

GEOTRACES Synthesis preparation workshop Delmenhorst 3-4 July 2025

Summary

GEOTRACES synthesis preparation workshop

Delmenhorst, July 3 – 4, 2025

Organisers:

Walter Geibert, Elena Masferrer
and Doris Meyerdierks (host)

with contributions from the organizing committee:
Catherine Jeandel, Lise Artigue, Jianghui Du
and David González Santana

Thursday July 3, 2025

9:00 Doris Meyerdierks Welcome
9:05 Walter Geibert Why and how
9:10 Distributing observer roles, possible working groups and motivation of tasks

Taking stock: What kind of synthesis efforts are already going on?

09:15 Stephan Krisch - Towards a review in Arctic micronutrients?
09:35 Ed Hathorne - The proxies Nd, REE, Ba isotopes: Tracer-sediment links
09:55 Zhouling Zhang - Synthesis work on Nd isotopes
10:05 Marta Perez Rodriguez - Mercury and methyl mercury in the Southern Ocean
10:15 Mark Hopwood -
A brief statement on oxygen minimum zone research as part of GEOTRACES
10:25 Closing discussion 1st part

10:30 Coffee break

Taking stock: What kind of synthesis efforts are already going on?

10:45 Emilie LeRoy - Combining radioactive and stable tracers for budgets – examples from the radium world
11:00 Lise Artigue - Combining multi-tracer approaches with hydrodynamic modeling and microbiology
11:15 Martha Gledhill -
Chemical controls on trace elements in the ocean (+ Biogeotracers)
11:35 Ying Ye - example for modelling using existing data (with contributions by Kathrin Wuttig and Christoph Völker)
11:55 Yeala Shaked - An example of synthesis work: the Fe bioavailability index
12:10 Antoine Ringard and Hélène Planquette -
Biogenic trace metal stoichiometry in particulate material
12:25 Edelgard Baumann - Trace elements in the Southern Ocean, MISO cruise (IO9): new data connecting to the bigger picture
12:35 Closing discussion 2nd part
12:45 Walter Geibert - Baselines for economy and politics

13:00 Lunch

Aims and strategies

14:00 Bob Anderson - GEOTRACES synthesis
14:30 Elena Masferrer Dudas and Lise Artigue -
What has been achieved in terms of products?
15:00 Ryan Cloete -
Outreach and education opportunities through media and other avenues
15:15 Eric Achterberg - Creative and insightful synthesis approaches

15:30 Coffee break

Aims and strategies

15:45 Catherine Jeandel - The path of paradigms - suggestions on a way to build Geotracers synthesis
16:00 David Gonzalez Santana -
Low-cost analytical approaches and community-driven solutions
16:15 Eleni Stathopoulou - Where to shift the focus in upcoming TEI research?
16:30 Peter Croot - Synthesis of multiple datasets and deep learning approaches
16:45 Lars-Eric Heimbürger - Mercury - forming networks on an element cycle
17:00 Tim Conway - Fe, Fe isotopes and Fe fluxes
17:20 Ana Cristina Vásquez - Copper isotope work in a Costa Rican river - An ECR and Latin American perspective
17:35 Jay Cullen - Canadian-European links, high Latitudes and Biogeotracers Aspects
17:55 Free slot possible for late time zones (e.g. Ed Boyle, Margot Debyser)

18:00 Dinner at HWK

Friday July 4, 2025

- 09:00 Catherine Jeandel, Walter Geibert, Elena Masferrer - Report on current explorations of European funding
- 09:15 Julien Middleton - d30Si collaboration/exchange
- 09:25 Nabir Mamnun - Schmidt Science Institute funding
- 09:30 Ryan Cloete - Networking in Southern Ocean research
- 09:35 David Gonzalez Santana - An ECR perspective on collaborations
- 09:45 Mark Hopwood - Pacific Rim Networking
- 09:55 Wen Hsuan Liao - Metal isotopes and beyond
- 10:00 Rob Middag - Introduction of networking potential around micronutrients and BioGeoScapes activities
- 10:10 Antoine Ringard/Hélène Planquette - possible connections for networking/funding
- 10:15 Peter Croot - possible connections for networking /funding
- 10:25 If possible from the cruise: brief introduction of Hajime Obata, Jun Nishioka and Yoshiko Kondo

10:30 Coffee break

All times for personal networking introductions are approximate - range between 1 and 10 + 5 minutes as discussed

- 10:45 Eleni Stathopoulou - possible connections for networking /funding
- 10:55 Zhouling Zhang - possible connections for networking /funding
- Seyed Reza Saghravani - possible connections for networking /funding
- Gabriel de Souza Franco - possible connections for networking /funding (with database creation aspects)
- Edelgard Baumann - possible connections for networking /funding from an ECR/ Southern Ocean perspective
- Lars-Eric Heimbürger - possible connections for networking /funding from a mercury perspective

- Lise Artigue - possible connections for networking /funding
- Emilie LeRoy - possible connections for networking /funding
- Eric Achterberg - possible connections for networking /funding
- Ed Hathorne - possible connections for networking /funding
- Stephan Krisch - possible connections for networking /funding
- Kathrin Wuttig - possible connections for networking /funding
- Ying Ye - possible connections for networking /funding
- Yeala Shaked - possible connections for networking /funding (experience from Fe bioavailability working group)
- Ana Cristina Vasquez - An ECR and regional LatAm perspective on networking
- Ed Boyle - possible connections for networking /funding from a Pb isotope perspective
- Margot Debyser - possible connections for networking /funding e.g. from a Si isotope synthesis perspective
- Tim Conway - possible connections for networking /funding (Fe+ Fe isotope perspective)
- Jay Cullen - possible connections for networking /funding
- Other networking contributors

13:00 Lunch

- 14:00 Reports from observers, reports from possible working groups and organising writing and further networking (e.g. Goldschmidt) tasks
- 14:50 Closing remarks
- 15:00 Farewell/ End of workshop

Some (possible) next steps Thursday

- GEOTRACES Community: Consider developing a GEOTRACES Science Plan 2.0 to better coordinate and guide international process studies
- Early Career Research Committee: Work on expanding representation to include more researchers from Latin America and Africa
- David/Early Career Committee: Develop strategies to make GEOTRACES more inclusive and accessible to labs with limited resources, including practical courses and regional mini-workshops
- Database Team: Release the 4th version of the Neodymium and Strontium isotope database by late 2025/early 2026, including standardized metadata and suitable hosting platform
- Database Teams: Align vocabularies between different Geotrades-related databases to improve interoperability
- GEOTRACES Community: Prepare for the 5th International Polar Year in 2032 through coordinated funding and research activities
- Gesine Mollenhauer/Susann Henkel: Submit cruise proposal for the 2027 Polarstern expedition to the Beaufort Sea
- Canadian and European Teams: Continue collaboration on the 2027 Polarstern Arctic cruise planning and implementation
- Lars/Mercury Research Team: Revise Arctic mercury budget estimations to include seasonal variability based on new data
- Tim/Research Team: Continue investigation of iron isotope signatures at sediment-water interfaces to better understand fractionation processes
- Early Career Scientists: Continue leading synthesis efforts for Arctic data
- Biogeoscapes Team: Continue development of process studies and time series programs in collaboration with Geotrades
- GEOTRACES IPO: Update the GEOTRACES publications database to include filtering capabilities for synthesis papers
- Elena: Implement Walter's suggestion to promote more of the Synthesis initiative on the GEOTRACES website
- GEOTRACES Community: Contribute existing educational and outreach materials to the GEOTRACES website by emailing them to Elena
- GEOTRACES Community: Establish a Discord channel for database coordination and communication
- Database Team: Consider organizing a workshop at Goshami 2026 for the database release
- Community Members: Consider joining the database initiative team to help with ongoing work
- Canadian Researchers: Explore new collaboration opportunities through Horizon Europe membership

Some (possible) next steps Friday

- Elena & Workshop Team: Prepare 2-page document summarizing research priorities for next EU funding program
- All PIs: Contact national offices/delegates with the 2-page Horizon program outline to push for GEOTRACES-specific calls in 2026-2027 program
- Walter/Elena: Prepare a 2-page outline document for future Horizon program funding needs to be distributed to national delegates
- Rob/BIOGEOSCAPE Team: Develop international data management plan for BIOGEOSCAPE program
- David/Early Career Committee: Create a list of available equipment/facilities for sharing and training between labs on the GEOTRACES website
- Antoine/Interested Parties: Form a working group to study fluid/benthic nepheloid layers
- Zhouling & Team: Coordinate boron isotope intercalibration effort among labs in China, US, France, and Taiwan
- Jessica Fitzsimmons, Jim Moffett, others: Consider including barium and silicon isotopes in their upcoming collection of new GEOTRACES reference water
- Gabriel & Team: Create a publication summarizing all existing databases containing GEOTRACES data
- Early Career Researchers Committee: Explore funding opportunities through the Hastings Simons Foundation Science Program
- Elena: Organize a committee to prepare a 2-page proposal for SCORE-sponsored workshop in the United States next year
- Peter: Look into JPI Oceans call opportunity
- Hajime/Interested Parties: Compile and analyze time variation data from GEOTRACES crossover stations
- Early Career Researchers: Connect with David regarding the mixer event at GOLDSCHMIDT 2025 conference
- Workshop Participants: Submit slides/materials from presentations to the shared folder for documentation
- Elena: Create and distribute form for participants to express interest in EU funding proposals
- Workshop Organizers: Compile and distribute workshop notes combining Kathrins's notes and AI companion transcripts
- Yeala & Jay: Consider organizing Geotraces-related sessions for 2024 Goldschmidt Conference in Montreal
- Jay: Investigate remote participation possibilities for 2024 Goldschmidt Conference
- Workshop Organizers: Prepare summary report for GEOTRACES Scientific Steering Committee
- Antoine & Team: Continue discussions on optimization methods and parameter comparisons in the Discord channel
- Elena: Create new channels in Discord for specific topics, including a "Sedi-traces" channel
- Rob & Walter: Create a form to collect interest in Southern Ocean trace metal review paper

Notes: Very helpful human notes were taken by Dr. Kathrin Wuttig-working at AWI on TEI/modelling interface. Also used was the Zoom AI companion- providing useful summaries, but sometimes getting names wrong.

What is already there in terms of synthesis products ?

Synthesis means different things to the different participants, some of which have already been (partly) achieved, others still standing out.

- In terms of data synthesis → data products and 2nd level products like egeotracess.org
- In terms of outreach → compilation of all materials, extraction of highlights
- Overview of publications, and condensed or simplified films, instructions etc., bundled in the web page

(shown by Elena Masferrer-Dodas and Lise Artigue)

Still missing

is an official and structured summary of the scientific findings.

Bob suggests a synthesis volume with roughly 1 paper per TEI (Iron probably more)

Highlighting major processes/carriers (suspended particles, aerosols, but also micronutrients, contaminants, proxies, ...)

Catherine suggests a similar approach, structured into single elements, than multi-elements from the process studies, than basin-scale

Also important: labeling synthesis outcome as „GEOTRACES synthesis“ to make it visible and recognisable (Walter)

Very important: Legacy data product! Peter Croot

Artificial intelligence: Synthesis on demand

The way people extract, summarize and synthesise information is rapidly changing.

AI now can for example convert the GEOTRACES web page to a convincing podcast. (Yeala) Still no replacement for data products, scientific papers, web page, but changes the level of processing required.

ECR foci

- Outreach
- Capacity building
- Low-cost analytical solutions
- Work with practical impact
- Enabling/Empowering more countries and people to conduct trace metal work, acknowledging the importance for Ecosystems and food safety

Funding debate

Synthesis requires funding

Some possible routes:

EU funding, co-ordinated effort possible
JPI Oceans, national commitments.

Any new funding route will also mean a shift in focus