

Open Access: Maximizing the Impact of Research and Scholarship

Heather Joseph
Executive Director, SPARC
CENDI Meeting
March 5, 2013



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- The Budapest Open Access Initiative – February 14, 2002

Critical Infrastructure: Open Access Journals

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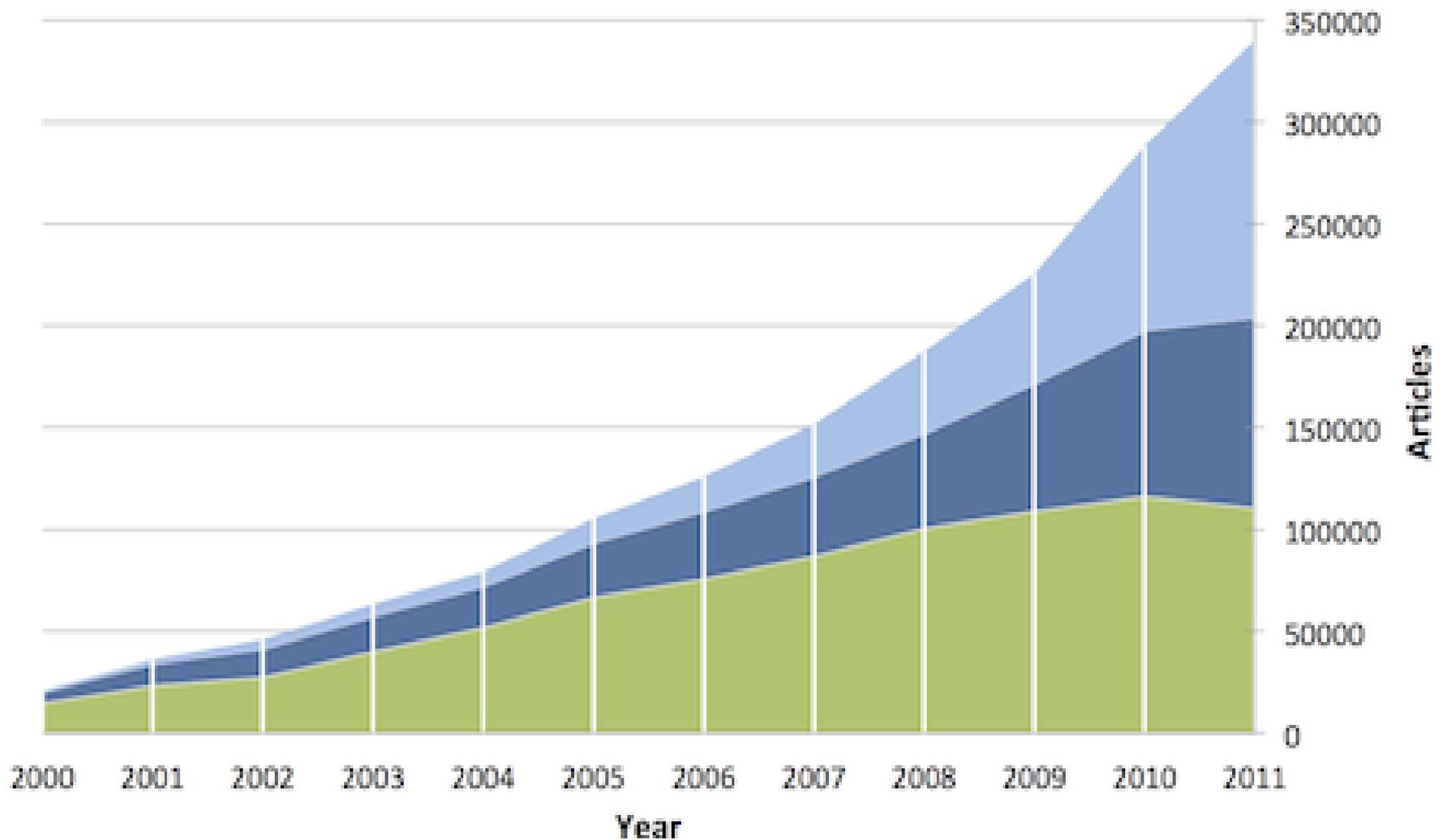


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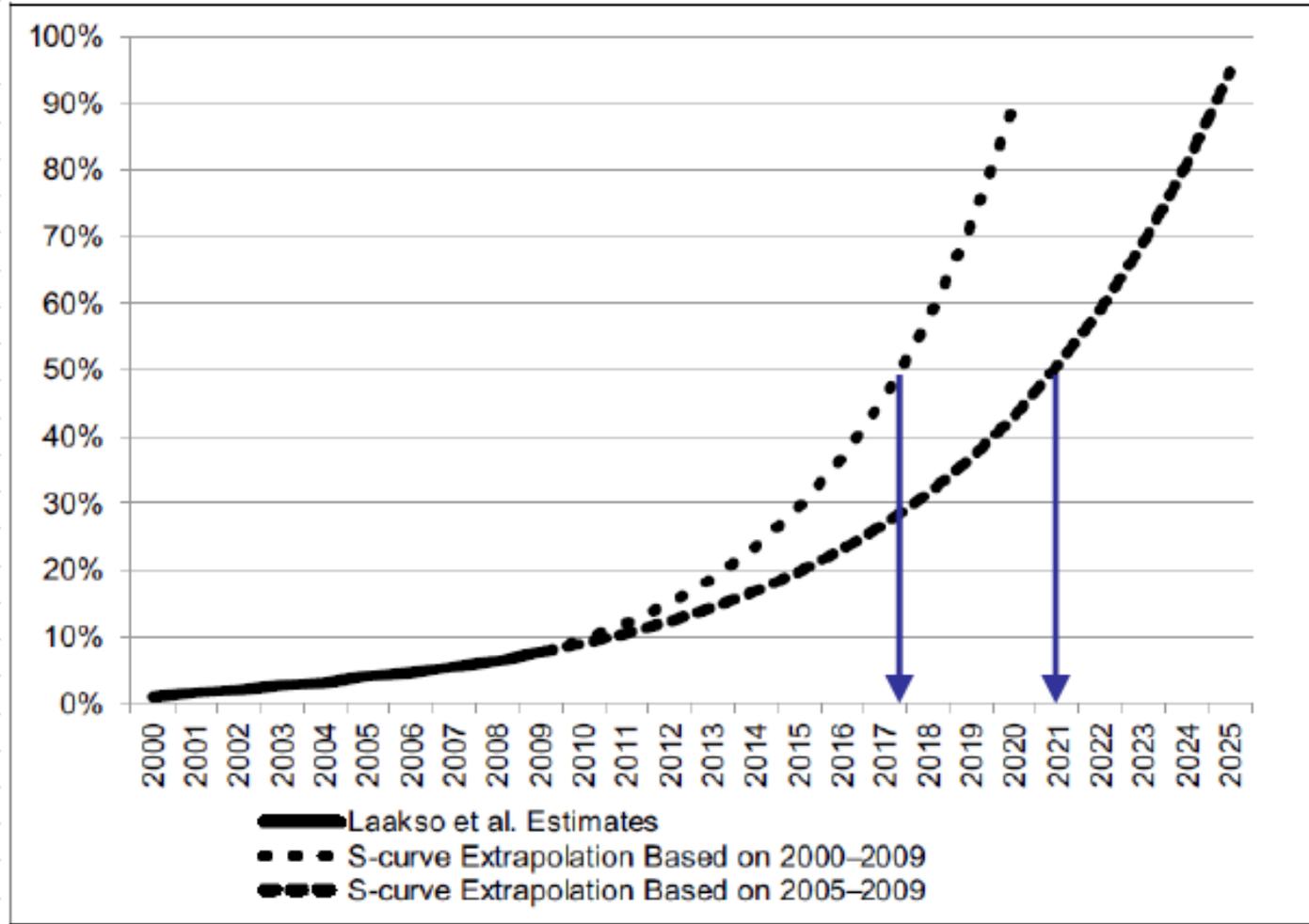
The rapid rise in open access. The graph (from Laasko and Bjork's paper – BMC Medicine 2012, 10:124) shows the numbers of papers published in three different types of online open access journals from 2000 to 2011. Courtesy The Guardian

Predicted 'Disruption Timeframe' of OA vs Subscription model

TABLE 1

Pace of Substitution of Direct Gold OA for Subscription Journals

	Laakso et al. Estimate	Extrapolation Based of 2000–2009	Extrapolation Based of 2005–2009
2000	1.0%		
2001	1.7%		
2002	2.0%		
2003	2.7%		
2004	3.1%		
2005	4.1%		
2006	4.7%		
2007	5.5%		
2008	6.4%		
2009	7.7%		
2010		9.6%	9.0%
2011		12.1%	10.5%
2012		15.1%	12.3%
2013		18.8%	14.4%
2014		23.6%	16.9%
2015		29.4%	19.7%
2016		36.8%	23.1%
2017		46.0%	27.0%
2018		57.5%	31.6%
2019		72.0%	36.9%
2020		89.9%	43.2%
2021			50.7%
2022			59.2%
2023			69.2%



Source: "The Inevitability of Open Access", David Lewis

<http://crl.acrl.org/content/73/5/493.full.pdf+html> (College and Research Libraries, Sep 2012)



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Scientific publishing

Changing Nature

Feb 27th 2013, 22:47 by J.P.

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IN THE world of academic publishing, it is hard to get more traditional than *Nature*. The British scholarly weekly has been reporting scientific breakthroughs since 1869. It hews to the time-honoured, and time-consuming, peer review, in which papers' worth is judged by anonymous experts prior to publication. Fewer than one in ten submissions make the cut. Successful ones are printed on dead trees and dispatched by mail to subscribers, who pay for the privilege of reading about the latest important findings. Their authors win kudos just for getting their paper in.

Contrast this with [Frontiers](#). The Swiss publisher has been posting online papers since 2007. Its peer reviewers, whose names are known, accept 80-90% of submissions, rejecting only those which are fatally flawed. Authors of successful manuscripts pay a publication fee, ranging from \$750 to \$2,600, so that readers can have free access to articles. A paper's merit is gauged after publication, using assorted internet metrics like the number of downloads.

HIGH QUALITY OPEN ACCESS PUBLISHING AND RESEARCH NETWORKING



Nature Publishing Group and Frontiers form alliance to further open science

NPG and Frontiers will work together to empower researchers to change the way science is communicated, through open access publication and open science tools.

Frontiers remains true to its grand vision to build an Open Science platform where everybody has an equal opportunity to seek, share and generate knowledge.

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***Outsell* estimates that Open Access journals generated \$172 million in revenue in 2012 – up 34% from 2011.**

- *The Economist*, 2/28/2013

Financials: Achieving Sustainability and Investing in Open-Access Advancement

PLOS posted an increase in net assets of \$3.95 million in 2011, the second straight year of sustainability. Gross revenue grew 49% to \$24.7 million—the result of publishing nearly twice as many research articles as in 2010—while expenses (inclusive of publication fee assistance) grew by 51% to \$20.8 million, resulting in a modest improvement in our financial performance of net assets over 2010. The key contributor to our growth was *PLOS ONE*, now the largest journal in the world, which had the biggest absolute increase in volume. Our growth and revenues validate open access as a viable and sustainable publishing model, and enable us to invest in our mission by scaling up our infrastructure and removing barriers through increased open access and innovation.

TOTAL EXPENSES PLUS PUBLICATION FEE ASSISTANCE

\$20.8 million

61% PUBLISHING

Editorial and production operations and advocacy, including staff, outsourced vendor expenses, platform maintenance, and improvements.

12% PUBLICATION FEE ASSISTANCE

Waivers provided by PLOS for authors unable to pay all or part of their article publication fees. Assistance also includes discounts for Institutional members.

6% RESEARCH & DEVELOPMENT

Research and development to transform scientific communication, such as encouraging post-publication activity and speeding the dissemination of results after completion of research.

21% GENERAL & ADMINISTRATION

General and administrative operations,

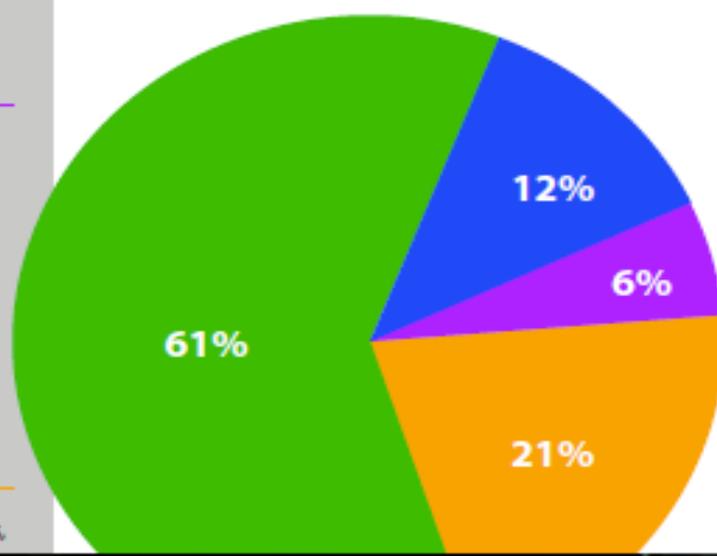
Income Statement (\$000s)

REVENUE AND SUPPORT 2011

Contribution	\$ 378
Publication fee	\$23,469
Membership fee	\$ 277
Advertising and other	\$ 608
Total gross revenue and support	\$24,733
Less: Publication fee assistance	\$ 2,457
Total net revenue and support	\$22,276

EXPENSES 2011

Publishing	\$13,922
General and administrative	\$ 4,404
Total expenses	\$18,326
Increase in net assets	\$ 3,950



Balance Sheet (\$000s)

ASSETS 2011

Current assets

Cash and cash equivalents	\$ 1,556
Contributions receivable	\$ 200
Program and accounts receivable, net	\$ 1,465
Prepaid expenses	\$ 121
Total current assets	\$ 3,342

Noncurrent assets

Investments (\$331 restricted)	\$ 7,113
Property and equipment, net	\$ 1,333
Deposits	\$ 9
Total noncurrent assets	\$ 8,454

Total assets **\$11,796**

LIABILITIES AND NET ASSETS

Current liabilities

Accounts payable	\$ 820
Accrued liabilities	\$ 723
Deferred revenue	\$ 1,346
Total current liabilities	\$ 2,889

Deferred rent liability \$ 186

Total liabilities **\$ 3,075**

Net assets

Unrestricted	\$ 7,576
Temporarily restricted	\$ 1,144
Total net assets	\$ 8,720

Total liabilities and net assets **\$11,796**

Part of the PeerJ mission is to reduce the financial burden of publication, so that research monies can be more effectively spent. As a result we want to direct your attention to a new feature on our homepage (<https://PeerJ.com>), which calculates the “money saved” by the global research enterprise as a result of publishing in PeerJ. As you can see, we currently estimate that publishing these 50 articles has potentially saved as much as \$241K already – money that can be diverted towards research funding, rather than publications.

❓ How much is PeerJ saving researchers and their institutions?

Many estimates put the **average cost of an article** in a subscription-based journal at \$5,333 (\$US). And the most popular Open Access journals still charge more than \$1,300 per article. One way or another these costs come out of money that could be going to research.

The savings you see on the frontpage of PeerJ is based on the average subscription-based article cost less the cost of authors having published in PeerJ. Divide that number by ~5.5 to get the savings over popular Open Access venues. At just \$99 per author, this means PeerJ saves a considerable amount with each new publication. And remember, this is for life, so subsequent publications from the same author continue to save even more.

Finally, the upcoming *PeerJ PrePrints* (research that hasn't been formally peer-reviewed) are free for authors if made public. The research savings would be even greater than that reported on the frontpage if preprints were included.

**Open Access Publishing has
proven profitability – not just
sustainability.**

**What does this maturing Open
Access market mean for
researchers and scholars?**

**Broader reach/wider audience for
their work;**

***Access to more, license to do more
with work of others; and***

New ways to see **who is using
their work, and **how** they are
using it**

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Lets Us Collect Information on
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Impact factor: researchers should define the metrics that matter to them

The impact factor assumes that the most cited articles are the most influential, but influence is only one aspect of importance.



Whether it's citations, bookmarks, or size of a network of collaborators, researchers should be able to sort through different indicators and decide which ones are important to them. Photograph: Getty Images/MedioImages

One of the challenges faced by [research](#) funders – both public and private – is how to maximise the amount of work being done on important problems, without institutionalising any particular dogma which may suppress novel ideas. The most common arrangement is to fund good researchers but refrain from being overly prescriptive about outcomes, and, in turn, the way to identify good researchers has been to look at the publications that follow the research they fund.

In 1955, Eugene Garfield, the founder of the Institute for Scientific Information (now part of Thomson Reuters), introduced a means for identifying influential journals according to the number of times work appearing in them was cited. This process results

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a.k.a.
Alternative Metrics (Altmetrics)

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AN ALM SNAPSHOT OF HOW READERS INTERACT WITH ARTICLES



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145,296 CrossRef Citations

10,439 PLOS Notes and Comments

1,259 Research Blogging Posts

Areas to the right are scaled to show the most common ways articles are used, based on ALM analysis of 37,267 PLOS ONE articles. (Courtesy Martin Fenner, Technical Lead of PLOS ALMs.)

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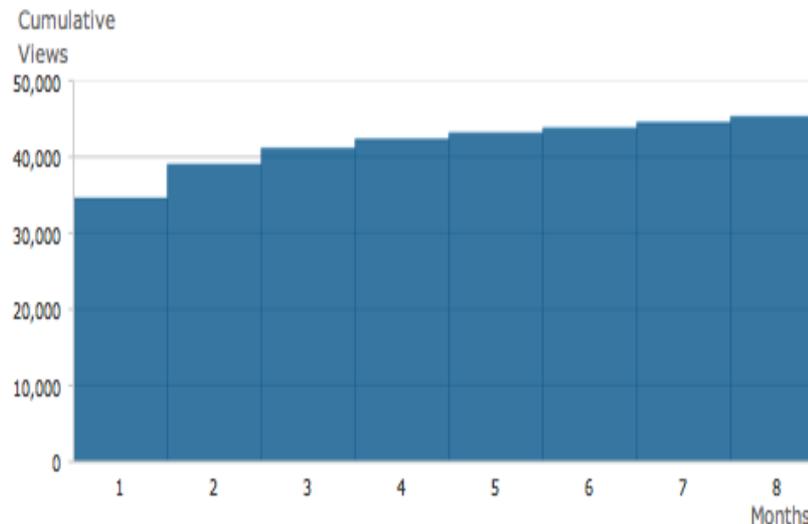
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PMC	133	46	n.a.	179
Totals	42,314	2,969	79	45,362



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As a Researcher...

**(I wonder *who* is reading my
work..)**

RESEARCH ARTICLE

Were Multiple Stressors a 'Perfect Storm' for Northern Gulf of Mexico Bottlenose Dolphins (*Tursiops truncatus*) in 2011?

Ruth H. Carmichael , William M. Graham, Allen Aven, Graham Worthy, Stephan Howden

Article

About the Authors

Metrics

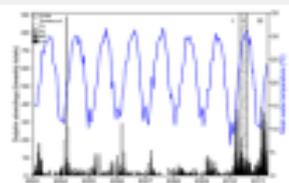
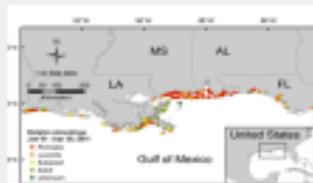
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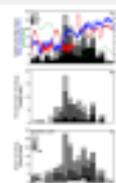
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	LC	MC	FC	FL	
Perinatal (n=186)	10	30	28	0	68
Other (n=175)	36	11	11	1	60
Subtotal (n=361)	46	41	39	1	127
Not reported	1	1	0	0	2
Total	47	42	39	1	129



Hide Figures

Abstract

Introduction

Methods

Results

Discussion

Acknowledgments

Author Contributions

References

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Abstract

An unusual number of near term and neonatal bottlenose dolphin (*Tursiops truncatus*) mortalities occurred in the northern Gulf of Mexico (nGOM) in 2011, during the first calving season after two well documented environmental perturbations; sustained cold weather in 2010 and the Deepwater Horizon oil spill (DWHOS). Preceding the stranding event, large volumes of cold freshwater entered the nGOM due to unusually large snowmelt on the adjacent watershed, providing a third potential stressor. We consider the possibility that this extreme cold and freshwater event contributed to the pattern of perinatal dolphin strandings along the nGOM coast. During the 4-month period starting January 2011, 186 bottlenose dolphins, including 46% perinatal calves (nearly double the percentage for the same time period from 2003–2010) washed ashore from Louisiana to western Florida. Comparison of the frequency distribution of strandings to flow rates and water temperature at a monitoring buoy outside Mobile Bay, Alabama (the 4th largest freshwater drainage in the U.S.) and along the nGOM coast showed that dolphin strandings peaked in Julian weeks 5, 8, and 12 (February and March), following water temperature minima by 2–3 weeks. If dolphin condition was already poor due to depleted food resources, bacterial infection, or other factors, it is plausible that the spring freshet contributed to the timing and location of the unique

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N-Acetylgalactosamine	GalNAc	203.0794
Fucose	Fuc	146.0579
Xylose	Xyl	132.0423
N-Acetylneuraminic acid	NeuAc	291.0954
N-Glycolylneuraminic acid	NeuGc	307.0903

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Blogs and Media Coverage ?



7.  fellranger #PLoS: Were Multiple Stressors a 'Perfect Storm' for Northern Gulf of Mexico Bottlenose D... <http://t.co/KVxLUtRV>
Jul 19, 2012
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Jul 19, 2012
9.  lizabio True costs still unknown MT @kzelnio Gulf Mex dolphins hit hard by BP #oilspill + cold winter @plosone paper #DeepSN <http://t.co/0rVImdVi>
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10.  MBARI_News RT @kzelnio: #PLoS: Gulf of Mex dolphins hit hard by BP #oilspill + cold winter, data in new @PLOS ONE paper #DeepSN <http://t.co/AhrHTFJR>
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Jul 19, 2012
13.  justindgregg Recipe for mass dolphin death: add one part cold weather, one part fresh water, and 52,000 tons of oil <http://t.co/0lCoYhs5>
Jul 19, 2012

Or as an evaluator...

(I still care about citations...)

RESEARCH ARTICLE

Estimated HIV Incidence in the United States, 2006–2009

Joseph Prejean , Ruiguang Song, Angela Hernandez, Rebecca Ziebell, Timothy Green, Frances Walker, Lillian S. Lin, Qian An, Jonathan Mermin, Amy Lansky, H. Irene Hall, for the HIV Incidence Surveillance Group

Article

About the Authors

Metrics

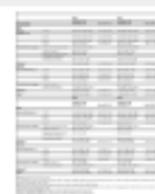
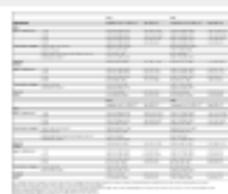
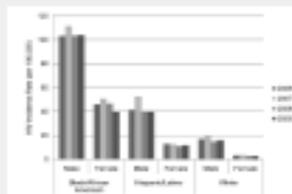
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Abstract

Introduction

Methods

Results

Discussion

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Figures

Abstract

Background

The estimated number of new HIV infections in the United States reflects the leading edge of the epidemic. Previously, CDC estimated HIV incidence in the United States in 2006 as 56,300 (95% CI: 48,200–64,500). We updated the 2006 estimate and calculated incidence for 2007–2009 using improved methodology.

Methodology

We estimated incidence using incidence surveillance data from 16 states and 2 cities and a modification of our previously described stratified extrapolation method based on a sample survey approach with multiple imputation, stratification, and extrapolation to account for missing data and heterogeneity of HIV testing behavior among population groups.

Principal Findings

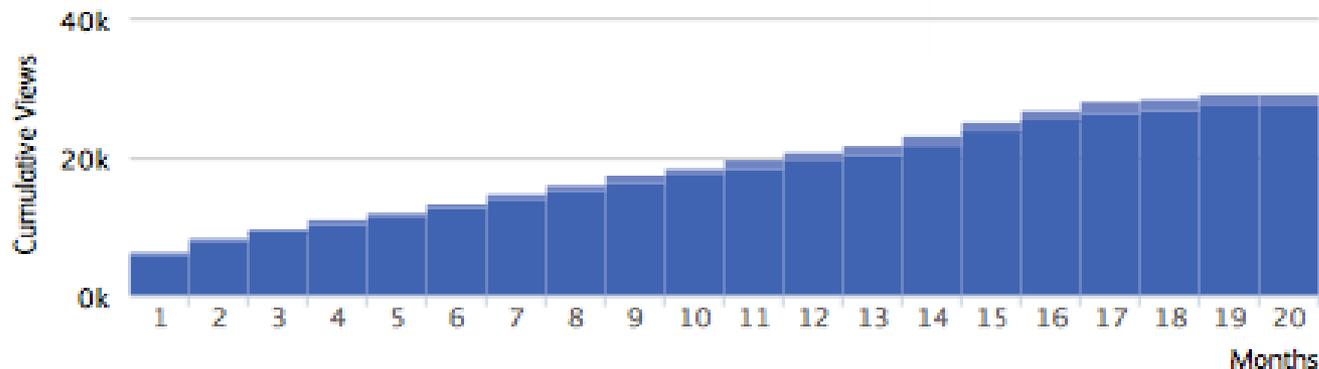
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PLOS	23,218	4,065	171	27,454
PMC	1,124	518	n.a.	1,642
Totals	24,342	4,583	171	29,096

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*Although we update our data on a daily basis, there may be a 48-hour delay before the most recent numbers are available. PMC data is posted on a monthly basis and will be made available once received.

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- [Estimated HIV Incidence in California, 2006–2009](#)
 1. Susan Scheer, Shoshanna Nakelsky, Trista Bingham, Mark Damesyn, Dan Sun, Chi-Sheng Chin, Anthony Buckman, Karen E. Mark
PLoS One. 2013; 8(2): e55002. Published online 2013 February 6. doi: 10.1371/journal.pone.0055002
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- [Measuring Population Transmission Risk for HIV: An Alternative Metric of Exposure Risk in Men Who Have Sex with Men \(MSM\) in the US](#)
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PLoS One. 2012; 7(12): e53284. Published online 2012 December 28. doi: 10.1371/journal.pone.0053284
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 3. Steven M. Goodreau, Nicole B. Carnegie, Eric Vittinghoff, Javier R. Lama, Jorge Sanchez, Beatriz Grinsztejn, Beryl A. Koblin, Kenneth H. Mayer, Susan P. Buchbinder
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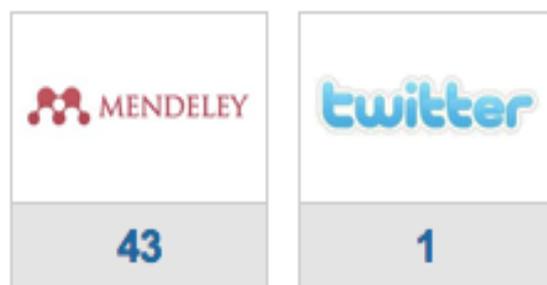
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 4. Kathryn E. Muessig, M. Kumi Smith, Kimberly A. Powers, Ying-Ru Lo, David N. Burns, Andrew E. Grulich, Andrew N. Phillips, Myron S. Cohen
AIDS. Author manuscript; available in PMC 2013 February 28.

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Engagement	<ol style="list-style-type: none"> 5. enhanced level of informed debate in biomedicine 6. significant engagement of key audiences & increased reach
Research leaders	<ol style="list-style-type: none"> 7. develop a cadre of research leaders 8. evidence of significant career progression among those we support
Research environment	<ol style="list-style-type: none"> 9. key contributions to the creation, development and maintenance of major research resources 10. contributions to the growth of centres of excellence
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Reduced premature mortality in Rwanda: lessons from success

BMJ 2013; 346 doi: <http://dx.doi.org/10.1136/bmj.f65> (Published 18 January 2013)

Cite this as: BMJ 2013;346:f65

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GLOBAL UPDATE

Rwanda's Health Care Success Story

By DONALD G. McNEIL Jr.

Published: February 4, 2013

In the less than two decades since the 1994 [genocide](#) that killed nearly a million Rwandans and displaced another two million, the country has become a spectacular public health success story and could provide a model for the rest of Africa, according to a new analysis by American health experts.

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In an article published last month by the British journal *BMJ*, Dr. Paul E. Farmer, a founder of [Partners in Health](#), which delivers medical services in [Rwanda](#) and [Haiti](#), [totaled up the successes the tiny country has managed](#). In 1994, 78 percent of the population lived below the poverty line; now 45 percent do. The gross domestic product has more than trebled. Almost 99 percent of primary-school-age children go to school.

With help from Western donors, the number of people getting treatment for [AIDS](#) rose to 108,000 from near zero a decade earlier.

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February 4

Dr. Peter Hotez on NTDs in Australia and the Pacific.



A call to eliminate tropical diseases | Pacific Beat | ABC Radio Australia www.radioaustralia.net.au

A new health report says thousands of people in Australia and the Pacific are infected with what are defined as Neglected

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February 6



Rwanda's Health Care Success Story

www.nytimes.com

A report in BMJ cites impressive gains in AIDS treatment and reducing child mortality, mostly through a network of village-based health workers.

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(Has this work influenced research priorities or policy directions?)

Adoption of Rapid Diagnostic Tests for the Diagnosis of Malaria, a Preliminary Analysis of the Global Fund Program Data, 2005 to 2010

Jinkou Zhao,^{1,2,*} Marcel Lama,¹ Eline Korenromp,^{1,3} Patrick Aylward,¹ Estifanos Shargie,¹ Scott Filler,¹ Ryuichi Komatsu,¹ and Rifat Atun⁴

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Abstract

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Introduction

The World Health Organization Guidelines for the Treatment of Malaria, in 2006 and 2010, recommend parasitological confirmation of malaria before commencing treatment. Although microscopy has been the mainstay of malaria diagnostics, the magnitude of diagnostic scale up required to follow the Guidelines suggests that rapid diagnostic tests (RDTs) will be a large component. This study analyzes the adoption of rapid diagnostic testing in malaria programs supported by the Global Fund to fight AIDS, Tuberculosis and Malaria (Global Fund), the leading international funder of malaria control globally.

Methods and Findings

We analyzed, for the period 2005 to 2010, Global Fund programmatic data for 81 countries on the quantity of RDTs planned; actual quantities of RDTs and artemisinin-based combination treatments (ACTs) procured in 2009 and 2010; RDT-related activities including RDTs distributed, RDTs used, total diagnostic tests including RDTs and microscopy performed, health facilities equipped with RDTs; personnel trained to perform rapid diagnostic malaria test; and grant budgets allocated to malaria diagnosis. In 2010, diagnosis accounted for 5.2% of malaria grant budget. From 2005 to 2010, the procurement plans include 148 million RDTs through 96



Malaria NetWorks
@malarianetworks

The Lancet: In resource-limited settings, malaria control programmes should consider use of text messaging to... <http://fb.me/Eakerale>

5 Aug 11



PAHO/WHO Equity
@eqpaho

The effect of mobile phone text-message reminders on Kenyan health workers' adherence to malaria treatment guidelines <http://t.co/BhbGRad>

16 Aug 11



DFID_HDRC
@dfid_hdrc

RT @mngreenall: The effect of mobile phone text-message reminders on Kenyan health workers' adherence to malaria treatment guidelines: <http://t.co/z3m7uEn>

26 Aug 11



StompOutMalariaKenya
@stompm_kenya

Texting health care workers in #Kenya improve treatment of #malaria: <http://t.co/L5FGpZE7>

4 Oct 11

Identity matters in impact.

**To be successful, Article Level
Metrics (ALMs) need to be
proliferated....**

**They need to be adopted across
open access journals....**

...and they are being adopted.

A novel role for lipid droplets in the organismal antibacterial response



Preetha Anand, Silvia Cermelli, Zhihuan Li, Adam Kassan, Marta Bosch, Robilyn Sigua, Lan Huang, Andre J Ouellette, Albert Pol, Michael A Welte, Steven P Gross

University of California Irvine, United States; University of Rochester, United States; Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Spain; University of California Irvine, United States; University of Southern California, United States; Institució Catalana de Recerca i Estudis Avançats, Spain

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Cite as eLife 2012;1:e00003

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Why sauropods had long necks; and why giraffes have short necks

[Michael P. Taylor](#)^{✉1}, [Mathew J. Wedel](#)²

➤ [Author and article information](#)

▼ [Abstract](#)

The necks of the sauropod dinosaurs reached 15 m in length: six times longer than that of the world record giraffe and five times longer than those of all other terrestrial animals. Several anatomical features enabled this extreme elongation, including: absolutely large body size and quadrupedal stance providing a stable platform for a long neck; a small, light head that did not orally process food; cervical vertebrae that were both numerous and individually elongate; an efficient air-sac-based respiratory system; and distinctive cervical architecture. Relevant features of sauropod cervical vertebrae include: pneumatic chambers that enabled the bone to be positioned in a mechanically efficient way within the envelope; and muscular attachments of varying importance to the neural spines, epiphyses and cervical ribs. Other long-necked tetrapods lacked important features of sauropods, preventing the evolution of longer necks: for example,

[Introduction](#)[Long Necks in Different Taxa](#)[Factors Enabling Long Necks](#)[Architecture of Sauropod Necks](#)[Conclusions: Why Giraffes Have Such Short Necks](#)[Museum Abbreviations](#)[Acknowledgements](#)[Additional Information and Declarations](#)[References](#)[Peer Review history](#)

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Great on their own, but...

**No Single Indicator tells the
whole story.**

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it's on us.

Our metrics data (like our source code) is completely open and free of charge.

As a philanthropically-funded not-for-profit, we're in this because we believe open altmetrics are key for building the coming era of Web-native science.

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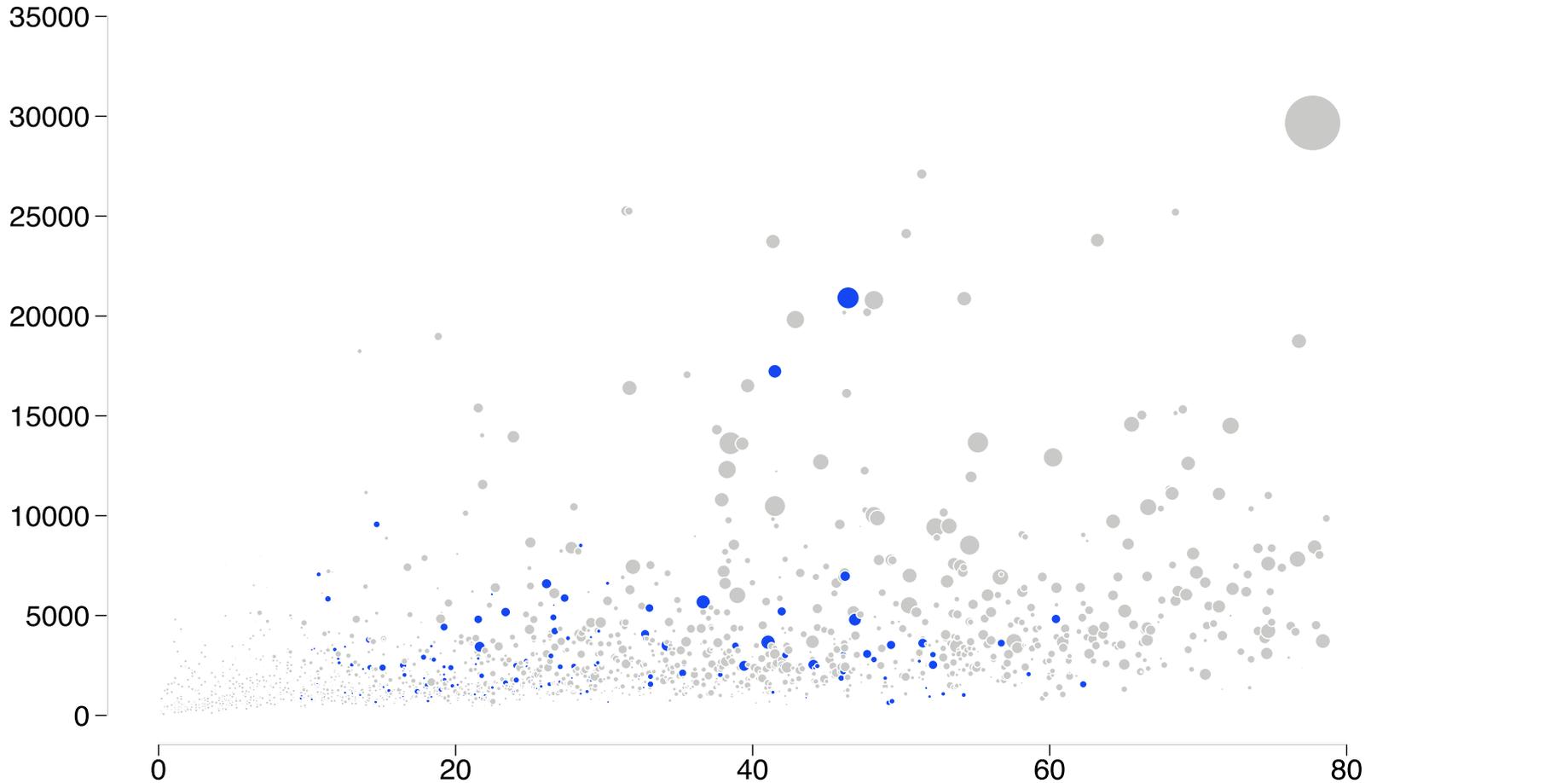
**Opportunity not just to collect
individual metrics....**

**...but also to put metrics about
articles into *context*.**

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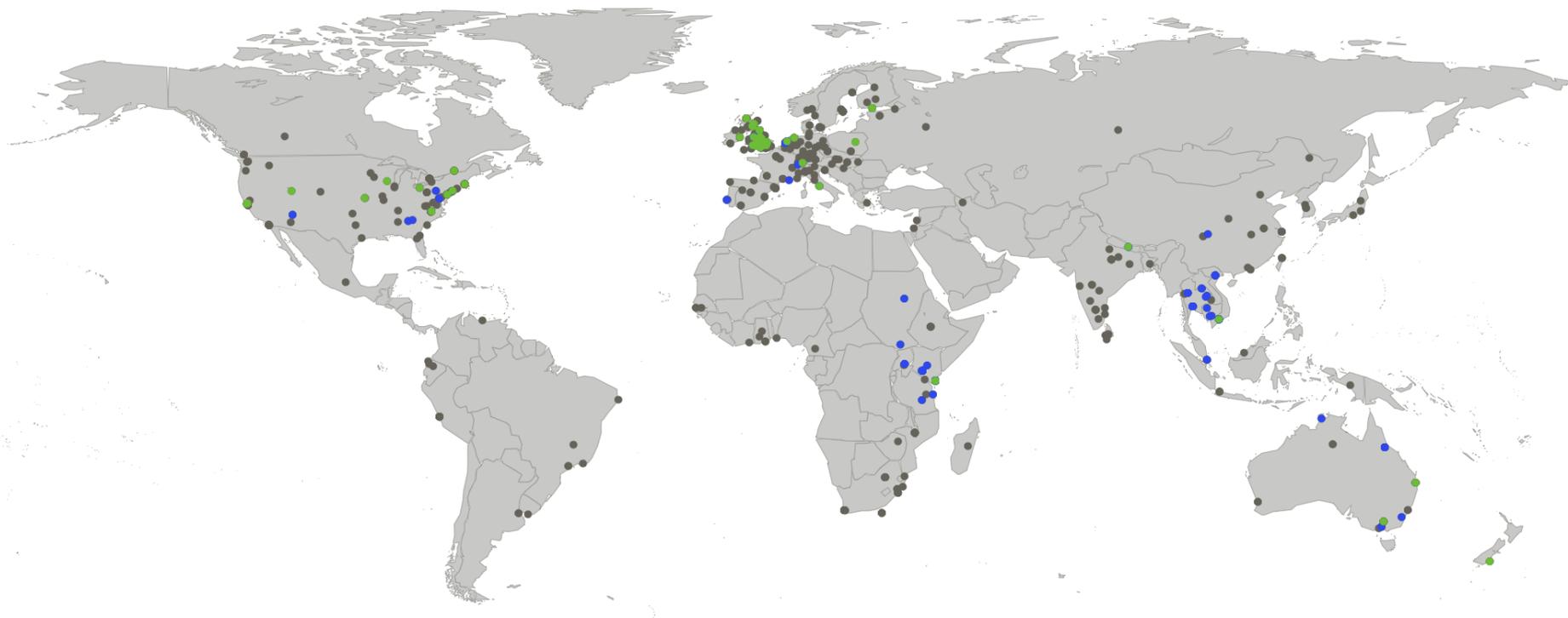
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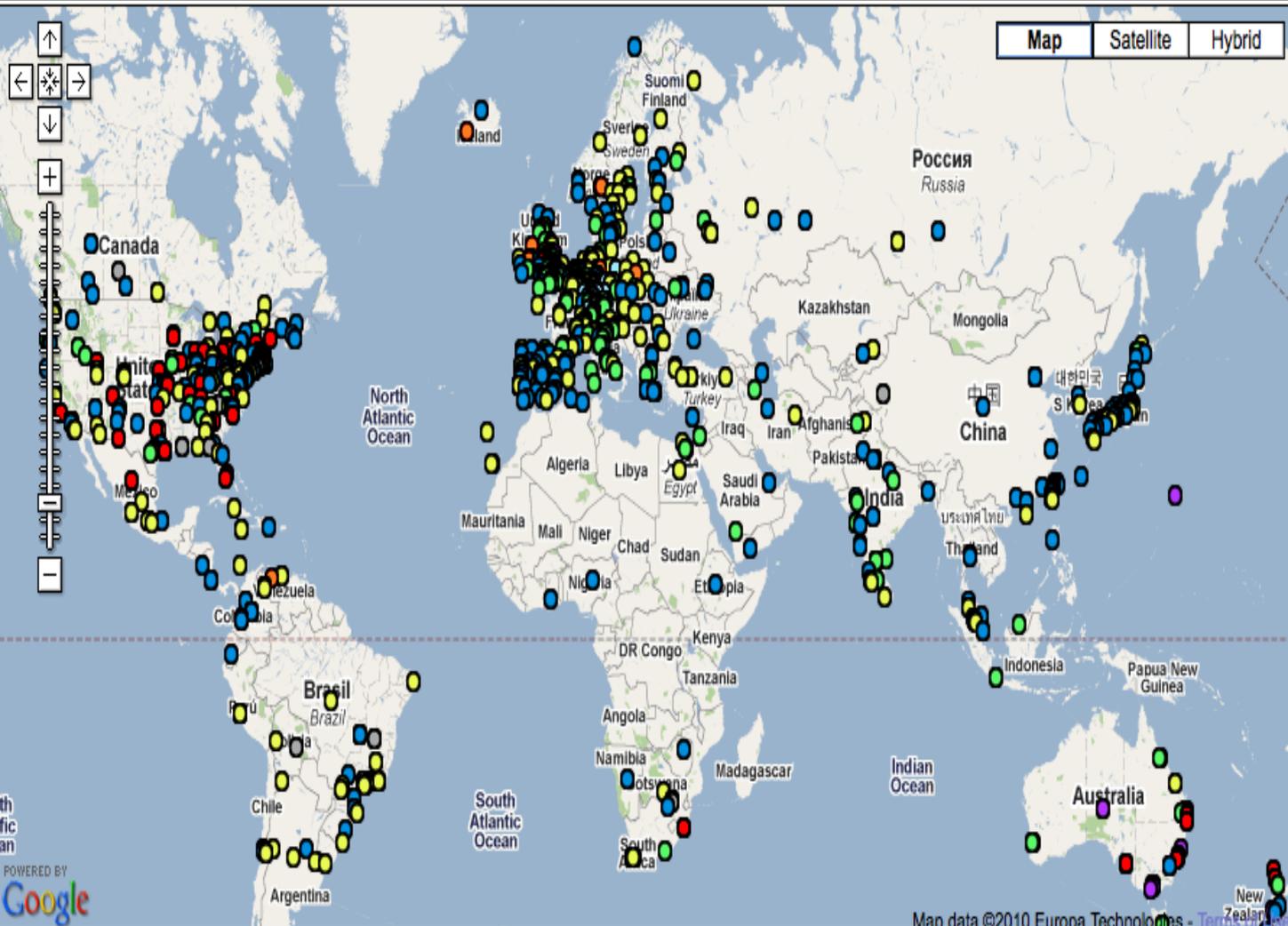


ALMs are *not* just for journals

**Can be applied to other crucial
piece of infrastructure:
Open Access Repositories**



Platform: All (1422) Country: All (1422) Registered between January 1990 and February 2010 filter results show all



Map Satellite Hybrid

Information bar

- DSpace (480)
EPrints (283)
BEPress (91)
ETD-db (36)
OPUS (28)
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>Show all

Normal icons | Repository size icons

There are 21,500,046 items held in the 1422 repositories on this map.

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Data provided by: ROAR & OpenDOAR

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view metrics in seconds

Point us to your research products in Slideshare, GitHub, and Dryad. Import items from your Google Scholar profile or a BibTeX file.

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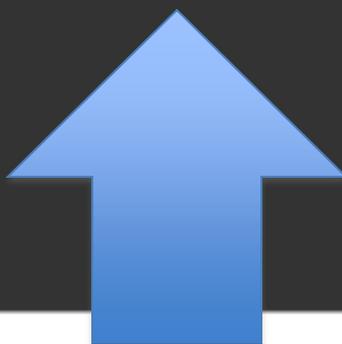


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Use ImpactStory's full-featured API to add metrics to your own projects. Or drop our embeddable Javascript widget into your publishing platform's HTML.

Open data, open source.

Our data (like our source code) is wide open. As a non-profit organization, we are in this because we believe open altmetrics are key for building the coming era of Web-native science.



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api & widget

Recommended approach: JavaScript widget

The easiest way to include ImpactStory metrics on a webpage is via our JavaScript widget, shown below. There are two steps:

1. Paste this script at the top of your page:

```
<script type="text/javascript" src="http://impactstory.org/embed/v1/impactstory.js"></script>
```

2. Paste this div where you want the badges to show.

```
<div class="impactstory-embed" data-id="19210768" data-id-type="pmid" data-api-key="API-DOCS"></div>
```

To use the widget, [get your free API key](#) and embed the widget on your page. Your free API key works for 1000 unique items; for more than that, you can pay a [cost-recovery fee](#) and *register* the additional items.

There are two ways to register additional items:

- register a DOI range (like "10.myjournal.*") with us directly ([contact us](#) for details), or
- register items individually using our [REST API](#).

**Assessing public engagement will
be growing in importance....**

**...especially for digital
repositories...**

“One Question arising from recent initiatives such as *FASTR* and the *OSTP public access policy memorandum*... is how will anyone be able to evaluate whether or not the public are actually engaging with the content. Altmetrics can provide real evidence of public engagement with open access research outputs.”

*- Pat Loria, London School of Economics blog,
3/5/2013*



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Collaborating on a Conference Panel with Google Drive Institutional repositories have work to do if they're going to solve the access problem

Mar 5 2013

The new metrics cannot be ignored – we need to implement centralised impact management systems to understand what these numbers mean

Blog Admin

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By using the social web to convey both scholarly and public attention of research outputs, altmetrics offer a much richer picture than traditional metrics based on exclusive citation database information. [Pat Loria](#) compares the new metrics services and argues that as more systems incorporate altmetrics into their platforms, institutions will benefit from creating an impact management system to interpret these metrics, pulling in information from research managers, ICT and systems staff, and those creating the research impact.

Researchers today are under enormous pressure to demonstrate impact in order to secure the



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**As With Impact Factors, Alt
Metrics and ALMS have
shortcomings.**

Not Yet Fully Understood.

what do these number actually mean?

The short answer is: probably something useful, but we're not sure what. We believe that dismissing the metrics as "buzz" is short-sited: surely people bookmark and download things for a reason. The long answer, as well as a lot more speculation on the long-term significance of tools like ImpactStory, can be found in the nascent scholarly literature on "altmetrics."

[The Altmetrics Manifesto](#) is a good, easily-readable introduction to this literature, while the proceedings of the recent [altmetrics11](#) and [altmetrics12](#) workshops go into more detail. You can check out the shared [altmetrics library](#) on Mendeley for more even relevant research. Finally, the poster [Uncovering impacts: CitedIn and total-impact, two new tools for gathering altmetrics](#), recently submitted to the 2012 iConference, describes a case study using ImpactStory (then called total-impact) to evaluate a set of research papers funded by NESCent; it has some brief statistical analysis and some visualisations of the results.

**And like all metrics (including
Impact Factors)...**

They can be gamed.

**Not a reason to dismiss them. A
reason to help shape them.**

**Still Early Days. But Important
Days.**

**Disruptive Technologies,
Opportunities for Big Uses, and
Meaningful Change.**

Thank you!

Heather Dalterio Joseph

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