

***PANGAEA® - platform for an ICSU World  
Data Center as a networked publication and  
library system for geoscientific data***



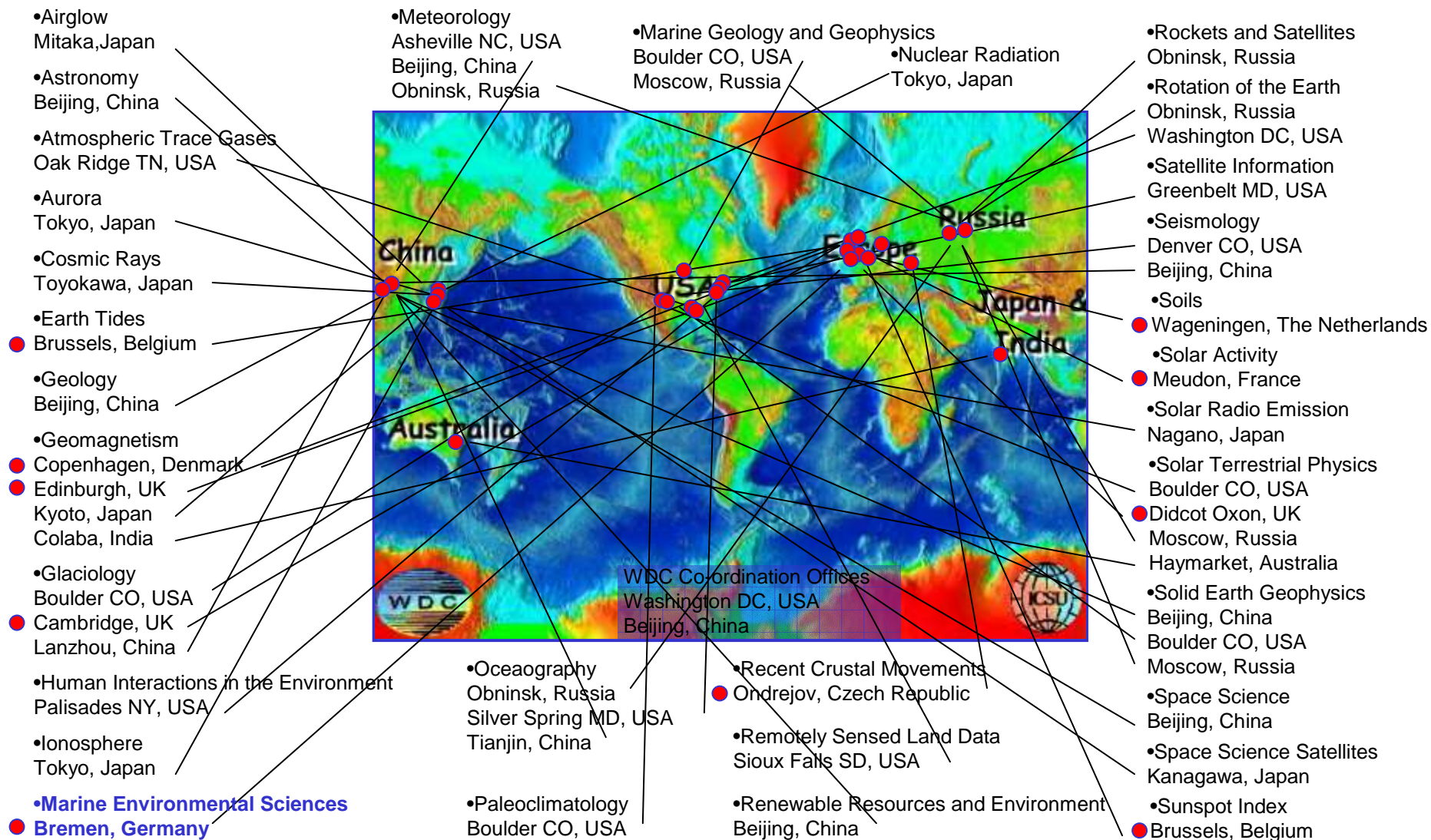
WDC-MARE - World Data Center  
for Marine Environmental  
Sciences  
<http://www.wdc-mare.org/>

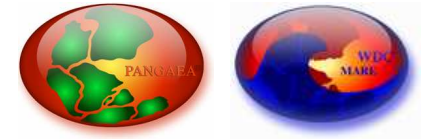


PANGAEA - Publishing Network  
for Geoscientific and  
Environmental Data  
<http://www.pangaea.de/>

Michael Diepenbroek (marum, Bremen University)  
Hannes Grobe (AWI - Alfred Wegener Institute, Bremerhaven)  
Uwe Schindler (marum, Bremen University)

# Network of ICSU WDCs





## World Data Center for Marine Environmental Sciences

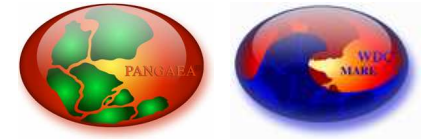
Biogeochemistry, Circulation, and Life of Present and Past Oceans

Operated by: Centre for Marine Environmental Sciences (MARUM) at the Bremen University and the Alfred Wegener Institute for Polar and Marine Research (AWI)

Summary of Data Held: The WDC is aimed at collecting, scrutinizing, and disseminating data related to global change in the fields of **environmental oceanography, marine geology, paleoceanography, and marine biology**. It focuses on georeferenced data using the information system PANGAEA. The WDC stores and handles numeric, string, and image data. Users can retrieve data through the Internet via different gateways. Input is accepted in electronic form; specifics can be discussed with the WDC staff.

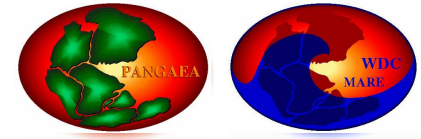
User Services: The WDC for Marine Environmental Sciences offers data management services, in particular project data management and data publication. It maintains an inventory of site and sampling locations for all related fields. It provides hosting and mirroring of electronic journals and serves software products for analyzing, visualization, and transformation of data.

Visitors are welcome.



## *Why do we need data publishers and data libraries?*

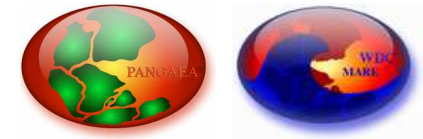
- Good scientific practice
- Prerequisite for the verification of research results
- Good availability of scientific data fosters complex and large scale approaches in research
- Reusage is more effective than reproduction of data



## *Supporting policies*

- Good scientific practice in research and scholarship  
[ESF 2000](#)
- Open access for all kinds of research material  
[Berlin declaration 2003](#)
- “peer review” like procedures for quality assurance  
of scientific data  
[OECD 2004 & 2007](#)

# PANGAEA® - services & activities



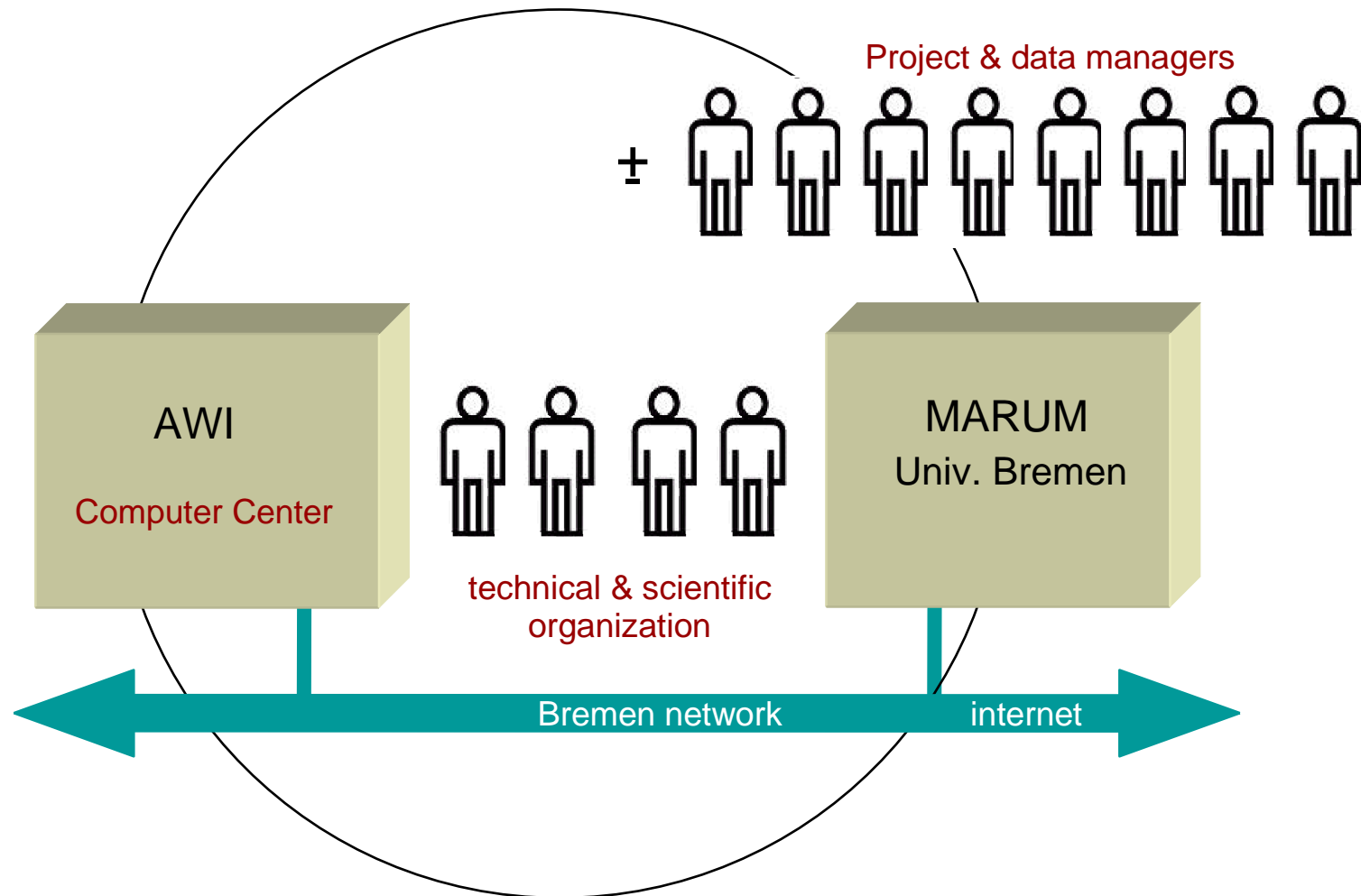
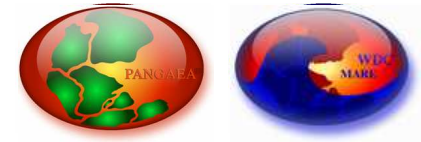
- Project data management
- Data publication
- Data infrastructures (networking)

*European framework  
of publication of data and  
- data portals, networking  
- ~~Citation~~ datasets by CL  
- networking, observatories  
and local search engines  
- referenced with Digital  
- fostering SDI standards  
- controlled vocabularies*

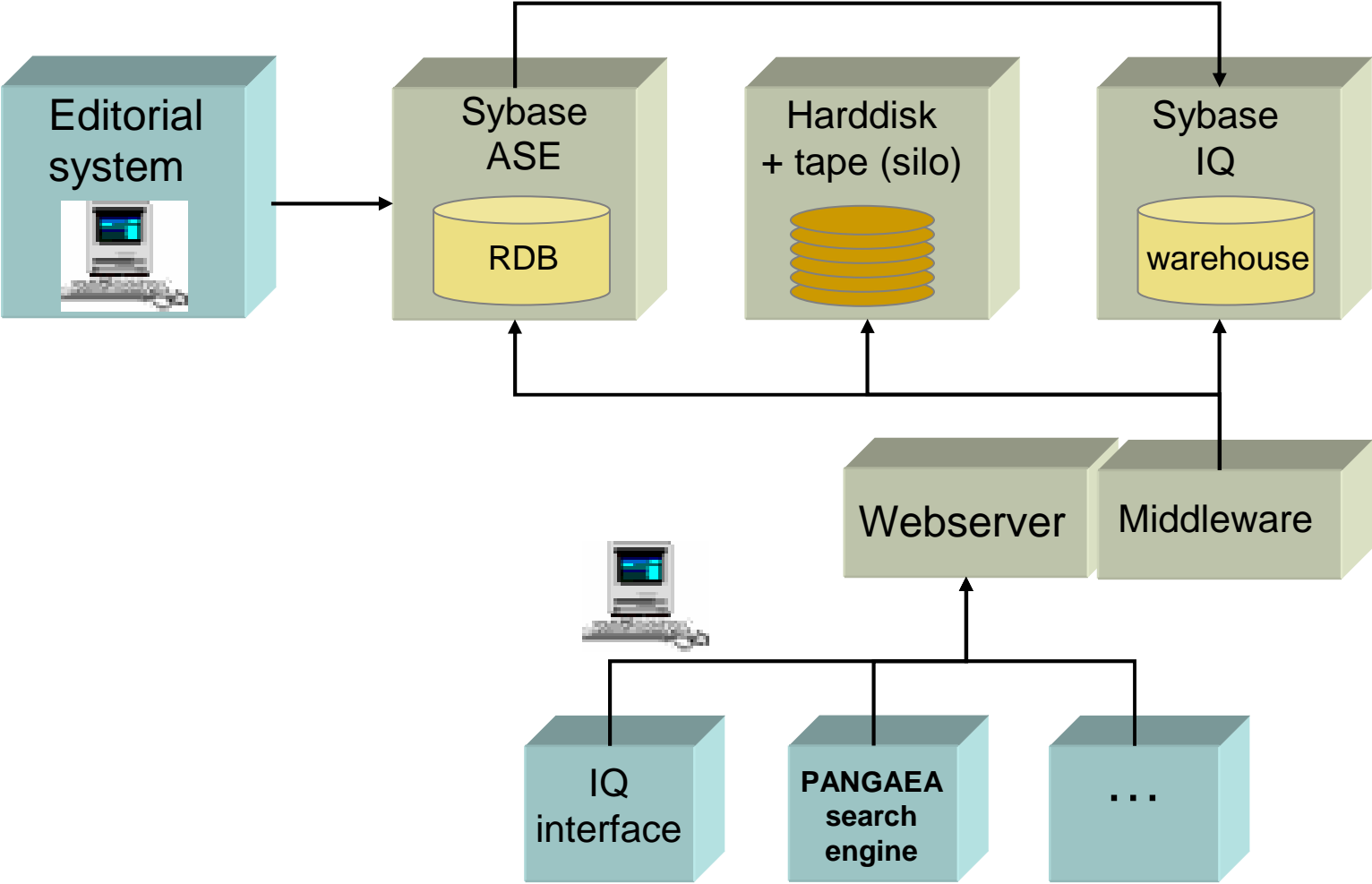
Project Name	Abbreviation
ACD	Arctic
ACES	Arctic
ADEPD	Arctic
AESOPS	Arctic
AMGRF	Arctic
ANDRILL	Drilling
ARCOD	Arctic
ASOF-N	Arctic
ASSEMBLAGE	Arctic
AUI	Arctic



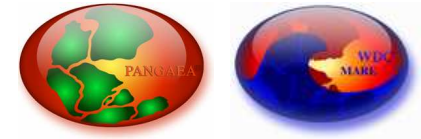
# PANGAEA<sup>®</sup> – resources



# PANGAEA® - technical architecture



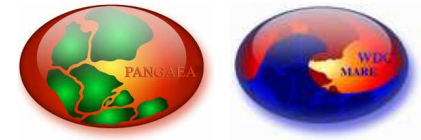




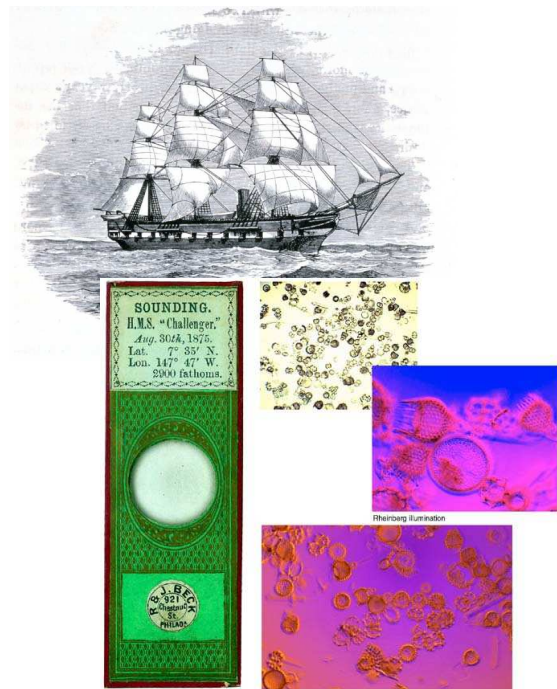
# *Archiving & publishing scientific data*

*or: how to make data available to science?*





## *Effects of technical developments*



1875 – Glomar challenger



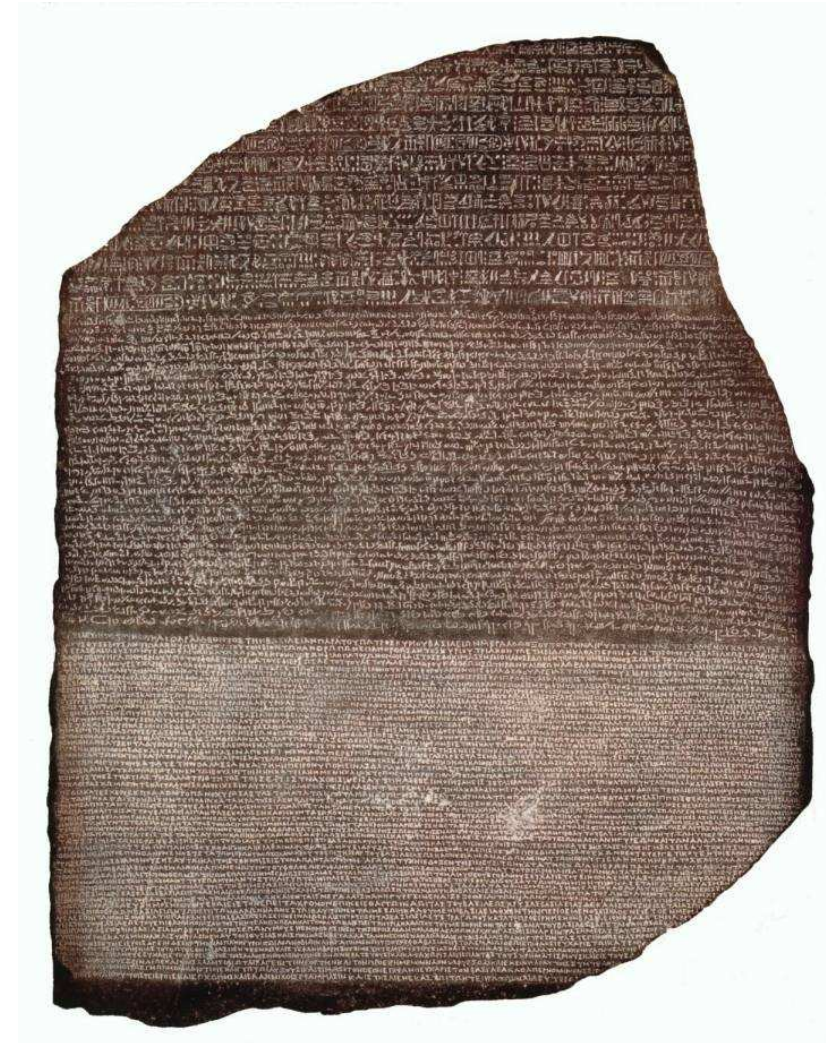
2008



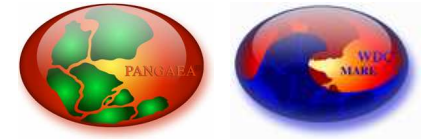
## *Effects of technical developments*

Lifetime of storage media (years):

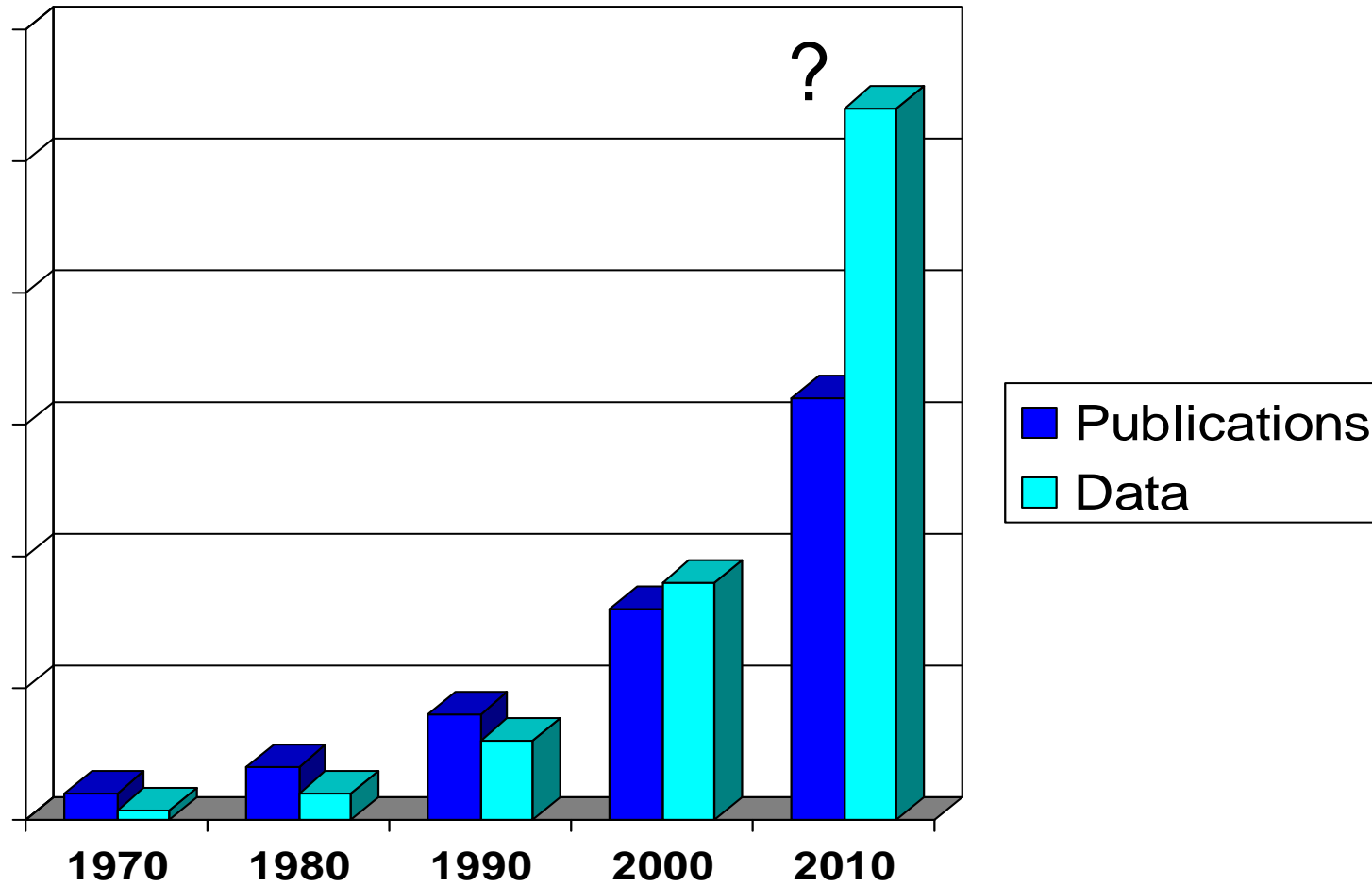
<i>Hard disk</i>	5
<i>CD / DVD</i>	20
<i>Tape</i>	30
<i>Paper</i>	> 100
<i>Papyrus</i>	> 1000

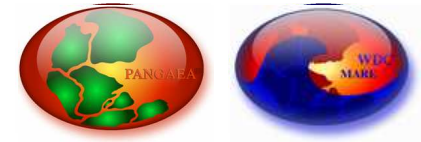


Stone of Rosette



## *Global increase in publications in empirical sciences*





## *What are the prerequisites for publishing scientific data?*

Citable data sets and persistent identifiers (DOI)

Peer review for scientific data

- *Completeness of data set description*
- *Validity of methods used*
- *Data values (precision, sequence, ranges etc.)*
- *Including specific QA/QC procedures*

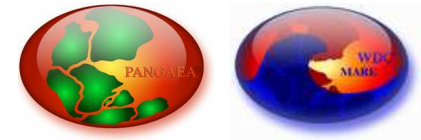
Longterm\_archiving facilities

- *Clear commission as data libraries (e.g. ICSU World Data Center)*
- *Data management infrastructure and expertise and manpower*
- *Longterm commitment and funding*

Userfriendly and reliable systems for retrieval and distribution of data



# Data management as an editorial and publishing process



**Data provision  
& scientific  
quality control**

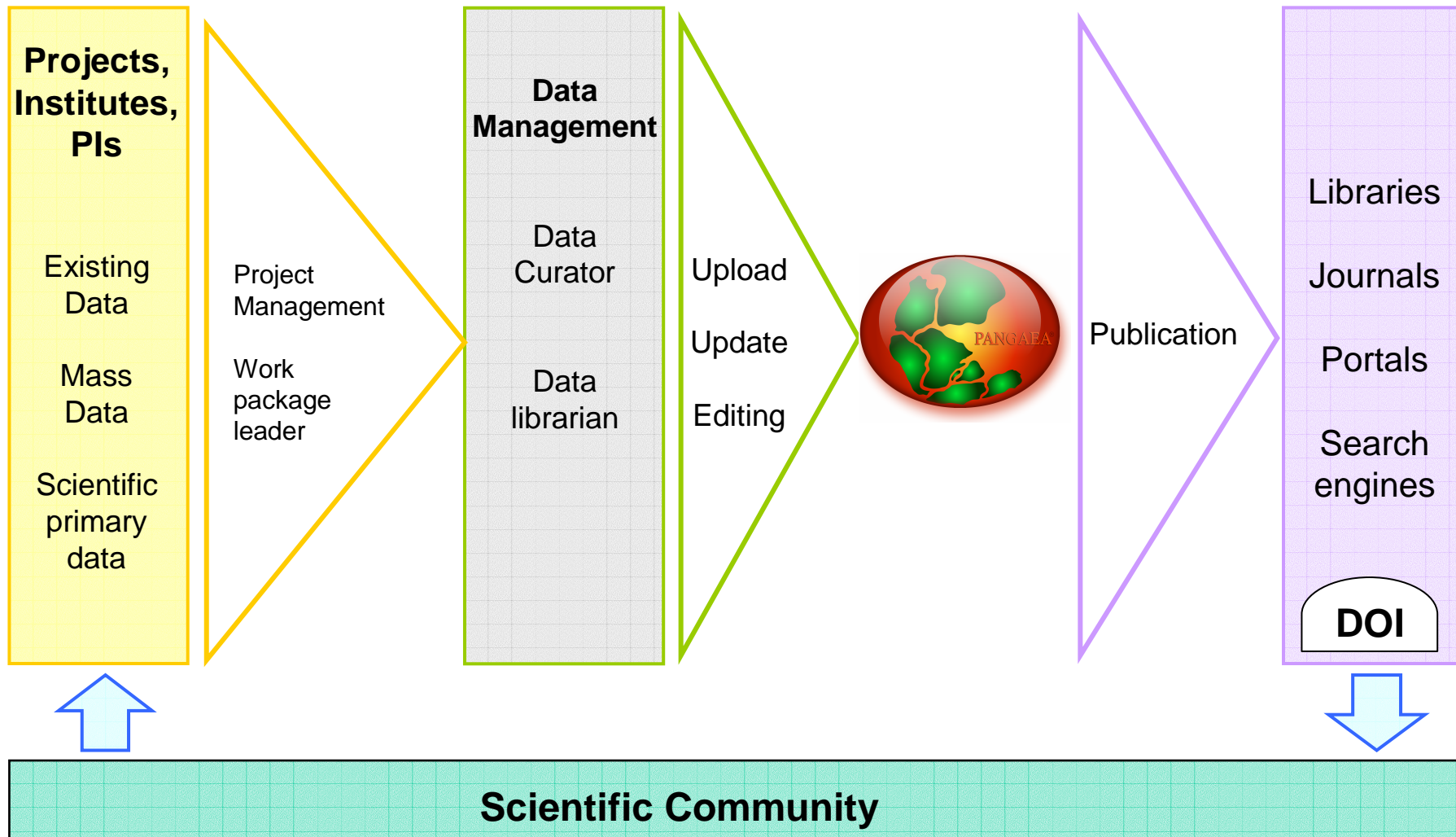
**Monitoring**

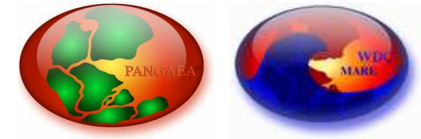
**Technical harmonization  
& quality control**

**Digital archive,  
library & publisher**

**Editorial  
& review**

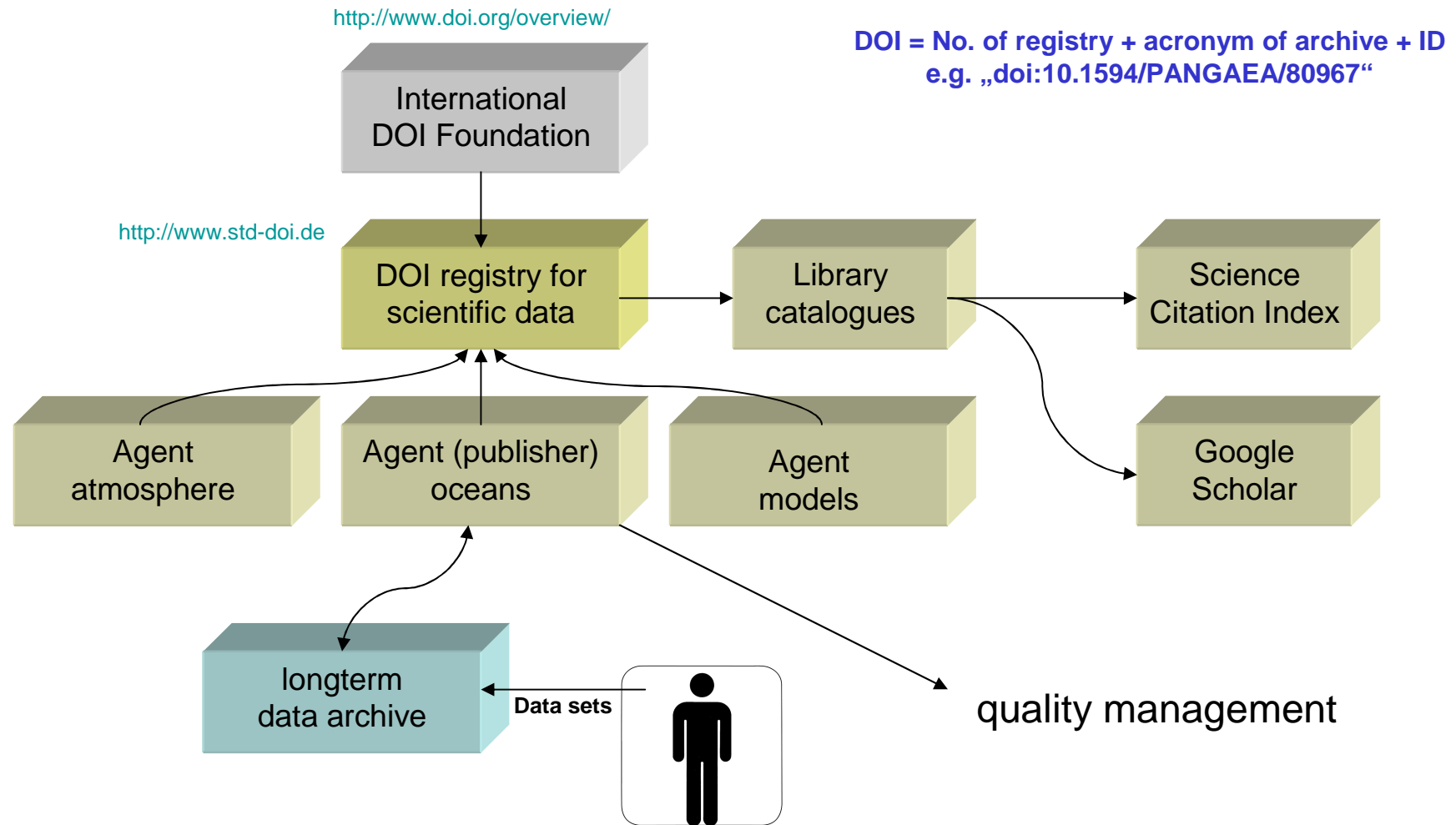
**Distribution  
& access**



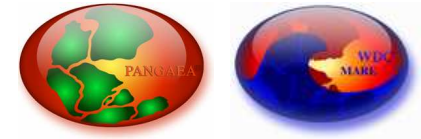


# Digital Object Identifiers (DOI)

- a way to get data published & citable







## *Data management costs in PANGAEA*

*(estimated costs in Euro per data set in the geo-, biosciences)*

- <b>Data archiving &amp; publication</b> <i>(aquisition, dokumentation, processing, archiving &amp; publication)</i>	<b>150,-</b>
- <b>Post publication curational works</b> <i>(corrections, improvements, restructuring works)</i>	<b>15,-</b>
- <b>Technical infrastructure and staffs of information system</b> <i>(computer, storage media, networks, administration)</i>	<b>40,-</b>
- <b>Development of the information system</b> <i>(incl. ongoing extensions, improvements)</i>	<b>20,-</b>

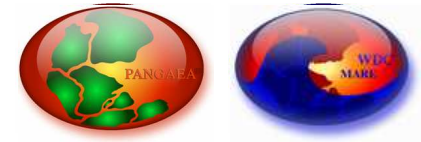
for comparison

- total for ~5 data sets per publication	1.100,-
- preparation of a publication	12.000,-
- Data production (incl. costs for expeditions & laboratories)	120.000,-

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Conclusions:

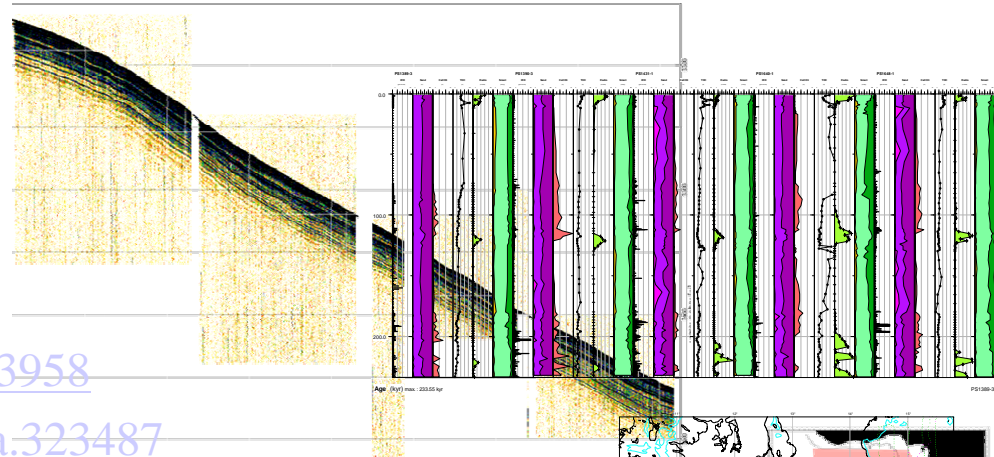
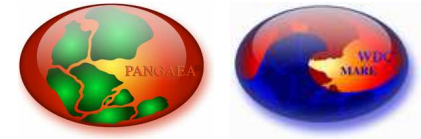
- The costs for aquiring new data sets are more than 2/3 of the total data management costs
- Data management costs are only 1 - 1,5% of the total costs



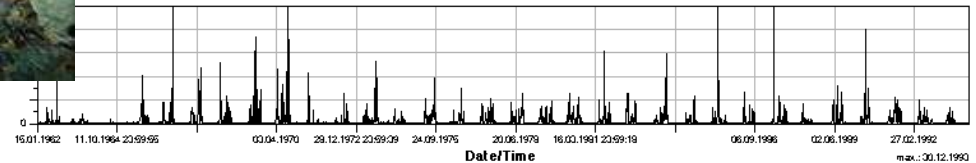
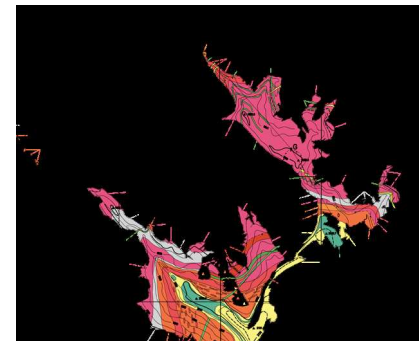
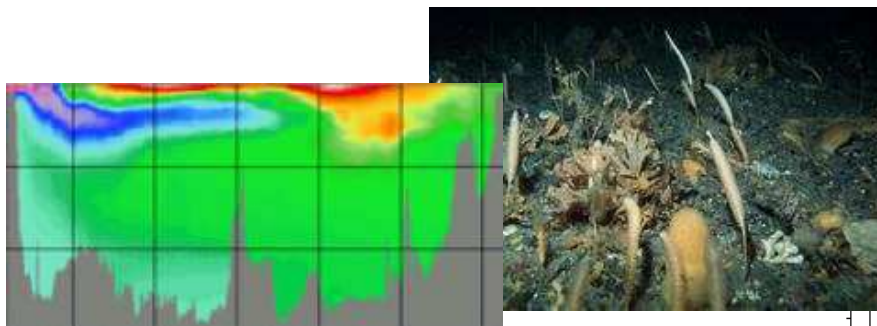
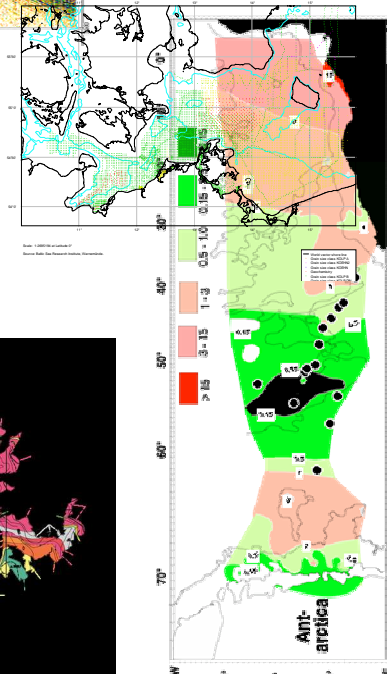
# *Content*



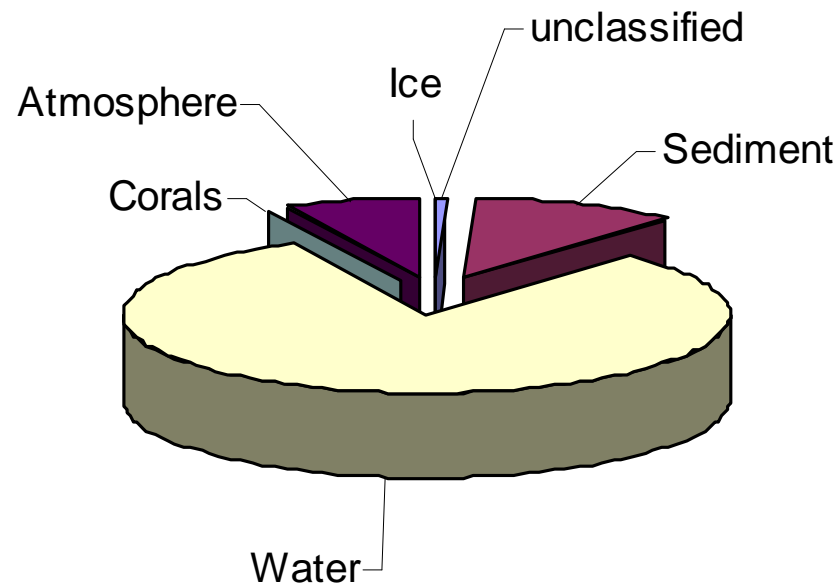
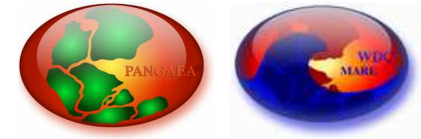
# Data types in PANGAEA



- Profiles -> [doi:10.1594/pangaea.103958](https://doi.org/10.1594/pangaea.103958)
- Time series -> [doi:10.1594/pangaea.323487](https://doi.org/10.1594/pangaea.323487)
- Sea bed photos -> [doi:10.1594/PANGAEA.319877](https://doi.org/10.1594/PANGAEA.319877)
- Distributes samples -> [doi:10.1594/pangaea.51749](https://doi.org/10.1594/pangaea.51749)
- Complex data -> [doi:10.1594/PANGAEA.108079](https://doi.org/10.1594/PANGAEA.108079)
- Air photos -> [doi:10.1594/PANGAEA.323540](https://doi.org/10.1594/PANGAEA.323540)
- Audio record -> [doi:10.1594/PANGAEA.339110](https://doi.org/10.1594/PANGAEA.339110)



# Statistics (2/2008)

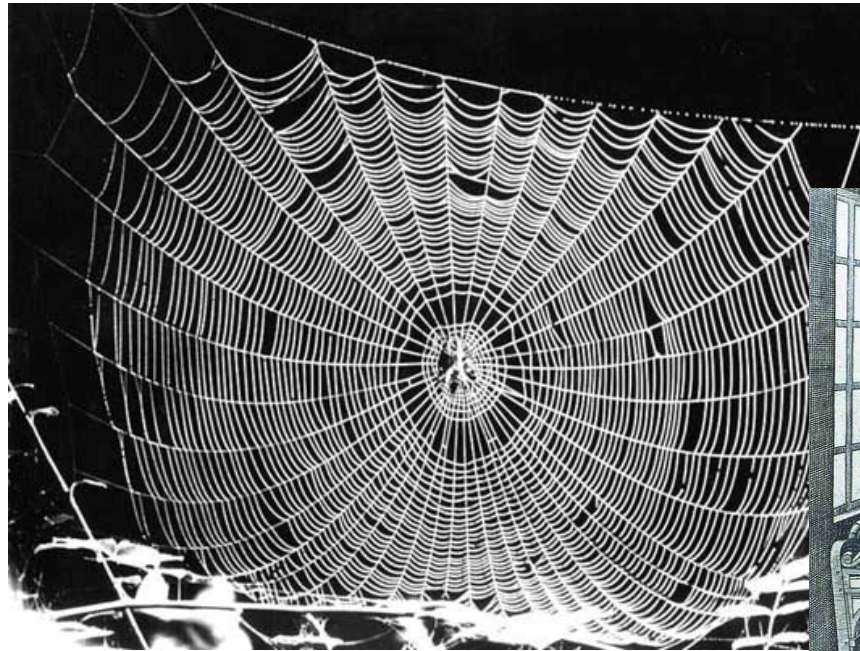


Total number of data sets ~ 573,000  
Data items ~ 4.1 billions





# *Networking*



One stop shopping  
for reliable and usable data

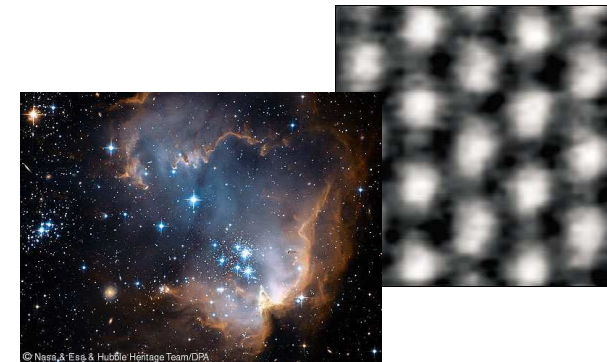
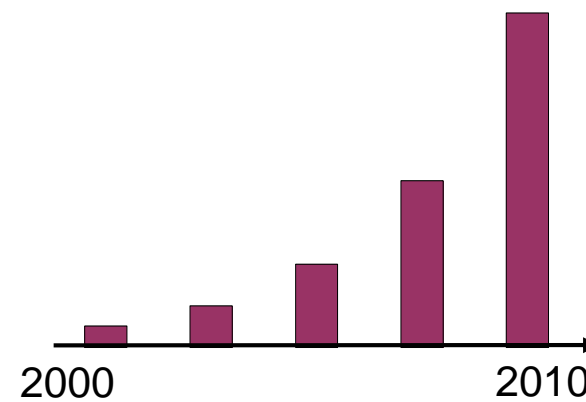


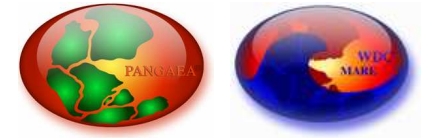
# *Data Driven Science*

**wireless**

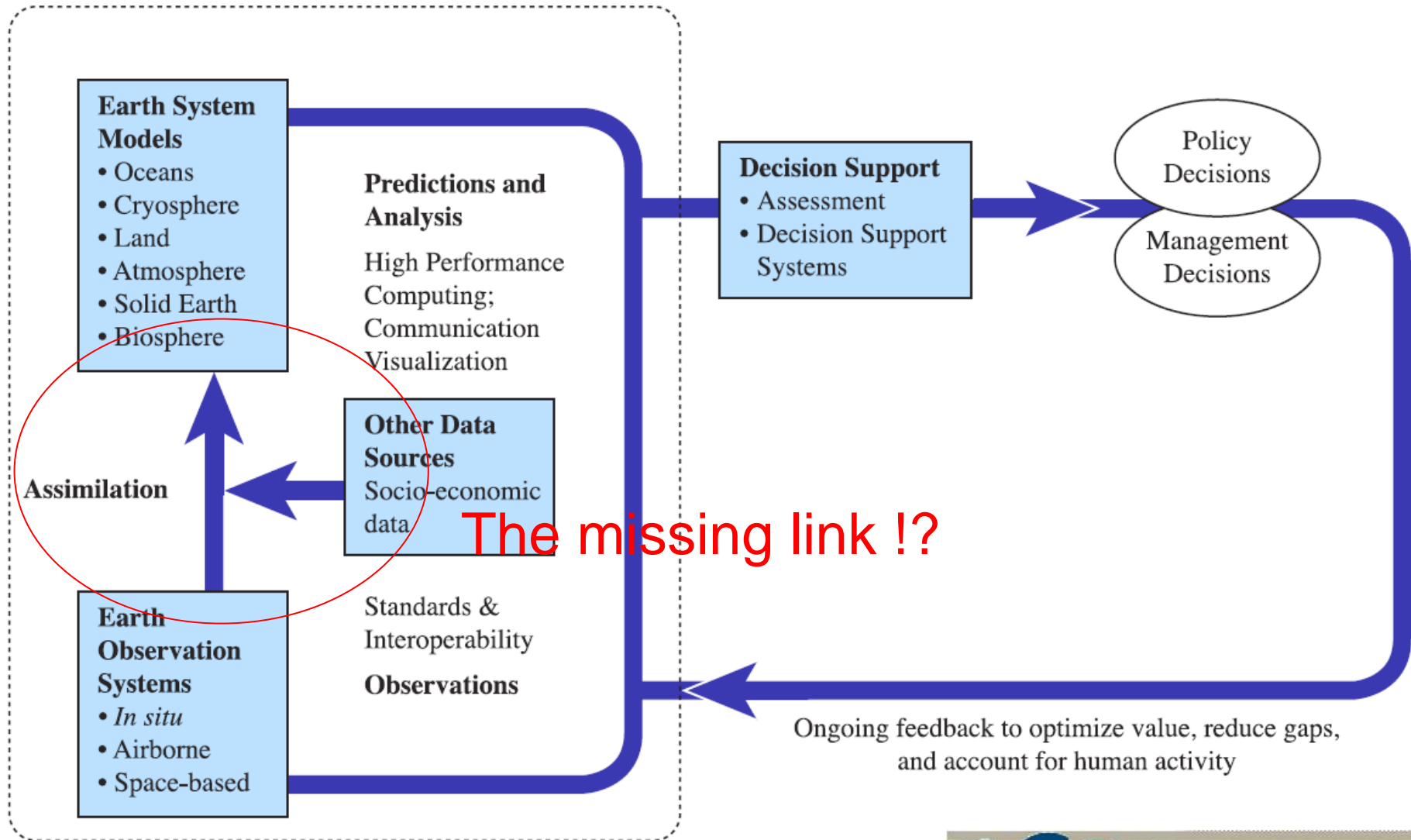


**cabled**



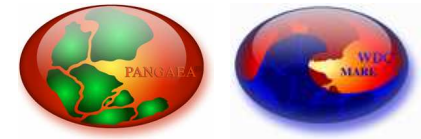


# GEOSS *Global Earth Observation System of Systems*





# PANGAEA<sup>®</sup> – standard interfaces for metadata



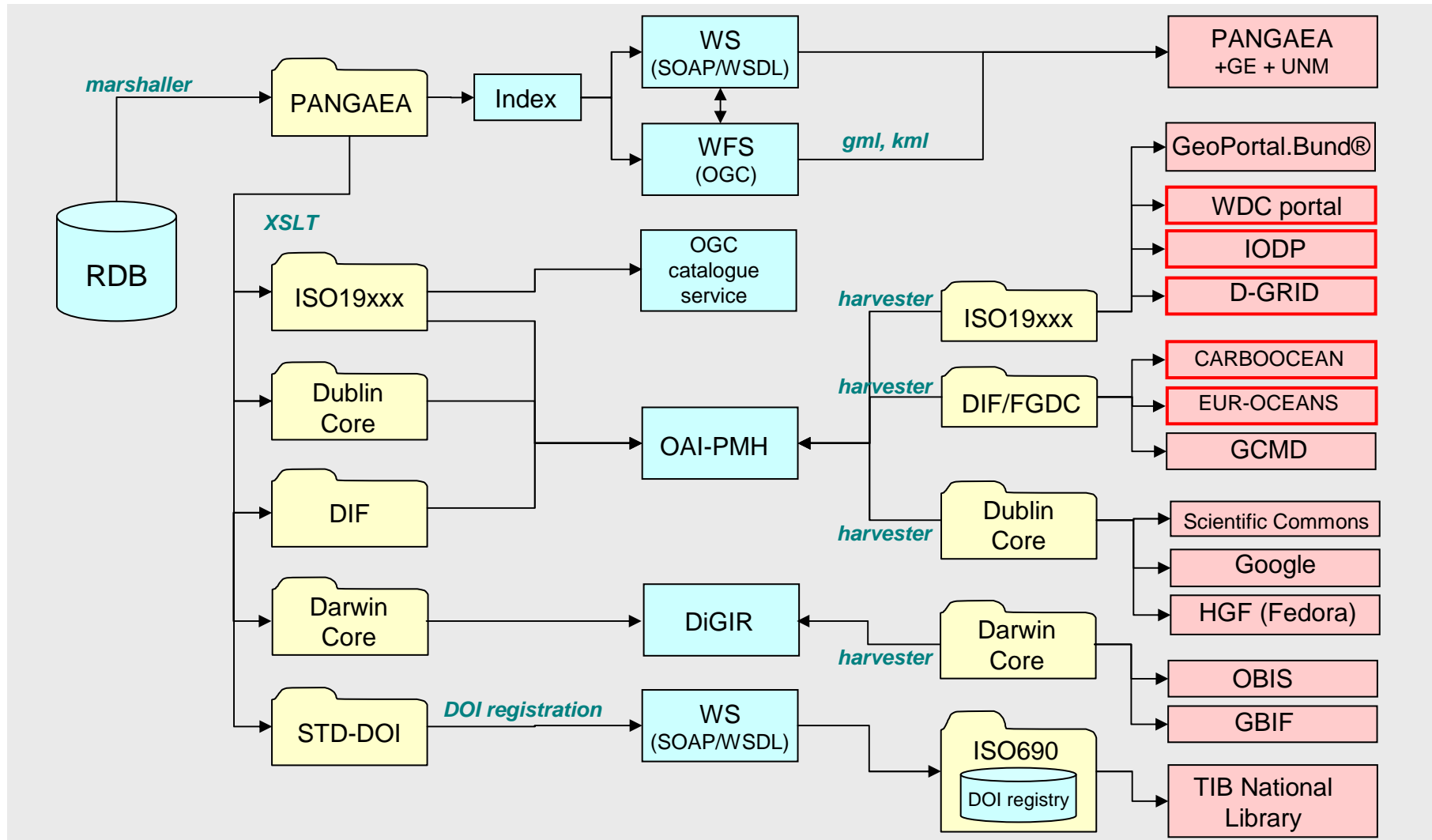
data management & longterm archiving

catalogues

protocols

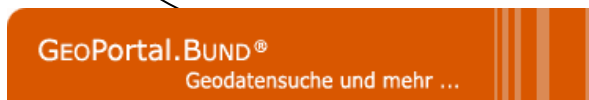
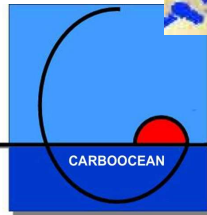
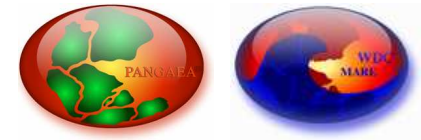
Compiled catalogues

Frontends / portals



# PANGAEA®

– dissemination of data and metadata via portal networks



iGoogle - Windows Internet Explorer

http://www.google.com/ig?hl=de

Wikipedia

Datei Bearbeiten Ansicht Favoriten Extras ?

iGoogle

mdiepenbroek@pangaea.de | [Klassische Startseite](#) | [Mein Konto](#) | [Abmelden](#)

**iGoogle** Web [Bilder](#) [Groups](#) [News](#) [Produkte](#) [Maps](#) [Mehr »](#)

Erweiterte Suche  
Einstellungen  
Sprachtools

Google-Suche Auf gut Glück!

Web-Suche  Suche Seiten auf Deutsch

Startseite  Outer Space Raumzeit [Seite hinzufügen](#) [Hintergrund ändern](#) | [Gadgets hinzufügen »](#)

**PANGAEA latest datasets**

- [\(Table 4\) Chemistry and isotope ratios of glass and palagonite from DSDP Hole 53-418A](#)
- [\(Table 3\) Rare-earth and trace elements of glass and palagonite from DSDP Hole 53-418A](#)
- [\(Table 2\) Rare-earth elements of basalts from DSDP Hole 53-418A](#)

**DIE ZEIT:**

- [Pakistan : Ära von Präsident Musharraf geht zu Ende](#)
- [AIK Stockholm : Der "Bill Gates der Pornobranche" kauft den Klub](#)
- [Italien: Mord durch Rumänen schürt Ausländerhass](#)

**Lesezeichen**

- [Bahn](#)
- [Bahn - Firmenportal](#)
- [Bahn - Uniportal](#)
- [Börse](#)
- [Google Maps](#)
- [Klack.de](#)
- [Map24](#)
- [WetterBremen](#)

**heise online News**

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- [Apple schließt sieben kritische Lücken in Quicktime](#)
- [BKA-Chef setzt auf Online-Durchsuchung](#)

**FAZ.NET**

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- [Indien: Mädchen mit vier Armen und Beinen wird operiert](#)
- [Kickers Offenbach: Jörn Andersen neuer Trainer](#)

**dict.leo.org**

**Wetter**

**Bremen**  
7°C






Publishing Network for Geoscientific & Environmental Data - Search - Windows Internet Explorer

http://www.pangaea.de/search?count=10&minlat=&minlon=&maxlat=&maxlon=&mindate=&maxdate=&env=All&q=wolfgan

Wikipedia

Datei Bearbeiten Ansicht Favoriten Extras ?

Publishing Network for Geoscientific & Environmental ...

 All Water Sediment Ice Atmosphere

You are not logged in (LOG IN)

wolfgang berger ice ages Search

Help Advanced Search Preferences more...

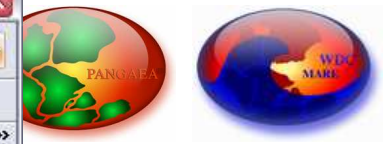
Always quote reference/citation when using data!

**8 datasets** found on search for »wolfgang berger...« [Show Map](#)

<< PREV | 1 | NEXT >>

- Berger, WH (2004):** Oxygen isotope stratigraphy Ojplus03 for the last 838,000 years [supplementary data to the reference given]  
Reference: **Berger, WH (2004):** Climate future in a warming world: lessons from the ice ages, *In: Wernli, RL & Kennel, CF (eds) Oceans 2003 MTS/IEEE Conference Proceedings, Holland Enterprises, Escondido CA*  
Size: 420 data points  
doi:10.1594/PANGAEA.204029 - Score: 100%
- Kemle-von Mücke, S; Berger, WH; Wefer, G (2004):** Oxygen isotope composition of planktonic foraminifer Globigerinoides ruber in sediment core GeoB1413 from the eastern edge of the South Atlantic central gyre [supplementary data to the reference given]  
Reference: **Kemle-von Mücke, S (1994):** Oberflächenwasserstruktur und -zirkulation des Südostatlantiks im Spätquartär, *Berichte, Fachbereich Geowissenschaften, Universität Bremen*  
**Berger, WH; Wefer, G (2003):** On the dynamics of the ice ages: stage-11 paradox, mid-Brunhes climate shift, and 100-ky cycle, *Geophysical Monograph (earths's climate and orbital eccentricity: the marine isotope stage 11 question) American Geophysical Union*  
Size: 444 data points  
doi:10.1594/PANGAEA.189980 - Score: 48%
- Berger, WH (1997):** Isotope stratigraphy of Site 806  
Reference: **Berger, WH; Bickert, T; Yasuda, MK et al. (1996):** Reconstruction of atmospheric CO2 from ice-core data and the deep-sea record of Ontong Java plateau: the Milankovitch chron, *Geologische Rundschau*  
Size: 1248 data points  
doi:10.1594/PANGAEA.52113 - Score: 19%
- Schiffelbein, P; Berger, WH (2005):** Stable oxygen isotope ratio of planktonic foraminifer G. sacculifer from sediment core ERDC-084P  
Reference: **Schiffelbein, P (1984):** Stable isotope systematics in Pleistocene deep-sea sediment records, *PhD Thesis, University of California, San Diego*  
**Berger, WH; Bickert, T; Yasuda, MK et al. (1996):** Reconstruction of atmospheric CO2 from ice-core data and the deep-sea





Windows Internet Explorer window titled "Publishing Network for Geoscientific & Environmental Data - Search". The address bar shows a search URL for "ice ages". The search results show "349 datasets found on search for »ice ages«".

Navigation: All | Water | Sediment | Ice | Atmosphere

Search: ice ages [Search]

Help | Advanced Search | Preferences | more...

Always quote reference/citation when using data!

- 349 datasets found on search for »ice ages«
- << PREV | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | NEXT >>
- Wagenbach, D; Graf, W; Minikin, A et al. (2006):** Ice age properties on top of Berkner Island, Filchner-Ronne Ice Shelf, Antarctica  
Reference: **Wagenbach, D; Graf, W; Minikin, A et al. (2006):** Ice age properties on top of Berkner Island, Antarctica  
Size: 6 datasets  
doi:10.1594/PANGAEA.548752 - Score: 100%
  - McIntosh, WC (2004):** Summary of 40Ar/39Ar geochronology data to the reference given]  
Reference: **McIntosh, WC (2000):** 40Ar/39Ar geochronology of the Filchner-Ronne Basin, Antarctica, *Terra Antarctica*  
Size: 103 data points  
doi:10.1594/PANGAEA.194709 - Score: 100%
  - McIntosh, WC (2006):** Argon age determination of ice cores from the reference given]  
Reference: **McIntosh, WC (2000):** 40Ar/39Ar geochronology of the Filchner-Ronne Basin, Antarctica, *Terra Antarctica*  
Size: 3 datasets  
doi:10.1594/PANGAEA.548516 - Score: 100%
  - Hart, CP; Webb, P-N (1999):** Analytical results of ice cores from the reference given] (Table 1) [supplementary data to the reference given]  
Reference: **Hart, CP; Webb, P-N (1998):** Amino acid geochemistry of ice cores from the reference given]

Windows Internet Explorer window titled "PANGAEA Search Map". The map shows a geographical view of Antarctica with a color-coded elevation model. The map is titled "PANGAEA Search Map" and includes a "Select Aspect" dropdown set to "North Pole".

Select Layers:

- Coastline (GSHHS)
- Elevation Modell (GEBCO)
- Elevation Modell (ETOPO2)
- Bathymetry (GEBCO)
- Query: ice ages
  - Points
  - Areas

The map displays a topographic view of Antarctica. The continent is shown in shades of red and orange, indicating high elevation. The surrounding ocean is shown in shades of blue and green, indicating depth. Red dots are scattered across the continent, representing ice age data points. A scale bar at the bottom right indicates 0, 350, and 700 km.



Kemle-von Mücke, Sylvia; Berger, Wolfgang H; Wefer, Gerold (2004): Oxygen isotope composition o - Windows Internet Explorer

http://doi.pangaea.de/10.1594/PANGAEA.189980

Wikipedia

File Edit View Favorites Extras ?

Kemle-von Mücke, Sylvia; Berger, Wolfgang H; Wefer...

RIS BibTEX

**Data Description**

**Citation:** Kemle-von Mücke, Sylvia; Berger, Wolfgang H; Wefer, Gerold (2004): Oxygen isotope composition of planktonic foraminifer Globigerinoides ruber in sediment core GeoB1413 from the eastern edge of the South Atlantic central gyre [supplementary data to the reference given], *PANGAEA*, doi:10.1594/PANGAEA.189980

**Reference(s):** Kemle-von Mücke, Sylvia (1994): Oberflächenwasserstruktur und -zirkulation des Südostatlantiks im Spätquartär, *Berichte, Fachbereich Geowissenschaften, Universität Bremen*, **55**, 151 pp  
 Berger, Wolfgang H; Wefer, Gerold (2003): On the dynamics of the ice ages: stage-11 paradox, mid-Brunhes climate shift, and 100-ky cycle, *Geophysical Monograph (earth's climate and orbital eccentricity: the marine isotope stage 11 question) American Geophysical Union*, **137**, 41-59

**Abstract:** Die Paläozeanographie versucht die Klimageschichte des Quartärs zu rekonstruieren und die Zusammenhänge zwischen Klimaänderungen und ozeanischer Zirkulation besser zu verstehen. Ein wichtiges Hilfsmittel stellen die planktischen Foraminiferen dar. Die Analyse planktischer Foraminiferengemeinschaften hat gezeigt, daß die Verbreitung dieser Protozoa durch die Umweltbedingungen in den Oberflächenwasserströmen bestimmt wird (BoLTOVSKOY, 1969; CIFELLI& BENIER, 1976; OTIENS, 1991). Durch ihre Ablagerung und Erhaltung am Meeresboden speichern sie diese Informationen und bilden einen Indikator für Wassermassen und Oberflächenwassertemperaturschichtung. Zeitliche und räumliche Veränderungen der Faunenvergesellschaftungen und der Verhältnisse stabiler Sauerstoff- und Kohlenstoffisotope einzelner Foraminiferenarten haben damit einen maßgeblichen Beitrag zur Kenntnis der spätquartären Temperatur- und Zirkulationsänderungen der Oberflächenströme geliefert (SHACKLETON & OPDYKE, 1973; BE et al., 1976; RUDDIMAN & MCOOYRE, 1976; VINCENT & BERGER, 1981; CLIMAP, 1981; RA VELO et al., 1990).  
 Mit Hilfe der planktischen Foraminiferen soll diese Arbeit einen Beitrag zur Rekonstruktion der spätquartären Ozeanographie des Südatlantiks liefern. Die Oberflächenströme des Südatlantiks sind das Bindeglied im Wärmeaustausch zwischen niederen und hohen Breiten. Durch den Südäquatorialstrom (SEC) werden warme Wassermassen, die sich aufgrund der hohen Sonneneinstrahlung im tropischen Atlantik gebildet haben, in den Nordatlantik transportiert. Die Wärme wird im Nordatlantik unter Bildung des Nordatlantischen-Tiefenwassers (NADW) an die Atmosphäre abgegeben. Durch dieses Ereignis wird maßgeblich das nordeuropäische Klima beeinflusst (BROECKER & DENTON, 1989). Die Intensität des SEC wird durch den saisonal variierenden SE-, NE-Passat gesteuert, der hauptsächlich durch die Präzession der geneigten Erdochse bzw. durch die Insolation auf der Nordhalbkugel kontrolliert wird (Mc OOOYRE et al., 1989; MOLFINO & Mc INTYRE, 1990). Der SEC fließt entlang des Äquators von Ost nach West und kalte, nährstoffreiche, tiefere Wassermassen (Südatlantisches-Zentralwasser (SACW)) steigen vor allem im Osten auf und erzeugen das hochproduktive äquatoriale Auftriebsgebiet. Im Osten ist der Temperaturgradient in der Wassersäule steiler, und die Thermoklinentiefe nimmt von Ost nach West zu. Die Lage der Thermokline ist damit ein wesentlicher Faktor, der den Wärmehaushalt im Atlantik mitbestimmt. So wird z. B. im äquatorialen Auftriebsgebiet und im Auftriebsgebiet des küstennahen Benguela-Stroms, wo die Thermoklinentiefe durch aufsteigende kalte Wassermassen gering ist, eine Wärmezunahme von 100 W/qm im Wärmehaushalt erreicht (PETERSON & STRAMMA, 1991). Zur spätquartären Rekonstruktion des Wärmeflusses und der Oberflächenzirkulation im Südostatlantik ist es daher wichtig, auch die zeitlichen und räumlichen Veränderungen tieferer Wasserschichten (bis 300 m) zu erfassen.

**Project(s):** Geosciences, University of Bremen (GeoB)

**Coverage:** West: -9.4550 \* East: -9.4550 \* South: -15.6800 \* North: -15.6800  
 Minimum Age: 0.000 kyr BP \* Maximum Age: 886.000 kyr BP  
 Date/Time Start: 1991-04-17T00:00:00 \* Date/Time End: 1991-04-17T00:00:00

**Event(s):** GeoB1413-4 \* Latitude: -15.6800 \* Longitude: -9.4550 \* Elevation: -3789.0 m \* Date/Time: 1991-04-17T00:00:00 \* Recovery: 10.1 m \* Location: West Angola Basin \* Campaign: M16/1 \* Basis: Meteor (1986) \* Device: Gravity corer (Kiel type)

**Comment:** Mean sedimentation rate is 1.07 cm/kyr, analysis and age assignments by S. Kemle-von Muecke, sampled at 5 cm intervals, interpolated for 2 kyr age steps.

**Parameter(s):**

Parameter	Short Name	Unit	Principal Investigator	Method	Comment
AGE	Age	kyr BP			Geocode
DATE/TIME	Date/Time				Geocode
LATITUDE	Latitude				Geocode
LONGITUDE	Longitude				Geocode
Globigerinoides ruber white, d18O	G. ruber w d18O	per mil PDB	Kemle-von Mücke, Sylvia	interpolated	

**Size:** 444 data points

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