DOIs for Research Data

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http://orcid.org/0000-0002-0687-5460
Scope

1. DataCite Services
2. Data Citation
3. Connecting Scholarly Output
4. Scholarly Link Exchange (Scholix)
5. Event Data
6. ORCID Integration
History

• In 2004 TIB became the global agent for the registration of data DOIs

• The first data set with a DOI from the World Data Center for Climate (WDCC) at DKRZ available on the Internet 2004-03-18:

  DOI: 10.1594/WDCC/EH4_OPYC_SRES_A2
DataCite - A quick snapshot

- German charitable association founded 2009
- 50 members worldwide
- > 1300 data centres
- > 10 million DOIs created
- More than 8 million resolutions/month
DataCite - Mission

DataCite is the leading global provider of DOIs for research data, enabling users to register, find, use, connect and track research data.
Register DOI

All Data Centers:

<table>
<thead>
<tr>
<th>Resource Types</th>
<th>Total Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dataset</td>
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</tr>
<tr>
<td>Text</td>
<td>2,307,327</td>
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<tr>
<td>Image</td>
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<tr>
<td>Collection</td>
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<tr>
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<tr>
<td>Model</td>
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<tr>
<td>Interactive resource</td>
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<tr>
<td>Workflow</td>
<td>270</td>
</tr>
<tr>
<td>Service</td>
<td>38</td>
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</table>

Total Works: 9,143,720

Max Planck Gesellschaft:

<table>
<thead>
<tr>
<th>Resource Types</th>
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<td>Workflow</td>
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</tr>
<tr>
<td>Other</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Works: 2,067

https://search.datacite.org
Find a Repository for your Research Data

- 750 data centres in the re3data registry assign DataCite DOIs to data.

Types:
- Multidisciplinary (e.g. Figshare)
- Discipline specific (e.g. PANGAEA)
- Institution specific (e.g. HEP Data from CERN)
- Resource specific (TIB AV-Portal)

https://www.datacite.org/re3data.html
Nano-Roboter im Körper: Zukunft der Medizin

Max-Planck-Institut für Intelligente Systeme

Universität Stuttgart
Institut für Materialwissenschaft

Zitierlink des Filmsegments: https://doi.org/10.34461/15401/ft-00:32.00:37

Embed Code:
<iframe width="560" height="315" scrolling="no" src="/av/tib.eu/player/15401" frameborder="0" allowfullscreen></iframe>
Granularity – Recommendations (International DOI Foundation)

“A DOI name can be assigned to any object, regardless of the extent to which that object might be a component part of some larger entity.

DOI names can be assigned at any desired degree of precision and granularity that a registrant deems to be appropriate."

DOI Handbook (https://www.doi.org/doi_handbook/2_Numbering.html#2.3.2)
Granularity – Recommendations DataCite/da|ra

1. **Citation**: The current citation and research practices among the client’s user community: what is likely to be cited?

2. **The use of data**: The needs of various stakeholders: how will funders/publishers/administrators etc. use the data?

3. **The type of resource**: for example a complex dataset may require a more granular identifier structure than a document or image file.

4. **Sustainability**: The client must be able to maintain each item with a DOI name in accordance with DataCite client responsibilities.
If necessary:

- Several DOI names for the different granularity level

and

- Connect Metadata record element `<relatedidentifier>` with "isPartOf/hasPart"

Rauber et al, Data Citation of Evolving Data: Recommendations of the Working Group on Data Citation (WGDC), 2017, RDA, https://b2share.eudat.eu/records/ead2dc65f599497f81cf403b97fcfcb0
### Granularity Example

#### Data Description

**Citation:** WOCE Hydrographic Programme, WHP (2002): Hydrochemistry measured on water bottle samples during Ryofu Maru cruise 49RY9407_1 on section P09. doi 10.1594/PANGAEA.837292

**Related to:** WOCE (2002): World Ocean Circulation Experiment, Global Data, Version 3.0. WOCE International Project Office, WOCE Report, Southampton, UK; U.S. National Oceanographic Data Center, Silver Spring, 180/02, DVD-ROM

**Further details:** WHP cruise summary information of section P09 (WOCE)

**Project(s):** World Ocean Circulation Experiment (WOCE)

**Coverage:**
- Median Latitude: 25.122751
- Median Longitude: 137.036789
- South-bound Latitude: 13.990700
- West-bound Longitude: 136.954700
- North-bound Longitude: 34.250000
- East-bound Longitude: 137.448200

**Date/Time Start:** 1994-07-08T16:58:00
**Date/Time End:** 1994-07-26T21:28:00

**Minimum DEPTH, water:** 0.00 m
**Maximum DEPTH, water:** 5589.70 m

**Event(s):**

1. **49RY9407_1/1-1**
   - **Latitude:** 34.250000
   - **Longitude:** 137.002300
   - **Date/Time:** 1994-07-08T16:58:00
   - **Elevation:** -150.0 m
   - **Campaign:** 49RY9407_1
   - **Device:** CTD/Rosette (CTD-RO)
   - **Comment:** Section P09

2. **49RY9407_1/10-1**
   - **Latitude:** 32.816500
   - **Longitude:** 137.000300
   - **Date/Time:** 1994-07-10T02:30:00
   - **Elevation:** -3895.0 m
   - **Campaign:** 49RY9407_1
   - **Device:** CTD/Rosette (CTD-RO)
   - **Comment:** Section P09

3. **49RY9407_1/10-2**
   - **Latitude:** 32.808800
   - **Longitude:** 137.077700
   - **Date/Time:** 1994-07-10T04:16:00
   - **Elevation:** -4015.0 m
   - **Campaign:** 49RY9407_1
   - **Section:** P09
DataCite Metadata Schema

- relatively simple schema, maintained by DataCite members
- flexible with regards to resource type
- support for collections
- multiple relation types for related content

Findable, Accessible, Interoperable, and Re-usable = FAIR

http://schema.datacite.org/
https://www.force11.org/group/fairgroup/fairprinciples
Find Resources

Find resources with DOIs and associated information.

- DataCite API
- DataCite Search
- DataCite OAI-PMH

DataCite Search

max planck

2,063 Works

Bo Barker Joergensen, Christian Borowski, Nina Knab, Tina Treude, Jens Greinert, Barry A Cragg, Maksim Gutin, Gabriel Ion, Dan Secrèru, Jurgen Schauer & Karen Hissmann
Article Journal published 2005 via Max Planck Institute for Marine Microbiology
: 1-58

https://doi.org/10.2312/cr_pos317_3

Timothy G Ferdetman
Article Journal published 2016 via Max-Planck-Institut für marine Mikrobiologie
: 1-104

https://doi.org/10.2312/cr_so245
## Data Centers

<table>
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<tr>
<th>Data Center</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIB Hannover</td>
<td>697</td>
</tr>
<tr>
<td>Max Planck Digital Library</td>
<td>674</td>
</tr>
<tr>
<td>World Data Center for Climate</td>
<td>105</td>
</tr>
<tr>
<td>Joint Research Centre's Institute of Energy</td>
<td>79</td>
</tr>
<tr>
<td>ZENODO - Research. Shared.</td>
<td>62</td>
</tr>
<tr>
<td>Max Planck Institute for Human Development</td>
<td>59</td>
</tr>
<tr>
<td>University of Cambridge</td>
<td>32</td>
</tr>
<tr>
<td>PANGAEA - Data Publisher for Earth &amp; Environmental Science</td>
<td>31</td>
</tr>
<tr>
<td>figshare Academic Research System</td>
<td>30</td>
</tr>
<tr>
<td>TIB KMO / FLOWWORKS GmbH</td>
<td>19</td>
</tr>
<tr>
<td>GESIS Leibniz Institute for the Social Sciences</td>
<td>18</td>
</tr>
<tr>
<td>Coherent X-ray Imaging Data Bank</td>
<td>15</td>
</tr>
<tr>
<td>Columbia University Libraries/Information Services (CUL/IS)</td>
<td>15</td>
</tr>
<tr>
<td>Humboldt-Universität zu Berlin Arbeitsgruppe Elektronisches Publizieren am Computer- und Medienservice (CMS)</td>
<td>15</td>
</tr>
<tr>
<td>ResearchGate</td>
<td>15</td>
</tr>
</tbody>
</table>
Use Resources

Access to the content that was registered, and information how it can be used.

- License information in metadata
- Most of the content available without restrictions
- Directly access content via Content Resolver Service

Methane oxidation rates of sediment core MEDECO2-D337-PC-14
Antje Boetius, Janine Felden & Christina Bienhold
Dataset published 2012 via PANGAEA - Data Publisher for Earth & Environmental Science

https://doi.org/10.1594/pangaea.801921  Cite  Add to ORCID record

Download
DataCite XML
RDF-XML
Schema.org JSON-LD
Citeproc JSON

Creative Commons Attribution 3.0 Unported (CC-BY)
Citation Recommendations

1. All datasets intended for citation must have a **globally unique persistent identifier** that can be expressed as unambiguous URL.

2. Persistent identifiers for datasets must support **multiple levels of granularity**, where appropriate.

3. This persistent identifier expressed as URL must **resolve to a landing page** specific for that dataset.

4. The persistent identifier must be embedded in the landing page in **machine-readable format**.

5. The repository must provide **documentation and support** for data citation.

A Data Citation Roadmap for Scholarly Data Repositories (2017): M. Fenner and Mercè Crosas. LIBER Webinar
Cite Resources

1. DataCite Search

Methane oxidation rates of sediment core MEDECO2-D337-PC-14
Antje Boetius, Janine Felden & Christina Bienhold
Dataset published 2012 via PANGAEA - Data Publisher for Earth & Environmental Science

https://doi.org/10.1594/pangaea.801921

Deep-water amphipods from mooring time-series FEVI7 in 800 m depth at AWI HAUSGARTEN

Angelina Kraft, Eduard Bauerfeind, Eva-Maria Nöthig, Michael Klages, Agnieszka Beszczyńska-Möller & Ulrich Bathmann

Dataset published 2013 via PANGAEA - Data Publisher for Earth & Environmental Science

Citation:

Kraft, Angelina; Bauerfeind, Eduard; Nöthig, Eva-Maria; Klages, Michael; Beszczyńska-Möller, Agnieszka; Bathmann, Ulrich (2013): Deep-water amphipods from mooring time-series FEVI7 in 800 m depth at AWI HAUSGARTEN. doi:10.1594/PANGAEA.809438,


Always quote above citation when using data! You can download the citation in several formats below.
Cite Resources – Citation Formatter

DOI Citation Formatter

Paste your DOI:
10.17871/carboscope-sb1_v3.7
For example 10.1145/2783446.2783605

Select Formatting Style:
american-chemical-society

Begin typing (e.g. Chicago or IEEE.) or use the drop down menu.

Select Language and Country:
en-US

Begin typing (e.g. en-GB for English, Great Britain) or use the drop down menu.

Format


Copy to clipboard

Do you want to integrate this service? Check the Documentation

DOI Registration Agencies

DataCite
Crossref
EDRA
DOI

https://citation.crosscite.org/
Connecting scholarly output

Connect resources, which have a DataCite DOI, to other resources - for example:

✓ New versions of the same dataset,
✓ Collections of related datasets,
✓ or articles citing the dataset. …… AND

→ linking these resources to the people and organizations (coming next) who have contributed to their generation.
Seamless Integration across the research life cycle
Relation Types

- IsDerivedFrom
- Handle
- IsNewVersionOf
- DOI
- IsDocumentedBy
- arXiv
- IsCitedBy
- CrossRef DOI
- IsSupplementedBy
- URL

DataCite
FIND, ACCESS, AND REUSE DATA
Related Resources

Climatological observations from ship logbooks between 1750 and 1854 (release 2.1)

Phil D Jones, Dennis A Wheeler, Gunther P Können, Frits B Koek, Maria del Rosario Prieto & Ricardo García-Herrera

Collection of datasets published 2007 via PANGAEA - Data Publisher for Earth & Environmental Science

The Climatological Database for the World’s Oceans: 1750–1854 (CLIOWOC) project, which concluded in 2004, abstracted more than 280,000 daily weather observations from ships’ logbooks from British, Dutch, French, and Spanish naval vessels engaged in imperial business in the eighteenth and nineteenth centuries. These data, now compiled into a database, provide valuable information for the reconstruction of oceanic wind field patterns for this key period that precedes the time in which anthropogenic influences on climate became...

DataCite (RelatedIdentifier) 4.774

http://doi.org/10.1594/PANGAEA.611088  Cite  Add to ORCID record

Meteorological observations during JASON cruise from St. Eustacius to Hellevoetsluis started at 1780-07-07

Ricardo García-Herrera, Gunther P Können, Dennis A Wheeler, Maria del Rosario Prieto, Phil D Jones & Frits B Koek

Work published 2010 via PANGAEA - Data Publisher for Earth & Environmental Science

Is part of http://doi.org/10.1594/PANGAEA.611088  DataCite (RelatedIdentifier)

http://doi.org/10.1594/PANGAEA.749881  Cite

Sources

Relation Types

 Meteorological observations during PRINCIPE cruise from La Coruña to La Habana started at 1778-06-06

Ricardo García-Herrera, Gunther P Können, Dennis A Wheeler, Maria del Rosario Prieto, Phil D Jones & Frits B Koek

Work published 2010 via PANGAEA - Data Publisher for Earth & Environmental Science

3 article reference lists
Scholerly Link Exchange (Scholix)

- RDA/WDS Scholix Working Group 2016
- Group aims to enable a comprehensive global view of the links between scholarly literature and data, and doing this by establishing:
  1. An interoperability framework with guidelines and standards
  2. Enabling infrastructure
  3. Outreach and support for communities of practice
- Guidelines finalized by the end of 2017
Minimal Information – Heavy Use of PIDs and their Metadata

- Standardized information exchange will potentially include all data centers and publishers

<table>
<thead>
<tr>
<th>Link Information Package</th>
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<td>Link Publication Date (1)</td>
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<td>Link Provider (1..N)</td>
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<td>License URL (0..1)</td>
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<table>
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<th>Target Object</th>
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<td><strong>Object Type (1)</strong></td>
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<td>Object Creator (0..N)</td>
</tr>
<tr>
<td>Object Publication Date (0..1)</td>
<td>Object Publication Date (0..1)</td>
</tr>
</tbody>
</table>

- The initial group of Scholix hubs includes:
  1. Crossref, working with publishers
  2. DataCite, working with data centers
  3. OpenAIRE, working with institutional repositories

http://www.scholix.org/
Linking Data and Articles
Research - Conceptual Model

- **Linkage as Triples.** In the form *subject-predicate-object*, consistent with the Resource Description Framework (RDF) data model.

- **Describing the relation.** Additional information such as relation type (e.g. *A is new version of B*) and provenance.

- **Persistent Identifiers as HTTP URIs.** This makes them actionable, and compatible with the RDF data model.

- **Centralized infrastructure for persistent identifier linking.** Provided for example by ORCID and DataCite, facilitating discovery.
### Statistics of provided Links

<table>
<thead>
<tr>
<th>Content provider</th>
<th>Contributed links</th>
<th>Referred objects</th>
<th>Referred publications</th>
<th>Referred datasets</th>
<th>Referred objects of unknown typology</th>
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<tbody>
<tr>
<td>OpenAIRE</td>
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<td>238244</td>
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<td>217454</td>
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<td>906001</td>
<td>634785</td>
<td>638885</td>
<td>2482</td>
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<tr>
<td>STU.Datacentrum</td>
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<td>0</td>
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<td>1474</td>
<td>921</td>
<td>603</td>
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<td>Thomson Reuters</td>
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</table>
Track Re-Use

Data Citations

Started
  - DOI resolutions
  - Repository usage stats

Planned
  - Wikipedia
  - Twitter

→ Forward Data Citations to Data Centers via:
  - DataCite Search
  - Notifications
Data Level Metrics (DLM)

- Collects events found via the relatedIdentifier and nameIdentifier attributes of DataCite Metadata
Making Data Count: Promoting a New Normal

….will develop and deploy the social and technical infrastructure necessary to elevate data to a first-class research output.

1. Develop and publish a COUNTER code of practice recommendations for how data usage is measured

2. **Deploy central online hub** for acquiring, managing and presenting DLMs

3. **Integrate new sources and clients of aggregated metrics**

<table>
<thead>
<tr>
<th>Data Usage Stats</th>
<th>Data Citations</th>
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<tbody>
<tr>
<td>DataONE Federation</td>
<td>PubMed Central</td>
</tr>
<tr>
<td>DOI resolver logs via DataCite</td>
<td>Crossref</td>
</tr>
<tr>
<td>Institutional repository (Re3data)</td>
<td>Europe PMC</td>
</tr>
</tbody>
</table>

4. **Encourage growth and uptake of DLMs through an engaged stakeholder community**
Project Details

Project: **Making Data Count: Promoting a New Normal**

ALFRED P. SLOAN FOUNDATION

Funding: **750 K for 2 years** (June 2017 – June 2019)

Partners: CDL, DataCite and DataONE

- Collaborate with other data metrics initiatives: Crossref Event Data, JISC IRUS UK, NISO Altmetrics working group, RDA/WDS Scholix, etc.

- Start: RDA BoF with relevant stakeholders
Software Repositories

**Matdcal**
Kirk Bevan
Simulation Tool published 2015 via nanoHUB
Non-equilibrium Green's Function Density Functional Theory Simulator

https://doi.org/10.4231/D3JH3D36M  Cite

By Kirk Bevan
*McGill University*

Non-equilibrium Green's Function Density Functional Theory Simulator

Launch Tool
Version 3.0 - published on 09 Jan 2015
doi:10.4231/D3JH3D36M cite this

Citations
Non-affiliated (1)  |  Affiliated (0)

Non-affiliated authors

Yap Siong (2011), "Molecular Electronics As A Future Electronic Device": pg. -.

BibTex  EndNote

Share:  

Page 33
User Details

World usage
Location of all "Matdcal" Users Since Its Posting

Simulation Users
380
Apr 2017

Users By Organization Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Users</th>
<th>Percentage</th>
</tr>
</thead>
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<td>270</td>
<td>71.05%</td>
</tr>
<tr>
<td>Unidentified</td>
<td>81</td>
<td>21.32%</td>
</tr>
<tr>
<td>Industry</td>
<td>13</td>
<td>3.42%</td>
</tr>
</tbody>
</table>

Users by Country of Residence

<table>
<thead>
<tr>
<th>Country</th>
<th>Users</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITED STATES</td>
<td>68</td>
<td>34%</td>
</tr>
<tr>
<td>INDIA</td>
<td>50</td>
<td>25%</td>
</tr>
<tr>
<td>CHINA</td>
<td>22</td>
<td>11%</td>
</tr>
<tr>
<td>GERMANY</td>
<td>12</td>
<td>6%</td>
</tr>
</tbody>
</table>
ORCID in a Nutshell

• ORCID provides a persistent digital identifier

• Distinguishes you from every other researcher

• Integrates in key research workflows such as manuscript and grant submission,

• Supports automated linkages between you and your professional activities ensuring that your work is recognized.
ORCID Profile Service

- DataCite – CrossRef – ORCID Collaboration
- Automatic ORCID Profil Update if ORCID is submitted with DOI metadata (ORCID push)

Supplementary Data for: "Core-Collapse Supernovae from 9 to 120 Solar Masses Based on Neutrino-powered Explosions"
Tuguldur Sukhbold, Thomas Ertl, Stan Woosley, Justin M. Brown & Hans-Thomas Janka
Work published 2016 via Max Planck Institute for Astrophysics, 85748 Garching, Germany

https://doi.org/10.17617/1.b  Cite  Add to ORCID record

Research Data Publications with ORCID

Digital CV (e.g. institutional CRIS, ORCID ...)

Paper / Journal

Institut

Data Repository

DOI

Portal
To Dos

1. Register **ORCID iD**

2. Ask your library to provide you with **DOIs** for your research output

3. **Find a repository** with DOI registration services

4. Write a Data Management Plan for your next research project

5. Activate the automatic push of your DOI publications in DataCite Search
# DataCite Services

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THANK YOU!

Further information:
www.tib.eu
www.datacite.org

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