

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN SOUTH AFRICA
JUNE 2013 – JUNE 2014

In 2013, South African scientists participated in the SANAE53 Cruise to the Southern Ocean on the BONUS-GOODHOPE line. Three collaborative projects were combined to constitute the South Atlantic Fe Pool project: “SAFePool project”: The first project “Bioactive trace elements in the Southern Ocean” (PI: Prof. A. Roychoudhury) focuses on the regional and vertical distribution of different Iron species (i.e., particulate, dissolved, and soluble species) across Southern Ocean fronts. The second project focuses on the impact of dissolved iron addition on phytoplankton photosynthetic performance and production under different light regimes Fe, light limitations in Antarctic phytoplankton (PI: Dr. Thato Mtshali) and the third one “Speciation of particulate iron: Photochemical and biological transformation” (PI: Dr P. Lam) focuses on the distribution of Fe mineralogy and its lability for phytoplankton uptake.

Aims of this project are to:

1. Characterize and quantify the ferricline region in the south Atlantic Ocean region.
2. Understand the distribution and processes of Fe pool in this ocean region
3. Understand how Southern Ocean phytoplankton community responds to Fe and light deprivation and what control the phytoplankton growth?
4. Investigate the biologically and photo-chemically-mediated transformations of particulate iron minerals for phytoplankton uptake.

Apart from the on-board deck experiments, much of the work, however, focused on calibrating the sampling system and trouble shooting contamination issues related to dissolved iron measurement. There are still problems with the sampling protocol using the CTD system. We believe that some of the contamination issues encountered are related to the sampling vials used. Cross-over station data show somewhat higher than previously measured Fe concentrations and replicates show random variation.

Conferences

- B.P. von der Heyden, A.N. Roychoudhury and S.C.B. Myneni (2013) Quantification and speciation study of the marine solid-phase iron pool. 23rd Annual V M Goldschmidt Conference, Florence, Italy, August 25 –31, 2013.

Publications

- Treasure, A.M., Moloney, C.L., Bester, M.N., McQuaid, C.D., Findlay, K.P., Best, P.B., Cowan, D.A., de Bruyn, P.J.N., Dorrington, R.A., Fagereng, A., Froneman, P.W., Grantham, G.H., Hunt, B.P.V., Meiklejohn, K.I., Pakhomov, E.A., Roychoudhury, A.N., Ryan, P.G., Smith, V.R., Chown, S.L. and Ansoorge, I.J. (2013) South African research in the Southern Ocean: new opportunities but serious challenges. *South African Journal of Science*. V109, pp 1-4, DOI 10.1590/sajs.2013/a009.
- Coleen L. Moloney, Sean Fennessy, Mark J. Gibbons, Alakendra Roychoudhury, Frank A. Shillington, Bjorn P. von der Heyden, Kate Watermeyer (2013) What is the evidence for offshore marine ecosystem 1 change in South Africa? *African Journal of Marine Science*, 35(3), pp 427-448. DOI: 10.2989/1814232X.2013.836135.
- Bjorn P. Von der Heyden, Emily J. Hauser, Bhoopesh Mishra, Gustavo A. Martinez, Andrew R. Bowie, Tolek Tyliczszak, Thato N. Mtshali, Alakendra N. Roychoudhury, Satish C.B. Myneni (In review) Ubiquitous presence of Fe(II) in aquatic colloids and its association with organic carbon. *Environmental Science & Technology, Letters*.

- Fietz S, Prahlg FG, Moraleda N, Rosell-Melé A. Eolian transport of glycerol dialkyl glycerol tetraethers with dust from north-west Africa. *Organic Geochemistry* 64, 112–118, 2013.
- Fietz S, Hambach B, Huguet C, Rosell-Melé A. Hydroxylated isoprenoidal GDGTs in the Nordic Seas. *Marine Chemistry*, 152, 1-10. 2013.
- Huguet C, Fietz S, Rosell-Melé A. Global distribution patterns of hydroxy glycerol dialkyl glycerol tetraethers. *Organic Geochemistry*, 57, 107-118. 2013

Activities of interest

As representative of South African GEOTRACES program, Prof. Roychoudhury attended the Western Indian Ocean Regional Focus Group Meeting to help plan the IIOE-2 initiative in Mauritius. SCOR is thanked for providing travel funds. Representatives of 18 countries attended the meeting and the outcome of the meeting was a participant statement confirming broad regional cooperation through facilitation of collegial interactions, collaborative working relationships, and mutual synergistic engagement in planning exercises. Establishment of IIOE-2 was strongly supported by all:

“We strongly support the establishment of an IIOE-2 for 2015-20, as a unique opportunity for regional collaboration in marine research, training, capacity-building and societal application, in alignment with the Decision of the 27th meeting of the 146 Member States of the Assembly of the IOC of UNESCO in 2013. That Decision called for an IIOE-2 proposal to be addressed at the 47th meeting of the Executive Council of the IOC of UNESCO in 2014.”

New Funding

- Fietz, S, Roychoudhury, AN and Bjorn Munro_Jenssen (2013 – 2015) Southern Ocean Phytoplankton Adaption to mimicked future changes in light and iron availability - Molecular bases and modelling (SOPA) South Africa – Norway Bilateral cooperation grant, R 2,500,000

Submitted by Prof. AN Roychoudhury (roy@sun.ac.za).