

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN GERMANY

May 1st, 2024 to April 30th, 2025

New GEOTRACES or GEOTRACES relevant scientific results

- see publications

GEOTRACES or GEOTRACES relevant cruises

GI07/ SO308 (RV Sonne) - South Indian Ocean, 31st October – 22nd December 2024, Durban (South Africa) - Fremantle (Australia). October 31, 2024, to December 22, 2024. Cruise and GEOTRACES PI Eric Achterberg

GN06/PS144/Arcwatch-2 (FS Polarstern)- Central Arctic Ocean, August 9, 2024, to October 13, 2024. Tromsø, Norway to Bremerhaven, Germany via the Eurasian / Central Arctic Ocean and the Barents Sea continental slope in the Nansen Basin. It revisited two sections previously studied during the GEOTRACES section cruise GN05 (PS94) in 2015, and also included the GEOTRACES crossover station near the North Pole. Cruise PI Benjamin Rabe, GEOTRACES PI Walter Geibert

GApr21 / M206 (RV METEOR) Amazon-GEOTRACES-2 process study, Fortaleza (Brazil) - Belém (Brazil) (December 1, 2024 - December 30, 2024), 'Interactions of trace metals, DOM, and particles in the Amazon estuary and plume as key processes for trace metal and DOM fluxes into the Atlantic during low-discharge period', PI Andrea Koschinsky

New projects and/or funding

- ^{231}Pa , ^{226}Ra and ^{230}Th in the Arctic Ocean (PaRaThA) on PS144. Funding of a PhD project through the INSPIRES call of the Alfred Wegener Institute for Polar and Marine Research (Start date 1st of April 2025). PI Walter Geibert, Benjamin Rabe.
- Whale, seal and seabird feces: Promoters of Southern Ocean phytoplankton productivity and carbon export?, SPP DFG Project, PIs: S. Trimborn, M. Iversen, funding of a PhD project, Start date: 1st of January 2026

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GEOTRACES workshops and meetings organised

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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)

- Interviews of cruise participants recorded during GApr21 / M206: <https://andrea-koschinsky.org/young-learners-outreach/>

Other GEOTRACES activities

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

- Arnone, V., Santana-Casiano, J. M., González-Dávila, M., Sarthou, G., Krisch, S., Lodeiro, P., Achterberg, E. P., & González, A. G. (2024). Distribution of copper-binding ligands in Fram Strait and influences from the Greenland Shelf (GEOTRACES GN05). *Science of the Total Environment*, 909, 168162. doi:10.1016/j.scitotenv.2023.168162
- Guo, Y., Al-Hashem, A. A., Krisch, S., Hopwood, M. J., Chen, X.-G., & Achterberg, E. P. (2025). Distributions, sources, and dynamics of particulate Ba, Cr, Sr, Zn, Mo, W, Th, and U on the Northeast Greenland Shelf. *Chemical Geology*, 686, 122822. doi:10.1016/j.chemgeo.2025.122822
- Liu, T., Plass, A., Gledhill, M., Scholz, F., Achterberg, E. P., & Hopwood, M. J. (2025). Trace Metal Effluxes From Peruvian Shelf Sediments Constrained in Parallel by Benthic Lander Mounted Pumps and Pelagic Rosette Sampling. *Journal of Geophysical Research: Biogeosciences*, 130. doi:10.1029/2024jg008583
- Chen, X.-G., Gledhill, M., Lohan, M. C., Milne, A., & Achterberg, E. P. (2024). Surface ocean biogeochemistry and deep ocean circulation control relationships between nutrient-type trace metals (Cd, Ni, Cu, and Zn) and nutrients in the South Atlantic Ocean near the subtropical front. *Geochimica et Cosmochimica Acta*, 370, 144–160. doi:10.1016/j.gca.2024.01.001
- Chen, X.-G., Milne, A., Klar, J. K., Gledhill, M., Lohan, M. C., Hsieh, Y.-T., Henderson, G. M., Woodward, E. M. S., & Achterberg, E. P. (2024). Controls on distributions of aluminium, manganese and cobalt in the South Atlantic Ocean along GEOTRACES transect GA10. *Geochimica et Cosmochimica Acta*, 373, 177–196. doi:10.1016/j.gca.2024.03.019
- Gu, Y., James Hopwood, M., Gledhill, M., Rapp, I., Wuttig, K., & Achterberg, E. P. (2024). Spatial and temporal variations in the micronutrient Fe across the Peruvian shelf from 1984 to 2017. *Progress in Oceanography*, 221, 103208. doi:10.1016/j.pocean.2024.103208
- Liu, H., Yuan, Z., Gosnell, K. J., Liu, T., Tammen, J. K., Wen, Z., Engel, A., Liu, X., Huang, B., Kao, S.-J., Achterberg, E. P., & Browning, T. J. (2024). Patterns of (micro)nutrient limitation across the South Pacific Ocean. *Communications Earth & Environment*, 5. doi:10.1038/s43247-024-01749-1
- Zhang, Z., Xu, A., Hathorne, E., Gutjahr, M., Browning, T. J., Gosnell, K. J., Liu, T., Steiner, Z., Kiko, R., Yuan, Z., Liu, H., Achterberg, E. P., & Frank, M. (2024). Substantial trace metal input from the 2022 Hunga Tonga-Hunga Ha’apai eruption into the South Pacific. *Nature Communications*, 15. doi:10.1038/s41467-024-52904-3
- Waltemathe, H., Struve, T., Rehbein, M., & Pahnke, K. (2024). Influence of water mass mixing and hydrothermal processes on the distribution of dissolved Nd isotopes and concentrations in the South Pacific. *Earth and Planetary Science Letters*, 642, 118846. doi:10.1016/j.epsl.2024.118846

- Struve, T., Zander, M., Pahnke, K. (2025). Testing the Ce Limit of Mass Bias Correction Using $^{145}\text{Nd}/^{142}\text{Nd}$ as Normalizing Ratio in Radiogenic Neodymium Isotope Analysis by MC-ICP-MS. *Rapid Communications in Mass Spectrometry* 39, e9951. doi:10.1002/rcm.9951. Xu, A., Hathorne, E., Seidel, M., Liu, T., Asp, N. E., Koschinsky, A., Dittmar, T., & Frank, M. (2025). The Amazonian mangrove systems accumulate and release dissolved neodymium and hafnium to the oceans. *Communications Earth & Environment*, 6. doi:10.1038/s43247-024-01989-1
- Kurahashi, E., Poehle, S., & Koschinsky, A. (2024). Determination of vanadium redox species V(IV) and V(V) in seawater using chelating resin and inductively coupled plasma mass spectrometry. *Deep Sea Research Part I: Oceanographic Research Papers*, 206, 104261. doi:10.1016/j.dsr.2024.104261
- do Nascimento, L. S., Pestana, I. A., Seidel, M., da Silva Junior, J. M., de Oliveira, B. C. V., Gomes, P. R., Koschinsky, A., Dittmar, T. & de Rezende, C. E. (2025). Mercury concentrations along the Amazon estuary and plume: Spatial trends and geochemical processes. *Environmental Research*, 121129. <https://doi.org/10.1016/j.envres.2025.121129>
- Camoying, M., Koch, F., Stimpfle, J., Hassler, C., Trimborn, S. 2024 Distinct responses of diatom- and flagellate-dominated Antarctic phytoplankton communities to altered iron and light supply. *Front Mar Sci* 11:1441087, doi:10.3389/fmars.2024.1441087.
- Böckmann, S., Trimborn, S., Schubert, H., Koch, F. 2024 Grazing by nano- and microzooplankton on heterotrophic picoplankton dominates the biological carbon cycling around the Western Antarctic Peninsula. *Polar Biology* 47:279-294, doi:10.1007/s00300-024-03231-2.
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Please indicate if there is any forthcoming or planned GEOTRACES special issue publication

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

- Marianne Camoying (2025): Ecophysiological response of Southern Ocean cryptophytes to temperature, CO₂, light and iron availability. University Bremen.
- Sebastian Böckmann (2024): Grazing in times of fading light: How zooplankton shapes the ecosystem at the Western Antarctic Peninsula during autumnal shifts of growth limiting factors. University Bremen.
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GEOTRACES presentations in international conferences

- Trimborn, S. 2024 Southern Ocean phytoplankton – Key drivers of CO₂ uptake. EUREKA symposium, 10-11 October, Würzburg, Germany.

- Trimborn, S. 2025 Iron and manganese availability drives Antarctic primary production and carbon export. POF4 AWI evaluation, Breakout Session Topic 6, 25 March, Bremerhaven, Germany.
- Stimpfle, J., Koch, F., Ebner, B., Sukekava, C., Sander, S., Zitoun, R., Henkel, S., Kasten, S., Trimborn, S. 2024 Quantifying the bioavailability of nearshore iron sources to Southern Ocean phytoplankton. AWI Science week, 12 November, Bremerhaven, Germany.
- Trimborn, S., Balaguer, J., Koch, F. 2024 Low light conditions promote FeMn co-limitation of the key diatom *Fragilariopsis* in two Weddell Sea phytoplankton assemblages. Regional Working Group Workshop "Weddell Sea Dronning Maud Land", 7-8 November, online.
- Balaguer, J., Koch, F., Trimborn, S. 2024 The combined effect of light, iron and manganese availability on Southern Ocean phytoplankton growth and productivity. Ocean Science Meeting, 17-23 February, New Orleans, USA.
- Stimpfle, J., Koch, F., Ebner, B., Zitoun, R., Henkel, S., Trimborn, S. 2024 Quantifying the bioavailability of nearshore iron sources from South Georgia to natural phytoplankton communities. Ocean Science Meeting, 17-23 February New Orleans, USA.
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Submitted by ... (please include contact e-mail address)