New Zealand

In June 2011 New Zealand successfully completed the middle leg (NE of New Zealand to SE of Tahiti) of the zonal Pacific GEOTRACES section from Brisbane to Lima.
Our main activities since July 2011 have been the sample and data analysis from this voyage which is ongoing. Highlights from the voyage include:
Detailed water sampling (trace metals, electrochemistry, microbiology) around an underwater volcano on the Kermadec Ridge.
The anticipated availability of paired datasets on trace metals and nanonutrients (including nitrate, phosphate, ammonium).
Sampling of aerosols and rain storms.
Sampling for bioGEOTRACES.

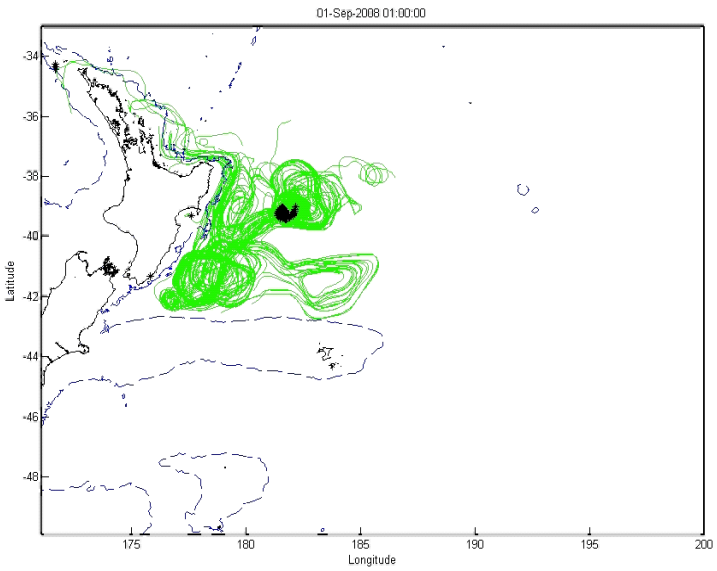

Figure 9: *FeCycle II eddy (black symbols) and sources of the waters that formed the eddy E of New Zealand (green trajectories, from an altimetry model). Dashed lines denote shelf break. From Boyd et al. (in review).*

Other activities have included the write-up, publication and oral communication of the findings from the GEOTRACES-ratified process study FeCycle II that investigated iron biogeochemistry of high iron (0.6 nmol/l) offshore waters. A list of submitted manuscripts are at the end of this report. Some of these findings were presented at the AGU/ASLO/TOS Ocean Sciences meeting in Salt Lake City. Highlights include:
Evidence that microbes sequester much of the available winter reserve inventory of new iron and hence control the diatom bloom duration and magnitude.
The region is supplied with iron from a combination of water mass communication with shelf sediments and then eddy shedding from a western boundary current (see Figure 9)

Other related highlights
We have recently obtained three years of funding to enable the development of dual spike stable iron isotopic method, to complement ongoing research with cadmium stable isotopes, and a collaboration with Michael Ellwood at ANU in Canberra on iron stable isotopes.
Sylvia Sander from the University of Otago is the chair of the new SCOR Working Group on Trace

Metal binding ligands, that will be liaising closely with GEOTRACES. Their first meeting after the Salt Lake City Ocean Sciences was attended by Sander and Boyd.

The results from the ongoing ship of opportunity Pacific dust sampling programme (Japn to New Zealand) were presented at the SOLAS workshop by Tim Jickells who contrasted and compared their Atlantic meridional Transect dust data with those from the Pacific meridian over multiple years.

Boyd, along with Carol Robinson continues to co-ordinate the bioGEOTRACES sampling programme, for example samples were taken on the Australian and New Zealand legs of the Brisbane to Lima zonal transect for bioGEOTRACES.

Boyd and collaborators at Stanford have produced detailed circumpolar maps of phytoplankton iron acquisition and compared them with maps of iron supply across the Southern Ocean, including surface supply of hydrothermally-derived iron from the deep ocean.

Publications

Boyd et al. (in review) Microbial control of diatom bloom dynamics in the open ocean. Geophysical Research Letters.

Boyd, P.W.; Arrigo, K.R.; Strzepek, R.; van Dijken, G.L. (2012). Mapping phytoplankton iron utilization: Insights into Southern Ocean supply mechanisms. J. Geophys. Res., Vol. 117, No. C6, C06009 http://dx.doi.org/10.1029/2011JC007726

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