

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN SWITZERLAND

May 1st, 2023 to April 30th, 2024

GEOTRACES or GEOTRACES-relevant cruises

Mingzhao Sun (ETH Zurich) participated in cruise EMB 324 of R/V *Elisabeth Mann Borgese* (Leibniz Institute of Baltic Sea Research Warnemünde) in the Baltic Sea in summer 2023, collecting seawater, porewater and sediment samples for analysis of transition metal concentrations and isotopes.

Dr. Isabelle Baconnais (University of Lausanne) collected a set of seawater and particulate samples along Line P (NE Pacific) in September 2023 (SCrIPT Project).

Prof. Samuel Jaccard (University of Lausanne) and Dr. Christel Hassler (EPFL) collected an array of seawater samples along southwestern Greenland in August–September 2023 (GreenFjord project).

New projects and/or funding

Dr. D. J. Janssen (EAWAG) received funding from the Swiss National Science Foundation to investigate the biogeochemical cycling of Mn, Fe and paleoredox proxies in a redox-stratified Swiss lake, 2024–2028.

New GEOTRACES or GEOTRACES-relevant publications (Researchers at Swiss institutions in bold)

Ai, X. E., L. M. Thöle, A. Auderset, M. Schmitt, S. Moretti, **A. S. Studer**, E. Michel, M. Wegmann, A. Mazaud, P. K. Bijl, D. M. Sigman, A. Martínez-García, and **S. L. Jaccard**. 2024. The southward migration of the Antarctic Circumpolar Current enhanced oceanic degassing of carbon dioxide during the last two deglaciations. *Communications Earth & Environment* 5, 10.1038/s43247-024-01216-x.

Casacuberta, N. and J. N. Smith. 2023. Nuclear reprocessing tracers illuminate flow features and connectivity between the Arctic and Subpolar North Atlantic Oceans. *Annual Review of Marine Science* 15:203-221, doi: 10.1146/annurev-marine-032122-112413.

Du, J. 2023. SedTrace 1.0: a Julia-based framework for generating and running reactive-transport models of marine sediment diagenesis specializing in trace elements and isotopes. *Geosci. Model Dev.* 16:5865-5894, 10.5194/gmd-16-5865-2023.

Fleischmann, S., J. Du, A. Chatterjee, J. McManus, S.D. Iyer, A. Amonkar, and **D. Vance**. 2023. The nickel output to abyssal pelagic manganese oxides: A balanced elemental and isotope budget for the oceans. *Earth and Planetary Science Letters* 619:118301, 10.1016/j.epsl.2023.118301.

Fourquez, M., D. J. Janssen, T. M. Conway, **D. Cabanes**, M. J. Ellwood, **M. Sieber**, S. Trimborn, and **Christel Hassler**. 2023. Chasing iron bioavailability in the Southern Ocean: Insights from *Phaeocystis antarctica* and iron speciation. *Science Advances* 9, 10.1126/sciadv.adf9696.

He, Z., C. Archer, S. Yang, and **D. Vance**. 2023. Sedimentary cycling of zinc and nickel and their isotopes on an upwelling margin: Implications for oceanic budgets and

paleoenvironment proxies. *Geochimica et Cosmochimica Acta* 343:84-97, doi: 10.1016/j.gca.2022.12.026.

Little, S. H., **G. F. de Souza**, and R. C. Xie. 2024. Metal stable isotopes in the marine realm. *Treatise on Geochemistry*, Vol. 3e, 10.1016/B978-0-323-99762-1.00019-X.

Raimondi, L., A.-M. Wefing, and N. Casacuberta. 2024. Anthropogenic carbon in the Arctic Ocean: perspectives from different transient tracers. *Journal of Geophysical Research: Oceans* 129, doi: 10.1029/2023JC019999.

Zhang, X., N. Lemaitre, J.D. Rickli, T.J. Suhrhoff, R. Shelley, A. Benhra, S. Faye, M.A. Jeyid, and D. Vance. 2024. Tracing anthropogenic aerosol trace metal sources in the North Atlantic Ocean using Pb, Zn and Ni isotopes. *Marine Chemistry* 258:104347, <https://doi.org/10.1016/j.marchem.2023.104347>.

Forthcoming or planned GEOTRACES special issue publications

de Souza, G. F. and A. K. Morrison. 2024. The Southern Ocean hub for nutrients, micronutrients, and their isotopes in the global ocean. *Oceanography* 37:46-59, Special Issue on Twenty Years of GEOTRACES, 10.5670/oceanog.2024.414.

Completed GEOTRACES PhD or Master theses

Chen, Manyu. 2023. Insights of silicon benthic flux by studying silicon stable isotope in porewater from the abyssal sediments in the equatorial Pacific Ocean. M.Sc. thesis, ETH Zurich.

Eisenring, Claudia. 2023. A data-constrained view of the marine biogeochemical cycle of zinc and its isotopes: advances in data-driven modelling. Ph.D. thesis, ETH Zurich. <https://www.research-collection.ethz.ch/handle/20.500.11850/673686>.

Müsing, Kim. 2023. The record of oceanic zinc and nickel isotopes in marine sediment archives. Ph.D. thesis, ETH Zurich. <https://www.research-collection.ethz.ch/handle/20.500.11850/603222>.

Schmitter, Janine. 2024. Testing the fidelity of diatom silicon stable isotope composition as a tracer of past changes in the marine silicon cycle. M.Sc. thesis, ETH Zurich.

Sun, Mingzhao. 2023. Records of transition metal abundances and isotope compositions in the ancient ocean. Ph.D. thesis, ETH Zurich. <https://www.research-collection.ethz.ch/handle/20.500.11850/635795>.

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