

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN ISRAEL

April 1st, 2018 to March 31st, 2019

New scientific results

- Adi Torfstein's research group (Institute of Earth Sciences at the Hebrew University and Interuniversity Institute (IUI) for Marine Sciences of Eilat) operates a sediment trap mooring that has been deployed continuously in the centre of the north Gulf of Aqaba/Eilat since January 2014. This mooring combines monthly profiles with daily-timescale sample collection. The particulate samples are measured for organic C and N and their isotope composition, as well as major and trace element concentrations and foraminifera assemblages. Coeval seawater profiles are sampled using a Kevlar cable and Teflon-coated Go-Flo bottles, with emphasis of monitoring the short-term impact of dust storms on seawater trace element cycling. The dissolved samples are analysed trace element concentrations, Pb isotopic compositions and $^{230}\text{Th}/^{232}\text{Th}$ ratios. In addition, two dust samplers are deployed at the IUI, and collect dust samples continuously. During the reporting period, the research group included two postdocs (Daniel Palchan, David Weinstein), two PhD students (Natalie Tchernihovsky, Tal Ben-Altabet), 2 MSc students (Gil Lapid, Merav Gilboa), and a lab technician (Barak Yarden).
- Yeala Shaked's research group (Institute of Earth Sciences at the Hebrew University and IUI) with 1 PhD students (Siyuan Wang), 3 post-docs (Sunhajit Basu, Tzachi Yacobson and Meri Eichenr), and a research technician (Murielle Dray) continue investigating the bioavailability of dust and mineral iron to cyanobacteria. The study of dust as a source of iron to Trichodesmium is conducted with various international collaborators, including Satish Myneni from Princeton (Synchrotron analysis of bio-induced transformations of dust), Rhona Stuart from Livermore National Laboratories (Fe uptake from dust using Nano-Sims), Martha Gledhill from GeoMar (siderophore identification with Orbitrap mass spectrometer), Dirk De Baar from Max Plank Inst for Microbiology (microelectrode measurements in trichodesmium colonies).
- The National Monitoring Program (NMP) for the Gulf of Eilat/Aqaba operates out of the IUI (<http://www.iui-eilat.ac.il/Research/NMPAbout.aspx>). Activities include monthly cruises across the north Gulf of Eilat/Aqaba, during which physical, chemical and biological measurements are performed in depth profiles (at a water depth of 700 meters) together with spatial-surface coverage. The main-relevant parameters monitored are: Temperature, salinity, dissolved oxygen, pH, alkalinity, POC, NO_2 , NO_3 , $\text{Si}(\text{OH})_4$, PO_4 , Chl-a. The samples are collected with the IUI Research Vessel, which has a powder coated aluminium Rosette (SeaBird) with 12 niskin bottles (12 liters each), and a CTD (SeaBird electronics). These measurements have been performed continuously since the year 2000. Analyses are performed at the IUI labs.

New projects and/or funding

- "Carbon export at the southeastern Levantine basin" (Weinstein and Berman-Frank). The initial results of this project were submitted for publication (see Alkalay et al. in the publication list below).
- "Bioavailability of particulate Fe to planktonic cyanobacteria", funded by the Israel

Science Foundation (Shaked).

- “Dust iron utilization by natural *Trichodesmium* colonies“, funded by the German-Israeli Foundation (Shaked, Gledhill, Achterberg).
- “Marine particle dynamics across abrupt storm events in the Gulf of Aqaba, north Red Sea: A unified Thorium isotope study” funded by the Israel Science Foundation (Torfstein)
- “The magnitude and distribution of anthropogenic pollution in the Gulf of Eilat”, funded by the Ring Foundation (Torfstein, Shaar).

GEOTRACES workshops and meetings organised

- The 7th Kaplan Symposium was convened in Eilat during February 2019, titled: “Tracers in the Sea: Trace Elements and their Isotopes in the Oceans, Future Directions and Instrumental Frontiers”. The meeting convened by Torfstein and Shaked hosted 8 international invited speakers with a total of 81 participants. More details on the website: <https://sites.google.com/view/7th-kaplan-symposium>

Other GEOTRACES activities

- Gil Lapid participated in a Training Course on Marine Radioactivity, 20-22 February 2019, Puerto Rico.
- Adi Torfstein participated in the GEOTRACES-PAGES workshop in France.
- Yeala Shaked participated in the GEOTRACES SSC meeting in Taipei.
- Yeala Shaked attended a workshop in WHOI on a follow-up program, a Bio-Geotraces like initiative involving trace elements, nutrients and omics (Biogeoscapes).

New GEOTRACES publications

- Chernihovsky N., Torfstein A., Almogi-Labin A. (2018) Seasonal flux patterns of planktonic foraminifera in a deep, oligotrophic, marginal sea: sediment trap time series from the Gulf of Aqaba, north Red Sea. *Deep Sea Research I* 140, p. 78-94.
- Torfstein A., Kienast S.S. (2018) No correlation between atmospheric dust and surface ocean chlorophyll-a in the oligotrophic Gulf of Aqaba, northern Red Sea. *Journal of Geophysical Research- biogeosciences* 123, doi.org/10.1002/2017JG004063.
- Basu S and Y. Shaked. 2018 Mineral iron utilization by natural and cultured *Trichodesmium* and associated bacteria, *Limnology and Oceanography* 63 (6), 2307-2320
- Basu S, M. Gledhill, D. de Beer, SG P Matondkar, Y Shaked. The mutual quest of *Trichodesmium* colonies and associated bacteria for iron from dust. *Communications Biology*, Final revisions.
- Alkalay R., Zlatkin O., Katz T., Herut B., Berman-Frank I., Halicz L. (submitted) Carbon export and drivers in the southeastern Levantine Basin. *Deep Sea Research II*.

GEOTRACES presentations in international conferences

- Chernihovsky N., Almogi-Labin A. and Torfstein A. (2018) Seasonal flux patterns of planktonic foraminifera in a deep, oligotrophic, marginal sea: sediment trap time series from the Gulf of Aqaba, north Red Sea. Foraminifera in a changing world workshop, Edinburgh, Scotland.
- Torfstein A. and Kienast S.S. (2018) Trace element fluxes and export production across daily-, seasonal- and multiannual- timescales in the oligotrophic Gulf of Aqaba, Red Sea,

Goldschmidt meeting.

- Benalabet T. and Torfstein A. (2018) Dissolved trace metals and Pb isotopes across dust storm events in the oligotrophic waters of the Gulf of Aqaba, Goldschmidt meeting.
- Kienast S.S., Torfstein A., Riehl L. and Fennel K. (2018) Organic carbon fluxes and Nitrogen isotopes in the oligotrophic Gulf of Aqaba, Goldschmidt meeting.
- Alkalay R., Zlatkin O., Katz T., Herut B., Berman-Frank I., Halicz L. (2018) Carbon Export in the Ultra-Oligotrophic Levantine Basin: Results from the Deep-Lev Mooring, Gordon Conference of Marine Biogeochemistry in Hong Kong.
- Lapid G. and Torfstein A. (2019) Dissolved ^{230}Th and ^{232}Th as tracers of the impact of dust storms in the Gulf of Aqaba, Red Sea, ASLO meeting.

Submitted by Adi Torfstein (adi.torf@mail.huji.ac.il).