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Novel approaches in open data access and science -

Publishers' viewpoint

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Alfred-Wegener-Institute for Polar and Marine Research,
Helmholtz Association - Germany

3rd Nordic ENVRI workshop on data management and interoperability,
Lund, 2015-10-28

AWI

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Publishing - with a capital P

- **A Marketing Meme – to emphasize a distinction**
  - to publish: make publicly available, e.g. upload to website
  - to Publish - as in Scientific Publishing :
    - is a quite formal, "ritualised" process
      requires systematic 3rd party scrutiny
      => QA supposedly yields higher quality
    - establishes priority
    - quality + priority => reputation => willingness to share
    - published items become part of "The Records of Science"

(Data) Publishing - with a capital P

- Standardized, well known process
  => TRUST => we can build on the work of others !!
- Apply these mechanisms to data
  - get all the benefits !! ??
    - thus: "Data Publishing with a capital P"
- In a broader sense, this is about:
  To make data a legitimate part of research culture

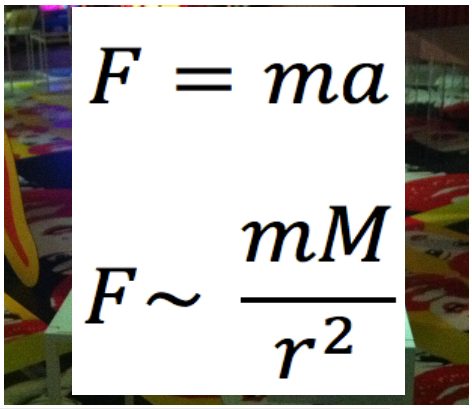
Agenda

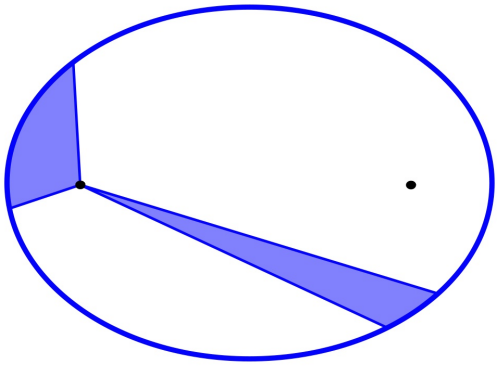
- A little bit of "historical perspective"
- Impression from recent publishers' workshop
  (COPDESS)
- ESSD, a Data Publishing journal, est. 2008
  with a note on presentation of data
- Linked Scientific Information
  (all Capital Letters) – but what are the objects?

An impression from history of science

Modern Science is based on data – since Renaissance!

- 1606 - 1618: Kepler‘s Laws
  - reduced Tycho Brahe‘s quality data
- 1684 – 1687 Newton De Motu – Principia
  - explained (!) Kepler‘s laws

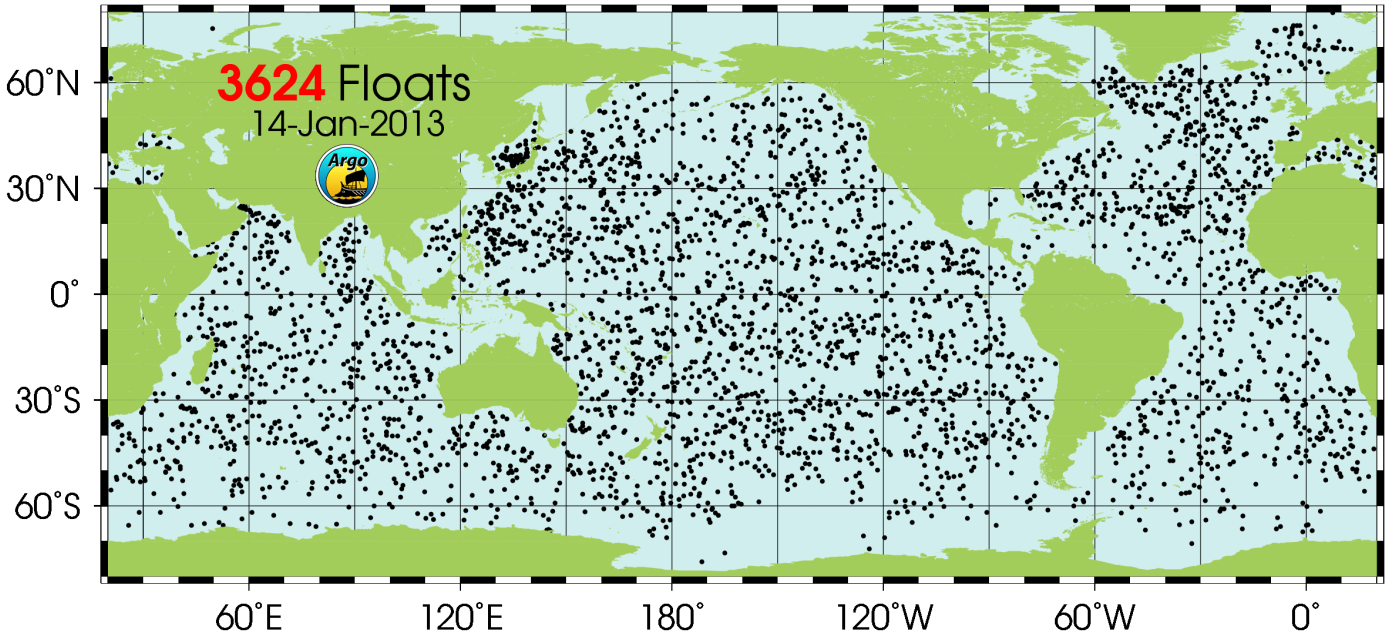




Planet	T	d	T^2	d^3	T^2/d^3
Merkur	0,241	0,387	0,058081	0,057960603	1,002077221
Venus	0,615	0,723	0,378225	0,377933067	1,000772446
Erde	1	1	1	1	1
Mars	1,881	1,524	3,538161	3,539605824	0,999591812
Jupiter	11,863	5,203	140,730769	140,8515004	0,999142846
Saturn	29,458	9,555	867,773764	872,3526289	0,994751131

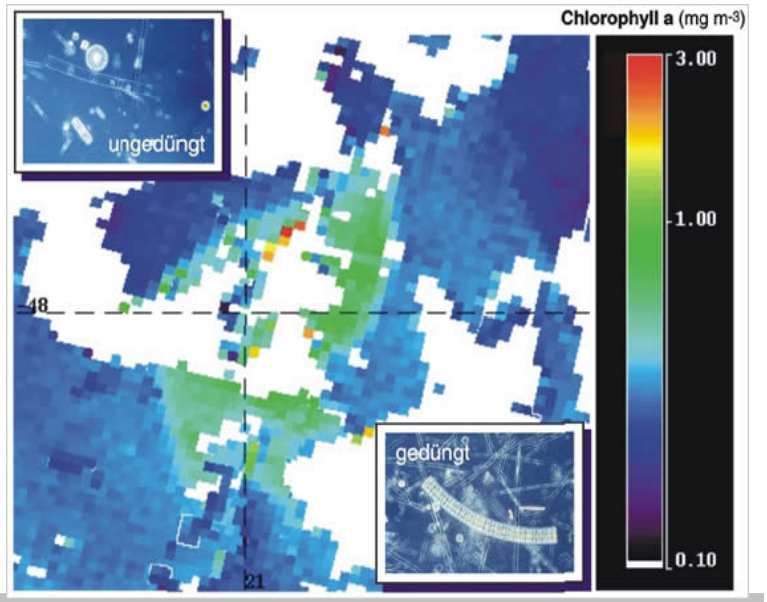
T = siderische Umlaufzeit in trop. Jahren d = große Halbachse in astronomischen Einheiten (Abstand Erde–Sonne)

The biggest experiment on this planet - ARGO

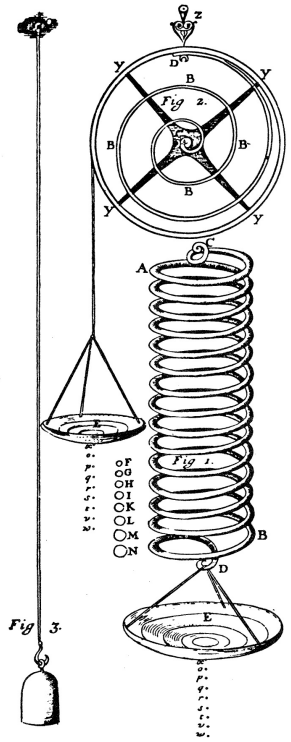


An important, "typical" Experiment

- EISENEX / EIFEX : Two expeditions of "**Polarstern**" :
  With a few tons of iron fertilizer, south of Capetown ….
- EIFEX (2004):
  - 54 scientists and students from
  - 14 institutes and 3 companies from
  - 7 EU countries and South Africa
  - **Oceanographers**
  - **Biologists**
  - **Chemists…..**
- **"Biogeochemistry"**
- **+ Satellite observations !**



Scared in the 17th Century



Hooke, published his law

1676 by anagram „ceiiinosssttuv“

1678 in booklet

PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.

Vol. I.
For Anno 1665, and 1666.

In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little without Temple-Bar, and James Allestry in Duck-Lane,
Printers to the Royal Society.

Impressions from COPDESS

- Coalition on Publishing Data in the Earth and Space Sciences -

FORCE11 » Groups » Joint Declaration of Data Citation Principles - FINAL

JOINT DECLARATION OF DATA CITATION PRINCIPLES - FINAL

When citing please use: Data Citation Synthesis Group: Joint Declaration of Data Citation Principles. Martone M. (ed.) San Diego CA: FORCE11; 2014 [https://www.force11.org/datacitation].

ENDORSEMENT LIST

DC1 Data Citation Principles

PREAMBLE

Sound, reproducible scholarship rests upon a foundation of robust, accessible data. For this to be so in practice as well as theory, data must be accorded due importance in the practice of scholarship and in the enduring scholarly record. In other words, data should be considered legitimate, citable products of research. Data citation, like the citation of other evidence and sources, is good research practice and

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Journals' Transparency Criteria

- TOP: modular, agnostic to disciplines, low barrier to entry; categories are:
  - a) **data citation**
  - b) design transparency (**standard operating procedures**, protocols)
  - c) materials transparency
  - d) **data transparency**
  - e) analytical methods (code) transparency
  - f) preregistration of studies
  - g) preregistration of analysis plans
  - h) replication
- 3 levels
  - level 1: article states whether data are available and where to access
  - level 2: data has to be in trusted repository
  - level 3: data in TR, but reported analyses will be reproduced independently

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Journal

- > 526 j

www.nytimes.com/2015/06/26/science/journal-science-releases-guidelines-for-publis...

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Grave of 'Griffin Warrior' at Pylos Could Be a Gateway to Civilizations


Deadly Heat Is Forecast in Persian Gulf by 2100


MATTER
DNA of Ancient Children Offers Clues on How People Settled the...

SCIENCE

Journal Science Releases Guidelines for Publishing Scientific Studies

By BENEDICT CAREY JUNE 25, 2015

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BROOKLYN

In the midst of a debate over scientific misconduct, one of the world's leading scientific journals on Thursday posted the most comprehensive guidelines for the publication of studies in basic science to date, calling for the adoption of clearly defined rules on the sharing of data and methods.

The guidelines, published in

Dr. Marcia McNutt, the editor-in-chief of Science, co-authored new guidelines to improve transparency of data, methods and materials in published studies.
Drew Angerer for The New York Times

H. Pfeiffenberger

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Directory of trustworthy repositories (for ESS):

- **Discipline-specific, because only those**
  - can catch the needed metadata
  - can be regarded sustainable
- **In order of specificity:**
  - re3data.org
  - „something" developed by AGU/NSF/COS
  - journals' lists (ESSD, Scientific Data)
- **Certification**
  - WDS (actually an accreditation process)
  - Data Seal of Approval

Identifiers

- **For data: persistent identifiers for data,**
  - ⇨ **preferably DOIs, implying fixity, integrity!**
- **For authors, contributors: ORCID**
  - ⇨ **all publishers to use ORCID, even the ORCID AuthN service**
- **For samples: IGSN**

- **For grants: FundRef (http://www.crossref.org/fundref/)**
  - ⇨ **http://dx.doi.org/10.13039/501100000780,**
    "European Commission",
    - **"narrower": [{"resource": "http://dx.doi.org/10.13039/501100000889"},**

Transparency = Openness?

- **The "How" of Open**
  - **Is registration acceptable ??**
  - **Which kind of license (if any)**

- **The "When" of Open**
  - **Some time after end of data acquisition?**
  - **Some time after end of project / funding?**
  - **At time of publication?!**
    - **After acceptance?**
      - **If there is an on-going embargo, how can reviewers have access?**

ESSD – Data Publishing in practise

2013: CO above Troll Station, Original Data

```
BAS microwave radiometerCO profiles acquired at Troll station, Antarctica between Feb 2008 and Jan 2010
Contact: Patrick Espy, tel:  +47 73 55 10 95, email: patrick.espy@ntnu.no
-------------------------------------------------------------------------------
date [UT]:                          2009-10-19 10:44:06
apriori contribution: The profile is most reliable where the contribution from the a priori profile is less than approx.
                      Negative values are a scaling artifact and should be regarded as close to 0.

The 2-sigma systematic errors provided have been determined using perturbation calculations:

temperature error:    error induced by the temperature profile (estimated error = 5K) needed as
                      additional information for the retrieval, mainly random
calibration error:    error induced by the calibration of the measured spectrum (estimated error = 10 percent), can be sys
spectroscopy error:   we used lineintensity from HITRAN 2004 with an estimated error of 2 percent, systematic
channel shape error:  uncertainty due to the use of a modified channel response function in the retrieval in order to cor
                      for an instability in one of the radiometers local oscillators after 2008-08-09, systematic
Error from measurement noise [K]:  0.1510, random
Smoothing error:      This error only needs to be considered if the profiles of the BAS radiometer are compared to
                      profiles with a significantly larger vertical resolution. For such a comparison the
                      better way would be to convolve the high-resolution profile with the AVK of the retrievals.

Sum of errors:        To build the sum of certain errors they are added up as follows sqrt(error1^2 + error2^2)
-------------------------------------------------------------------------------
```

pressure [hPa]	altitude [km]	vmr [ppmv]	apriori contribution [percent]	temperature error [ppmv]		calibration error [ppmv]		spectroscopy error [ppmv]	
0.749894	50.679	0.060	-5.939	0.003	0.048	0.010	0.234	0.011	
0.562341	53.021	0.065	-20.151	0.002	0.056	0.011	0.319	0.012	
0.421697	55.337	0.072	-27.600	0.002	0.061	0.012	0.349	0.013	
0.316228	57.609	0.080	-29.442	0.004	0.067	0.013	0.298	0.015	

Sun-earth Interactions

measurements carried out in order to study the dynamical context.
The data set covers the period from February 2008 to January 2010, however, due to very low CO concentrations

- Storage
- Contraints

General Information

Submission

Review

Abstract. This paper presents mesospheric carbon monoxide (CO) data acquired by the ground-based microwave radiometer of the British Antarctic Survey (BAS radiometer) stationed at Troll station in Antarctica (72° S, 2.5° E, 1270 a.m.s.l.). The data set covers the period from February 2008 to January 2010, however, due to very low CO

ESSD Principles and Criteria

- **ESSD expects data to be at a repository and be**
  - **Open Access, static, with a DOI**
- **ESSD expects authors to describe in the article**
  - **provenance, methods, limitations, estimates of error**
- **ESSD expects reviewers to**
  - **actually look at the data**
  - **assess consistency of article and dataset**

Fluxes of sedimenting material from sediment traps in the Atlantic Ocean

S. Torres-Valdés[1], S. C. Painter[1], A. P. Martin[1], R. Sanders[1], and J. Felden[2]

[1]Ocean Biogeochemistry and Ecosystems Research Group, Southampton, SO14 3ZH, UK

[2]Center for Marine Environmental Sciences, Universität Bre Bremen, Germany

Review Status

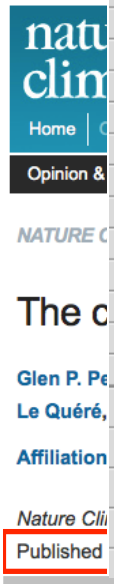
This discussion paper is under review for the journal Earth System Science Data (ESSD).

A huge work to find, assess, collate (quality) data;

24 out of 43 text pages are source data references!

Abstract. We provide a data set assemblage of directly observed and derived fluxes of sedimenting material (total mass, POC , PON , $BSiO_2$, $CaCO_3$, PIC and lithogenic/terrigenous fluxes) obtained using sediment traps. This data assemblage contains over 5900 data points distributed across the Atlantic, from the Arctic Ocean to the Southern Ocean. Data from the Mediterranean Sea are also included. Data were compiled from a variety of sources: data repositories (e.g., BCO-DMO, PANGAEA), time series sites (e.g., BATS, CARIACO), published scientific papers and data provided by originating PI's. All sources are specified within the combined data set. Data from the World Ocean Atlas 2009 were extracted to coincide with flux

2012: Nature Climate Change, ESSD and CDIAC

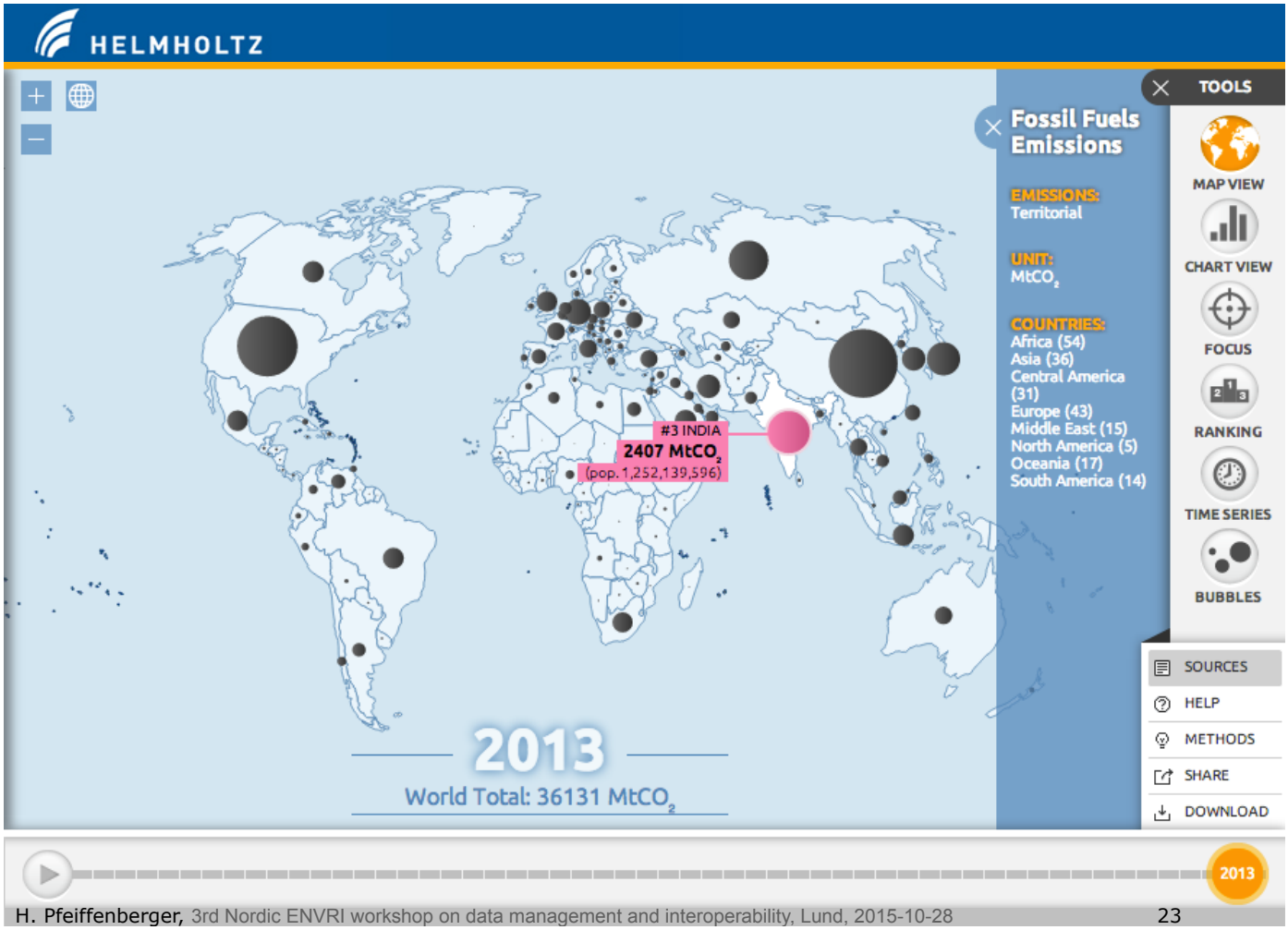


	A	B	C	D	E	F	G
1		**Terrestrial CO_2 sink (positive values represent a flux from the atmosphere to the land)**					
2		All values in petagrams of carbon per year (PgC/yr), for the globe. For values in carbon dioxide (CO_2), multi					
3		1PgC = 1 petagram of carbon = 1 billion tonnes C = 1 gigatonne C = 3.67 billion tonnes of CO_2					
4		**Cite as:**					
5		CLM4CN	Lawrence, D. M., Oleson, K. W., Flanner, M. G., Thornton, P. E., Swenson, S. C., Lawrence,				
6		HYLAND	Levy, P. E., M. G. R. Cannell, et al. (2004). "Modelling the impact of future changes in clim				
7		LPJ-GUESS	Smith, B., I. C. Prentice, et al. (2001). "Representation of vegetation dynamics in the mod				
8		LPJ	Sitch, S., B. Smith, et al. (2003). "Evaluation of ecosystem dynamics, plant geography and				
9		O-CN	Zaehle, S., P. Ciais, et al. (2011). "Carbon benefits of anthropogenic reactive nitrogen offs				
10		ORCHIDEE	Krinner, G., N. Viovy, et al. (2005). "A dynamic global vegetation model for studies of the				
11		SDGVM	Woodward, F. I. and M. R. Lomas (2004). "Vegetation dynamics - simulating responses to				
12		JULES	Clark, D. B., L. M. Mercado, et al. (2011). "The Joint UK Land Environment Simulator (JULE				
13		VEGAS	Zeng, N., A. Mariotti, et al. (2005). "Terrestrial mechanisms of interannual CO2 variability				
14							
15		Terrestrial CO2 sink as a residual		**Models**			
16	Year	of the global carbon budget		CLM4CN	HYLAND	LPJ-GUESS	LPJ
17	1959	0,42		0,79	2,02	0,42	-0,83
18	1960	1,14		0,75	1,53	1,16	0,81
19	1961	1,20		0,30	1,71	-0,07	-0,55
20	1962	1,76		0,79	2,37	1,25	0,57
21	1963	1,72		-1,20	1,81	0,26	-0,37

Global Carbon Atlas - Visualization

- **Note the two panels in www.globalcarbonatlas.org**
  - **data journalism ("emissions")**
  - **scientific visualization ("research")**

- **At the project website www.globalcarbonproject.org "real life" and linkage between publications and data**



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Conclusions

- „Earth Science“ is a „Big Data“ problem (“Variety” in 3 Vs)
  - finding and exploiting patterns in metadata and data
- Still needs Publishing processes
  - For quality assurance and recognition
  - Published text is the best „metadata“ one can have
  - Articles are *still* the linking hubs in the digital assets ecosystem
- Needs trustworthy infrastructures for data, software, …
  - most of all skilled people doing all the curatorial stuff etc.
- Clever systems exploiting all this for discovery, aggregation, analysis, … real time alerting, disaster mitigation, …

Thank you!

copdess.org

earth-syst-sci-data.net

expedition.awi.de

oa.helmholtz.de

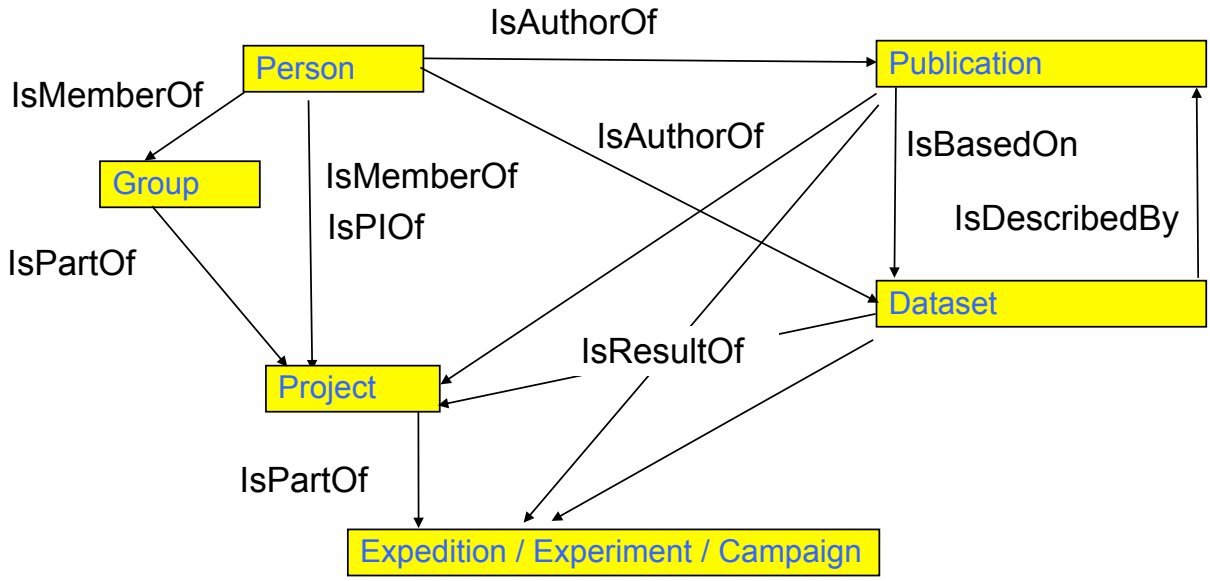
Bonus Material
- (almost) not shown in session

There is more than separate

publications and data!

Let‘s link it!

Pfeiffenberger, Macario, Text, Data and People, OAI4, CERN 2005



PANGAEA – Elsevier

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Abstract | Article | Figures/Tables | References

Marine Micropaleontology
Volume 66, Issues 3-4, 20 February 2008, Pages 192-207

doi:10.1016/j.marmicro.2007.09.002 | How to Cite or Link Using DOI
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Cited By in Scopus (2)

Organic matter rain rates, oxygen availability, and vital effects from benthic foraminiferal $\delta^{13}C$ in the historic Skagerrak, North Sea

Sylvia Brückner [a,] and Andreas Mackensen[a,]

[a]Alfred Wegener Institute for Polar and Marine Research, Columbusstr., D-27568 Bremerhaven, Germany

Received 27 March 2007; revised 21 September 2007; accepted 24 September 2007. Available online 4 October 2007.

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- All tables

Abstract

The sediment cores 225514 and 225510 were recovered from 420 and 285 m water depth, respectively. They were investigated for their benthic foraminiferal $\delta^{13}C$ during the last 500 years.

PANGAEA® – Supplementary Data
Stable carbon isotope composition of benthic foraminifera from sediments of the Skagerr...

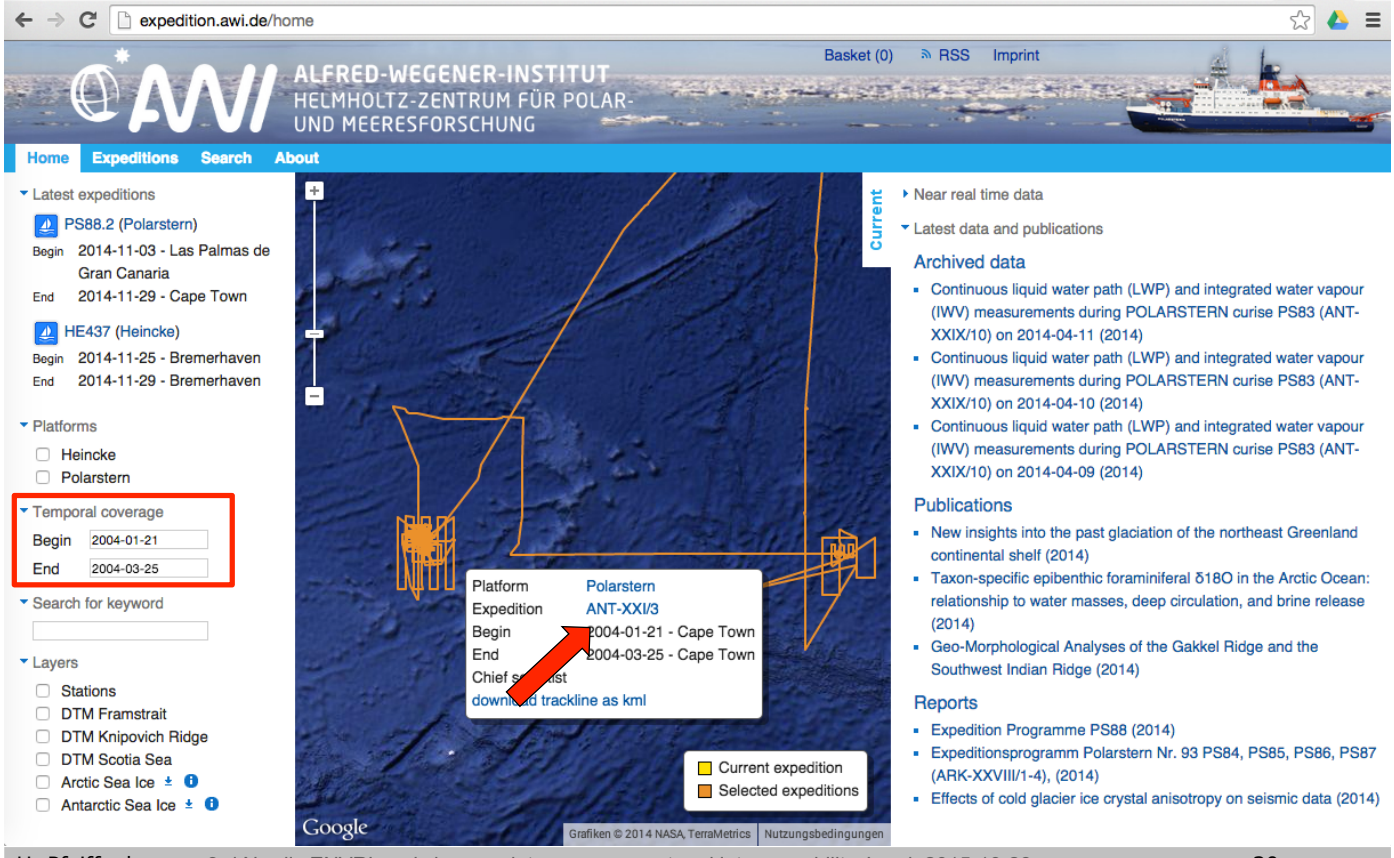
Related Articles

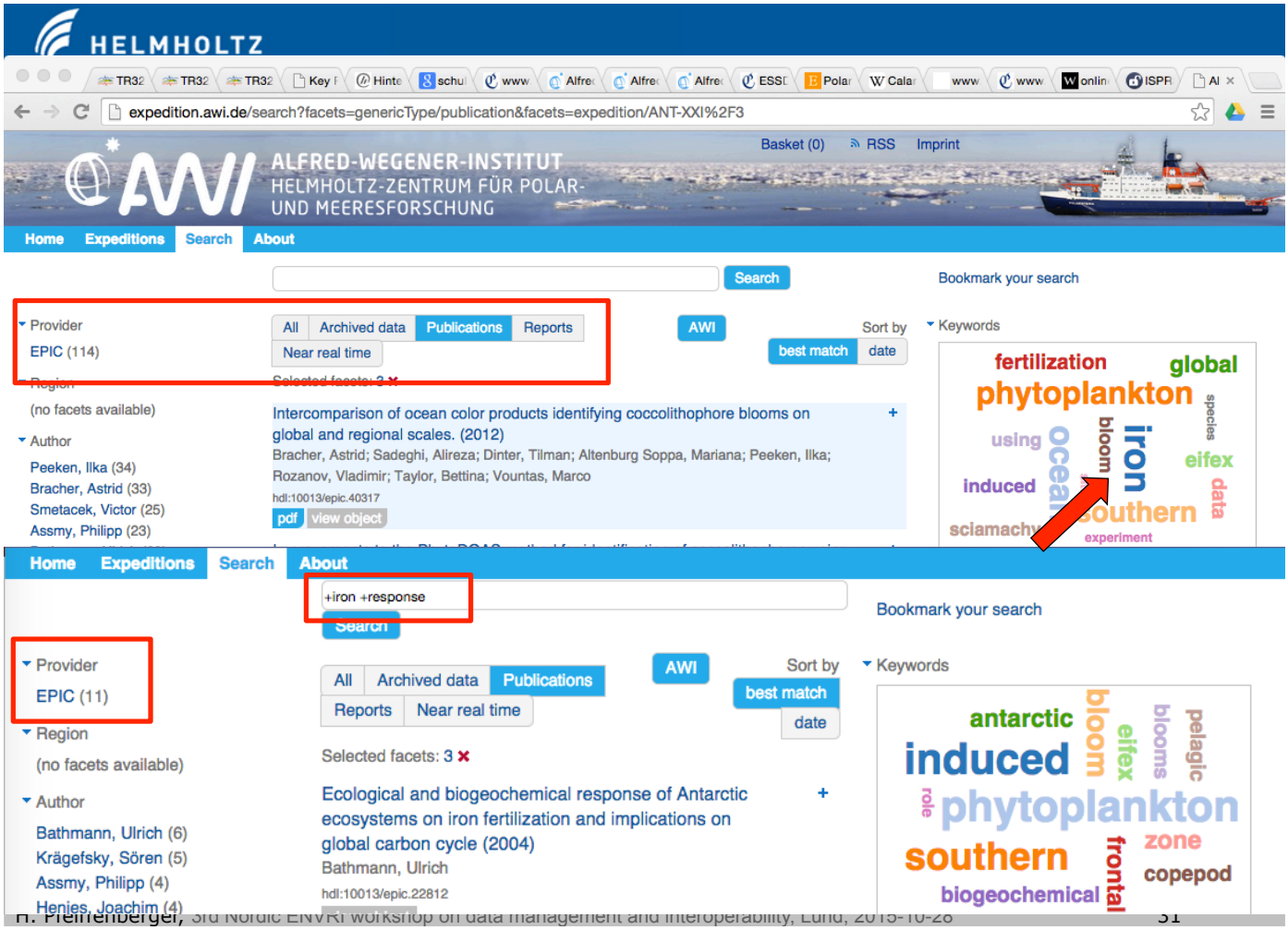
- The tropical rainbelt and productivity changes off nort... *Marine Micropaleontology*
- Temporal variability in living deep-sea benthic foramin... *Earth-Science Reviews*
- Early Maastrichtian benthic foraminiferal assemblages f... *Marine Micropaleontology*

eXpedition (in production since 2005)

Related Information: "Reports on Polar and Marine Research" (1982 to date)
Primary data (all polarstern datasets in PANGAEA)
Handbook and scientific device documentation(in deutsch)
DShip (Polarstern Data Acquisition System)
VirtualPS: Virtual Polarstern Tour

Expedition	Date || Port	Region || Research	Publications & Primary Data	Details
ANT-XXI/3 Coordinator: Pörtner, H. Chief scientist: Smetacek, V.	21.01.2004 - 25.03.2004 Capetown - Capetown [Map(png)]	Atlantic/Indian Ocean, Polar frontal zone Biology, EIFEX	ePIC: Publications ePIC: Reports on Polar and Marine Research ePIC: Weekly reports PANGAEA: Stations PANGAEA: Datasets *[Note: Publications and datasets for recent cruises may not yet be available]* Meteorology	▶
ANT-XXI/4	27.03.2004 - 06.05.2004	Lazarev Sea Biology, Krill, GLOBEC	ePIC: Publications ePIC: Reports on Polar and Marine Research	▶

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Keywords
(no facets available)
Author
Peeken, Ilka (34)
Bracher, Astrid (33)
Smetacek, Victor (25)
Assmy, Philipp (23)
Intercomparison of ocean color products identifying coccolithophore blooms on global and regional scales. (2012)
Bracher, Astrid; Sadeghi, Alireza; Dinter, Tilman; Altenburg Soppa, Mariana; Peeken, Ilka; Rozanov, Vladimir; Taylor, Bettina; Vountas, Marco
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phytoplankton
species
using
bloom
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experiment
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EPIC (11)
Region
(no facets available)
Author
Bathmann, Ulrich (6)
Krägefsky, Sören (5)
Assmy, Philipp (4)
Henjes, Joachim (4)
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Keywords
Selected facets: 3
Ecological and biogeochemical response of Antarctic ecosystems on iron fertilization and implications on global carbon cycle (2004)
Bathmann, Ulrich
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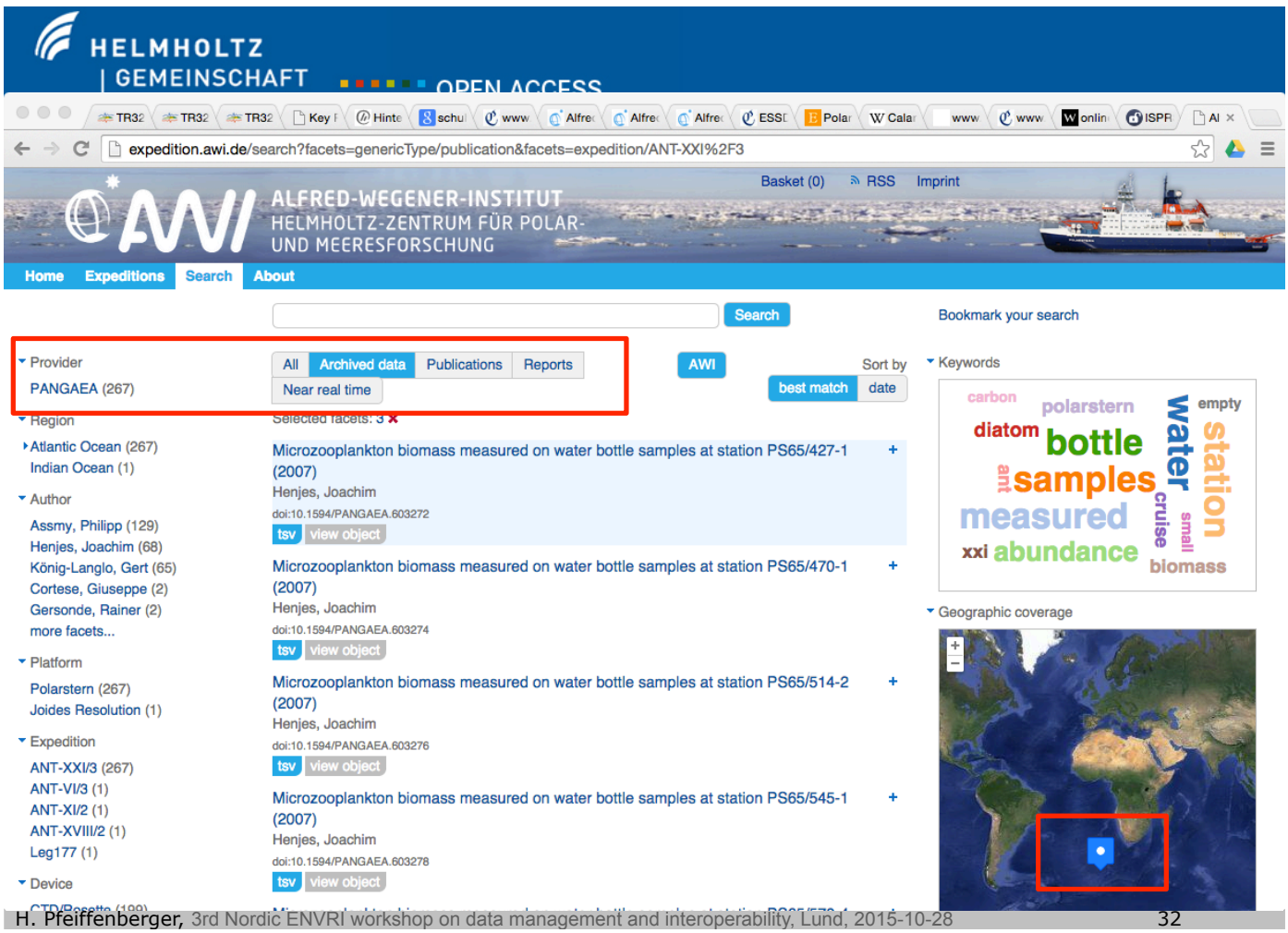
pelagic
role
phytoplankton
southern
zone
frontal
copepod
biogeochemical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Atlantic Ocean (267)
Indian Ocean (1)
Author
Assmy, Philipp (129)
Henjes, Joachim (68)
König-Langlo, Gert (65)
Cortese, Giuseppe (2)
Gersonde, Rainer (2)
more facets...
Platform
Polarstern (267)
Joides Resolution (1)
Expedition
ANT-XXI/3 (267)
ANT-VI/3 (1)
ANT-XI/2 (1)
ANT-XVIII/2 (1)
Leg177 (1)
Device
Selected facets: 3
Microzooplankton biomass measured on water bottle samples at station PS65/427-1 (2007)
Henjes, Joachim
doi:10.1594/PANGAEA.603272
tsv
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Microzooplankton biomass measured on water bottle samples at station PS65/470-1 (2007)
Henjes, Joachim
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Microzooplankton biomass measured on water bottle samples at station PS65/514-2 (2007)
Henjes, Joachim
doi:10.1594/PANGAEA.603276
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Microzooplankton biomass measured on water bottle samples at station PS65/545-1 (2007)
Henjes, Joachim
doi:10.1594/PANGAEA.603278
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carbon
polarstern
empty
diatom
bottle
water
station
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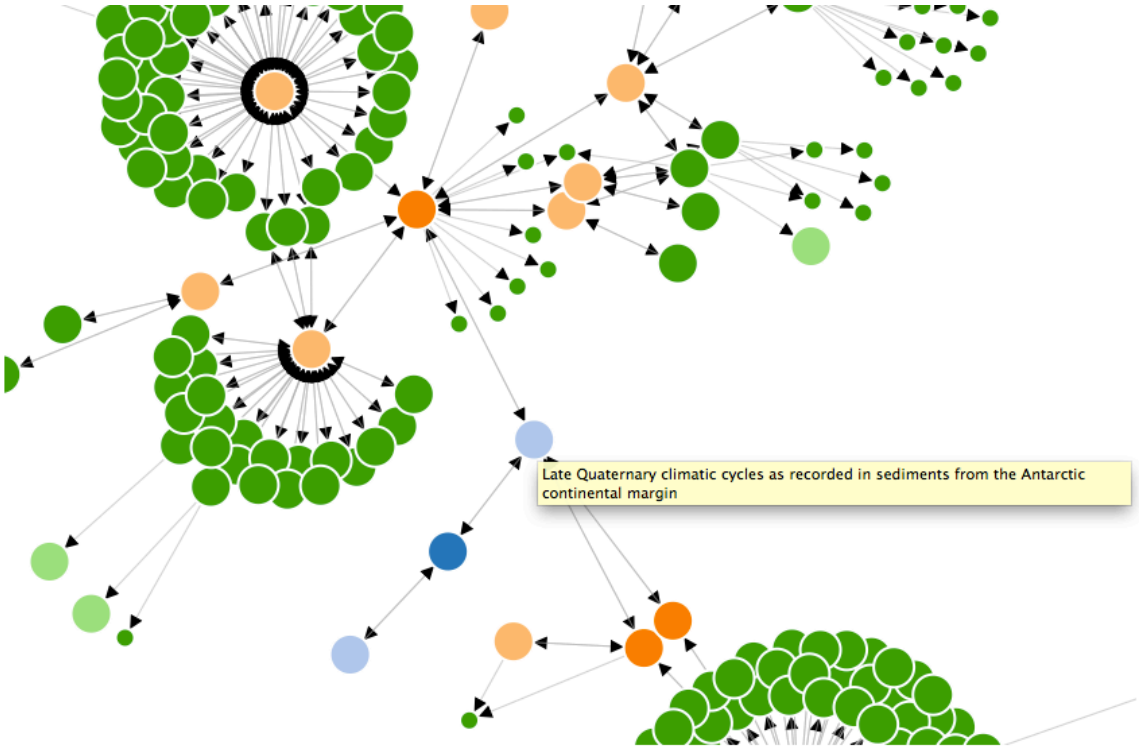
measured
cruise
small
xxl
abundance
biomass
Geographic coverage

eXpedition – Publications and Data network



Pfeiffenberger, Carlson, TR32 DM WS Cologne 2014