

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN TURKEY

May 1st, 2023 to April 30th, 2024

New GEOTRACES or GEOTRACES relevant scientific results

From May 2023 to May 2024, two comprehensive basin-wide cruises were conducted in the Sea of Marmara and the Black Sea during the May-June period. These expeditions were funded by both national sources (TÜBİTAK, strategic infrastructure funds) and the European Union's Horizon Program. Over 100 stations were investigated in both areas, with CTD casts and bottle sampling reaching depths of 1800 meters.

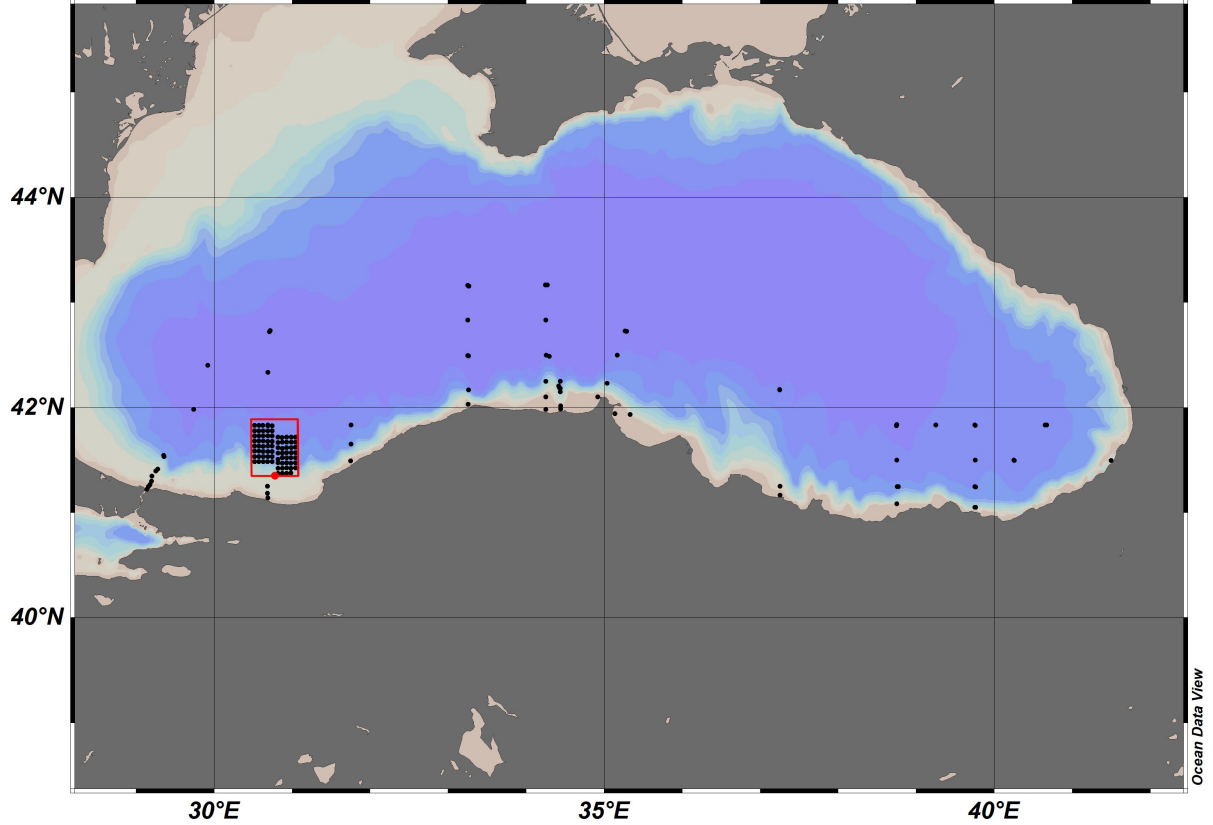


Figure 1: Stations of EU H2020 BRIDGE Black Sea Project 2023 June Cruise with R/V Bilim-2.

In the Black Sea, biogeochemical parameters were measured, including on-board measurements of redox species such as hydrogen sulfide, oxygen, and manganese. Sediment samples were collected in selected stations using a multi-corer on the Black Sea shelf for detailed biogeochemical analysis of porewater and solid sediment.

The European Research Council (ERC) Consolidator Grants program has funded the ERC DeepTrace project, which has recently completed the establishment of a new facility for metal inorganic nanoparticle analysis. This facility is one of the very few in the world, and the first of its kind in Turkey. It offers researchers cutting-edge capabilities for nanoparticle characterization using Field Flow Fractionation (FFF) and Dynamic Light Scattering (DLS). Time-of-flight ICP-MS (icpTOF, Tofwerk), specifically designed for multi-elemental characterization of single nanoparticles. Notably, this TOF-ICP-MS is also equipped with an online microdroplet system (Quantistar, Tofwerk), enabling direct analysis with seawater matrices. Method development for a holistic methodology will begin soon. The TOF-ICP-MS

with microdroplet calibration will work synergistically with the existing NexIon 350X ICP-MS and its ESI SC4 DX SeaFast system for method comparison.



Figure 2: TOF-ICP-MS (icpTOF) with online microdroplet system (Quantistar).



Figure 3: FFF and DLS instruments on the left.

Additionally, on the metal-sulfur nanoparticles aspect, an acid-volatile sulfur speciation system has been established, and new results are expected to be obtained shortly. A deep-sea voltammetric system has acquired for deep sea dives, the system rates for 4000m depths.

GEOTRACES or GEOTRACES relevant cruises

- R/V Bilim, May-June 2023, Sea of Marmara and the Black Sea

New projects and/or funding

- Prof. Dr. Mustafa Yücel selected to become an associate member of the Turkish Academy of Science
- ***MARMOD-Phase 3: New Phase of the Sea of Marmara Integrated Modelling System Project:*** Prof. Dr. Mustafa Yücel, METU IMS, as PI.

GEOTRACES workshops and meetings organized

None

Outreach activities conducted (please list any outreach/educational material available that could be shared through the GEOTRACES web site) (We are particularly interested in recordings from webinars from GEOTRACES research)

None

Other GEOTRACES activities

Prof. Dr. Mustafa Yücel become the Turkey's ambassador for the BioGeoSCAPES community and attended the general assembly meeting in Woods Hole Oceanographic Institute. PhD student Nimet Alimli applied for the fellowship program of the BioGeoSCAPES.

New GEOTRACES or GEOTRACES-relevant publications (published or in press) (If possible, please identify those publications acknowledging SCOR funding)

- Correggia M, Di Iorio L, Bastianoni AB et al. Standard Operating Procedure for the analysis of trace elements in hydrothermal fluids by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) [version 1; peer review: 3 approved with reservations]. Open Res Europe 2023, 3:90 (<https://doi.org/10.12688/openreseurope.15699.1>)
- Correggia M, Di Iorio L, Bastianoni AB et al. Standard operating procedure for the analysis of major ions in hydrothermal fluids by ion chromatography [version 2; peer review: 2 approved with reservations]. Open Res Europe 2024, 3:94 (<https://doi.org/10.12688/openreseurope.15605.2>)

Please indicate if there is any forthcoming or planned GEOTRACES special issue publication

none

Completed GEOTRACES PhD or Master theses (please include the URL link to the pdf file of the thesis, if available)

none

GEOTRACES presentations in international conferences

- Yücel, M., Alimli, N., Gülmez, Z. A., Cura, H., & Demir, N. Y. (2023 0). *Organic carbon distributions and carbon burial in a modern Proterozoic ocean analogue: the Sea of Marmara*. Goldschmidt 2023 Conference, Lyon, Fransa. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/16176>
- Yücel, M., Örek, H., Alimli, N., Mantıkçı, M., Özhan, K., Fach Salihoğlu, B. A., Tezcan, D., Örek, Y., Kalkan, E., Arkin, Ş. S., & Salihoğlu, B. (2023 0). *Phosphorus build-up, nitrogen loss and sulfide*

accumulation in response to recent deep-water deoxygenation in the Sea of Marmara. Goldschmidt 2023 Conference, Lyon, Fransa. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/15805>

- Yücel, M., Alımlı, N., Cura, H., Demir, N. Y., Myroshnychenko, V., Fach Salihoğlu, B. A., Arkin, Ş. S., Tuğrul, S., & Salihoğlu, B. (2023 0). *Western Black Sea suboxic layer biogeochemical structure during the December 2022 R/V Bilim Expedition.* Goldschmidt 2023 Conference, Lyon, Fransa. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/16120>
- Alımlı, N., & Yücel, M. (2023 0). *Benthic Iron Redox Mobilization Via Iron Reductive Respiration in Low Oxygen Seas: The Case of The Sea of Marmara.* Goldschmidt 2023 Conference, Lyon, Fransa. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/16601>

Submitted by Nimet Alimli (nimetal@metu.edu.tr)

- Yücel, M., Alımlı, N., Borovinskaya, O., Demir, N. Y., Cura, H., Tanner, M., & Djurdjevic, S. (2023 0). *Towards multi-element characterization of marine metal nanoparticles: First results from the suboxic zone of the Black Sea.* Goldschmidt 2023 Conference, Lyon, Fransa. <https://conf.goldschmidt.info/goldschmidt/2023/meetingapp.cgi/Paper/15070>