meetings and workshops:

- AGU Fall Meeting (San Francisco, USA, Dec 2014)
- ACCOMC-CGASM annual meeting (Aspendale, Victoria, Nov 2014)
- APICS (Melbourne, Australia), May 2015.
- Informal Aus-NZ GP13 data meeting during RV Investigator trials voyage

Upcoming cruises:

- 3 major voyages scheduled for next 12 months: “HEOBI”, “K-axis”, “SOTS-Eddies-CAPRICORN”
- Each includes a significant research component on the marine biogeochemical cycles of trace elements and isotopes
- All to be proposed as GEOTRACES Process Studies

Funding:

- Australian Research Council Discovery project: “Hot iron: Are submarine volcanoes important for Southern Ocean iron supply?”
- Australian Antarctic Science project: “Submarine Volcanism and Hydrothermalism around Heard and McDonald Islands”
- Shiptime funding for Southern Ocean cruises “HEOBI”, “K-axis”, and “SOTS-Eddies-CAPRICORN”
- Logistical support Antarctic sea-ice biogeochemical fieldwork

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Outputs:

➢21 journal articles reporting GEOTRACES activities

New results:

➢KEOPS-2 (GIpr01) natural iron fertilisation experiment published in Biogeosciences)

➢SIPEX-2 (GIpr02) Antarctic sea ice biogeochemistry published in Deep-Sea Research II

➢Submission of results for the GEOTRACES intercalibration exercises for marine particulate trace elements (led by Phoebe Lam)

New capabilities:

➢New Australian research vessel *Investigator* commissioned and GEOTRACES sampling equipment tested April 2015

➢Technical factsheets: http://csirofrvblog.com/about/

➢A series of land-based aerosol sampling stations are being established around Australia

➢Aus-NZ GEOTRACES website: www.austracemarine.net

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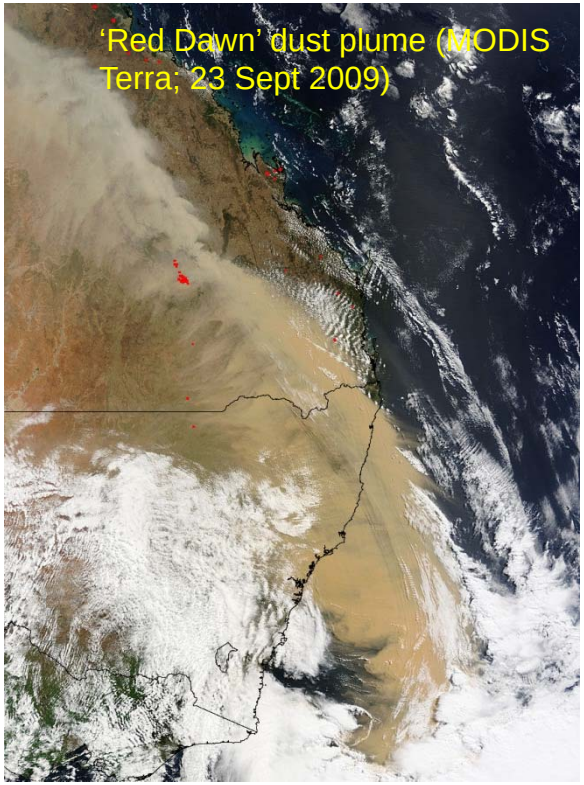
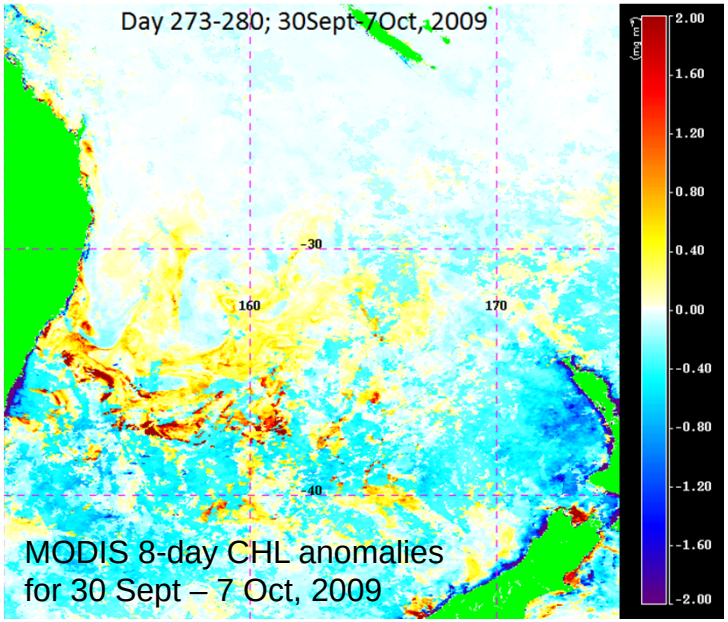
Science highlight I:

- Tasman Sea biological response to dust storm events during the austral spring of 2009 (Gabric et al., 2015).
- We investigated field, model and satellite data on atmospheric dust loading and chlorophyll levels in the Tasman Sea to explore the connection between the spring dust storm season of 2009 and the ecosystem response
- A high resolution dust transport model indicates significant, episodic deposition enhanced by widespread precipitation
- Large scale phytoplankton blooms resulted, with chlorophyll-a values well above their springtime climatological averages.
- First report of a significant biological response to dust-derived nutrient addition in the Tasman Sea





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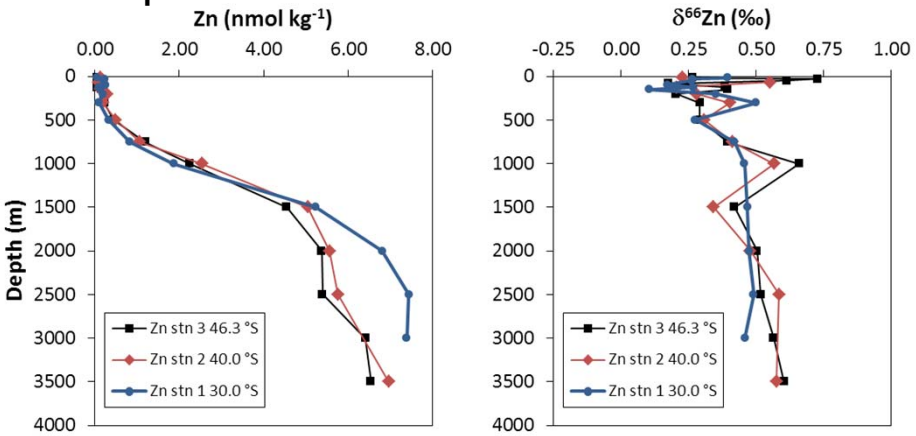
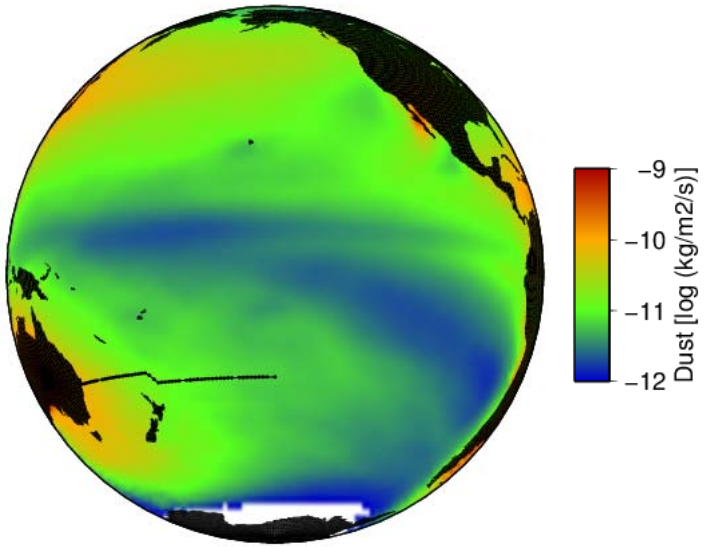
Science highlight II:

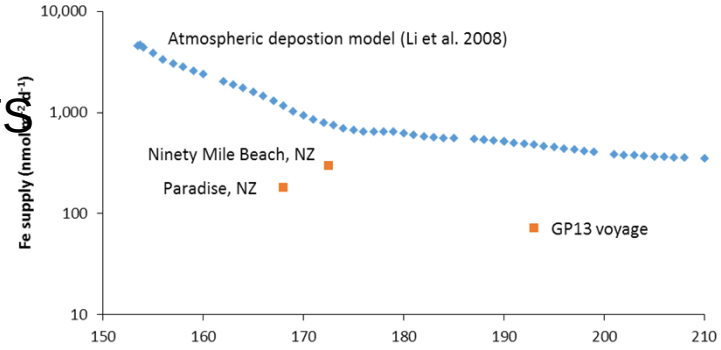
➢FeCycle II GEOTRACES process study – iron isotope paper published detailing iron isotope fraction during annual spring bloom

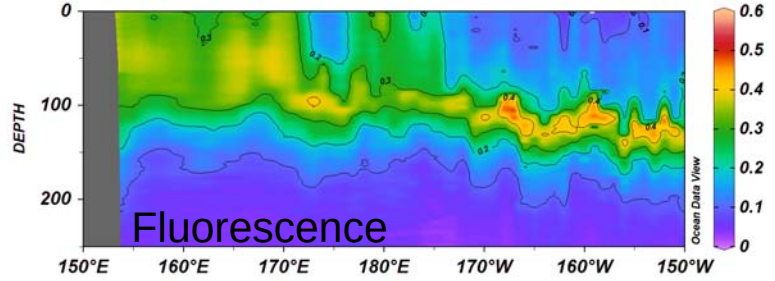
➢GP13 zonal section – sample analysis for TM is complete, a manuscript looking at the interaction between iron, nutrients and phytoplankton is being prepared

➢Zinc isotope analysis of samples from the PINTS 2010 voyage have been completed and is being written up









Li et al. JGR: Atm 113, D10207, (2008)
Arimoto et al. JGR: Atm 95, 22389-22405, (1990)
Halstead et al. Atmos. Environ. 34, 665-676, (2000)

New Zealand 2014-2015

GEOTRACES meetings and workshops:

- Assoc Prof Sylvia Sander (NIWA/University of Otago Research Centre for Oceanography) co-organized SCOR WG 138 symposium on “Organic Ligands – A Key Control on Trace Metal Biogeochemistry in the Ocean” (Croatia, 7-11 April 2015)
- Co-chaired new SCOR WG 145 MARCHEMSPEC “Modelling Chemical Speciation in Seawater to Meet 21st Century Needs” workshop
- Goldschmidt Conference (Sacramento, USA, July 2014)

Cruises:

- NZ scientists participated in the GEOTRACES process study Phantastic II aboard the Nathaniel B Palmer during cruise NBP 14-09 in the Southern Ocean, west of the Antarctic Peninsula. 44 stations sampled along 5 transects from the Antarctic Circumpolar Current toward the continent. Shipboard dissolved Fe, 5 Fe-light bioassay experiments and samples collected for shore-based multi element analysis (Y, Cd, La, Pb, Sc, Ti, Mn, Fe, Ni, Zn and Ga). Samples for iron binding ligands, cobalamin, iron isotopes and uranium isotopes were collected at 7 stations.

Funding:

- NIWA/University of Otago Research Centre for Oceanography has acquired a new mobile clean lab

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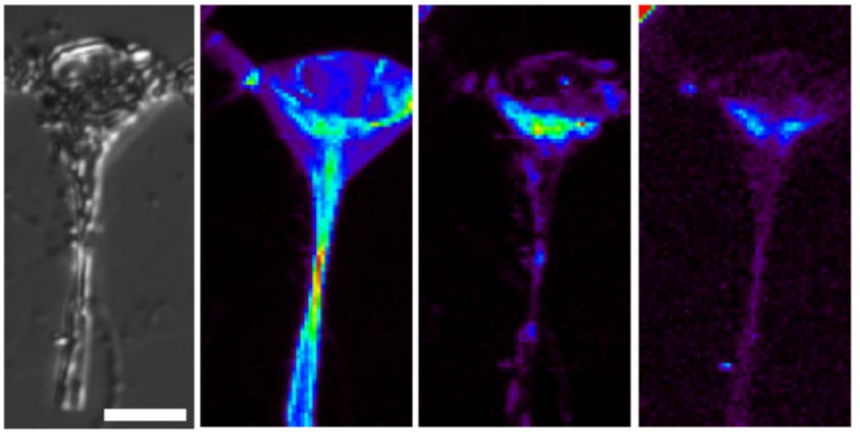
Science highlight III:

➢Update on the use of datasets from FeCycle II and III GEOTRACES Process voyages E of New Zealand

➢Continued publication of the activities from these voyages including:

- Twining et al. (2014). Differential remineralization of major and trace elements in sinking diatoms. Limnology and Oceanography 59, 689-704
- Ellwood et al. (2014 Iron stable isotopes track pelagic iron cycling during a subtropical phytoplankton bloom. PNAS, doi: 10.1073/pnas.1421576112
- Boyd et al. (in press) Why are biotic iron pools uniform across high- and low-iron pelagic Ecosystems. Global Biogeochemcial Cycles 10.1002/2014GB00514

➢Several additional manuscripts – on submesoscale iron biogeochemistry from the 2012 GEOTRACES process voyage FeCycleIII will be submitted in late 2015



Image, courtesy B. Twining

New Zealand 2014-2015

NZ GEOTRACES

NIWA/University of Otago Research Centre for Oceanography clean container