



INTERNATIONAL GEOTRACES PROGRAMME

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 Committee*






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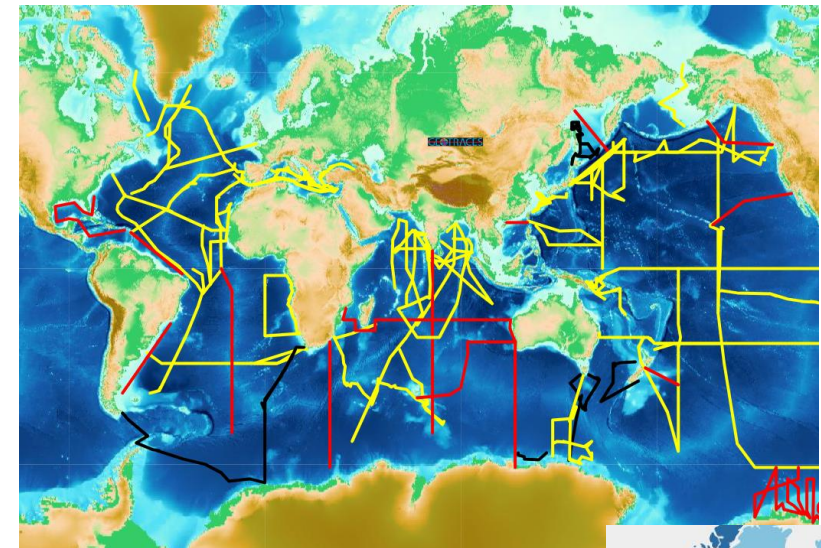
The **GEOTRACES mission** is to identify processes and quantify fluxes that control the distributions of key **trace elements and isotopes (TEIs)** in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions

WHY TO CARE ABOUT

RARE BUT NEVERTHELESS PRECIOUS FOR MARINE LIFE. THE CHEMICAL ELEMENTS KNOWN AS "TRACE ELEMENTS" ARE INDISPENSABLE TO THE FUNCTIONING OF THE OCEAN OR TO THE UNDERSTANDING OF IT.

TRACE ELEMENTS ARE:

NUTRIENTS	TOXINS	INDICATORS
		
THEY ARE ESSENTIAL FOR THE DEVELOPMENT OF PHYTOPLANKTON.	THEY ACCUMULATE ALONG THE FOOD CHAIN.	THEY PROVIDE ESSENTIAL INFORMATION TO IMPROVE CLIMATE MODELS.
IRON ZINC CADMIUM MANGANESE NICKEL COPPER COBALT	MERCURY LEAD RADIOELEMENTS	NEODYMIUM RARE EARTH BERYLIUM RADIUM



To date:

35 nations

148 cruises completed

50 sections completed (in yellow and black)

2,220 publications

3 data products (2014, 2017, 2021)



GEOTRACES DATA PRODUCT

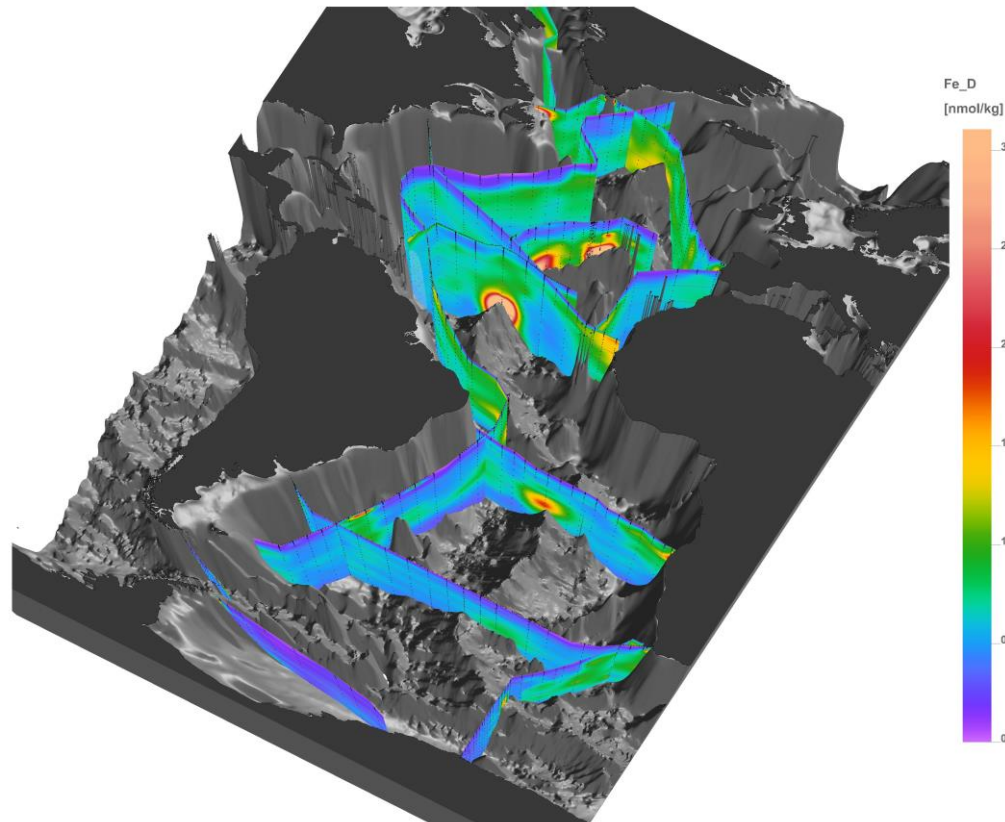


Freely available on-line!

Trace metal data from more than 3362 stations and 89 cruises...

It includes:

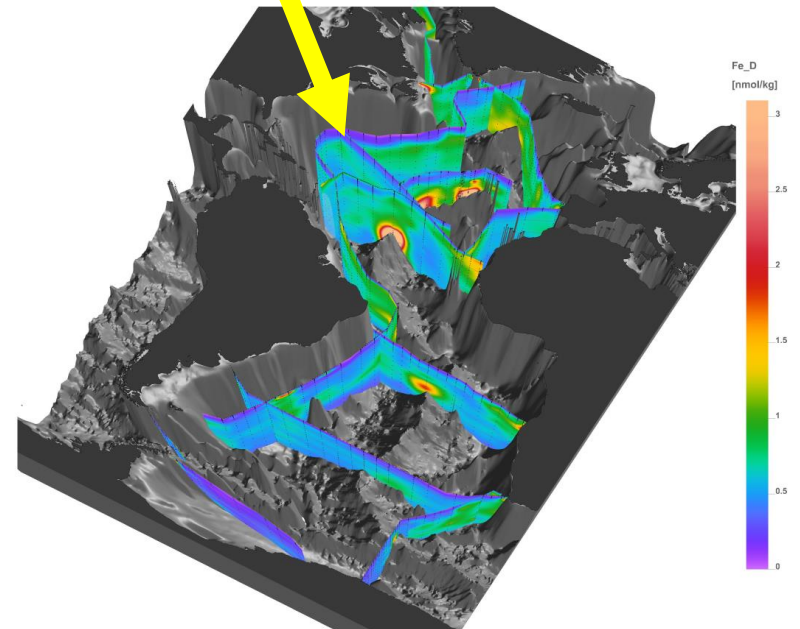
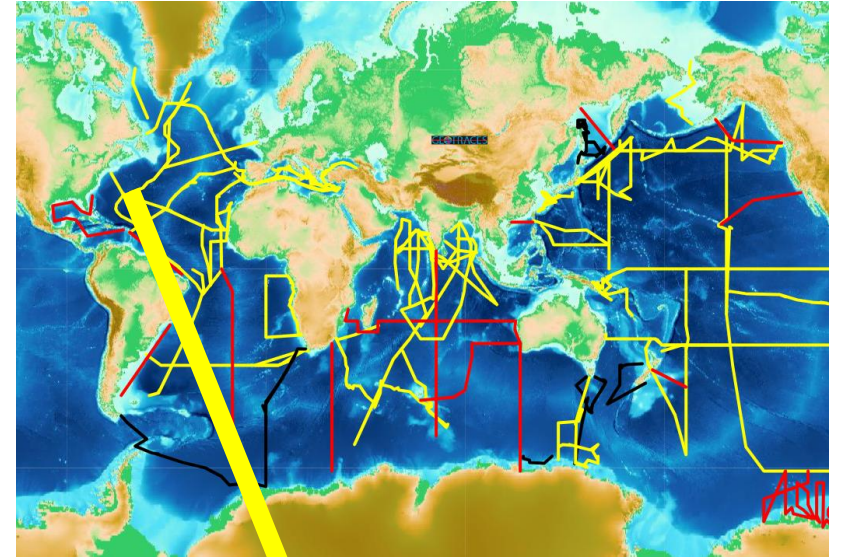
- (1) a compilation of digital hydrographical and biogeochemical data and associated metadata (geotraces.org/dp)
- (2) the *eGEOTRACES Electronic Atlas* (egeotraces.org)



Eager to foster collaborations with other ocean scientific communities and ocean professionals.

4 MAIN HIGHLIGHTS:

- 1) **compilation of data from scientists from 35 nations into a single database** where data are presented systematically using uniform parameter names
- 2) **internal consistency of data** generated by different labs in different nations
- 3) **active data management:** effort to ensure FAIR-compliant datasets
- 4) **Enabling visualization and/or partial download** of desired data from the GEOTRACES database by all ocean scientists **in a way that is simple and meets FAIR data objectives**



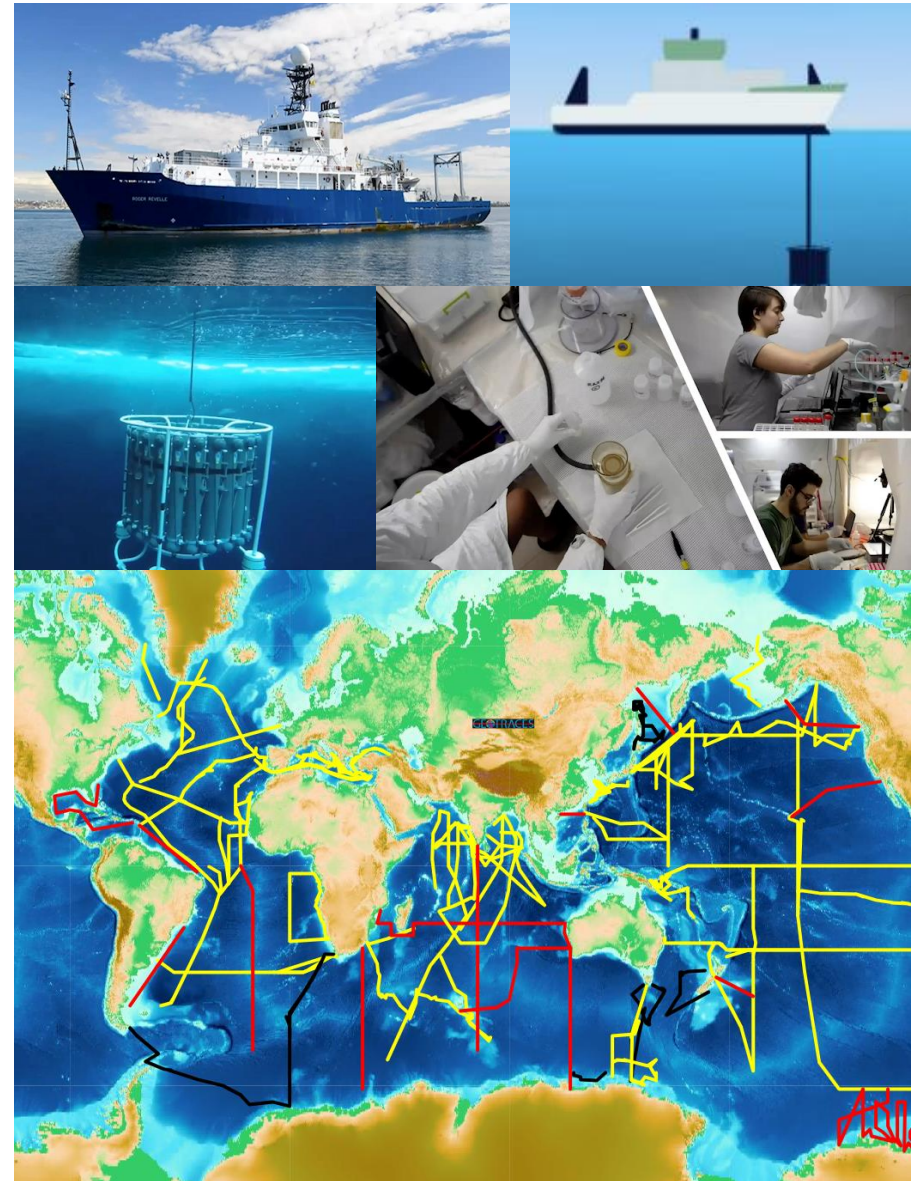
1. *Compilation of data from scientists from 35 nations into a single database where high quality-controlled data are presented systematically using uniform parameter names*

- **Collaboration and coordination:**

Organize collaboration to achieve objectives not attainable by a single lab or a single nation

Coordinated by the International Project Office

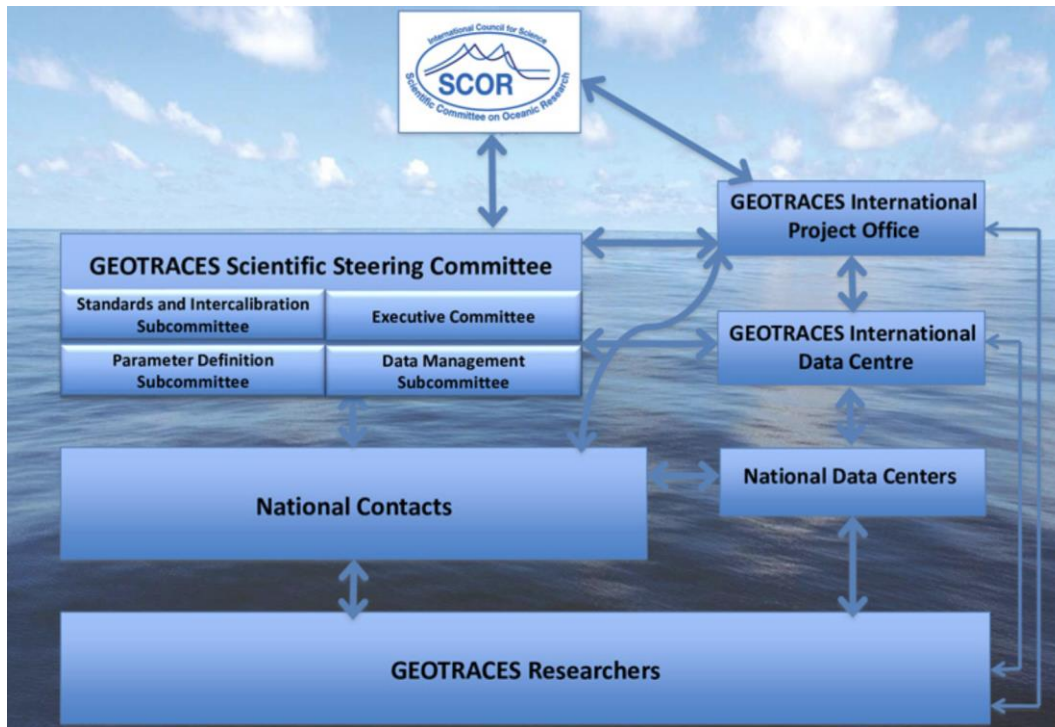
Contact: Elena Masferrer ipo@geotraces.org



1...

Compilation of data from scientists from 35 nations into a single database where high quality-controlled data are presented systematically using uniform parameter names

- **Good governance**



Trace Elements

Present in seawater in extremely low concentrations (orders of magnitude of 10^{-7} to 10^{-15} mol/kg)



Quality and internal consistency of collected data rigorously controlled by intercalibration protocols, under the supervision of a **Standards and Intercalibration (S&I) committee**

With more than 3000 parameters identified, the Parameter Definition Committee developed a consistent parameter naming scheme.

Data compiled and processed by the **GEOTRACES Data Assembly Centre (GDAC, British Oceanographic Data Centre, BODC, UK)** under the supervision of the **Data Management Committee (DMC)**

2. *Internal consistency of data generated by different labs in different nations*

A coherent global study with contributions from investigators worldwide requires high standards of intercalibration

- Reference seawater samples provided to analysts for method development and validation
- Recommended sampling and sample handling **protocols** (“The Cookbook”) is online and updated regularly:
<https://www.geotraces.org/methods-cookbook/>
- **Intercalibration and data reporting procedures** were established; to be followed on all GEOTRACES cruises:
<https://www.geotraces.org/intercalibration-procedures/>
- **A Standards and Intercalibration Committee** evaluates data to ensure reliability and assists investigators with data accuracy and reporting



3. **Active data management:** effort to ensure FAIR-compliant datasets

Active data management is essential to promote data sharing and collaboration

- **Data Assembly Centre** (BODC, UK) compiles data in an organized and accessible structure (www.bodc.ac.uk/geotraces/)
Contact: Donna Cockwell (geotraces.dac@bodc.ac.uk)
- **Data Management Committee** provides oversight and interfaces with data generators. They also recommend data policies, standards and formats for data submission
- **User friendly Portal** for data generators to register and intercalibrate the data and metadata (GEOTRACES Data for Ocean Research, **DOoR** Portal)
- **Ensure easy access** and visualisation of GEOTRACES data through free online **Intermediate Data Products (IDP)** release and development of dedicated web services for data download and visualisation (**webODV**).

IDP, web ODV and DOoR are strategical tools to increase GEOTRACES data FAIRness

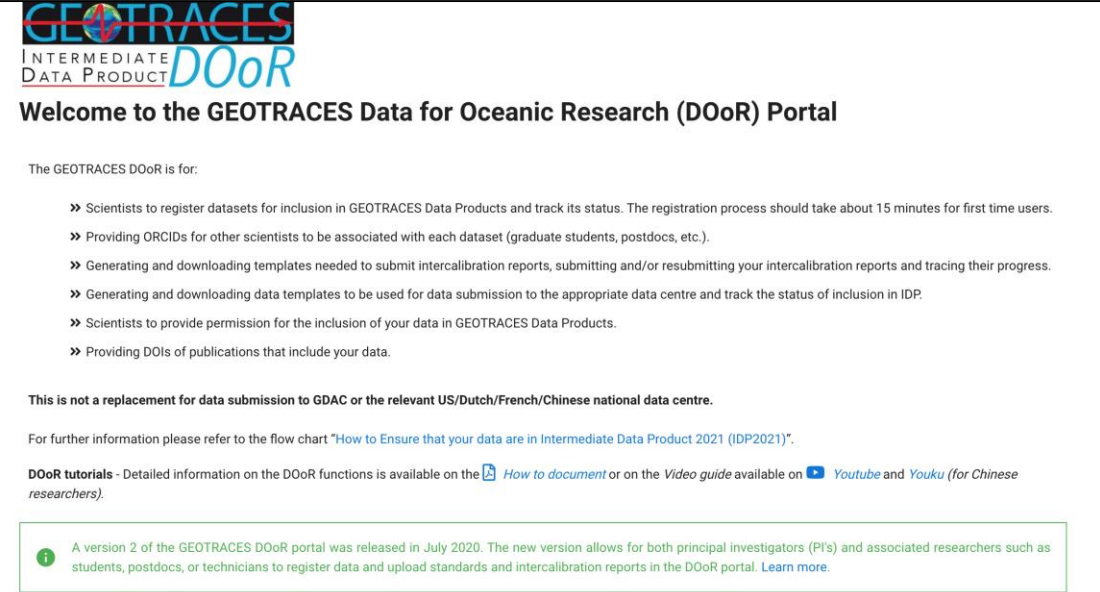
3... GEOTRACES Data for Ocean Research Portal (DOoR)*

Dedicated user-friendly on-line portal for:

- registering datasets
- generating data submission and intercalibration report templates
- entering metadata
- completing intercalibration assessment

Management tool (6 interfaces) for scientists and technicians working on the data and metadata, as well as committee members and IPO reviewing, processing and assembling these data

<https://geotraces-portal.sedoo.fr/pi/>



The screenshot shows the GEOTRACES DOoR Portal homepage. At the top left is the logo for GEOTRACES INTERMEDIATE DATA PRODUCT DOoR. The main heading is "Welcome to the GEOTRACES Data for Oceanic Research (DOoR) Portal". Below this, it states "The GEOTRACES DOoR is for:" followed by a list of bullet points: "Scientists to register datasets for inclusion in GEOTRACES Data Products and track its status. The registration process should take about 15 minutes for first time users.", "Providing ORCID's for other scientists to be associated with each dataset (graduate students, postdocs, etc.)", "Generating and downloading templates needed to submit intercalibration reports, submitting and/or resubmitting your intercalibration reports and tracing their progress.", "Generating and downloading data templates to be used for data submission to the appropriate data centre and track the status of inclusion in IDP.", "Scientists to provide permission for the inclusion of your data in GEOTRACES Data Products.", "Providing DOIs of publications that include your data." Below the list, it says "This is not a replacement for data submission to GDAC or the relevant US/Dutch/French/Chinese national data centre." and "For further information please refer to the flow chart 'How to Ensure that your data are in Intermediate Data Product 2021 (IDP2021)'." At the bottom, there is a section for "DOoR tutorials" and a green callout box stating "A version 2 of the GEOTRACES DOoR portal was released in July 2020. The new version allows for both principal investigators (PI's) and associated researchers such as students, postdocs, or technicians to register data and upload standards and intercalibration reports in the DOoR portal. Learn more."

- ➔ *Uniquely identifying/barcoding each dataset (Parameter Name::Barcode (e.g., Fe_D_CONC_BOTTLE::khpwfs) -> enables reliable dataset tracking*
- ➔ *Standardized lists to avoid free-text entries (e.g. PI identified using ORCID)*
- ➔ *Easy for researchers to select parameter names from dropdown menus*
- ➔ *Improves efficiency of data product creation*

*IT development: François André, SEDOO-Data Centre, Toulouse, France
Project leader: Elena Masferrer, GEOTRACES IPO,

3... GEOTRACES Data for Ocean Research Portal (DOoR)*

DOoR also ensures that the **data generators are always linked to their data and publications, and thus are properly acknowledged**

Parameter: Fe_D_CONC_BOTTLE

Cruise: GP16

6 Publications

TEXT EXPORT


BIBTEX EXPORT

2018

John, S. G., Helgoe, J., Townsend, E., Weber, T., DeVries, T., Tagliabue, A., Moore, K., Lam, P., Marsay, C. M., & Till, C. (2018). Biogeochemical cycling of Fe and Fe stable isotopes in the Eastern Tropical South Pacific. *Marine Chemistry*, 201, 66–76. doi:[10.1016/j.marchem.2017.06.003](https://doi.org/10.1016/j.marchem.2017.06.003)

Sanial, V., Kipp, L. E., Henderson, P. B., van Beek, P., Reyss, J.-L., Hammond, D. E., Hawco, N. J., Saito, M. A., Resing, J. A., Sedwick, P., Moore, W. S., & Charette, M. A. (2018). Radium-228 as a tracer of dissolved trace element inputs from the Peruvian continental margin. *Marine Chemistry*, 201, 20–34. doi:[10.1016/j.marchem.2017.05.008](https://doi.org/10.1016/j.marchem.2017.05.008) 

2017

Fitzsimmons, J. N., John, S. G., Marsay, C. M., Hoffman, C. L., & Nicholas, S. (2017). Iron persistence in a distal hydrothermal plume supported by dissolved–particulate exchange. *Nature Geoscience*, 10, 195–201. doi:[10.1038/ngeo2900](https://doi.org/10.1038/ngeo2900) 

Heller, M. I., Lam, P. J., Moffett, J. W., Till, C. P., Lee, J.-M., Toner, B. M., & Marcus, M. A. (2017). Accumulation of Fe oxyhydroxides in the Peruvian oxygen deficient zone implies non-oxygen dependent Fe oxidation. *Geochimica et Cosmochimica Acta*, 211, 174–193. doi:[10.1016/j.gca.2017.05.019](https://doi.org/10.1016/j.gca.2017.05.019) 

2016

Boiteau, R. M., Mende, D. R., Hawco, N. J., McIlvin, M. R., Fitzsimmons, J. N., Saito, M. A., Sedwick, P. N., DeLong, E. F., & Repeta, D. J. (2016). Siderophore-based microbial adaptations to iron scarcity across the eastern Pacific Ocean. *Proceedings of the National Academy of Sciences*, 113, 14237–14242. doi:[10.1073/pnas.1608594113](https://doi.org/10.1073/pnas.1608594113) 

2015

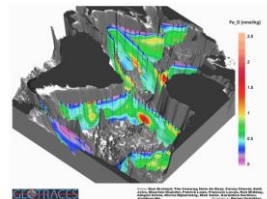
Resing, J. A., Sedwick, P. N., German, C. R., Jenkins, W. J., Moffett, J. W., Sohst, B. M., & Tagliabue, A. (2015). Basin-scale transport of hydrothermal dissolved metals across the South Pacific Ocean. *Nature*, 523, 200–203. doi:[10.1038/nature14577](https://doi.org/10.1038/nature14577)

4.

Enabling visualization and/or partial download of desired data from the GEOTRACES database by all ocean scientists in a way that is simple and meets FAIR data objectives

4 ways to access GEOTRACES data to accommodate different users:

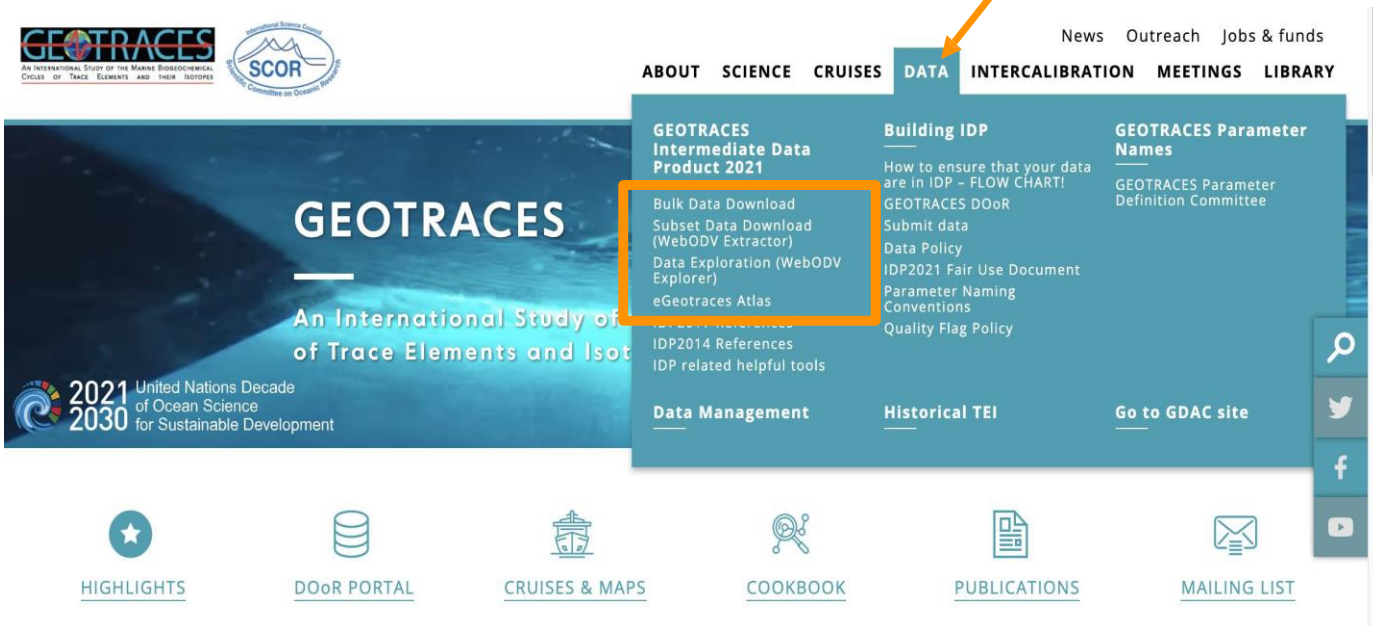
- 1 Bulk (full packages) download**
(BODC site, 3 formats: CSV-ASCII, NetCDF and Ocean Data View (ODV) collections)
- 2 Online subsetting and extraction***
(webODV Extractor, easy to select variables, region, cruises, etc.)
- 3 Online analysis and visualization***
(webODV Explorer, very user friendly, no need to download software or data)
- 4 eGEOTRACES.org Atlas***



The screenshot shows the webODV interface for data extraction. It features a central map of the Atlantic Ocean with a blue dashed line representing a cruise track. On the left, there are panels for 'CRUISES' (3 items selected), 'MAP DOMAIN' (Full range, Global), and 'TIME RANGE' (from: 01/01/1850, to: 12/31/2023). On the right, there is a 'SELECTION STATUS' panel showing 118 of 3149 stations and 8 of 348 output variables. Below the map is a 'STATION INFO' table with details for Accession Number 745, Cruise GA10, Station 24 (B), Longitude 54°W, and Latitude 36°S. At the bottom, there is a 'SELECTED VARIABLES' list including CTDPMS_T_VALUE, DEPTH, CTDTMP_T_VALUE, CTDSAL_D_CONC, SALINITY_D_CONC, ALD_CONC, Ba_D_CONC, and Fe_D_CONC.

*Reiner Schlitzer, Alfred Wegener Institute (AWI), Germany

ACCESS THE DATA



Contact GEOTRACES

International Coordination:

GEOTRACES International Project Office
(LEGOS-OMP, Toulouse, France)

Catherine Jeandel (Scientific Director)
Elena Masferrer Dodas (Executive Officer)

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