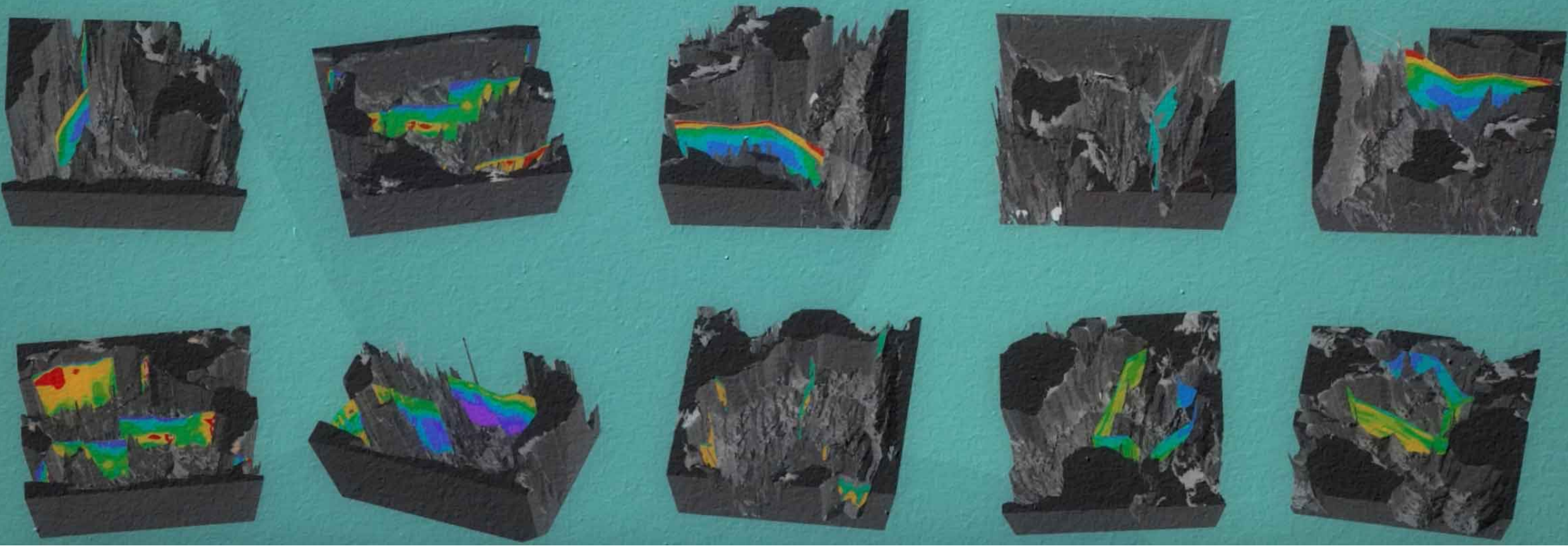




GEOTRACES: SHARING MARINE GEOCHEMICAL DATA

Maite Maldonado, UBC
Reiner Schlitzer, AWI



ZOOM ROOM RULES

Muted (default) – use Chat to ask questions

No Video (default)

No Screen Sharing (default)

Closed captioning enabled

Presentations and the recording will be available at the IPO site:

<https://GEOTRACES.org>

Also available through, the Ocean Decade Laboratory webpage.

For Twitter and
FB users!



www.geotraces.org

@geotraces
#OceanData #OceanDecade



AGENDA

- Welcome – Elena Masferrer (ipo@geotraces.org)
- Introduction to GEOTRACES – video
- Lessons learned in creating an international data product - Maite Maldonado (mmaldonado@eos.ubc.ca)
- Accessing IDP2021 – Reiner Schlitzer (Reiner.Schlitzer@awi.de)
- Potential uses of the data product: The case of genomics data - Maite Maldonado
- Conclusion and Q&A - Maite Maldonado

GEOTRACES INTERNATIONAL PROGRAMME

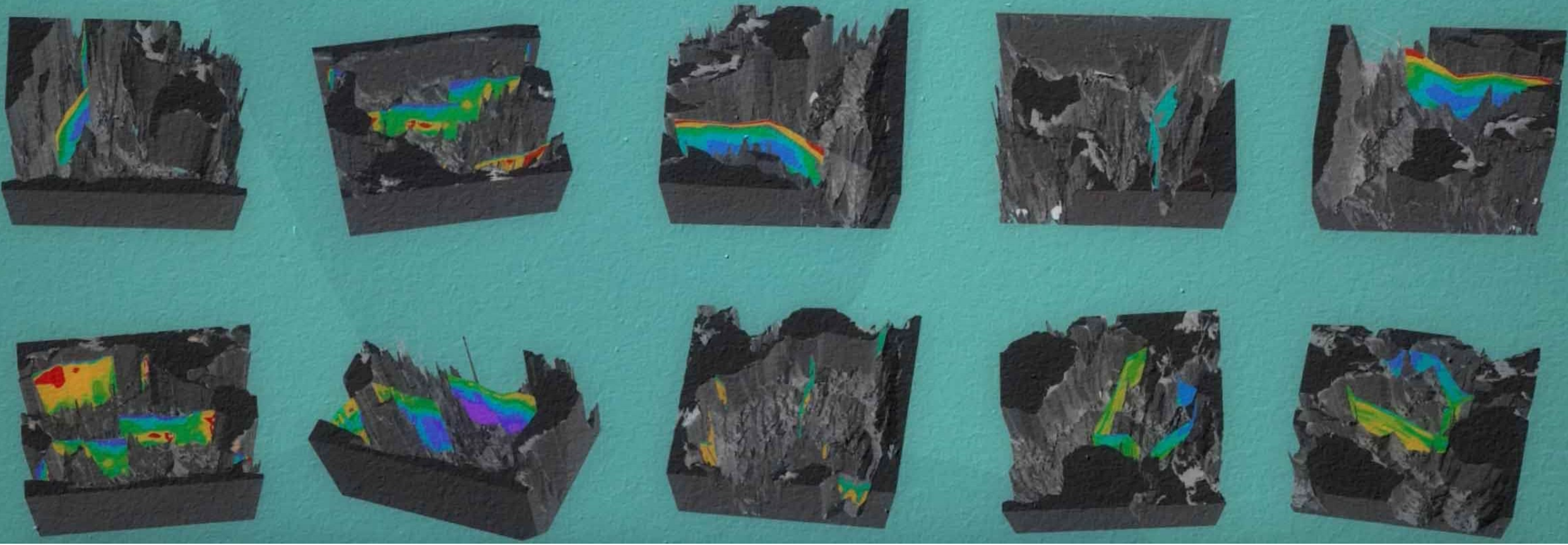
UNDERSTANDING THE OCEANS
TO PREPARE THE FUTURE

Animation by Adrian Artis

Directed by Catherine Jeandel and Elena Masferrer

Voice by Thomas Boutilier / Thanks to Rogue Elephant

Youtube link: <https://youtu.be/FoGnPTpOlCg>



LESSONS LEARNED IN BUILDING AN INTERNATIONAL DATA PRODUCT

Maite Maldonado

University of British Columbia, Canada

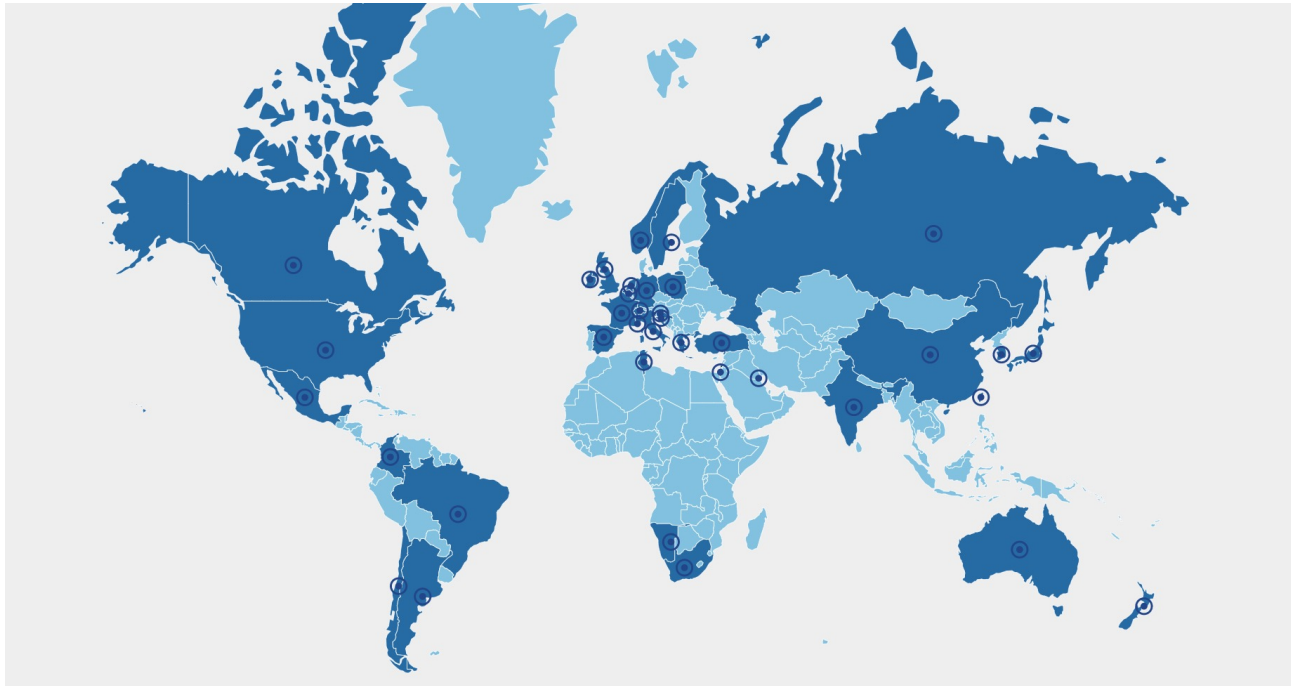


GEOTRACES MISSION

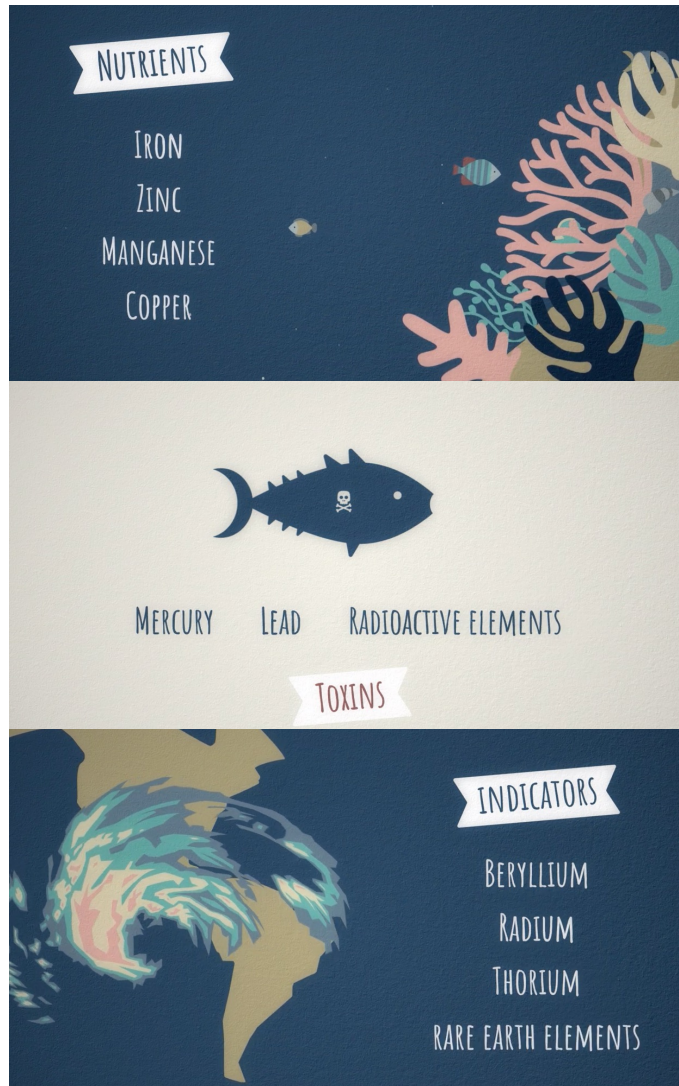
GEOTRACES mission is to identify processes that control the distributions of key trace elements and isotopes (TEIs) in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions

Scientists from more than **35 nations** have been involved in the programme, which is designed to study all major ocean basins

2006 – Science Plan 2010 – First cruises and IPO..... 2014, 2017 and 2021 – Release of data products



KEY TRACE ELEMENTS -> RARE BUT PRECIOUS



Act as micronutrients to control ocean productivity and ecosystems

(e.g. Fe, Zn, Cd, Cu, Ni, Co, Mn)

Contaminants in the present and future ocean
(e.g. Pb, Hg)

Trace modern processes in the ocean
(e.g. Al, REEs, Ra and Th isotopes, ^3He , ^{15}N , Nd isotopes)

Used as **proxies to reconstruct past climate**
(e.g. ^{231}Pa , ^{230}Th , Cd, ^{15}N , ^{30}Si , Ba, ϵNd)

The Periodic Table of the Elements

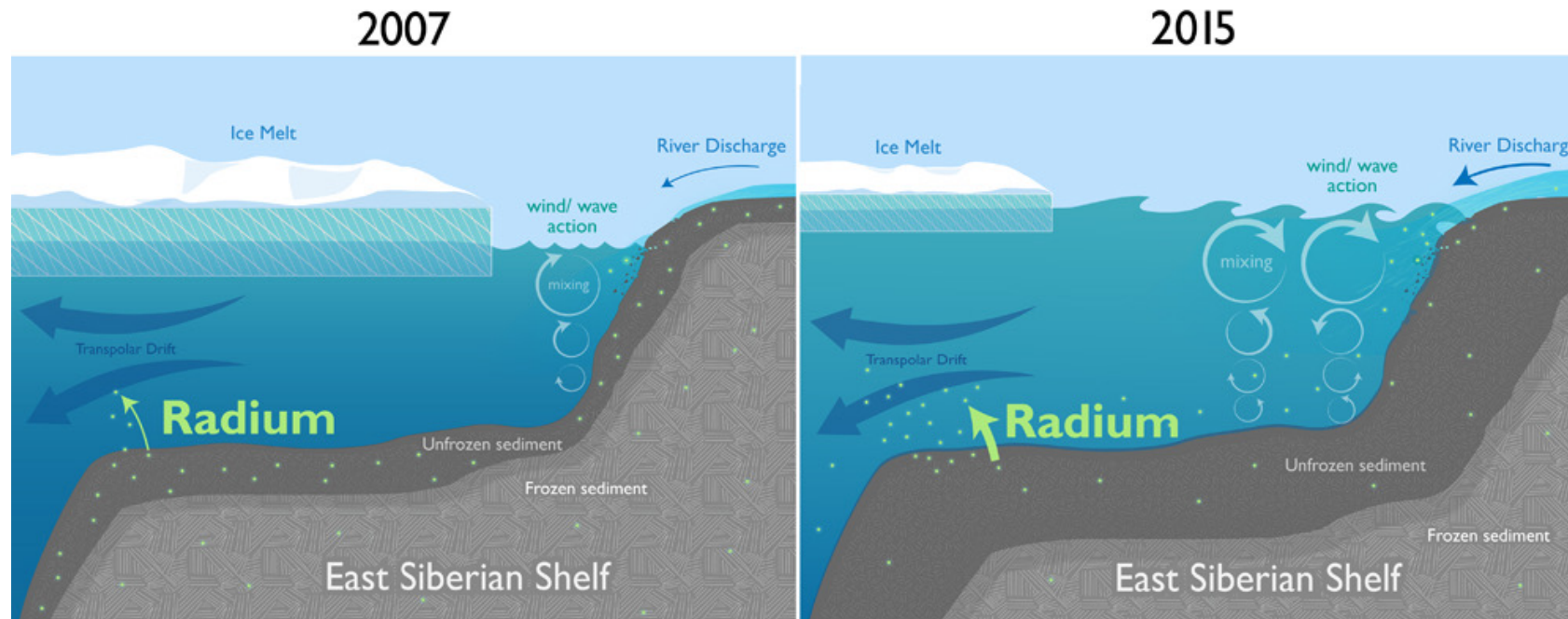
The periodic table shows elements from Hydrogen (H) to Oganesson (Og). Elements highlighted in red circles include: H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Cs, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, and Lr. The lanthanide and actinide series are shown below the main table.

The sum is greater than the parts!

GEOTRACES data document climate mediated changes in the Arctic...

Measurements of ^{228}Ra by US team in the Arctic surface waters has doubled due to an intensification of shelf-derived inputs

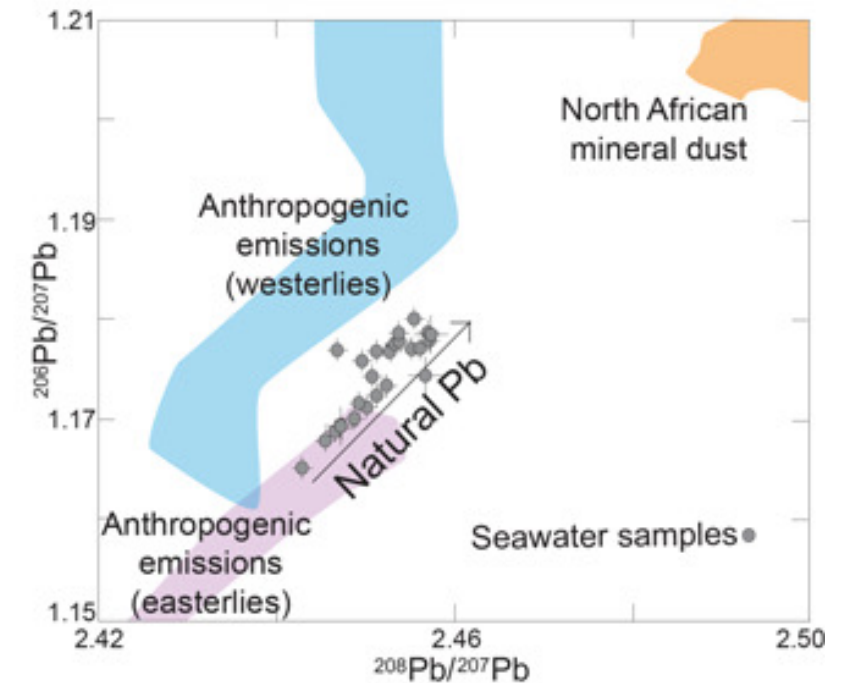
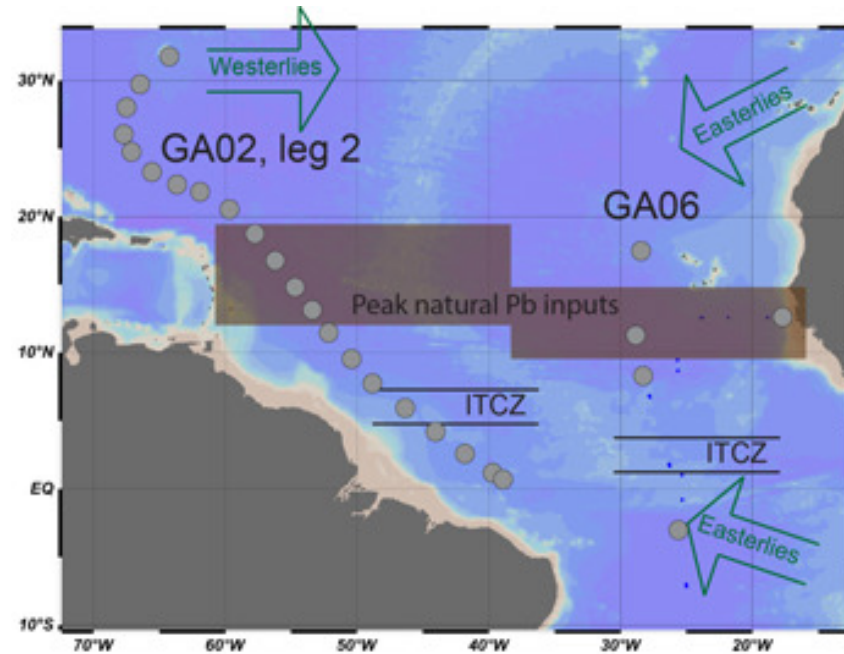
These climate mediated changes may have dramatic impacts on Arctic food webs and mammal populations



GEOTRACES data also provide evidence of the efficacy of legislations to reduce contaminant emissions

The ability to measure natural lead again in seawater shows the decrease of anthropogenic lead contamination.

This demonstrates the efficacy of major environmental regulations.

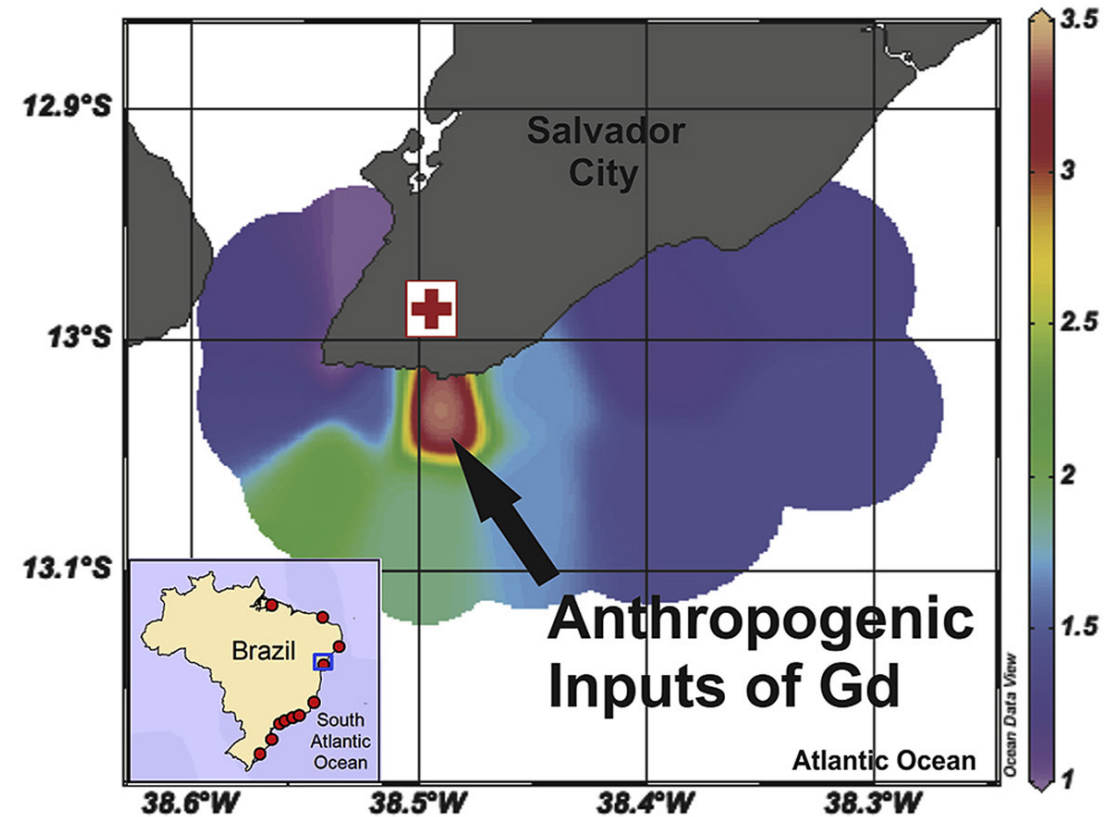


GEOTRACES data provide a baseline to assess future anthropogenic inputs of REE into the ocean

Growing use of the rare earth elements in various industries.

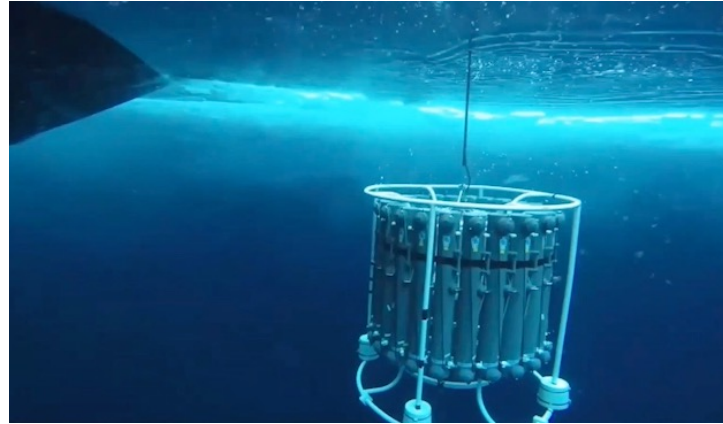
Gadolinium (Gd) in MRI, now released in environment.

Anthropogenic Gd measurable in coastal waters, and may provide a new tracer of wastewater.



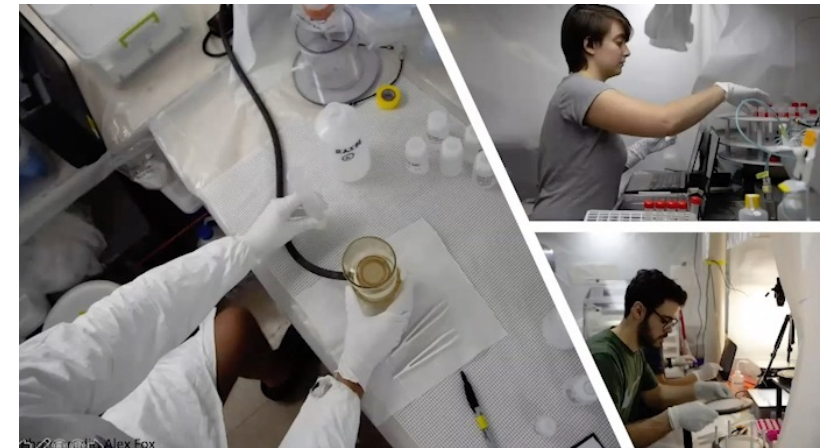
Pedreira et al, 2018

DEVELOPMENT, IMPLEMENTATION AND SHARING OF CONTAMINATION-FREE METHODS



Trace Elements

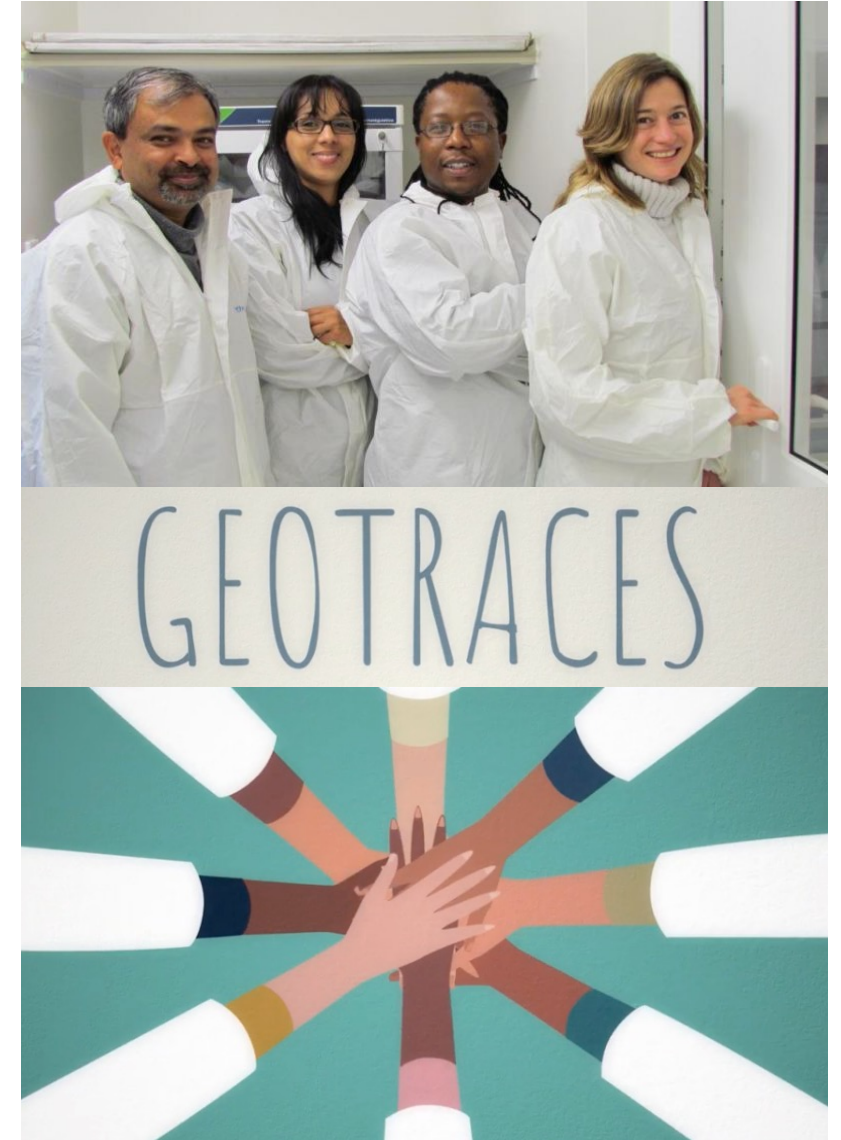
Present in seawater in extremely low concentrations (orders of magnitude of 10^{-7} mol/kg to 10^{-15} mol/kg)



CAPACITY BUILDING

Trace metal - clean sampling technology and methods

- Many nations lack infrastructure and expertise for clean sampling
- Principal barrier is sampling at sea, not analyses
- GEOTRACES offers international assistance in design, construction and use of clean sampling systems
- It also offers expertise and training (through summer schools, workshops, etc.)
- Offers online resources (best practices, tutorials, etc.)



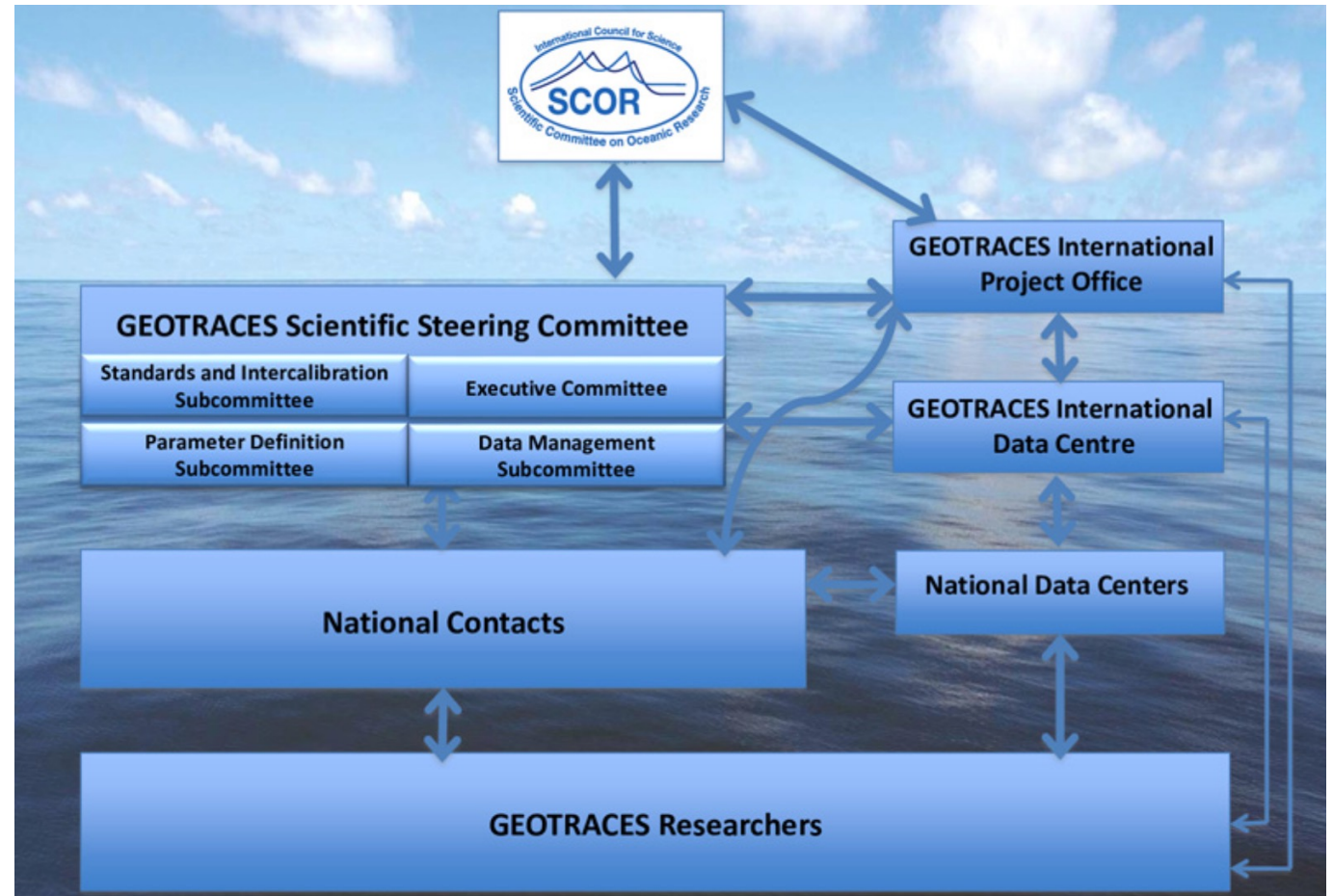
IMPORTANT ASPECTS TO GEOTRACES

- **Collaboration and coordination**

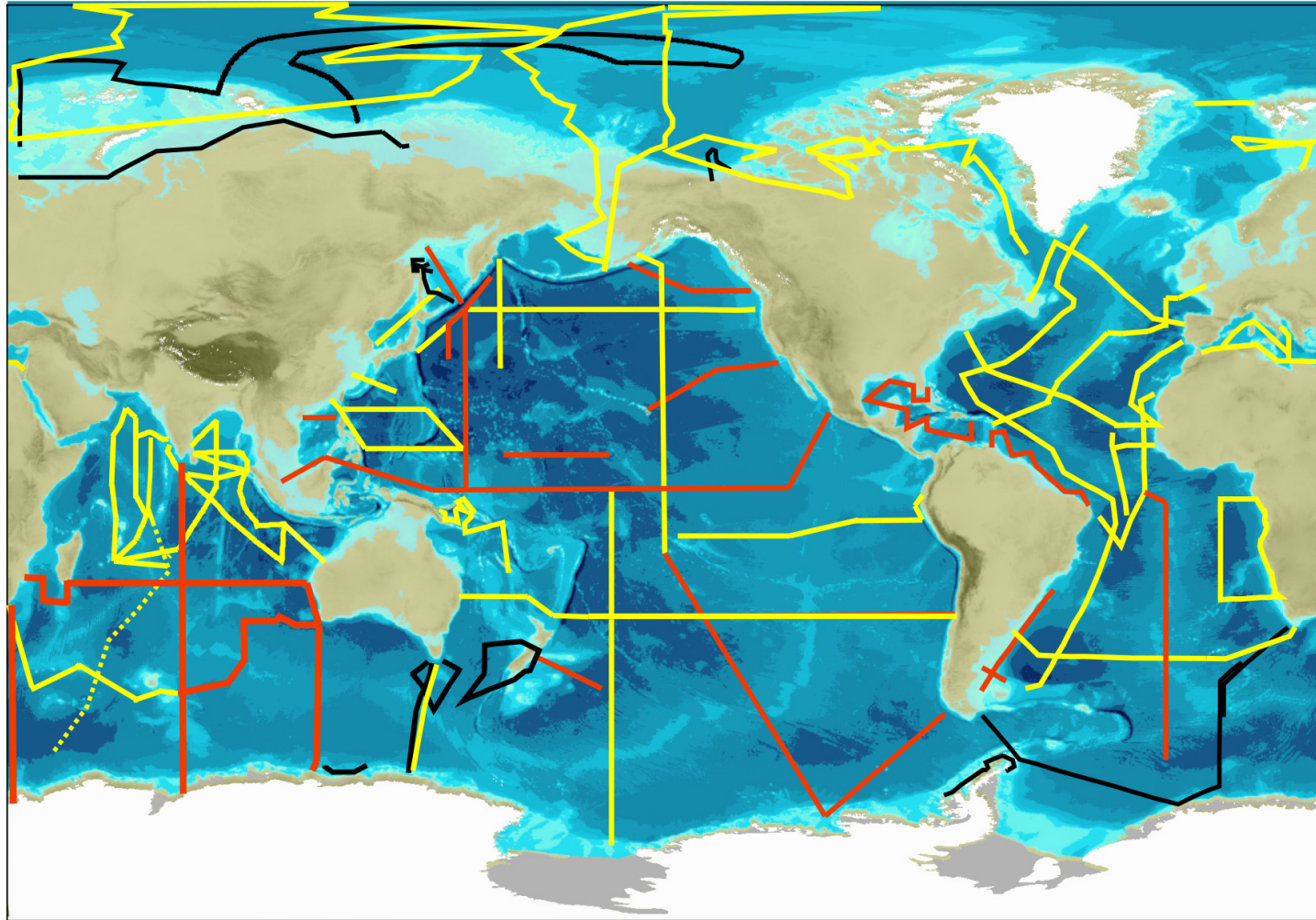
SCIENCE PLAN 2006 was key for the coordination of such ambitious global research program

-> International Project Office

- **Good governance** -> national representatives & scientific committees to oversight developments (**EDI compliant**)
- High quality data -> **Standardization & Intercalibration**
- **Active data Management**, including online data registration portal
- Release of **intermediate** data product



GOTRACES FIELD WORK



To date:

35 nations

132 cruises completed

45 sections completed

GEOTRACES cruises must follow defined criteria and be approved by the GEOTRACES SSC.

Standardization and Intercalibration: Assurance of high-quality, internally consistent global data set

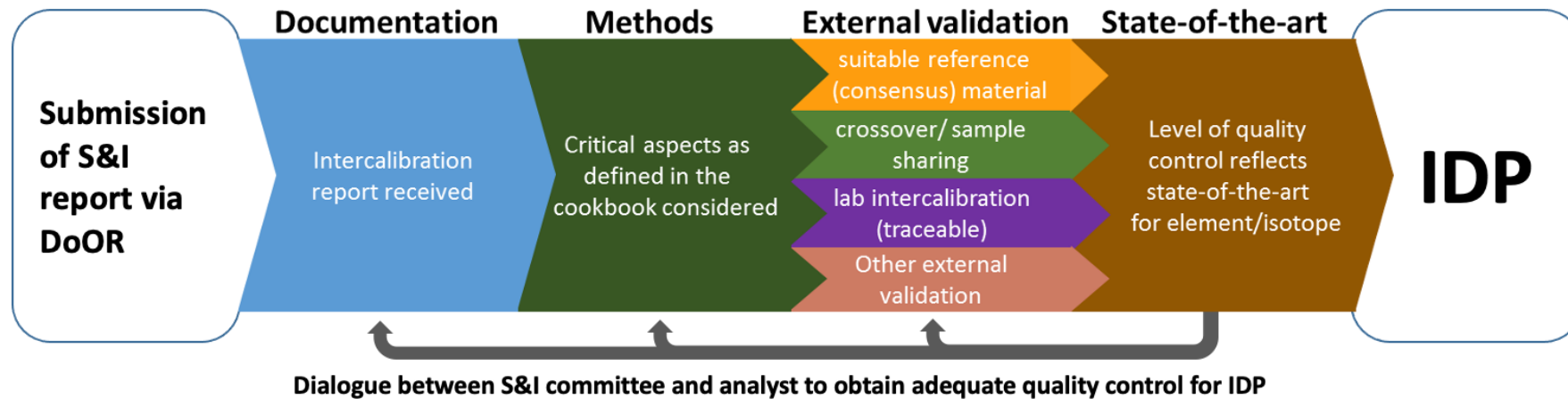
A coherent global data set with contributions from scientists worldwide requires high standards of intercalibration

- Sharing resources, expertise and equipment when needed
- **Recommended sampling protocols** ("The Cookbook") is online and updated regularly: <https://www.geotraces.org/methods-cookbook/>
- All GEOTRACES cruises must follow intercalibration procedures: <https://www.geotraces.org/intercalibration-procedures/>
- Reference seawater samples provided to analysts as standards
- A **Standards and Intercalibration Committee** evaluates data to ensure accuracy and assists investigators who experience data quality problems



HIGH-QUALITY DATA = INTERCALIBRATION

How does the GEOTRACES S&I committee assess data quality for IDP?

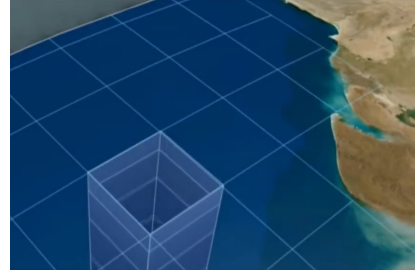


>>To submit data for the GEOTRACES Data Products:

- (1) **submit data**, AND in parallel,
- (2) **submit an intercalibration report**

Active data management: Facilitate community access to a well designed database

- Ensures public access to a well-designed database
- **Data Management Committee** provides oversight and interfaces with data generators. Recommend data policies, standards and formats for data submission
- Lesson learned from 2017 Intermediate Data Product -> Decision of **creating an online portal for data registration**
- **Data Assembly Center** (lead by Dr. Mohamed Adjou) compiles data in an organized and accessible structure (www.bodc.ac.uk/geotraces/)
- Formalised parameter names
- **FAIR Use Principles** for data access and sharing by whole community



GEOTRACES Data for Ocean Research Portal (DOoR)



Welcome to the GEOTRACES Data for Oceanic Research (DOoR) Portal

The GEOTRACES DOoR is for:

- » 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 ORCIDiDs 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.

This is not a replacement for data submission to GDAC or the relevant US/Dutch/French/Chinese national data centre.

For further information please refer to the flow chart "[How to Ensure that your data are in Intermediate Data Product \(IDP\)](#)".

DOoR tutorials - Detailed information on the DOoR functions is available on the [How to document](#) or on the *Video guide* available on [YouTube](#) and [Youku](#) (for Chinese researchers).

Please use your ORCID to login



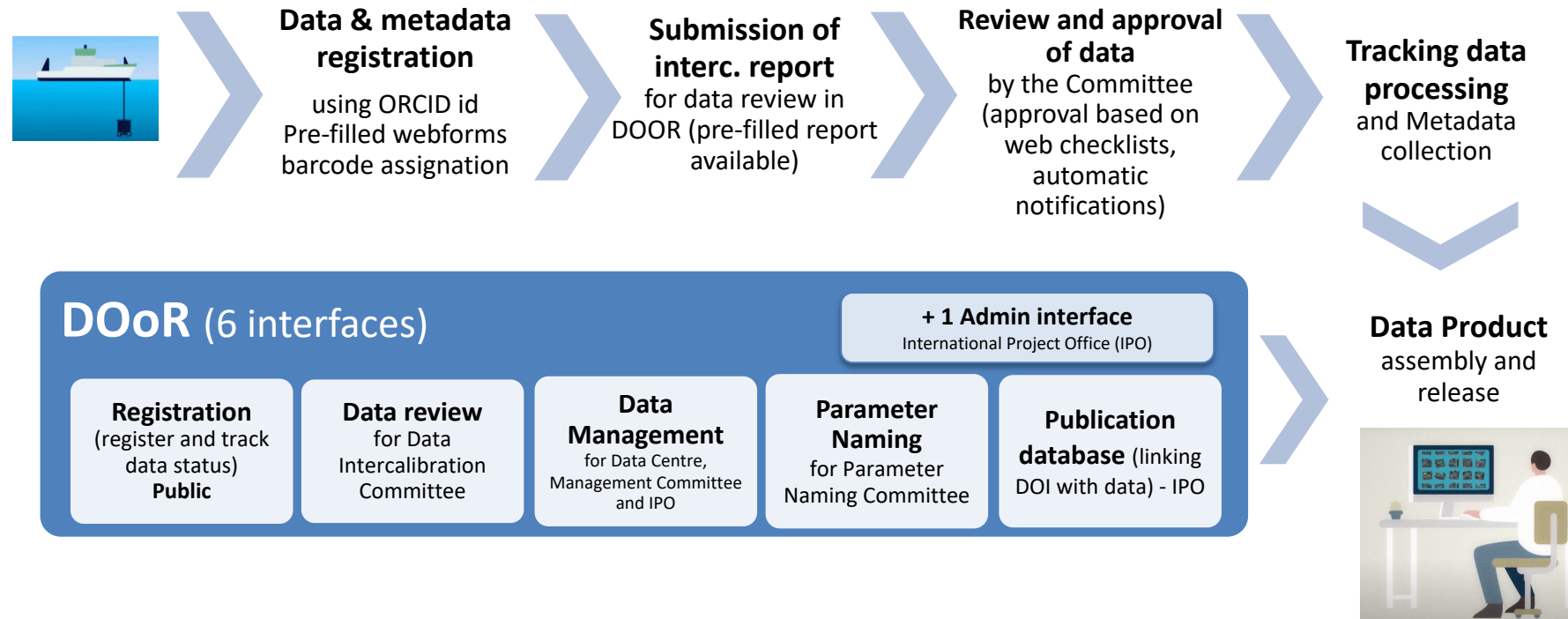
Project Manager:
Elena Masferrer,
International Project
Office, LEGOS

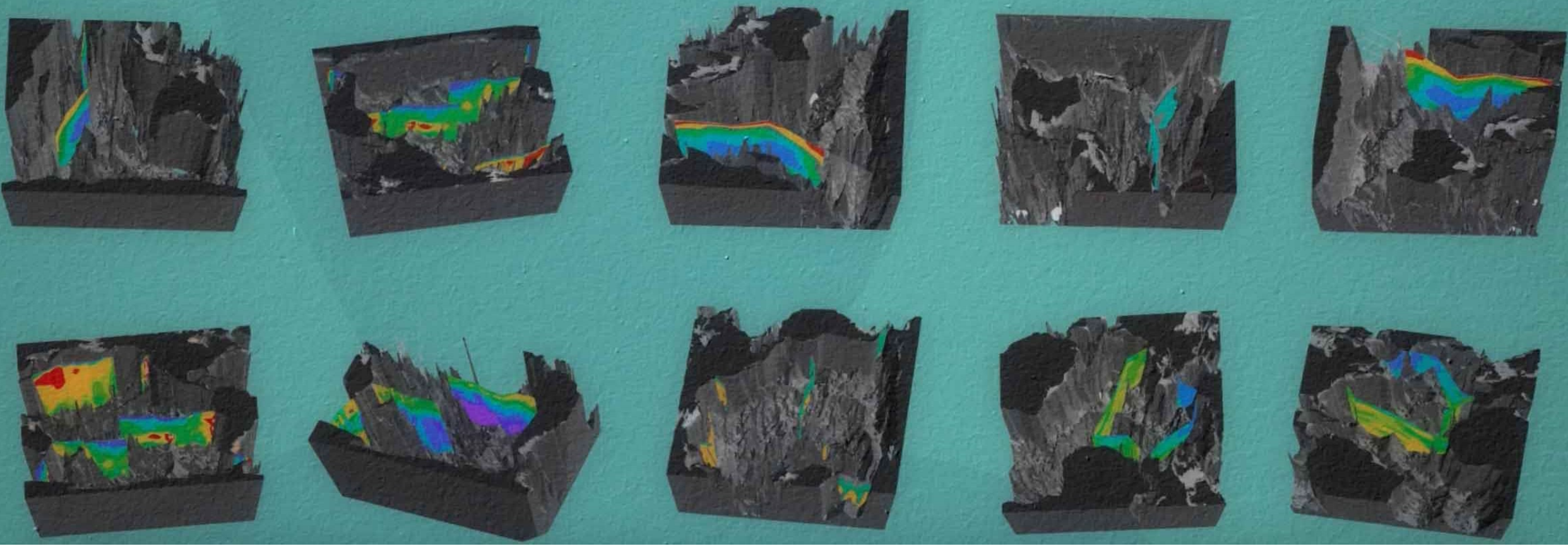
**Development by
SEDOO-OMP:**
François André
Guillaume Brissebrat
Arnaud Mière

GEOTRACES Data for Ocean Research Portal (DOoR)

On-line portal to collect data and metadata from GEOTRACES scientists to build the data product
- 880,000 data values from 77 cruises.

Multilevel management tool (6 interfaces) for scientists and technicians who review (intercalibration), process and assemble the data and metadata. One interface for function/group.





ACCESSING THE GEOTRACES INTERMEDIATE DATA PRODUCT 2021

Reiner Schlitzer

Alfred Wegener Institute, Germany

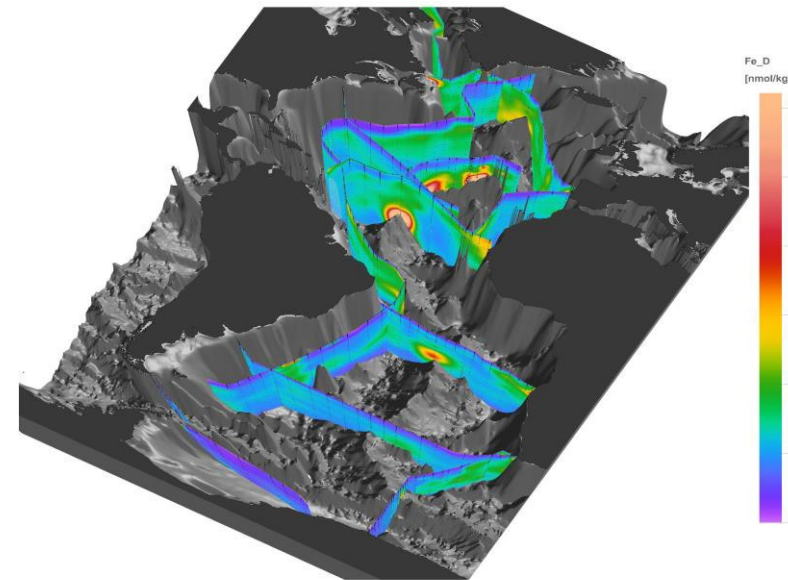
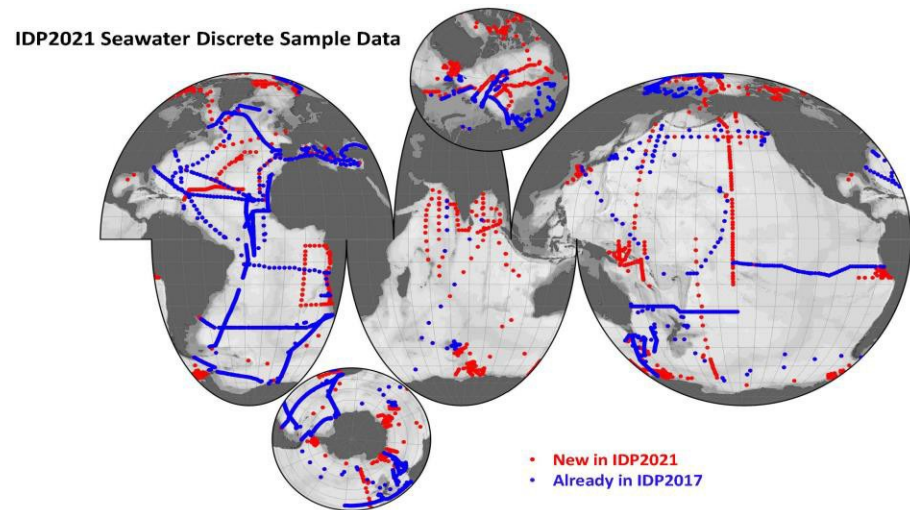


GEOTRACES IDP2021

By releasing and sharing more hydrographic and marine geochemical high-quality data from 77 cruises, we wish to strengthen and intensify the collaboration within the marine geochemical community itself, but also invite colleagues from other communities to join us.

IDP2021 consists on:

- (1) a compilation of digital trace metal data 100,000 samples from 77 cruises (geotraces.org/dp)
- (2) the eGEOTRACES Electronic Atlas (egeotraces.org)



Dissolved Fe in the Atlantic Ocean

ACCESS THE IDP2021

www.geotraces.org

The screenshot shows the GEOTRACES website homepage. At the top left are the GEOTRACES and SCOR logos. The main header includes links for News, Outreach, and Jobs & funds, followed by a navigation bar with ABOUT, SCIENCE, CRUISES, DATA (highlighted with an orange arrow), INTERCALIBRATION, MEETINGS, and LIBRARY. The main content area features a large banner for GEOTRACES with the text 'An International Study of Trace Elements and Isotopes' and a sidebar with links to 'GEOTRACES Intermediate Data Product 2021', 'Building IDP', 'GEOTRACES Parameter Names', 'Data Management', 'Historical TEI', and 'Go to GDAC site'. The footer contains icons and links for HIGHLIGHTS, DOoR PORTAL, CRUISES & MAPS, COOKBOOK, PUBLICATIONS, and MAILING LIST. A vertical sidebar on the right contains a search icon and social media links for Twitter, Facebook, and YouTube.

GEOTRACES
AN INTERNATIONAL STUDY OF THE MARINE BIOGEOCHEMICAL CYCLES OF TRACE ELEMENTS AND THEIR ISOTOPES

SCOR
International Science Council
Scientific Committee on Oceanic Research

News Outreach Jobs & funds

ABOUT SCIENCE CRUISES **DATA** INTERCALIBRATION MEETINGS LIBRARY

GEOTRACES Intermediate Data Product 2021

- Bulk Data Download
- Subset Data Download (WebODV Extractor)
- Data Exploration (WebODV Explorer)
- eGeotraces Atlas
- IDP2017 References
- IDP2014 References
- IDP related helpful tools

Building IDP

- How to ensure that your data are in IDP - FLOW CHART!
- GEOTRACES DOoR
- Submit data
- Data Policy
- IDP2021 Fair Use Document
- Parameter Naming Conventions
- Quality Flag Policy

GEOTRACES Parameter Names

- GEOTRACES Parameter Definition Committee

Data Management

Historical TEI

Go to GDAC site

2021 United Nations Decade of Ocean Science for Sustainable Development 2030

HIGHLIGHTS

DOoR PORTAL

CRUISES & MAPS

COOKBOOK

PUBLICATIONS

MAILING LIST

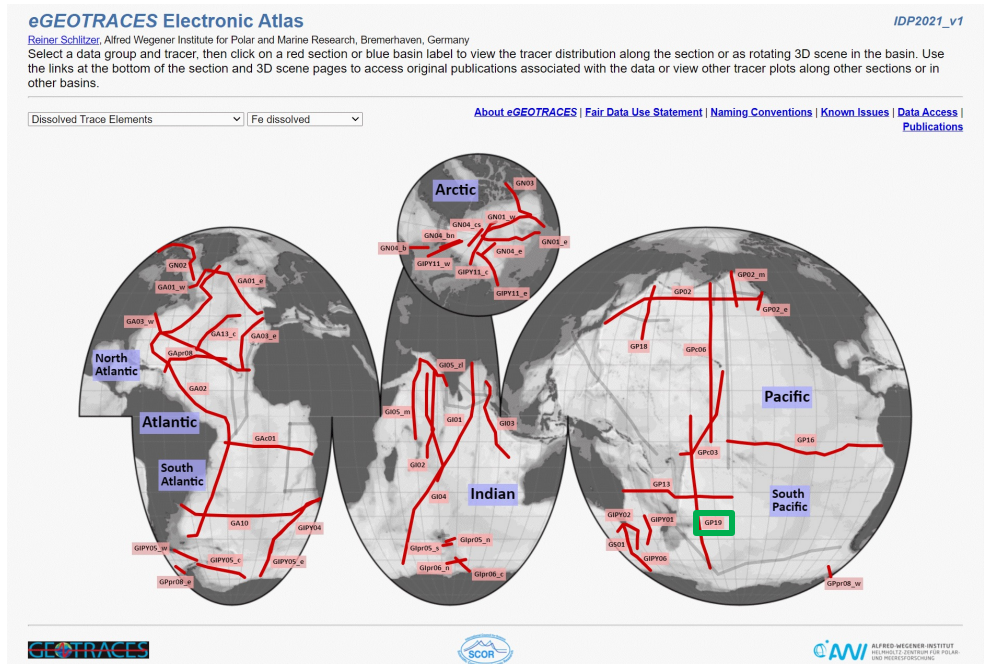
ACCESS THE IDP2021: Reiner Schlitzer (AWI) eGEOTRACES ATLAS

www.geotraces.org

The screenshot shows the GEOTRACES website homepage. At the top left are the GEOTRACES and SCOR logos. The main header includes navigation links: ABOUT, SCIENCE, CRUISES, DATA (highlighted), INTERCALIBRATION, MEETINGS, and LIBRARY. To the right of these are links for News, Outreach, and Jobs & funds. The main banner features the text "GEOTRACES" and "An International Study of Trace Elements and Isotopes". Below this is a banner for the "2021 United Nations Decade of Ocean Science for Sustainable Development 2030". The "DATA" menu is open, showing options like "GEOTRACES Intermediate Data Product 2021", "Building IDP", "GEOTRACES Parameter Names", "Data Management", "Historical TEI", and "Go to GDAC site". The "eGeotraces Atlas" link is highlighted with an orange box. At the bottom, there are icons and links for HIGHLIGHTS, DOoR PORTAL, CRUISES & MAPS, COOKBOOK, PUBLICATIONS, and MAILING LIST. On the right side, there are social media icons for search, Twitter, Facebook, and YouTube.

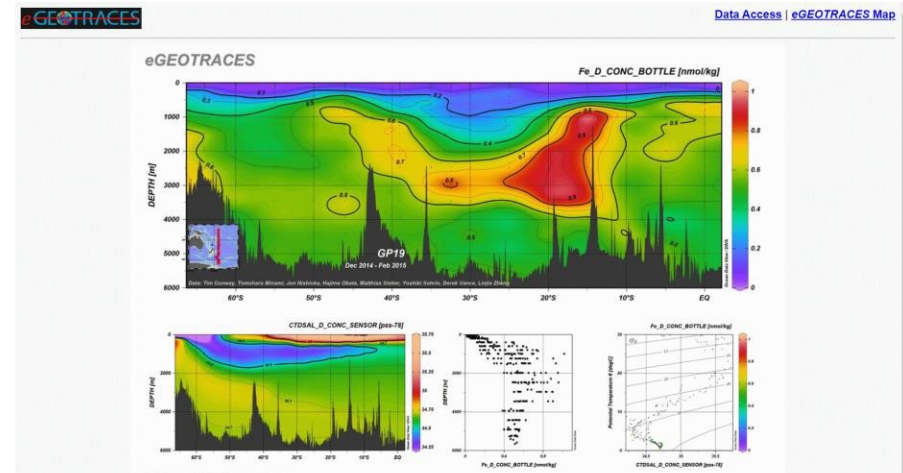
eGEOTRACES ATLAS

<https://egeotrac.es.org/>



1463 sections

269 3D scenes



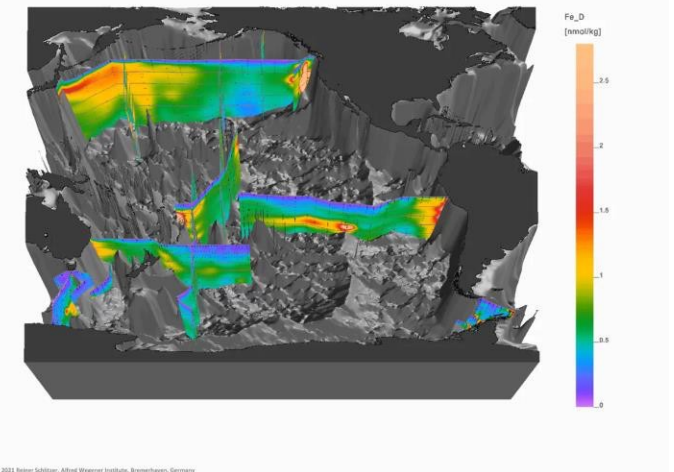
Description: Concentration of dissolved Fe.

Data creators: Tim Conway | Tomoharu Minami | Jun Nishioka | Hajime Obata | Matthias Sieber | Yoshiki Sohrin | Derek Vance | Linjie ;
Other tracers along this section: [Al dissolved](#) | [Cd dissolved](#) | [CTDSAL](#) | [Cu dissolved](#) | [delta Cd_114_110](#) | [delta Fe_56_54](#) | [Mn diss](#) | [Potential Temperature](#) | [Silicate](#) | [Zn dissolved](#)

Other sections with this tracer: [GA01_e](#) | [GA01_w](#) | [GA02](#) | [GA03_e](#) | [GA03_w](#) | [GA10](#) | [GA13_c](#) | [GAc01](#) | [GApr08](#) | [GI01](#) | [GI02](#) | [GI1](#) | [GIPY02](#) | [GIPY04](#) | [GIPY05_c](#) | [GIPY05_e](#) | [GIPY05_w](#) | [GIPY06](#) | [GIPY11_c](#) | [GIPY11_e](#) | [GIPY11_w](#) | [GIPr05_n](#) | [GIPr05_s](#) | [GIPr06_u](#) | [GN04_cs](#) | [GN04_e](#) | [GP02](#) | [GP02_e](#) | [GP02_m](#) | [GP13](#) | [GP16](#) | [GP18](#) | [GPc03](#) | [GPc06](#) | [GPpr08_e](#) | [GPpr08_w](#) | [GS01](#)

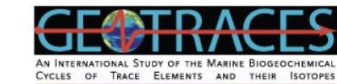
3D scenes with this tracer: [Arctic](#) | [Atlantic](#) | [Indian Ocean](#) | [North Atlantic](#) | [Pacific](#) | [South Atlantic](#) | [South Pacific](#)

Publications for this tracer: [GP19](#)



ACCESS THE IDP2021: DATA

www.geotraces.org



[News](#) [Outreach](#) [Jobs & funds](#)

[ABOUT](#) [SCIENCE](#) [CRUISES](#) [DATA](#) [INTERCALIBRATION](#) [MEETINGS](#) [LIBRARY](#)

GEOTRACES

An International Study of
of Trace Elements and Isotopes

2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

GEOTRACES Intermediate Data Product 2021

[Bulk Data Download](#)
[Subset Data Download
\(WebODV Extractor\)](#)
[Data Exploration \(WebODV
Explorer\)](#)
[Geotraces Atlas](#)

[IDP2017 References](#)
[IDP2014 References](#)
[IDP related helpful tools](#)

Data Management

Building IDP

[How to ensure that your data
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[GEOTRACES DOoR](#)
[Submit data](#)
[Data Policy](#)
[IDP2021 Fair Use Document](#)
[Parameter Naming
Conventions](#)
[Quality Flag Policy](#)

Historical TEI

GEOTRACES Parameter Names

[GEOTRACES Parameter
Definition Committee](#)

Go to GDAC site



[HIGHLIGHTS](#)



[DOoR PORTAL](#)



[CRUISES & MAPS](#)



[COOKBOOK](#)



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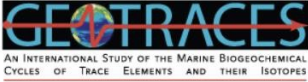
IDP2021 DATA ACCESS

- 1 Bulk (full packages) download
- 2 Online subsetting and extraction
- 3 Online analysis and visualization

New: Agreement to the **IDP2021 Fair Data Use Statement** is required, but registration and login are no longer necessary.

ACCESS THE IDP2021

www.geotraces.org



News Outreach Jobs & funds

ABOUT SCIENCE CRUISES **DATA** INTERCALIBRATION MEETINGS LIBRARY

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DOoR PORTAL



CRUISES & MAPS



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IDP2021 BULK DOWNLOAD

www.bodc.ac.uk/geotraces/data/idp2021/

Five Packages:

Seawater Discrete Sample Data

Seawater Sensor Data

Aerosol Data

Precipitation Data

Cryosphere Data

Three Formats:

csv ASCII

netCDF

ODV collection

GEOTRACES Intermediate Data Product 2021 (Version 1)

The GEOTRACES Intermediate Data Product 2021 (IDP2021) is released on 17 November 2021. The IDP2021 represents a major new data release. Compared to IDP2017, IDP2021 improves data coverage significantly in all ocean basins, especially in the Arctic, the Indian and the Pacific Oceans. Overall, the new data product contains more than twice the number of cruises, stations and actual data values.

IDP2021 is, open access data sets, licensed under a Creative Commons Attribution 4.0 International license. Please, read the [Fair Data Use Statement for GEOTRACES IDP2021](#) before using IDP2021.

The original versions of the IDP2021 digital datasets can be accessed from the links below - please use the current version of the digital datasets for any current research.

The GEOTRACES IDP2021 consists of two parts:

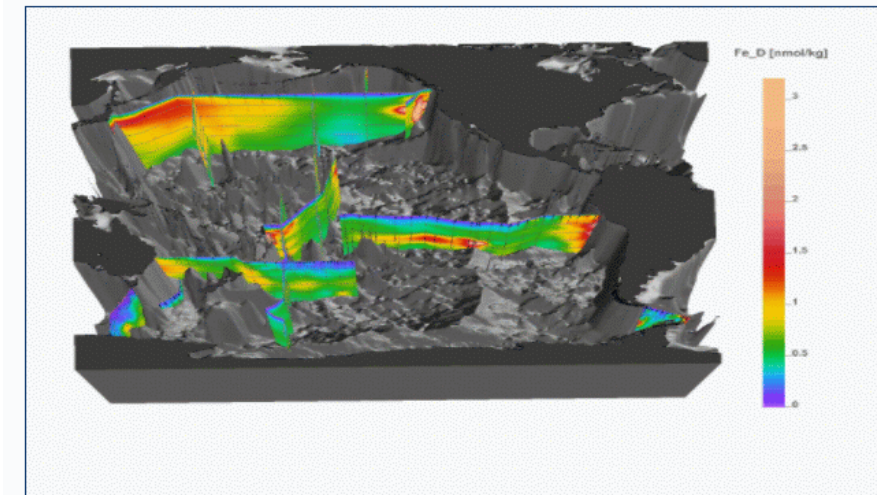
1. the digital datasets — available for download below or as a subset via the [online service](#) hosted by the Alfred Wegener Institute (AWI).
2. the [eGEOTRACES Electronic Atlas](#) — is based on the digital data package and provides section plots (as illustrated below) and animated 3D scenes for many of the parameters. The 3D scenes provide geographical context, which is crucial for correctly assessing extent and origin of tracer plumes as well as for inferring processes acting on the tracers and shaping their distribution.

IDP2021 digital datasets (original version)

The IDP2021 digital datasets are made available to [DOWNLOAD](#) by the GEOTRACES International Data Assembly Centre hosted by the British Oceanographic Data Centre (BODC). They are provided in 3 data formats: ASCII, NetCDF and ODV collections. The latter is for use with the [Ocean Data View software](#).

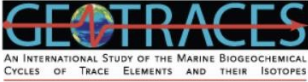
If the data sets are used in a presentation or publication then we ask that you acknowledge the source. This should be of the form: GEOTRACES Intermediate Data Product Group (2021). The GEOTRACES Intermediate Data Product 2021 (IDP2021). NERC EDS British Oceanographic Data Centre NOC. [doi:10.5285/cf2d9ba9-d51d-3b7c-e053-8486abc0f5fd](https://doi.org/10.5285/cf2d9ba9-d51d-3b7c-e053-8486abc0f5fd).

Please help us to improve the Intermediate Data Product by [sending us](#) your feedback.



ACCESS THE IDP2021

www.geotraces.org



News Outreach Jobs & funds

ABOUT SCIENCE CRUISES **DATA** INTERCALIBRATION MEETINGS LIBRARY

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HIGHLIGHTS



DOoR PORTAL



CRUISES & MAPS



COOKBOOK



PUBLICATIONS



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IDP2021 SUBSETTING AND EXTRACTION

geotraces.webodv.awi.de/

Select:

Cruises

Domain

Time range

[eGEOTRACES](#) [Publications](#) [Known Issues](#) [Privacy](#) | [Legal Notice](#)

webODV [geotraces](#) > IDP2021 > GEOTRACES_IDP2021_Seawater_Discrete_Sample_Data_v1.odv [Documentation](#) [Contact](#)

1. Select Cruises / Domain / Time Range

2. Select variables

3. Download

4. Exit

Click *Zoom in* to define a sub-region, *Apply* to select the sub-region, or *Zoom out* to return to full domain. Select *Time Range* in the format mm/dd/yyyy.

CRUISES

3 Items selected

MAP DOMAIN

Zoom mode

Zoom out

Full range

Global

TIME RANGE ⓘ

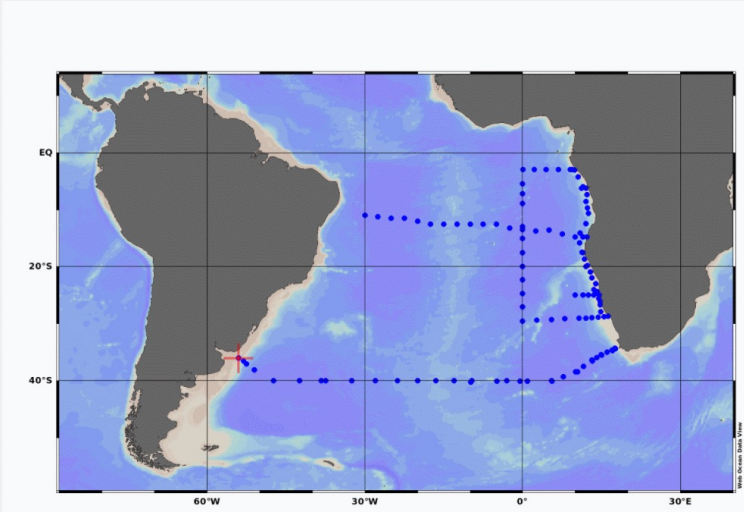
from: 01/01/1850

to: 12/31/2023

RESET

PAGE

GLOBAL



STATION INFO ⓘ

Accession Number	745
Cruise	GA10
Station	24 (B)
Longitude	54°W
Latitude	36°S
Date	26 January 2012

SELECTION STATUS

Stations: 118 of 3149

Output variables: 8 of 348

EXPORT IMAGE

Download

DATA PREVIEW

Scatter plot

SELECTED VARIABLES (OR) ⓘ

CTDPRS_T_VALUE

DEPTH

CTDTMP_T_VALUE

CTDSAL_D_CONC

SALINITY_D_CONC

Al_D_CONC

Ba_D_CONC

Fe_D_CONC

IDP2021 SUBSETTING AND EXTRACTION

geotraces.webodv.awi.de/

Select:

Variables (entire groups or individual entries)

webODV geotraces > IDP2021 > GEOTRACES_IDP2021_Seawater_Discrete_Sample_Data_v1.odv

1. Select Cruises / Domain / Time Range 2. Select variables 3. Download 4. Exit

Select variables from the treeview.

LOGIC
☒ OR ☐ AND

TREEVIEW
Collapse all
Expand all
Check all
Uncheck all

RESET
Global

VARIABLES

Search

- ☐ Seawater-Hydrography and Inert Gases
- ☐ Seawater-Biogeochemistry
- ☐ Seawater-Nutrient and Water Isotopes
- ☒ Seawater-Dissolved, total dissolvable and total trace elements
 - ☒ Al_D_CONC
 - ☒ Ba_D_CONC
 - ☐ Cd_D_CONC
 - ☐ Co_D_CONC
 - ☐ Cu_D_CONC
 - ☒ Fe_D_CONC
 - ☐ Fe_II_D_CONC
 - ☐ Fe_S_CONC
 - ☐ Ga_D_CONC
 - ☐ Hf_D_CONC
 - ☐ Li_D_CONC

SELECTION STATUS
Stations: 118 of 3149
Output variables: 8 of 348

DATA PREVIEW
Scatter plot

SELECTED VARIABLES (OR)
CTDPRS_T_VALUE
DEPTH
CTDTMP_T_VALUE
CTDSAL_D_CONC
SALINITY_D_CONC
Al_D_CONC
Ba_D_CONC
Fe_D_CONC

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IDP2021 SUBSETTING AND EXTRACTION

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Select:
Output format

Receive:
Data subset as zip file

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webODVgeotraces > IDP2021 > GEOTRACES_IDP2021_Seawater_Discrete_Sample_Data_v1.odvDocumentationContact

←1. Select Cruises / Domain / Time Range2. Select variables3. Download4. Exit→

Download data in different formats.

DOWNLOAD

ASCII Spreadsheet (.txt)

ODV Collection (.odv)

netCDF (.nc)

RESET

Global

SELECTION STATUS

Stations: 118 of 3149
Output variables: 8 of 348

DATA PREVIEW

Scatter plot

SELECTED VARIABLES (OR) ⓘ

CTDPRS_T_VALUE

DEPTH

CTDTMP_T_VALUE

CTDSAL_D_CONC

SALINITY_D_CONC

Al_D_CONC

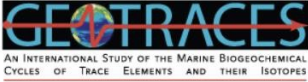
Ba_D_CONC

Fe_D_CONC

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ACCESS THE IDP2021

www.geotraces.org



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GEOTRACES

An International Study of
of Trace Elements and Isotopes

2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

GEOTRACES Intermediate Data Product 2021

- Bulk Data Download
- Subset Data Download (WebODV Extractor)
- Data Exploration (WebODV Explorer)**
- eGeotraces Atlas
- IDP2017 References
- IDP2014 References
- IDP related helpful tools

Building IDP

How to ensure that your data are in IDP - FLOW CHART!

GEOTRACES DOoR

Submit data

Data Policy

IDP2021 Fair Use Document

Parameter Naming Conventions

Quality Flag Policy

GEOTRACES Parameter Names

GEOTRACES Parameter Definition Committee

Data Management

Historical TEI

Go to GDAC site



[HIGHLIGHTS](#)



[DOoR PORTAL](#)



[CRUISES & MAPS](#)



[COOKBOOK](#)



[PUBLICATIONS](#)



[MAILING LIST](#)



IDP2021 online Analysis and visualization

geotraces.webodv.awi.de/ or explore.webodv.awi.de/



This site lets you explore many popular environmental datasets using the *ODV-online* browser tool. If you have used the *Ocean Data View* software before you will feel at home instantly. If you are a new user see the [ODV-online help document](#) or the [ODV documents](#). By using this site, you consent to our [Usage Agreement](#).

Browse the tree structures below, rest the mouse over a dataset for a brief description, click on a dataset to open the dataset in a separate browser tab. Return to this page to select another dataset. Once a dataset is open, you obtain more information about the dataset via the *Collection* menu. Note that the *ocean/carbon/socat* dataset is very large and may take a while to start up. Most other datasets are ready almost instantly.

Alternatively, view the [dataset summary list](#) and open a dataset by clicking on the respective link.

Ocean

- › optics
- › sea-level
- ~ tracer
 - › del13c
 - › geosecs
 - ~ geotraces
 - ~ idp2021
 - › aerosols
 - › cryosphere
 - › precipitation
 - ~ seawater
 - GEOTRACES_IDP2021_Seawater_Discrete_Sample_Da
 - › sensor
- › tritium-helium
- › whp-bottle
- › woa18

Atmosphere

- › meteorology
- › radiosonde

Ice

- › vostok

Rivers

- › discharge

Sediment

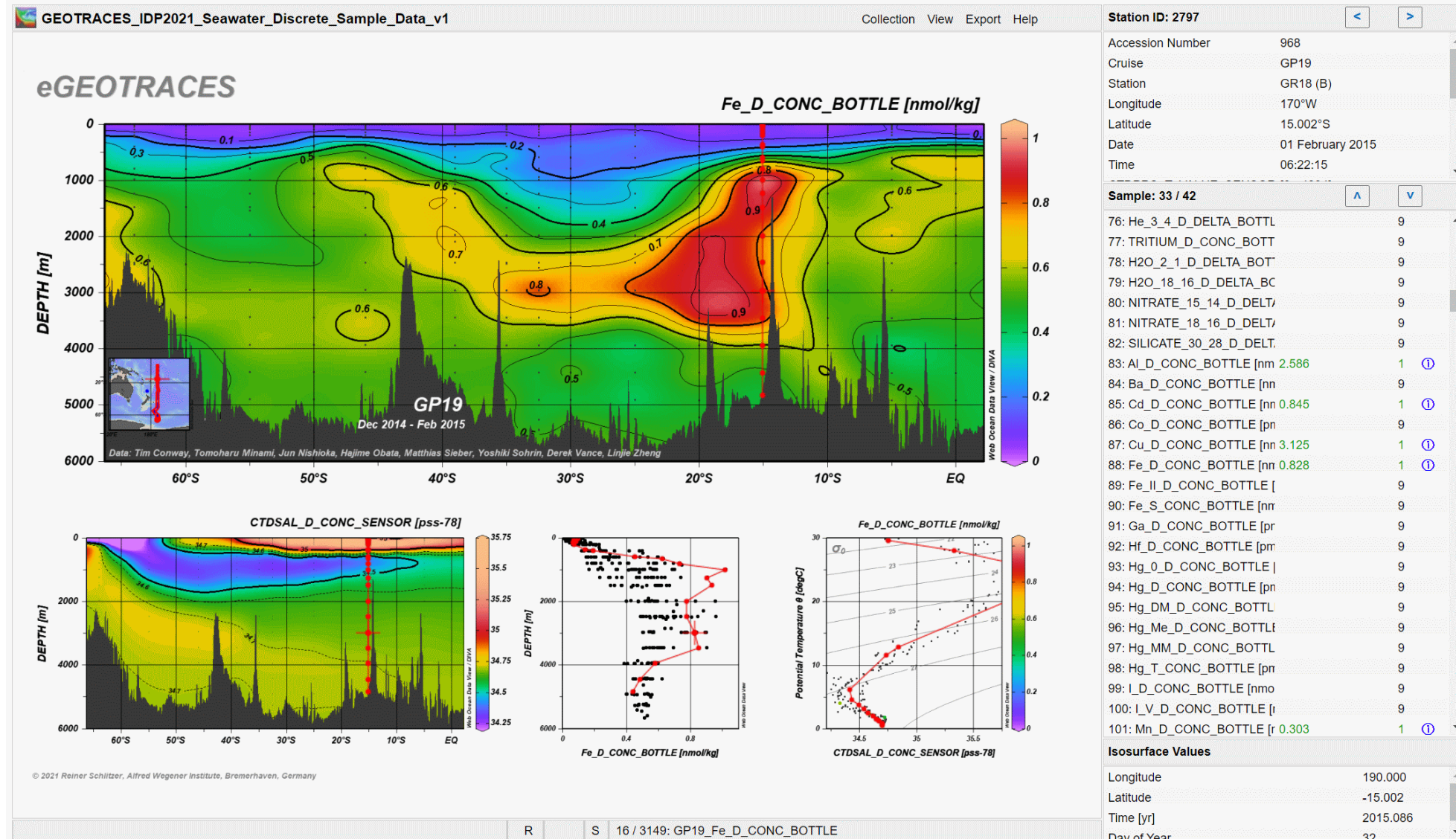
- › core-top

IDP2021 online Analysis and visualization

geotraces.webodv.awi.de/ or explore.webodv.awi.de/

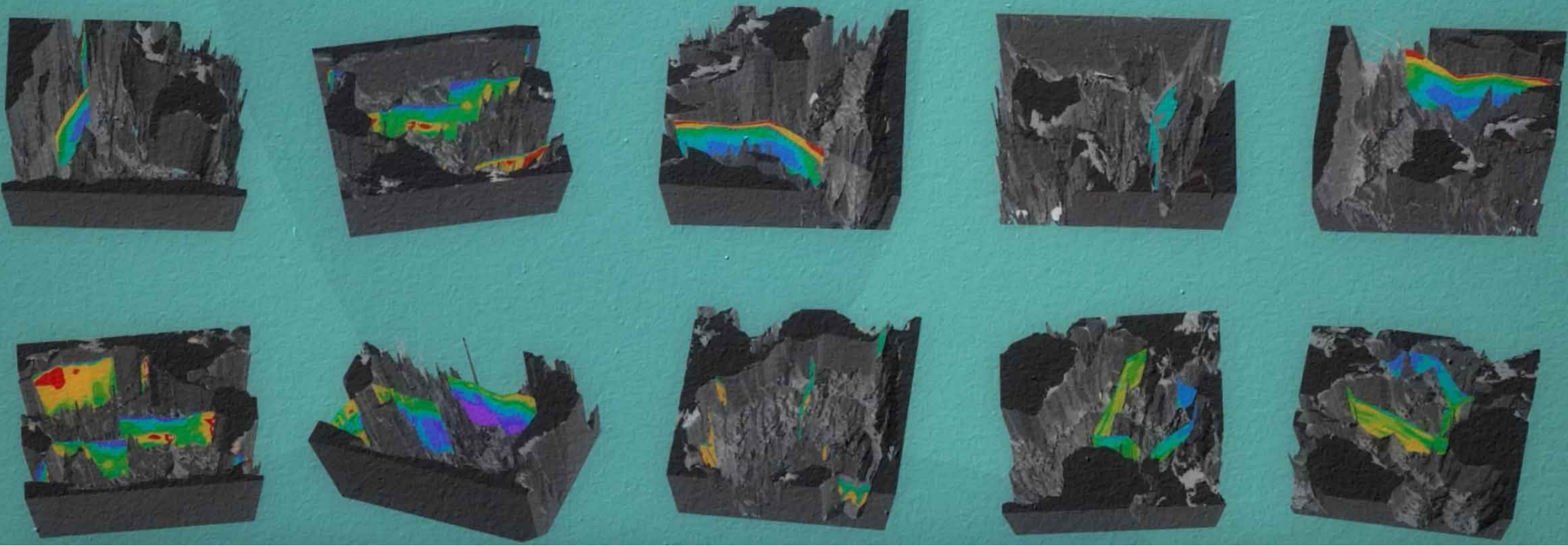
Features:

- ODV-like interface
- All eGEOTRACES section views
- No data download or software installation needed



Summary

- IDP2021 is an exciting new resource.
- Use it for your research, teaching or outreach activities.



EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

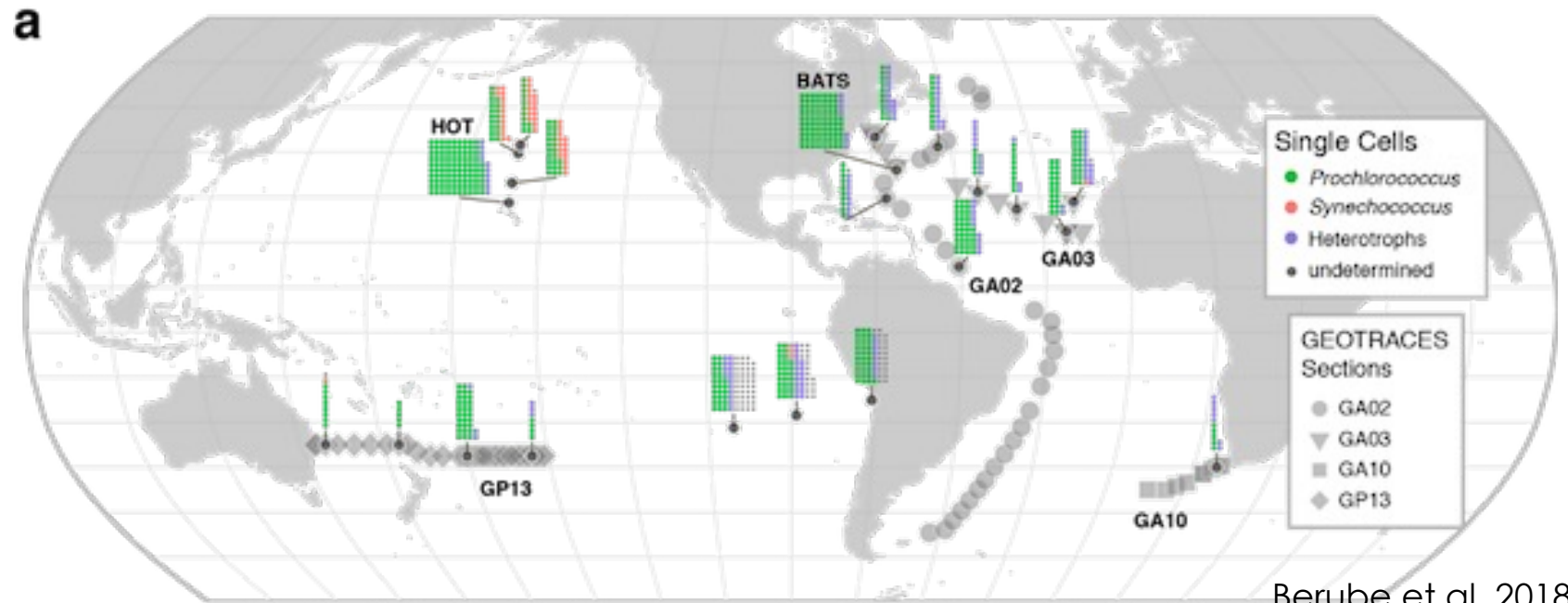
Maite Maldonado (UBC, Canada)

EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

To strengthen collaborations between the marine geochemical and the biological / omics' communities

GEOTRACES Sections with omics data

GA02
GA03
GA10
GP13



Berube et al. 2018
<http://doi.org/10.1038/sdata.2018.154>

EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

4 Types of omics data available in the IDP2021

480 Metagenomes
14 Single-Cell genomes
273 16S-18S-rRNA gene analyses

480 16S/18S amplicons (Functional & taxonomic analyses of metagenomes)

EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

Major challenge: omics data are dynamic (changes depending on ever-growing genome reference databases) **while the TEI data are static**

Acknowledgements to:

Reiner Schiltzer (AWI)

Paul Berube (MIT)

Jesse McNichol (U. Southern California)

And many others who made this possible, specially members of Penny Chisholm lab

4 Types of Sample Descriptors for omics data linkages in the IDP2021:

To NCBI (National Center for Biotechnology Information database)

To EMBL-EBI (European Bioinformatic Institute database)

EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

OMICs linkages

4 Sample Descriptors in the **Metadata variables**, (associated with **specific bottle numbers**):

- Accession numbers at NCBI or EMBL-EBI
- Or links to functional and taxonomic analyses webpages

OMICs linkages in Metadata VARIABLES #:

11. NCBI_Metagenome_BioSample accession #:

12. NCBI_Single_cell_genome_BioProject accession #:
@ <https://www.ncbi.nlm.nih.gov/bioproject/>

13. NCBI_16S-18S-rRNA-gene_BioSample accession #:
@ <https://www.ncbi.nlm.nih.gov/biosample/>

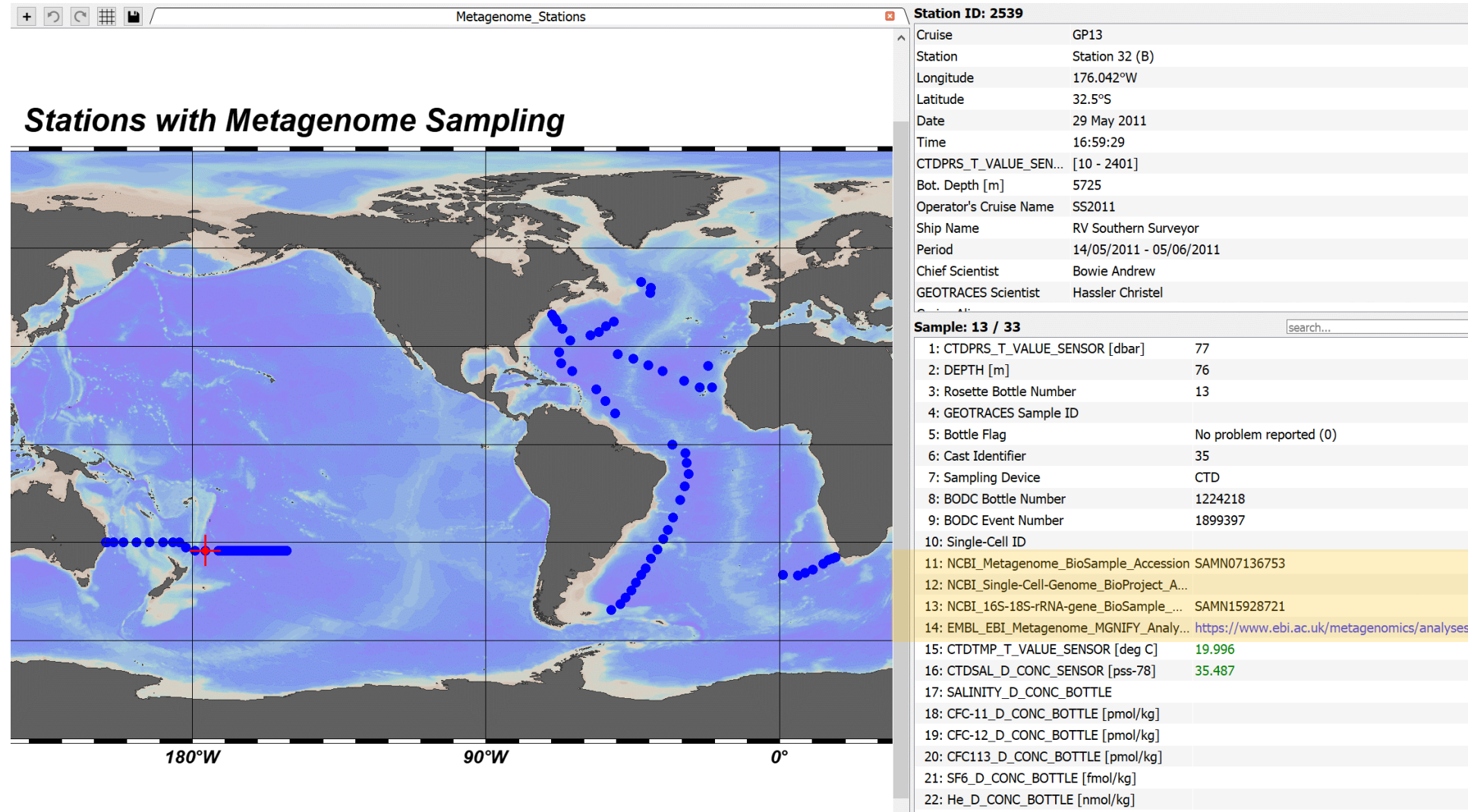
14. EMBL_EBI_Metagenome_MGNIFY_Analysis_Accession #:
@<https://www.ebi.ac.uk/metagenomics/analyses/MGYA>

EXPLORATION: LINKING TEI & GENOMICS DATA IN IDP2021

OMICs linkages

4 Sample Descriptors in the Metadata variables:

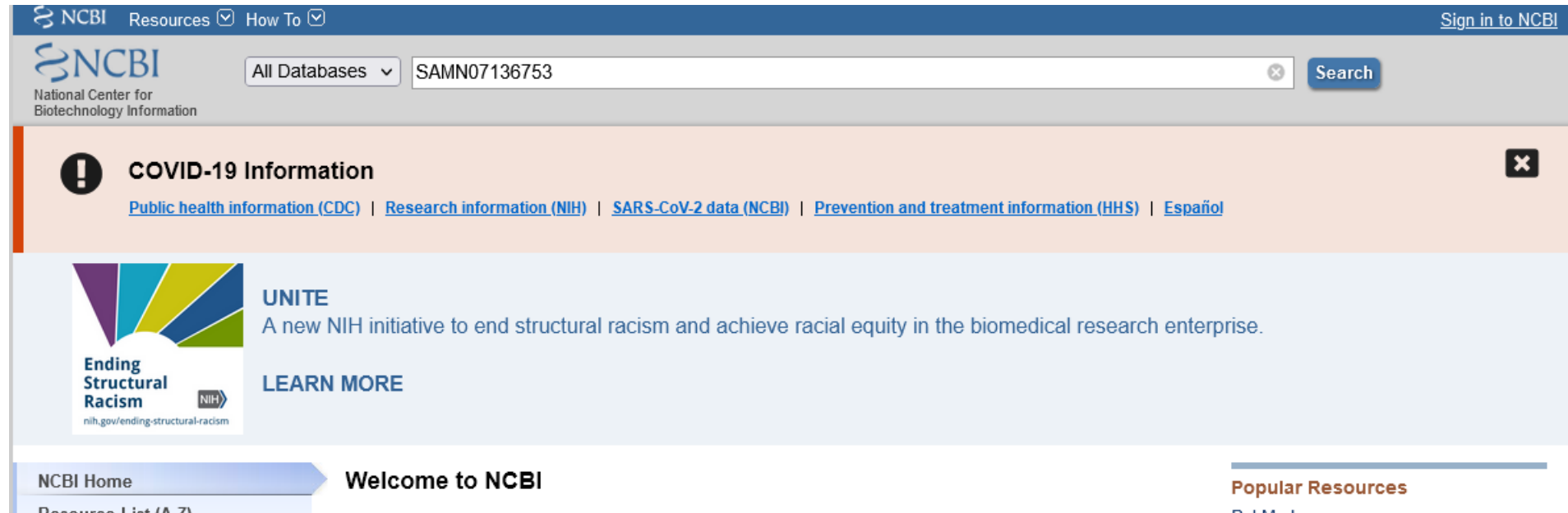
- Accession numbers at NCBI or EMBL-EBI
- Or links to functional and taxonomic analyses webpages



METAGENOME BIOSAMPLE ACCESSION NUMBERS AT NCBI

Example 1. Metagenome sample accession numbers at NCBI

www.ncbi.nlm.nih.gov



The screenshot shows the NCBI (National Center for Biotechnology Information) homepage. At the top, there is a navigation bar with links for "Resources" and "How To". Below this is the NCBI logo and a search bar. The search bar contains the text "All Databases" and the accession number "SAMN07136753". A "Search" button is located to the right of the search bar. Below the search bar, there is a banner for "COVID-19 Information" with links to "Public health information (CDC)", "Research information (NIH)", "SARS-CoV-2 data (NCBI)", "Prevention and treatment information (HHS)", and "Español". Below this is a banner for "UNITE" with the text "A new NIH initiative to end structural racism and achieve racial equity in the biomedical research enterprise." and a "LEARN MORE" link. At the bottom, there is a "Welcome to NCBI" message and a "Popular Resources" section.

METAGENOME BIOSAMPLE ACCESSION NUMBERS AT NCBI

Example 1. Variable #11
Metagenome sample
accession numbers at
NCBI

www.ncbi.nlm.nih.gov

NCBI Resources How To Sign in to NCBI

BioSample BioSample Advanced Search

COVID-19 Information
[Public health information \(CDC\)](#) | [Research information \(NIH\)](#) | [SARS-CoV-2 data \(NCBI\)](#) | [Prevention and treatment information \(HHS\)](#) | [Español](#)

Full Send to:

MIMS Environmental/Metagenome sample from marine metagenome

Identifiers **BioSample: SAMN07136753** Sample name: S0286; SRA: SRS2329440

Organism [marine metagenome](#)
unclassified entries; unclassified sequences; metagenomes; ecological metagenomes

Package [MIMS: metagenome/environmental_water_version 5.0](#)

Attributes

collection date	2011-05-29
depth	75m
broad-scale environmental context	ocean_biome
local-scale environmental context	ocean
environmental medium	water
geographic location	Pacific Ocean
latitude and longitude	32.5 S 176 W
geotraces_section	GP13
cruise_id	SS2011
cruise_station	32
bottle_id	SS2011Station32Cast35Niskin13

Description Keywords: GSC:MixS;MIMS:5.0

BioProject [PRJNA385854](#) marine metagenome
Retrieve [all samples](#) from this project

Related information
[BioProject](#)
[SRA](#)
[Taxonomy](#)

Recent activity
[Turn Off](#) [Close](#)

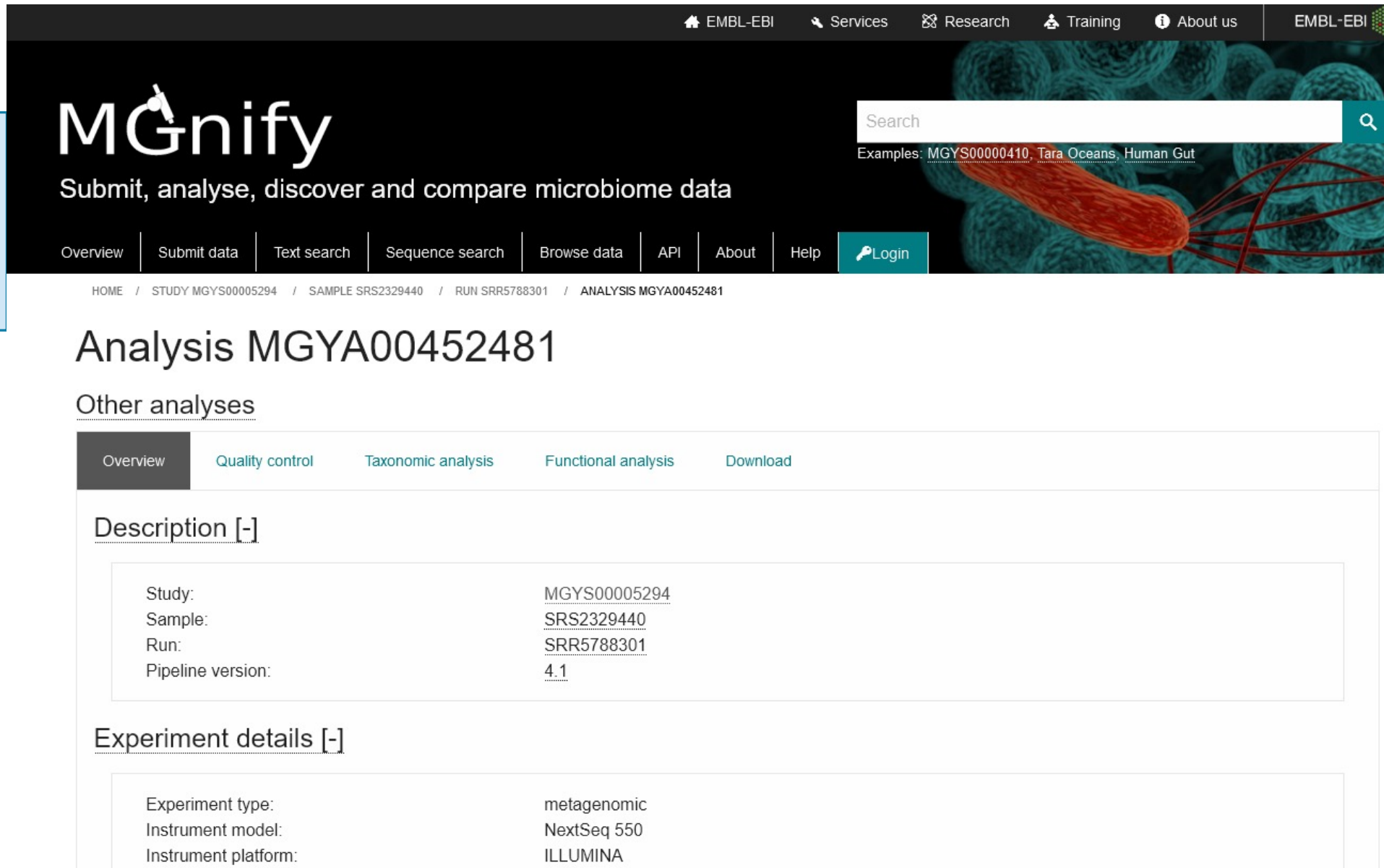
- [MIMS Environmental/Metagenome sample from marine metagenome](#) biosa
- [PRJNA445865 \(1\)](#) BioPr
- [Single cells of cyanobacteria and sympat microorganisms](#) BioPr
- [SAMN07136495 \(1\)](#) BioSa
- [GP13-S0286](#) biosa

See more

FUNCTIONAL & TAXONOMIC ANALYSES EMBL-EBI

Example 2. Variable #14

<https://www.ebi.ac.uk/meta-genomics/analyses/MGYA00452481#overview>



The screenshot displays the MGnify web interface. At the top, a navigation bar includes links for EMBL-EBI, Services, Research, Training, and About us. The MGnify logo is prominently displayed, followed by the tagline "Submit, analyse, discover and compare microbiome data". A search bar is located on the right, with examples like "MGYS00000410", "Tara Oceans", and "Human Gut". Below the navigation bar, a breadcrumb trail shows the path: HOME / STUDY MGYS00005294 / SAMPLE SRS2329440 / RUN SRR5788301 / ANALYSIS MGYA00452481. The main heading is "Analysis MGYA00452481". Underneath, there's a section for "Other analyses" with tabs for Overview, Quality control, Taxonomic analysis, Functional analysis, and Download. The "Overview" tab is selected, showing a "Description [-]" section with details: Study (MGYS00005294), Sample (SRS2329440), Run (SRR5788301), and Pipeline version (4.1). Below this is the "Experiment details [-]" section, showing: Experiment type (metagenomic), Instrument model (NextSeq 550), and Instrument platform (ILLUMINA).

EMBL-EBI Services Research Training About us EMBL-EBI

MGnify

Submit, analyse, discover and compare microbiome data

Search

Examples: [MGYS00000410](#), [Tara Oceans](#), [Human Gut](#)

Overview Submit data Text search Sequence search Browse data API About Help Login

HOME / STUDY MGYS00005294 / SAMPLE SRS2329440 / RUN SRR5788301 / ANALYSIS MGYA00452481

Analysis MGYA00452481

Other analyses

Overview Quality control Taxonomic analysis Functional analysis Download

Description [-]

Study:	MGYS00005294
Sample:	SRS2329440
Run:	SRR5788301
Pipeline version:	4.1

Experiment details [-]

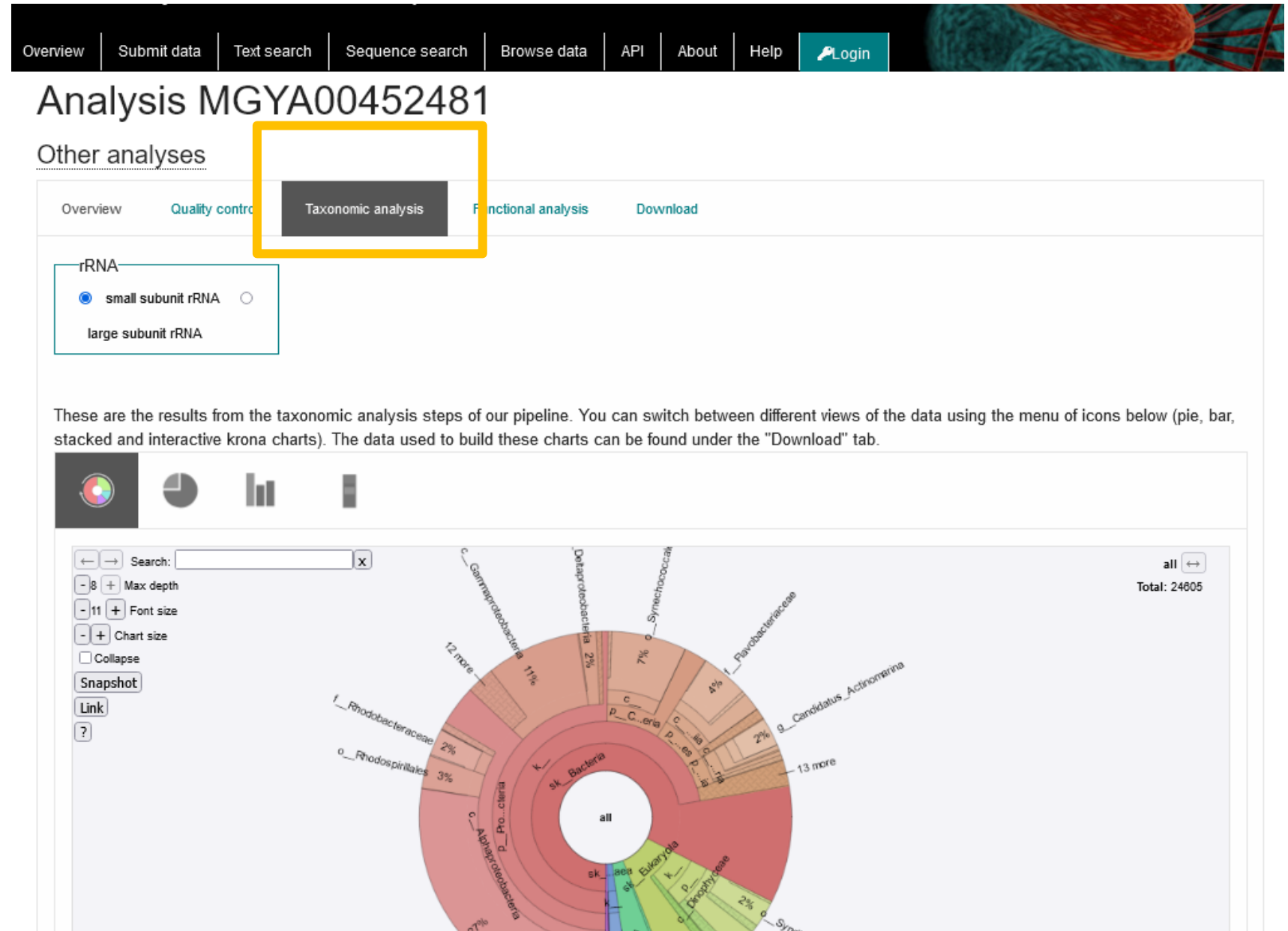
Experiment type:	metagenomic
Instrument model:	NextSeq 550
Instrument platform:	ILLUMINA

FUNCTIONAL & TAXONOMIC ANALYSES EMBL-EBI

Example 2.

Functional & taxonomic analyses of metagenomes at EMBL-EBI

- <https://www.ebi.ac.uk/metagenomics/analyses/MGYA00452481#overview>



FUNCTIONAL & TAXONOMIC ANALYSES EMBL-EBI

HOME / STUDY MG500005294 / SAMPLE SRR2329440 / RUN SRR5788301 / ANALYSIS MG500452481

Analysis MG500452481

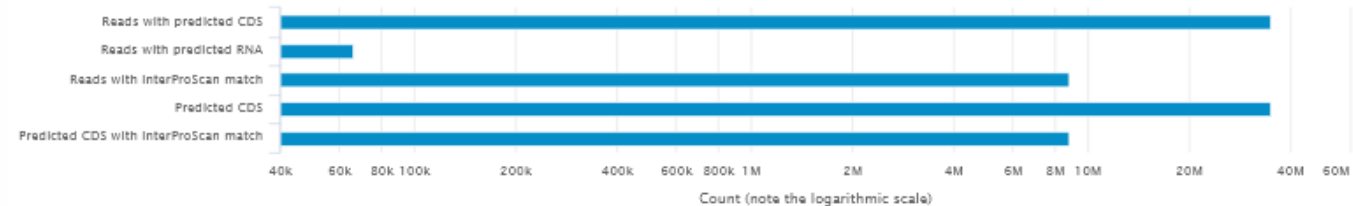
Other analyses

Overview Quality control Taxonomic analysis **Functional analysis** Download

These charts present the functional analysis of our pipeline, which focuses on matches to the [InterPro database](#) and [GO terms](#). These summarise the functional content of the sequences in the sample. The full set of results files may be found under the "Download" tab.

InterPro GO Terms

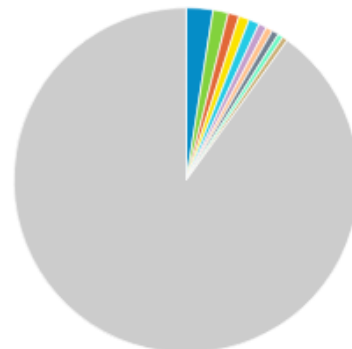
Sequence feature summary



InterPro match summary

InterPro match summary

Total: 8639785 InterPro matches



Show: 25 results from a total of 10112 (page 1 of 405).

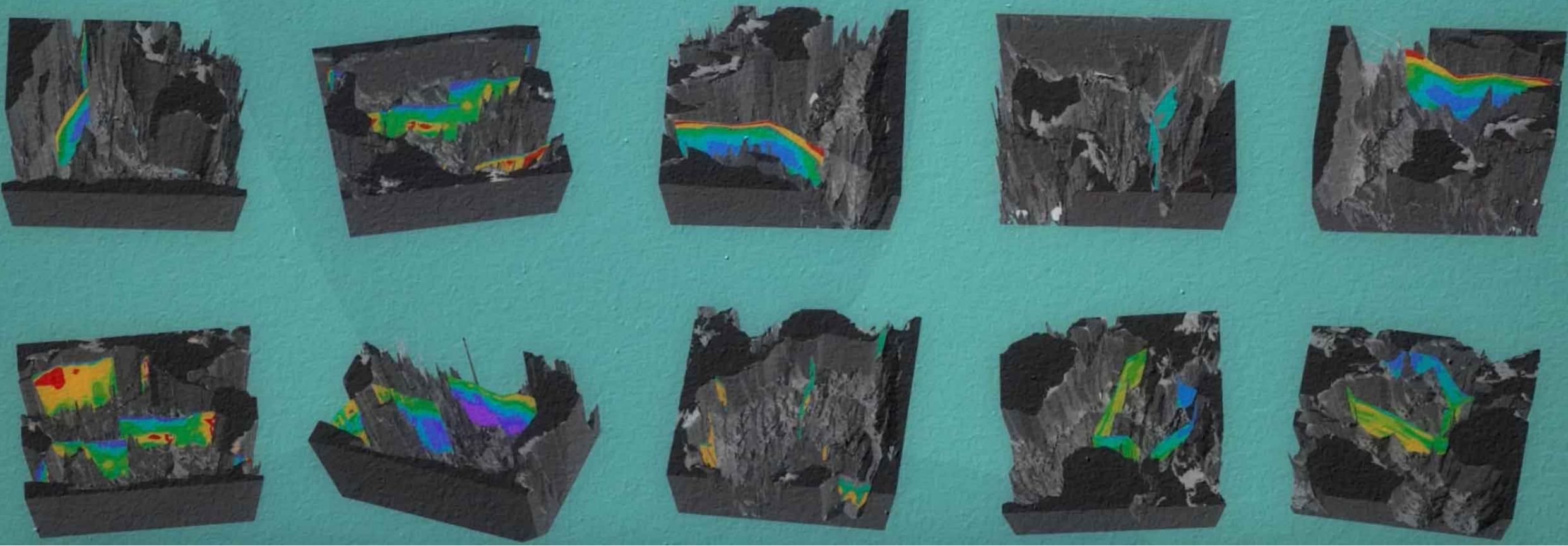
Download results

Entry name	ID	pCDS matched	%
1 Aldolase-type TIM barrel	IPR013785	215649	2.50
2 Rossmann-like alpha/beta/alpha sandwich fold	IPR014729	123660	1.43
3 Pyridoxal phosphate-dependent transferase, subdomain 2	IPR015422	89750	1.04
4 FAD/NAD(P)-binding domain	IPR023753	85430	0.99
5 Pyridoxal phosphate-dependent transferase, major	IPR015421	84283	0.98

Example 2.

Functional & Taxonomic analyses of metagenomes at EMBL-EBI

- <https://www.ebi.ac.uk/metagenomics/analyses/MG500452481#overview>



CONCLUSION & QUESTIONS

Maite Maldonado (UBC, Canada)

CONCLUSION

GEOTRACES data provide the clues to tackling, understanding and predicting the future of the Ocean and the planet.

- Data generated following a **Global Ocean Science Plan**
- Through International **collaboration and coordination for:**
 - **sample collection across all ocean basins**
 - **data processing and management**
- This dataset contains **high-quality** marine geochemical data (**1,721 publications** to date)
- **Open access** to data in a **timely manner** (3 open source data products 2014, 2017 and 2021)
- And visuals within the data product for stakeholders, educators and the public.
- **GEOTRACES provides and shares** infrastructure, knowledge and technologies for **capacity building** worldwide

Contact GEOTRACES

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