

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN ISRAEL

June 1st, 2015 to April 30th, 2016

This report summarizes activities between June 2015 and April 2016 by scientists in Israel that are related to the GEOTRACES objectives.

Briefly, this report presents the related work of Adi Torfstein, Yeala Shaked, and Yishai Weinstein. I also provided a paragraph about the work of the Israeli National Monitoring Program, which includes a long and extensive time series of open ocean measurements in the Gulf of Eilat/Aqaba.

Dr. Adi Torfstein, Institute of Earth Sciences, Hebrew University of Jerusalem (HUJI), and Interuniversity Institute (IUI) for Marine Sciences of Eilat:

Research & funding

- My group operates a sediment trap mooring that has been deployed continuously in the center of the north Gulf of Aqaba/Eilat since January 2014. This mooring combines two types of traps and time resolutions:
 - KC-Denmark cylinder trap stations deployed at five depth points (water depth is 600 meters) that are sampled at a monthly resolution
 - McLane PARFLUX-II time series trap that collects the sinking particulates at a depth of 400 meters (water depth is 600 meters) on a ~daily resolution (between 24-48 hours) across the year
 - The mooring also hosts continuously a S4 current meter (InterOcean Systems, Inc.) that records current direction and velocity at a 10 minute resolution

The collected samples are weighted, analyzed for their organic C and N content, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of the organic fraction, major and trace element concentrations of the bulk fraction, ^{230}Th , ^{232}Th , ^{234}U , ^{238}U . Planktonic assemblages are picked from different grain size fractions of the trap material

Seawater profiles are sampled regularly and analyzed for their Nd content and isotopic composition.

The Pb isotopic composition of Gulf of Eilat/Aqaba waters was measured at high temporal and spatial resolution during the summer of 2015, in collaboration with Adina Paytan (UCSC).

- The HUJI/IUI research group includes: a postdoc (Alison Hartman), a PhD student (Natalie Tchernichovsky), 2 MSc students (Ortal Sava, Merav Gilboa), an undergraduate research assistant (Ohad Steinberg), a lab technician (Barak Yarden). Israeli and international collaborators include: Dr. Ahuva Almogi-Labin (Geological Survey of Israel), Dr. Stephanie Kienast (Dalhousie University), Dr. Adina Paytan (UCSC), Prof. Jerry McManus (LDEO).
- Different aspects of the above project are funded by the Israel Science Foundation as well as collaborative work with Dr. S. Kienast at Dalhousie University funded by the Schulich Science Foundation.

Other sampling equipment and facilities at IUI:

- A clean lab (class 1000) includes two class 100 workstations, a Teflon coated acid purification system (Analab), two Teflon coated hotplates (Analab), a mq water system, a prepFAST-MC system.
- Eight Teflon coated GO-Flo bottles (12 Liters each), for trace element seawater sampling.
- One McLane WTS-Large Volume pump, 142 mm diameter, LV04.

Prof. Yeala Shaked, Institute of Earth Sciences, Hebrew University of Jerusalem, and Interuniversity Institute for Marine Sciences of Eilat:

Workshops and meetings

- We held a joint Vienna University & Hebrew University workshop in Israel titled “Atmospheric dust as nutrient source and pollutant in terrestrial and marine systems: Processes and mechanisms of nutrient acquisition and mineral weathering” (involving research groups of Prof. Stephan Kramer, Prof. Yeala Shaked and Prof. Yigal Erel).
- Yeala Shaked participated in a GEOTRACES meeting: Biological and climatic impacts of ocean trace element chemistry Dates: 7-8 December 2015 Location: Royal Society, London, UK.

Research & funding

- Funding is provided by the Israeli Science Foundation for the study of “Bioavailability of particulate Fe to planktonic cyanobacteria”
- We combine laboratory studies of cultured cyanobacteria and field studies with natural phytoplankton from Eilat.
- We strive to define and quantify the major components determining the ability of phytoplankton to acquire Fe from particles, focusing on the active role of cyanobacteria in “capturing” the particles, actively dissolving it etc.
- The research involves 2 PIs (Shaked, Nir Keren), 2 PhD students (Nivi Kessler, Chana Kranzler), a post-doc (Sunbhajit Basu), two research technicians (Murieller Dray, Rachel-Armoza-Zvoluni) and international collaborations (Satish Myneni, Princeton Synchrotron; Rhona Stuart, Livermore, Nano-Sims, Martha Gledhill, GeoMar, Orbitrap mass spectrometer.)

PhD's

- Chana Kranzler (HUJI) submitted her PhD on “Iron acquisition mechanisms in a unicellular, planktonic cyanobacterium”
- The PhD of Hagar Lis (HUJI) was approved: “The bioavailability of iron to phytoplankton: rates and mechanisms of iron uptake”

Related publications in 2015

- Lis, H., Kranzler, C., Keren, N. and Y. Shaked. 2015. A comparative study of iron uptake rates and mechanisms amongst marine and fresh water cyanobacteria, Life, (special issue “cynaobacteria: Ecology, Physiology and Genetics”). <http://www.mdpi.com/2075-1729/5/1/841>.
- Chana Kranzler*, Nivi Kessler*, Nir Keren and Yeala Shaked (submitted to Environmental Microbiology) Biological dissolution of ferrihydrite by a unicellular, planktonic cyanobacterium: Insights into the bioavailability of particulate iron.

Additional activities at the InterUniversity Institute (IUI) for Marine Sciences of Eilat (location of Adi Torfstein and Yeala Shaked):

- A dust collection system has been sampling suspended aerosols on a weekly basis continuously since 2006 on the IUI pier. All samples between 2006-2010 have been measured for major and trace element concentrations on the water-dissolved, acid-leachable and silicate fractions.

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, NO₂, NO₃, Si(OH)₄, PO₄, 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.

Prof. Yishai Weinstein, Bar-Ilan University:

- In preparation of the deployment of a deep sea sampling station in late 2016 in the East Mediterranean, the following equipment has been purchased: three McLane PARFlux 78h-21 sediment traps and two McLane Large Volume Water Transfer System.

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