

Data journals: building partnerships between publishers and data centres

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NERC Data Citation and Publication Project Team

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Tuesday 7 May 2013

Cedar Court Grand Hotel & Spa, York

Who are we and why do we care about data?

The UK's Natural Environment Research Council (NERC) funds six data centres which between them have responsibility for the long-term management of NERC's environmental data holdings.

We deal with a variety of environmental measurements, along with the results of model simulations in:

- Atmospheric science
- Earth sciences
- Earth observation
- Marine Science
- Polar Science
- Terrestrial & freshwater science, Hydrology and Bioinformatics



Even the Chancellor says data's important!

“The next generation of scientific discovery will be data-driven discovery.....”

“We need to make sure we capture value from this mass of data – both for economic growth and for social advances, such as better health.”

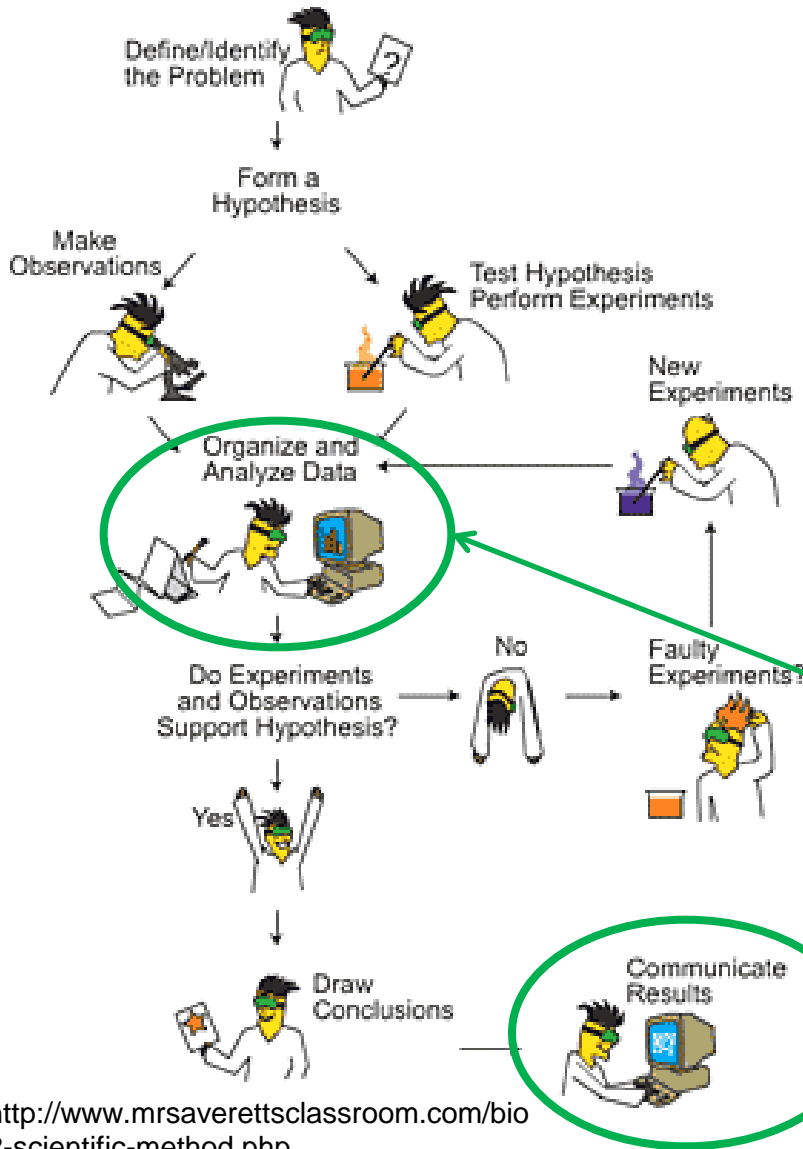
“This requires a transformation in data management”



Speech by the Chancellor of the Exchequer,
Rt Hon George Osborne MP, to the Royal
Society – 9 Nov 2012

Thanks to Jonathan Tedds (University of Leicester)

The Scientific Method



A key part of the scientific method is that it should be reproducible – other people doing the same experiments in the same way should get the same results.

Unfortunately observational data is not reproducible (unless you have a time machine!)

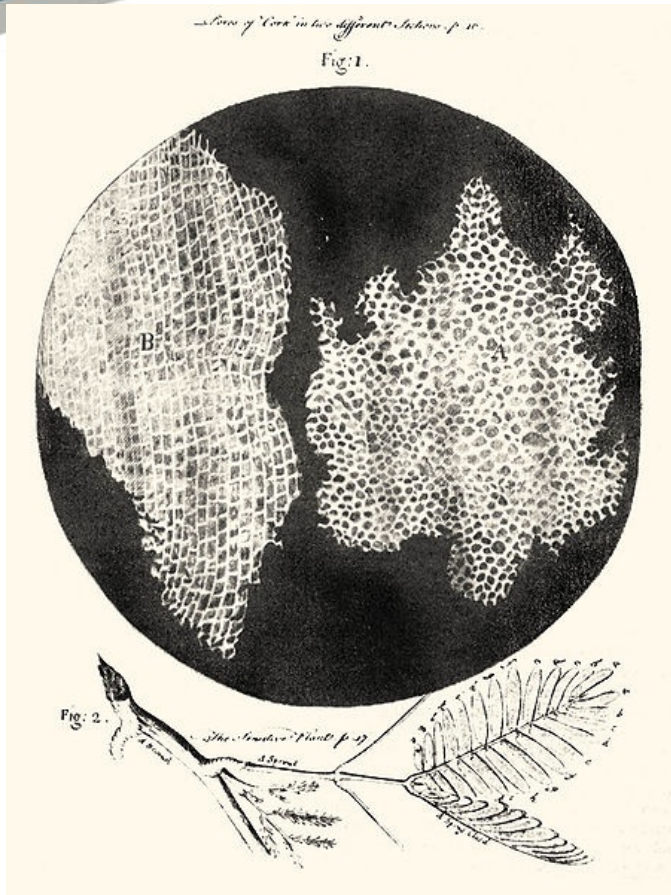
The way data is organised and archived is crucial to the reproducibility of science and our ability to test conclusions.

This is often the only part of the process that anyone other than the originating scientist sees.

We want to change this.

<http://www.mrsaverettsclassroom.com/bio/2-scientific-method.php>

Journals have always published data...



Suber cells and mimosa leaves. Robert Hooke, Micrographia, 1665

[Observations of Stars in the Spiral Nebula. H. 1622.

The spiral form of this nebula is very distinctly seen in the Pulkova refractor. Unfortunately in the month of March, the best season for the observation of this object, the sky was constantly cloudy; so that I could only get three nights' observations in the months of April and May, when the twilight did not cease for the whole night. It must be attributed to this unfavourable circumstance that the following list of determinations is not so complete as it probably would have been without the twilight. The observations have been made alternately with powers of 188 and 207.

Observations.

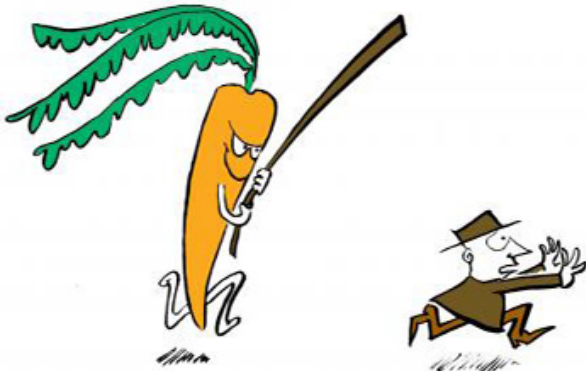
Date.	Object.	Magnitude.	Ang. Pos.	No. of measures.	Distance.	No. of measure.
1851, April 7.	N n	14 55	5	267-1	4
	N a	a = (11)	229 24	3	88-0	3
	N b	b = (11.12)	109 12	3	242-6	3
	a b	93 42	3	298-6	3
April 28.	a b	94 23	3	300-8	4
	N a	.....	228 36	4	
	N b	.....	108 54	4	
	n a	.....	283 42	3	
	n b	.....	153 30	3	
	a d	d = (12.13)	323 51	3		
	N d	.....	277 27	3	
	a e	e = (13)	112 13	3		
	N e	.....	161 56	3	
	N f	f = (12.13)	309 18	3		
	n f	.....	237 31	3	
a f	.....	335 23	3		
a g	g = (12.13)	215 17	3	115-5	4	
a h	h = (12.13)	193 29	3			
May 3.	g h	.....	87 5	3	
	N k	k = (13.14)	51 47	3		
	n k	.....	173 29	4	
	b k	.....	317 23	3	
	b l	.....	27 20	4	
	n l	l = (11.12)	83 17	4	335-2	4
	a e	.....	112 56	4	
	N e	.....	161 39	3	
	a m	m = (12.13)	172 43	5		
	N m	.....	190 44	4	
b m	.....	238 50	4		
N a	.....	229 12	4	87-0	3
N n	.....	14 47	4	264-2	3

The Scientific Papers of William Parsons, Third Earl of Rosse 1800-1867

...but datasets have gotten so big, it's not useful to publish them in hard copy anymore

Reasons for citing and publishing data

- **Pressure** from (UK) **government** to make data from publicly funded research available for free.
 - **Scientists** want attribution and **credit** for their work
 - **Public** want to know what the scientists are doing
 - Good for the **economy** if new industries can be built on scientific data/research
- Research **fund**ers want reassurance that they're getting **value for money**
 - Relies on peer-review of science publications (well established) and data (starting to be done!)
- Allows the wider **research community** and **industry** to **find and use** datasets, and understand the **quality** of the data
- Extra **incentive** for scientists to submit their data to data centres in appropriate formats and with full metadata



<http://www.evidencebased-management.com/blog/2011/11/04/new-evidence-on-big-bonuses/>

What it all comes down to:



Composite image from Flickr user [bnilsen](#) and Matt Stempeck (NOI), shared under [Creative Commons license](#)

Encourage and provide credit to researchers and institutions for managing and disseminating their data properly.

Making data available is good for science and good for everyone - including UK PLC!

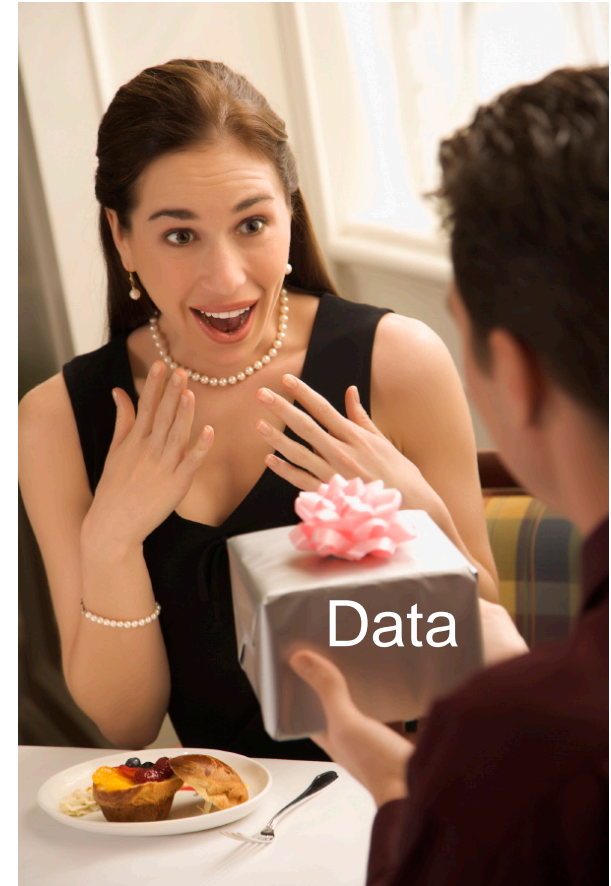
Why not just share the data?

Benefits of sharing:

- Ability to discover and reuse data which has already been collected
- Avoid redundant data collection
- Save time and money
- Provide opportunities for collaboration.

Research funders are keen to encourage data sharing.

For the most part, scientists are happy to share other scientists' data, but...



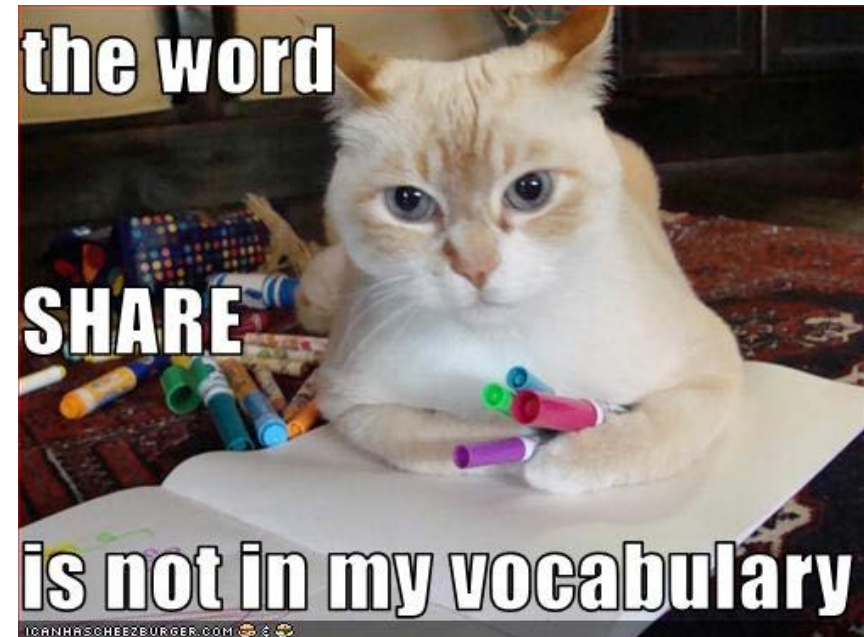
Knowledge is power!

Data may mean the difference between getting a grant and not.

There is (currently) no universally accepted mechanism for data creators to obtain academic credit for their dataset creation efforts.

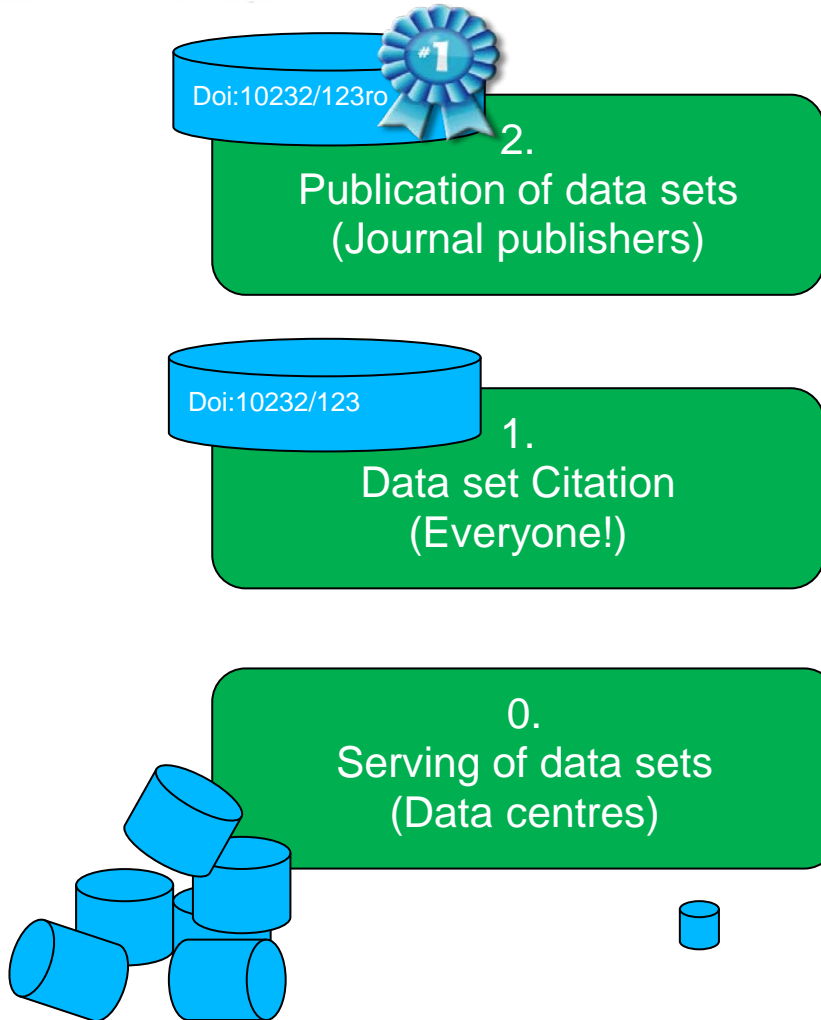
Creators (understandably) prefer to hold the data until they have extracted all the possible publication value they can.

This behaviour comes at a cost for the wider scientific community.



Reframing “sharing” as “publication” might encourage scientists to be more open with their data.

Serving, citing and publishing data



This involves the peer-review of data sets, and gives “stamp of approval” associated with traditional journal publications. Can’t be done without effective **linking/citing** of the data sets.

Citation needs **permanent and unambiguous global identifiers**. Citing something means that you want to get the same thing back when you de-reference the citation - which is why we’re using DOIs

This is what data centres do as our day job – take in data supplied by scientists and make it available to other interested parties. We have many ways to **locate and identify** the data in our archive. Note that the data can and does change!

How to publish data

- Stick it up on a webpage somewhere
 - Issues with stability, persistence, discoverability...
 - Maintenance of the website
- Put it in the cloud
 - Issues with stability, persistence, discoverability...
- Attach it to a journal paper and store it as supplementary materials
 - Journals not too keen on archiving lots of supplementary data, especially if it's large volume.
- Put it in a disciplinary/institutional repository
- Write a data article about it and publish it in a data journal



By David Fletcher
<http://www.cloudtweaks.com/2011/05/the-lighter-side-of-the-cloud-data-transfer/>

“Publishing” versus “publishing” and “Open” versus “Closed”

Distinction between:

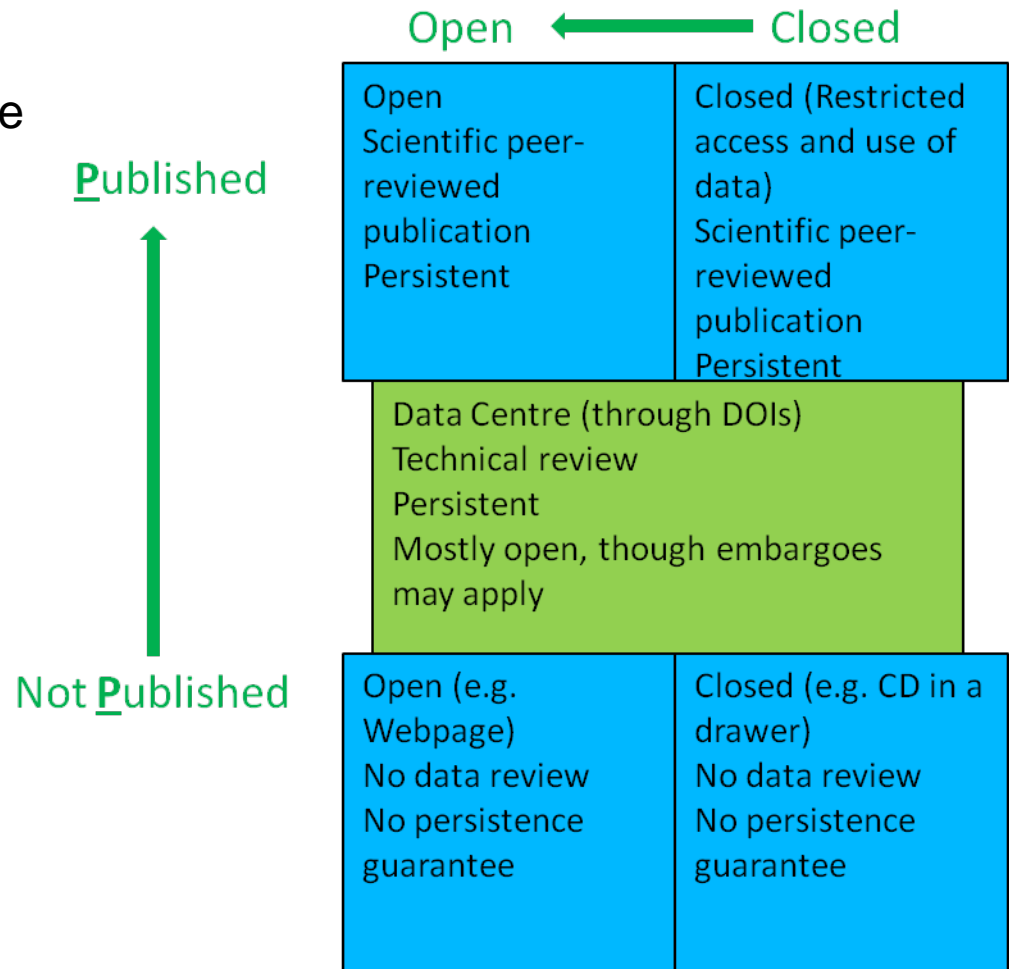
Publishing = publishing after some formal process which adds value for the consumer:

- e.g. PloS ONE type review, or
- EGU journal type public review, or
- More traditional peer review.

and

- provides commitment to persistence

And publishing/serving = making available for consumption (e.g. on the web)



We want to:

Encourage scientists to move away from storing their data on CDs in their locked filing cabinets...

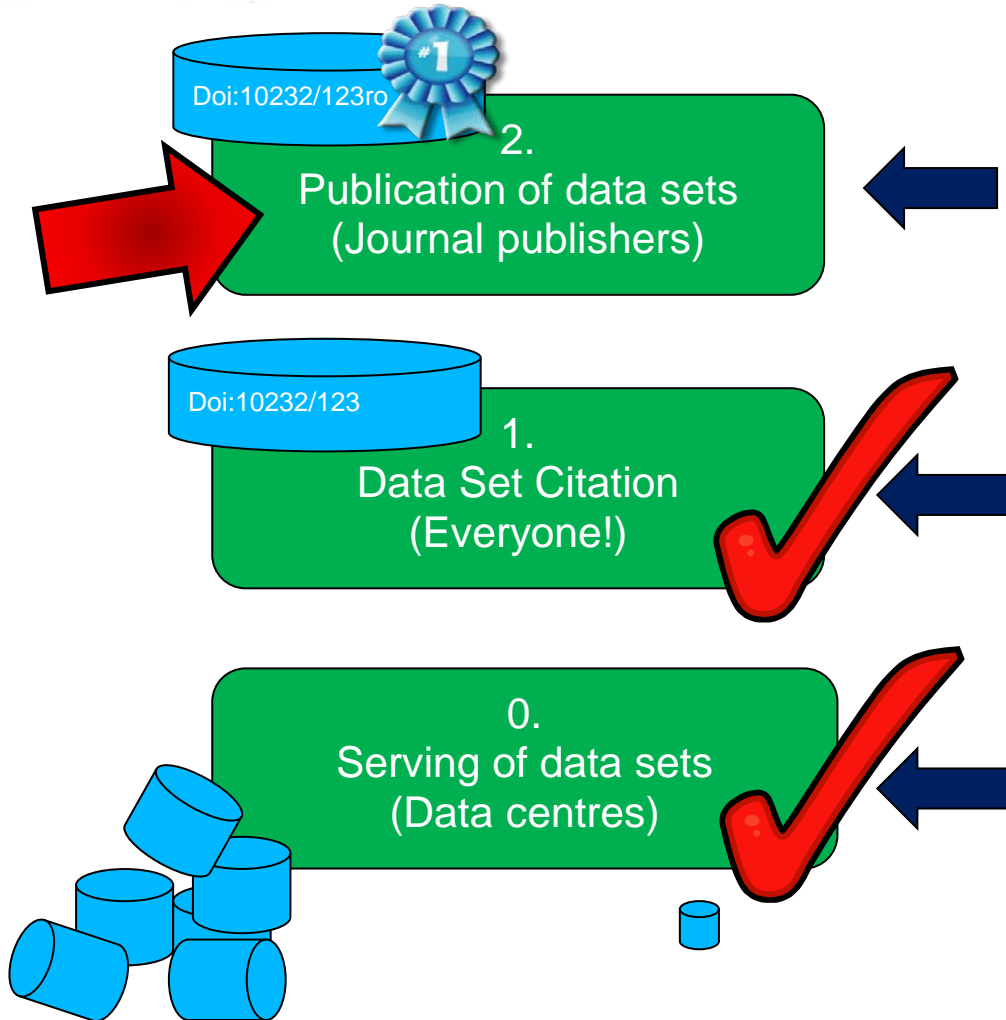
....or on hard disks with no backups....

And get them to put their data in a place where it'll be archived and looked after for the future properly...

...where it can be shared/made available/published for the benefit of other researchers/general public/policy makers



Partnering with journal publishers to publish data



The **scientific quality** of a dataset has to be evaluated by **peer-review** by scientists with domain knowledge. This peer-review process has already been set up by academic publishers, so it makes sense to collaborate with them for peer-review publishing of data.

Can cite using URLs, but we've realised that people don't trust URLs. We're loading DOIs with more meaning than them simply being a persistent identifier – using them to signify **completeness** and **technical quality** of the dataset.

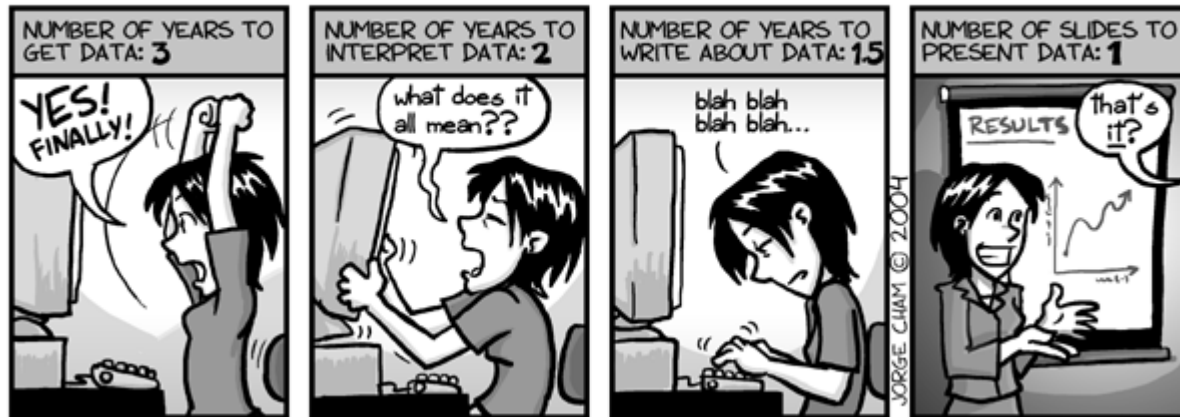
The **day job** – take in data and metadata supplied by scientists (often on an ongoing basis). Make sure that there is adequate metadata and that the data files are appropriate format. Make it available to other interested parties.

Data journals and scientific publication of data

- Now we can cite our datasets using DOIs, we can give academic credit to those scientists who get cited – making them more likely to give us good quality data to archive.
- Publication – and scientific peer-review – is the next step
- We are working with the Royal Meteorological Society and Wiley-Blackwell to operate a new data journal, the Geoscience Data Journal
- GDJ is an online-only, Open Access journal, publishing short data papers cross-linked to – and citing – datasets that have been deposited in approved data centres and awarded DOIs.

Other data journals already exist – see a list (in no particular order) at:
<http://proj.badc.rl.ac.uk/prepared/blog/DataJournalsList>

DATA: BY THE NUMBERS



www.phdcomics.com

Geoscience Data Journal, Wiley-Blackwell and the Royal Meteorological Society

- Partnership formed between **Royal Meteorological Society** and academic publishers **Wiley Blackwell** to develop a mechanism for the formal publication of data in the **Open Access Geoscience Data Journal**
- GDJ publishes short data articles **cross-linked** to, and **citing**, datasets that have been deposited in **approved** data centres and awarded DOIs (or other permanent identifier).



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Welcome to *Scientific Data*

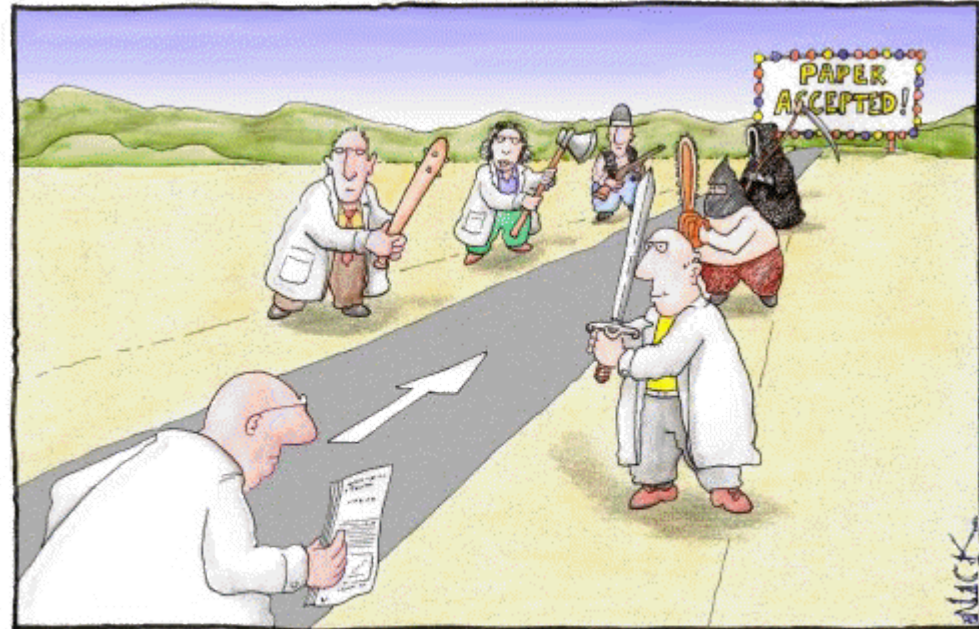
Scientific Data is a new open-access, online-only publication for descriptions of scientifically valuable datasets. It introduces a new type of content called the Data Descriptor, which will combine traditional narrative content with curated, structured descriptions of research data, including detailed methods and technical analyses supporting data quality. *Scientific Data* will initially focus on the life, biomedical and environmental science communities, but will be open to content from a wide range of scientific disciplines. Publications will be complementary to both traditional research journals and data repositories, and will be designed to foster data sharing and reuse, and ultimately to accelerate scientific discovery.

Scientific Data will launch in Spring 2014 and be open for submissions in Autumn 2013. Sign up for our [e-mail alerts](#) or follow us to stay informed.

Scientific Data is a new open-access, online-only publication for descriptions of scientifically valuable datasets. It introduces a new type of content called the Data Descriptor, which will combine traditional narrative content with curated, structured descriptions of research data, including detailed methods and technical analyses supporting data quality.

Publishing data for the scholarly record

- Scientific journal publication mainly focuses on the **analysis, interpretation and conclusions** drawn from a given dataset.
- Examining the raw data that forms the dataset is more difficult, as datasets are usually stored in digital media, in a variety of (proprietary or non-standard) formats.
- **Peer-review** is generally only applied to the methodology and final conclusions of a piece of work, and **not the underlying data** itself. But if the conclusions are to stand, the **data must be of good quality**.
- A process of **data publication**, involving peer-review of datasets would be of benefit to many sectors of the academic community.

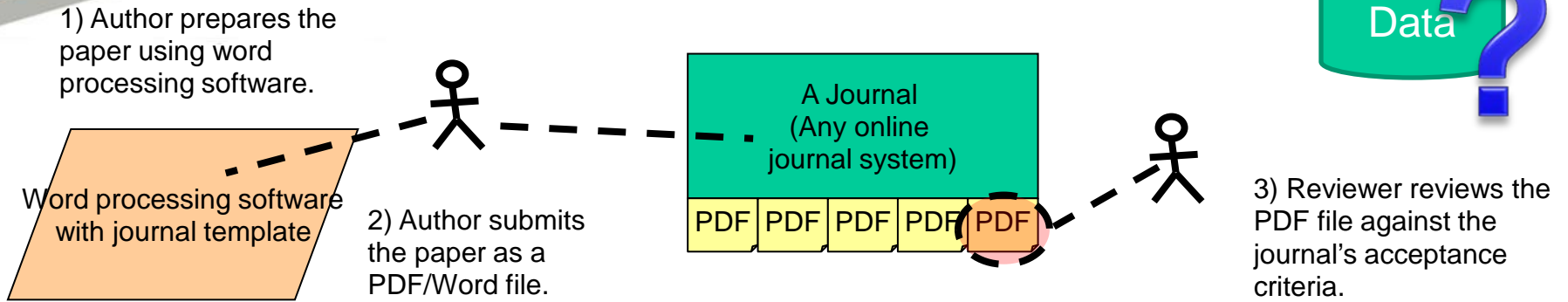


Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

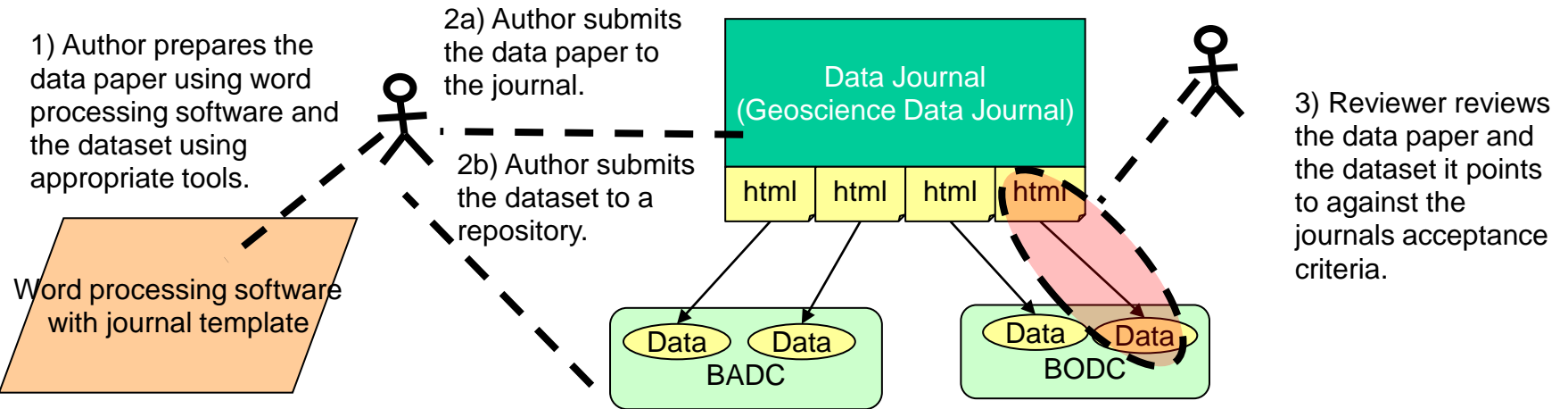
<http://libguides.luc.edu/content.php?pid=5464&sid=164619>



The traditional online journal model



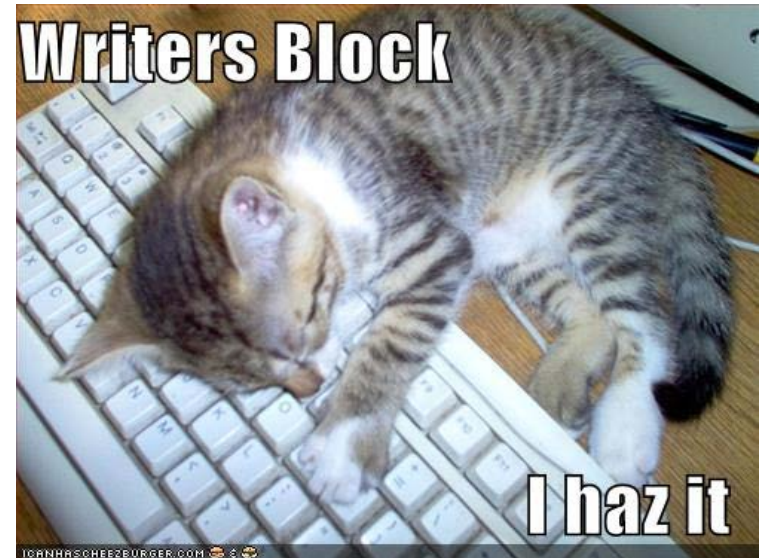
Overlay journal model for publishing data



What is a data article?

A **data article** describes a **dataset**, giving details of its collection, processing, software, file formats, etc., without the requirement of novel analyses or ground breaking conclusions.

- the **when, how and why** data was collected and what the data-product is.



PREPARDE: Peer REview for Publication & Accreditation of Research Data in the Earth sciences

Funded by JISC

Lead Institution: University of Leicester

Partners

- British Atmospheric Data Centre (BADC)
- US National Centre for Atmospheric Research (NCAR)
- California Digital Library (CDL)
- Digital Curation Centre (DCC)
- University of Reading
- Wiley-Blackwell
- Faculty of 1000 Ltd

Project Lead: Dr Jonathan Tedds (University of Leicester, jat26@le.ac.uk)

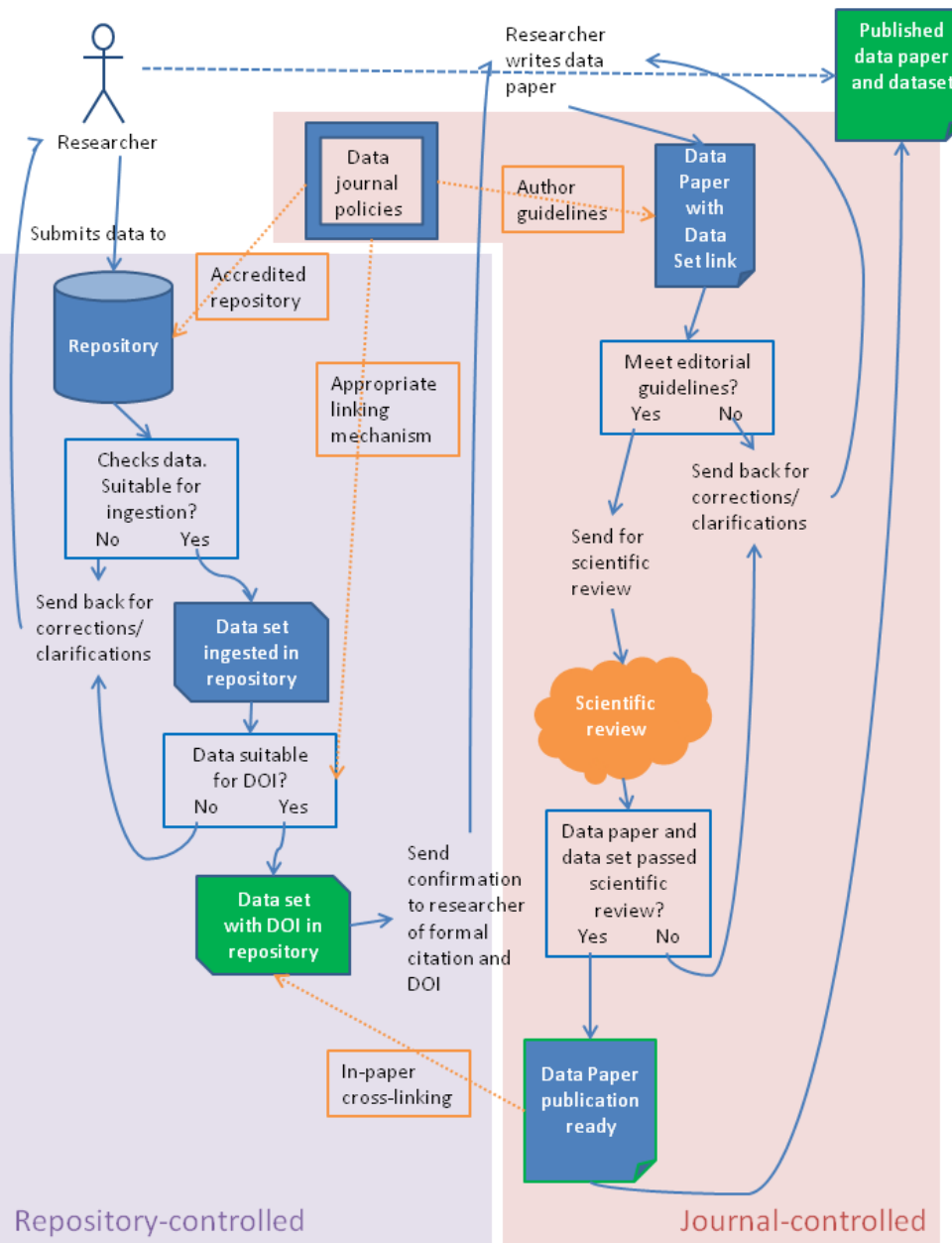
Project Manager: Dr Sarah Callaghan (BADC, sarah.callaghan@stfc.ac.uk)

Length of Project: 12 months

Project Start Date: 1st July 2012

Project End Date: 31st June 2013





PREPARDE topics

Example steps/workflow required for a researcher to publish a data paper

3 main areas of interest (in orange)

1. Workflows and cross-linking between journal and repository
 2. Repository accreditation
<http://bit.ly/ZhYHZI>
 3. Scientific peer-review of data
<http://bit.ly/DataPRforComment>
- Division of area of responsibilities between
 - *repository controlled* processes
 - *journal controlled* processes

The GBS dataset: measure x

onlinelibrary.wiley.com/doi/10.1002/gdj3.2/full

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RMetS Geoscience Data Journal

Open Access

Data Paper

The GBS dataset: measurements of satellite site diversity at 20.7 GHz in the UK

S. A. Callaghan¹, J. Waight, J. L. Agnew, C. J. Walden, C. L. Wrench, S. Ventouras

Issue

Article first published online: 17 MAR 2013
DOI: 10.1002/gdj3.2

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The research presented in this paper was funded by the UK's Ofcom as part of the Spectrum Efficiency Scheme and the support of Ofcom in providing the funding for the GBS experiment is greatly appreciated.

Abstract Article References Cited By

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Keywords:
site diversity; radio propagation; fade mitigation techniques

Abstract

The GBS (Global Broadcast Service) dataset is a series of radio attenuation measurements made at three sites in the UK: Chilbolton and Sparsholt, both in southern UK, and Dundee in Scotland. The aim of the experiment was to make long term measurements of the signal strength received from a 20.7 GHz beacon on the US Department of Defense satellite UFO-9 at multiple sites, in order to determine whether the use of site diversity as a fade mitigation technique would be effective. The dataset spans a period of 3 years, from August 2003 to August 2006 with signal attenuation sampled once per second.

Dataset

The GBS (Global Broadcast Service) dataset comes as 3 separate data streams:

- Identifier: doi:10.5285/639A3714-BC74-46A6-9026-64931F355E07
Creator: Science and Technology Facilities Council (STFC), Chilbolton Facility for Atmospheric and Radio Research, [Callaghan, S. A., J. Waight, C. J. Walden, J. Agnew and S. Ventouras].
Title: GBS 20.7 GHz slant path radio propagation measurements, Chilbolton site
publisher: NERC British Atmospheric Data Centre
Publication year: 2009
Resource type: Metadata document
Version: 1.0
- Identifier: doi:10.5285/db8d8981-1a51-4d6e-81c0-cced9b921390
Creator: Science and Technology Facilities Council (STFC), Chilbolton Facility for Atmospheric and Radio Research, [Callaghan, S. A., J. Waight, C. J. Walden, J. Agnew and S. Ventouras].

Live Data Paper in Geoscience Data Journal!

Dataset citation is first thing in the paper (after abstract) and is also included in reference list (to take advantage of citation count systems)

DOI: 10.1002/gdj3.2

Viewing GBS 20.7GHz slant x

badc.nerc.ac.uk/view/badc.nerc.ac.uk_ATOM_dep_11902119479621181

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Centre for Environmental Data Archival
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GBS 20.7GHz slant path radio propagation measurements, Chilbolton site

General Info

Title: GBS 20.7GHz slant path radio propagation measurements, Chilbolton site
Type: Activity
Sub-Type: Deployment
Publication State: Citable
URI: http://badc.nerc.ac.uk/view/badc.nerc.ac.uk_ATOM_dep_11902119479621181

Summary

The GBS (Global Broadcast Service) dataset is a series of radio attenuation measurements made at three sites in the UK: Chilbolton and Sparsholt, both in southern UK, and Dundee in Scotland. The aim of the experiment was to make long term measurements of the signal strength received from a 20.7GHz beacon on the US Department of Defense satellite UFO-9 at multiple sites, in order to determine whether the use of site diversity as a fade mitigation technique would be effective. The dataset spans a period of 3 years, from August 2003 to August 2006 with signal attenuation sampled once per second.

Please cite this dataset as:
 Science and Technology Facilities Council (STFC), Chilbolton Facility for Atmospheric and Radio Research, [S. A. Callaghan, J. Waight, C. J. Walden, J. Agnew and S. Ventouras], GBS 20.7GHz slant path radio propagation measurements, Sparsholt site, [Internet]. British Atmospheric Data Centre, 2003-2005. 1st April 2014. doi:10.1002/gdj3.2

This dataset is cited in:
 S. A. Callaghan, J. Waight, J.L.Agnew, C. J. Walden, C.L.Wrench, S. Ventouras "The GBS dataset: measurements of satellite site diversity at 20.7 GHz in the UK", Geoscience Data Journal, 17 March 2013, DOI: 10.1002/gdj3.2

Author

Name email
 Science and Technology Facilities Council (STFC), Chilbolton Facility for Atmospheric and Radio Research, [S. A. Callaghan, J. Waight, C. J. Walden, J. Agnew and S. Ventouras]

Online References

Relation	Title
Apply for access	Apply for to GBS data from Chilbolton
Download	Data directory for GBS data from Chilbolton
Documentation	DOI for dataset:10.5285/620-2714-1374-1636-2006-64021f255e07
Documentation	Data article in Geoscience Data Journal doi:10.1002/gdj3.2

Associated Data

Type	Title
Data Production Tool	Chilbolton: GBS receiver
Activity	Chilbolton Facility for Atmospheric and Radio Research (CFARR)
Observation Station	Chilbolton Facility for Atmospheric and Radio Research (CFARR), UK

Dataset catalogue page (and DOI landing page)

Reference to Data Article

Clickable link to Data Article

Working with Elsevier for publication to data linking

Data journals are a special case of journal publisher/data centre interactions.

There is still the need to link to data (held in repositories) from journal papers that mention/cite that data.

We're working with Elsevier to do just that.

Elsevier have updated their Guide for Authors text

How data and articles are linked

There are several ways in which we support interlinking of articles and data:

- **Referencing data in your article through tagging identifiers or accession numbers:** If your article contains relevant unique identifiers or accession numbers linking to information on genes, proteins, diseases, etc. or structures deposited in public databases, and you would like your article to link to that data, please identify these entities in the following way:

database abbreviation: data identifier

For example, "*PDB: 1TUP*" to identify the protein with accession number "*1TUP*" in the Protein Data Bank (PDB). Please bear in mind that an error in a letter or number will result in a dead link in the article. Database abbreviations and further examples can be found in the listing of [supported databases](#).

- **Data DOI's:** Elsevier supports [Data DOI's](#) as persistent identifiers for scientific data. If you include a data DOI in your article, it will automatically turn into a link to your data on ScienceDirect.
- **Linked data repository banners on ScienceDirect:** Elsevier collaborates with selected data repositories to show banner links next to relevant articles on ScienceDirect. This linking system requires that the data repository maintains accurate records of associations between articles and data sets. What you need to do as an author to support this type of linking depends on the data repository; see links to more information in the [supported databases](#) section.
- **Data visualization and integration applications:** In close collaboration with selected data repositories, Elsevier has developed a number of data-integration and visualization applications that are shown next to the article on ScienceDirect, e.g. the [Protein Viewer](#) (with PDB), the [PANGAEA](#) data visualization tool, and the [Genome Viewer](#) (with NCBI). These applications build further on tagged entities or banner links to visualize data and integrate it into the online reading experience.

From: <http://www.elsevier.com/about/content-innovation/database-linking#about-database-linking>



**British Atmospheric
Data Centre**

NATIONAL CENTRE FOR ATMOSPHERIC SCIENCE
NATURAL ENVIRONMENT RESEARCH COUNCIL



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Earth, Environmental & Oceanographic Data

Data Repository	How articles and data are linked	More information
BGS GeoScenic	Authors should specify BGS GeoScenic numbers, e.g. <i>GeoScenic: P603281</i> .	<ul style="list-style-type: none"> • BGS GeoScenic homepage
EarthChem	EarthChem banners will be shown on ScienceDirect when the repository has data for the article. Data is extracted from the literature by curators.	<ul style="list-style-type: none"> • EarthChem homepage • Example article
Marine Geoscience Data System (MGDS)	MGDS banners will be shown on ScienceDirect when the repository has data for the article.	<ul style="list-style-type: none"> • MGDS homepage • Submitting data • Example article
Natural Environment Research Council (NERC), including BADC, BODC, EIDC, and NGDC.	Authors should include data DOI's in their manuscript.	<ul style="list-style-type: none"> • NERC Data Centres
PANGAEA	Data integration application on ScienceDirect opens automatically for relevant articles.	<ul style="list-style-type: none"> • PANGAEA homepage • Submitting data • PANGAEA application • Example article
System for Earth Sample Registration (SESAR), registry for International Geo Sample Numbers (IGSN)	Authors should specify IGSN numbers, e.g. <i>IGSN: HRV003M16</i> .	<ul style="list-style-type: none"> • SESAR homepage • Registering samples
Woods Hole Open Access Server (WHOAS)	WHOAS banners will be shown on ScienceDirect when the repository has data for the article.	<ul style="list-style-type: none"> • WHOAS homepage • Example article

NERC data centres are listed in Elsevier's list of supported data repositories.

<http://www.elsevier.com/about/content-innovation/database-linking#supported-data-repositories>

Elsevier working with NGDC to link through accession numbers

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Abstract

Highlights

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 - 2.1. Sampling



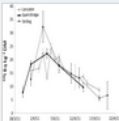
Table 1

2.2. Analyses

- 2.2.1. Centre for ecology & hydrology
- 2.2.2. University of Stirling

3. Results and discussion

3.1. Grass samples



3.2. Other sample types including milk

4. Conclusions

Addendum

Acknowledgements

References

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Journal of Environmental Radioactivity

Volume 114, December 2012, Pages 48–53

Environmental Impacts of the Fukushima Accident (PART II)



Observations of Fukushima fallout in Great Britain

N.A. Beresford^a, C.L. Barnett^a, B.J. Howard^a, D.C. Howard^a, C. Wells^a, A.N. Tyler^b, S. Bradley^b, D. Copplestone^b

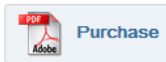
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<http://dx.doi.org/10.1016/j.jenvrad.2011.12.008>, How to Cite or Link Using DOI

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Abstract

Following the Fukushima accident in March 2011, grass samples were collected from 42 sites around Great Britain during April 2011. Iodine-131 was measurable in grass samples across the country with activity concentrations ranging from 10 to 55 Bq kg⁻¹ dry matter. Concentrations were similar to those reported in other European countries. Rainwater and some foodstuffs were also analysed from a limited number of sites. Of these, ¹³¹I was only detectable in sheep's milk (c. 2 Bq kg⁻¹). Caesium-134, which can be attributed to releases from the Fukushima reactors, was detectable in six of the grass samples (4–8 Bq kg⁻¹ dry matter); ¹³⁷Cs was detected in a larger number of grass samples although previous release sources (atmospheric weapons test and the 1986 Chernobyl and 1957 Windscale accidents) are likely to have contributed to this.

Highlights

► Grass samples from across Great Britain were sampled and analysed following releases from the Fukushima accident. ► Iodine-131 was detectable, at low levels, in grass samples from throughout the

Bibliographic information

N.A. Beresford, C.L. Barnett, B.J. Howard, D.C. Howard, C. Wells, A.N. Tyler, S. Bradley, D. Copplestone

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publication:	2011-12-31

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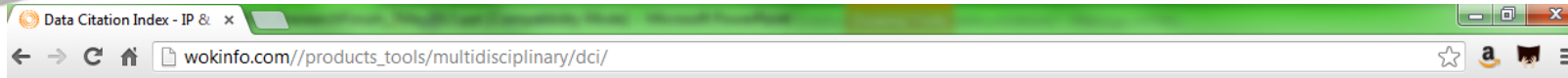
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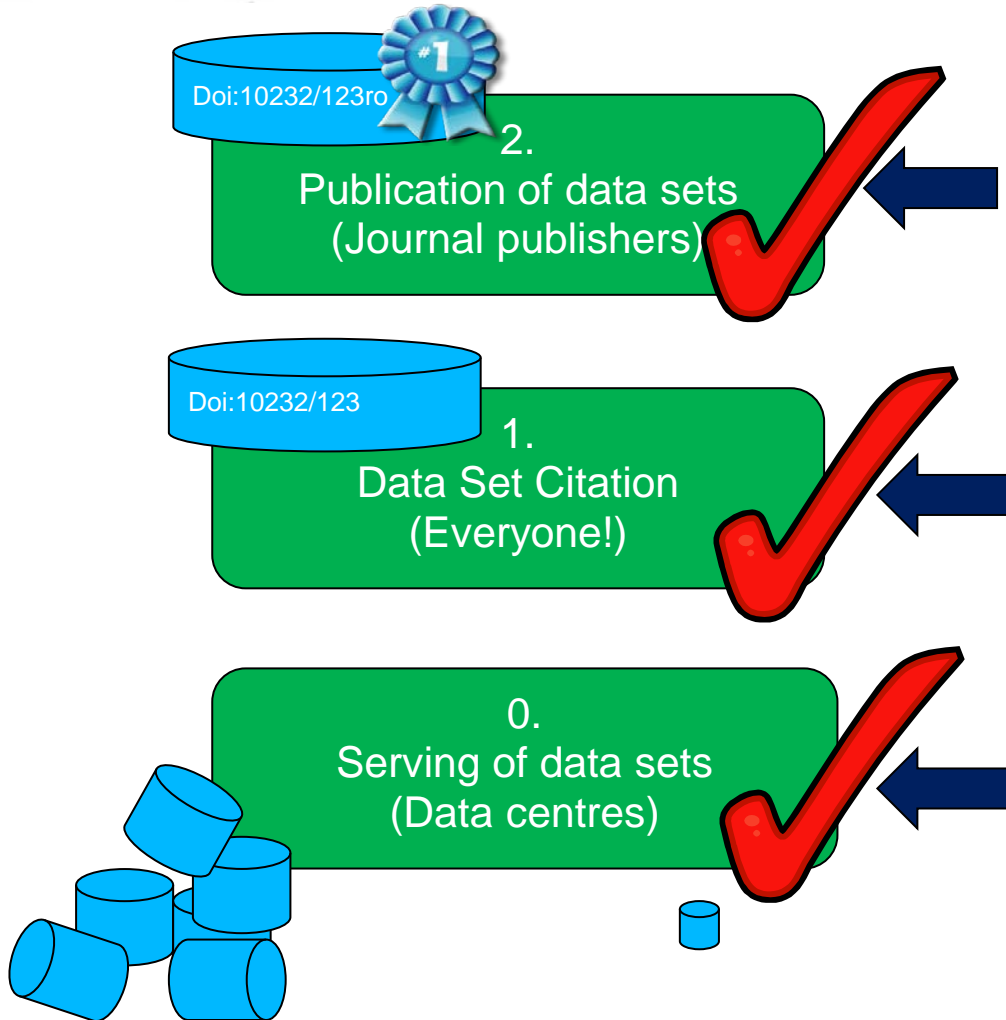
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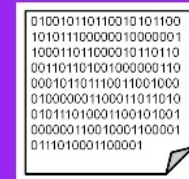


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Can cite using URLs, but we've realised that people don't trust URLs. We're loading DOIs with more meaning than them simply being a persistent identifier – using them to signify completeness and technical quality of the dataset. We're also looking at citation counts as metric for dataset impact.

The day job – take in data and metadata supplied by scientists (often on a on-going basis). Make sure that there is adequate metadata and that the data files are appropriate format. Make it available to other interested parties.

- The NERC data centres now have the ability to mint DOIs and assign them to datasets in their archives. We have also produced:
 - guidelines for the data centre on what is an appropriate dataset to cite
 - guidelines for data providers about data citation and the sort of datasets we will cite
 - text in the NERC grants handbook telling grant applicants about data citation
- We've already had users coming to us requesting DOIs for their datasets.
- We're progressing well with data publication through our partnership with Wiley-Blackwell, and discussions with Elsevier and Thompson-Reuters. NERC held datasets have been published in data journals and cited in papers.
- Still plenty of work to do! Not just mechanical processes (e.g. workflows, guidelines) but also changing the culture so that citing and publishing data is the norm.



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