

Understanding Global Impact Trends with Innovative Data and Metrics

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Head of Metrics Development

Digital Science



Work smart. Discover more.

Introduction – “The Map and the Territory”

Italy

Mesopotamia

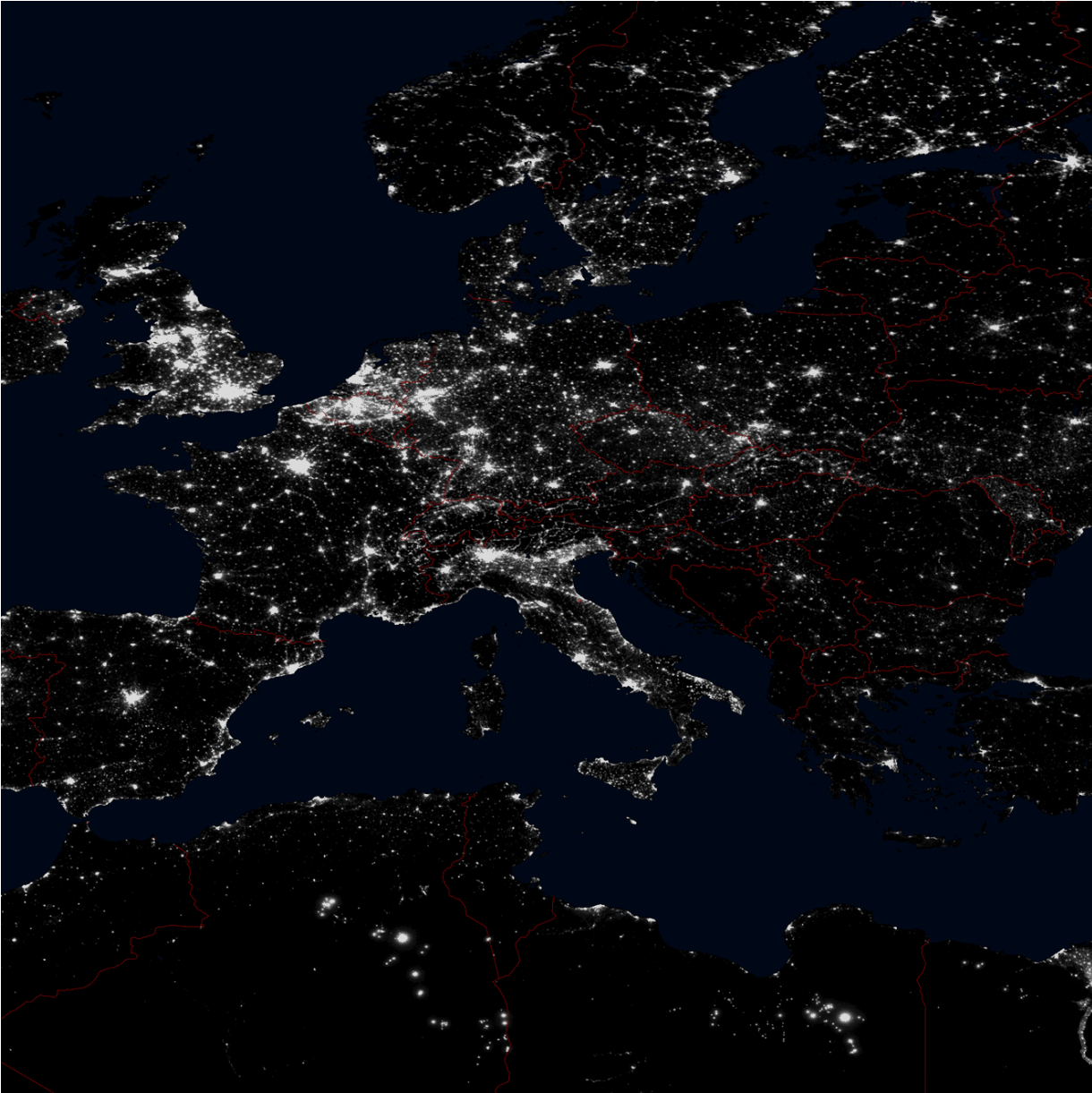
Nile delta

- Maps are not exact models of the territory
- They are limited by knowledge, technology, cultural and international perspective
- https://en.wikipedia.org/wiki/Psalter_world_map

A photograph of a rocket launch. The rocket is ascending vertically, leaving a large, bright plume of fire and smoke at its base. Several tall, lattice-structured cranes are positioned around the launchpad, some leaning towards the rocket. The sky is filled with scattered white clouds. The overall scene is captured in a cinematic style with warm lighting.

Metrics are not telemetry

- Research isn't 'launched' with a precise target – we have questions, objectives
- We only have partial control over where we can find data
- Researchers are aware of how they are being measured, and will react to measurement systems
- Researchers have human ambitions and desires
- Researchers are rooted in time, location and culture



The 'map' is necessarily partial

- Our infrastructure is only partially shared
- ORCID and DOIs are open and international: but some parts of the world and research lag behind (and place different cultural focus on the importance of personal attribution)
- Languages and countries are not universally indexed
- Qualitative information supports quantitative analysis

Concluding thoughts from the introduction

- Absence of evidence is not evidence of absence
- Metrics (when used internationally, and between disciplines) have to be accompanied by dialogue, and dialectic.
- Metrics can be qualitative, as well as quantitative.
- Metrics need to be sympathetic to international and cultural differences.

Themes in metrics creation

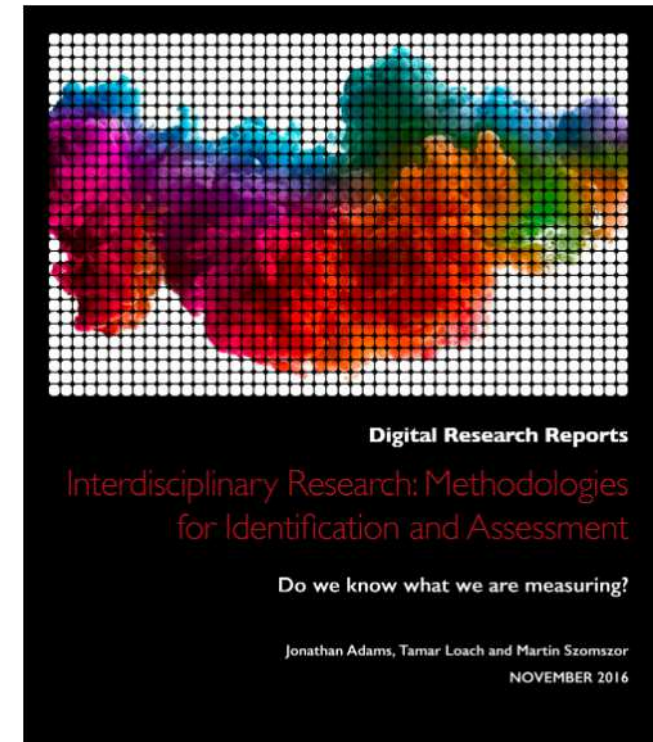
- The common practice is to use metrics of comfort, reputation and antiquity
- Metrics such as H-Index and Journal Impact Factor can be read easily, and many people believe they are comfortable with their use
- These metrics have dominated, despite criticism and methodological weakness
- The 'metrics' that drive Google and Amazon search results are complex, closed – and highly used, whether understood or not
- The challenge for metrics creation is to find a middle route – metrics that are as usable as Google and Amazon, but open and scientifically rigorous – and while incorporating new data

Context, expansion and utility

- Research is not a linear pipeline, but is part of society:
 - Funded by society
 - Answering societal needs
- New sources of data, and new technology give us the ability to go wider, and deeper into existing data:
 - Patents, clinical studies, policy papers, mainstream media, blogs
 - Data science, graph mathematics, cloud computing
 - Open access, open data
 - APIs
 - Sociology network theory

Making existing data work harder: questions of internationality and interdisciplinarity

- A big project for 2018 focus on metrics for **internationality** and **interdisciplinarity**
- Two particular pieces of work have lead us to investigate the meaning and impact of interdisciplinary work:
 - Builds on the work by Professor Jonathan Adams of Digital Science Consultancy - <http://bit.ly/2yl5hox>
 - Professor Robert Frodeman - *Sustainable Knowledge*, a Theory of Interdisciplinarity, Palgrave
<http://www.palgrave.com/us/book/9781137303011>

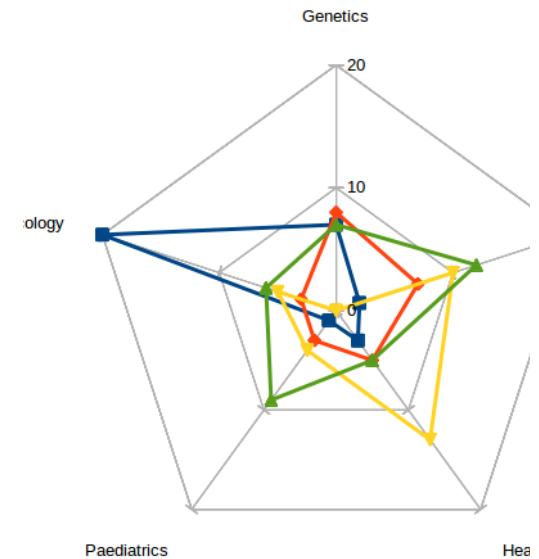


What is 'interdisciplinarity', 'transnationality' etc

- There is considerable movement towards funding interdisciplinarity, but the evidence for whether it is effective is scarce
- The evidence for the success of international collaboration is stronger
- Better data will provide better insights for policy makers – what works?
- Research partnership with NIH, also seeking partnerships with non-biomedical organization, and to duplicate the work with international organizations
- Focus is on identify the different stages at which disciplines and nations are mixed and combined (after Frodeman):
 - The mix of the author team - "multidisciplinarity" / "multinationality"?
 - The mix of the reference list - "interdisciplinarity" / "internationality"?
 - The mix of the citing articles - "transdisciplinarity" / "transnationality"?
- Our research is made possible by the machine learning classification systems used by Dimensions, and GRID, our open institutional taxonomy

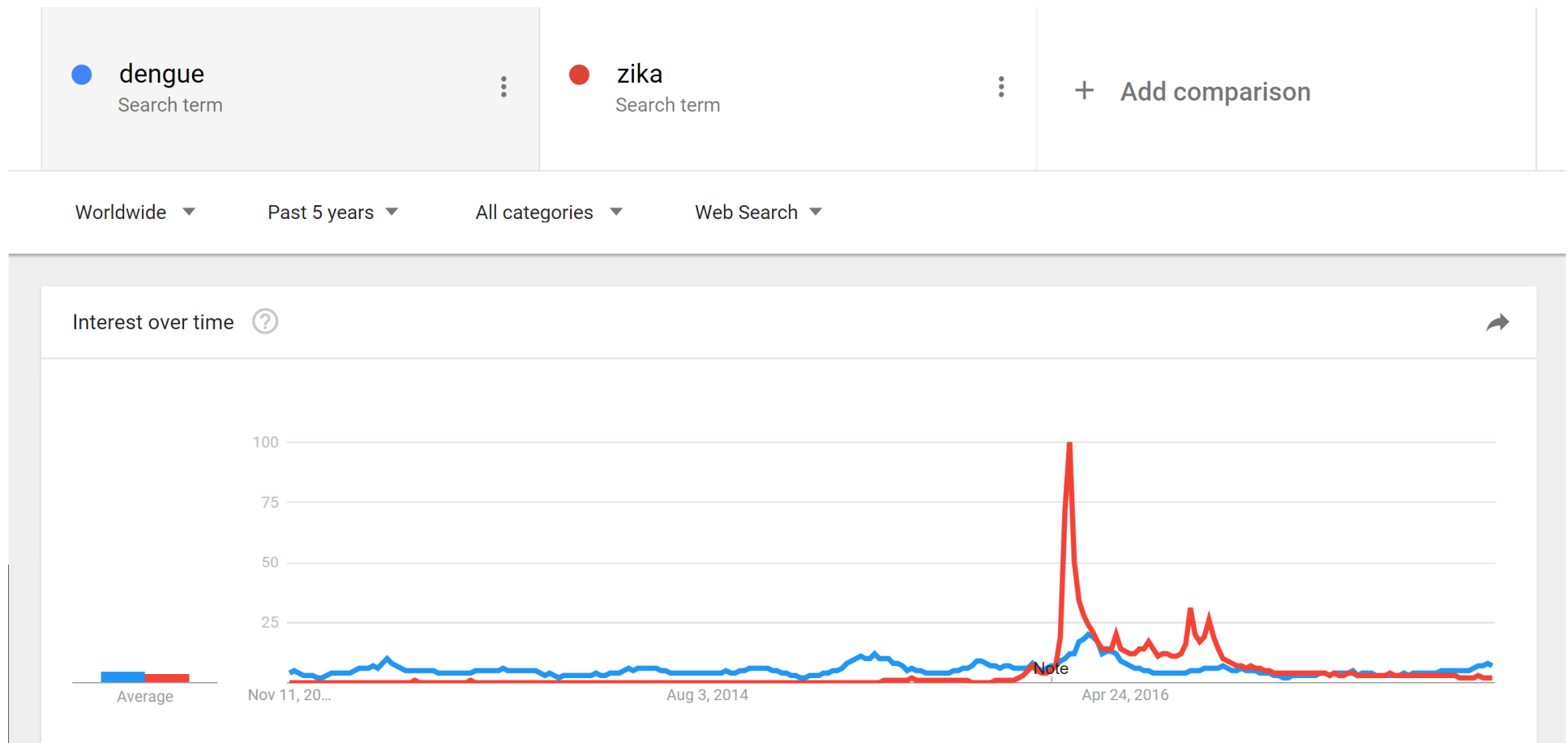
How will we use metrics, what stories and analytics do they support?

- We expect to research the richness and depth of the disciplinarity and national mix, and benchmark these against the field of the article, the funding of the research, the publishing journal
- Paper publishing next year, with metrics eventually appearing on Dimensions
- These measures have the promise of indicating not only if there's a difference in impact, but also which are the important features
- From the start, we are looking not only with an academic perspective, but how can this be incorporated into our platforms - how can we demonstrate utility for our users? For individual papers (qualitative) and large group analysis (quantitative)



Case Study: Understanding the funding context and broader impact with Dimensions and Altmetric

- Using throughout data comparing the research into dengue and zika, and the impact from publications with Brazilian-affiliated researchers
- Dimensions For Funders is a database of ~\$2T historical research funding



[Compare](#)[Heat Map](#)[Trend Viewer](#)[Geo Map](#)

Example data from Dimensions



precision medicine x

Free text in full data

personalized medicine x

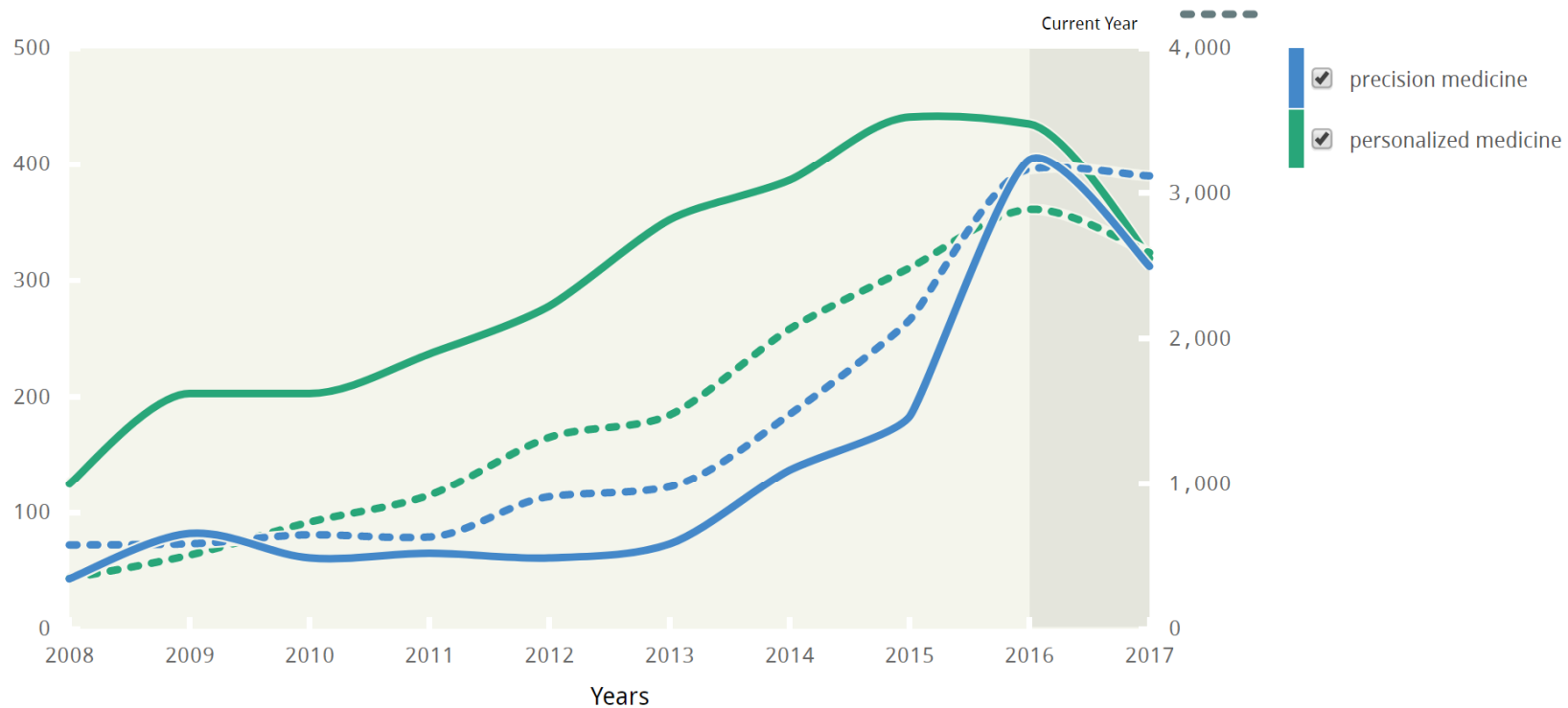
Free text in full data

Explore and compare trends in projects and publications. Enter up to three search expressions in the box above, each one separated by comma (sets of simple one term searches and of complex Boolean expressions are supported). The left hand facets are displayed based on the first query.

[Chart](#) | [Table](#)

Number of projects

Number of publications



Dengue and zika: funding and publications



dengue



Free text in full data

zika

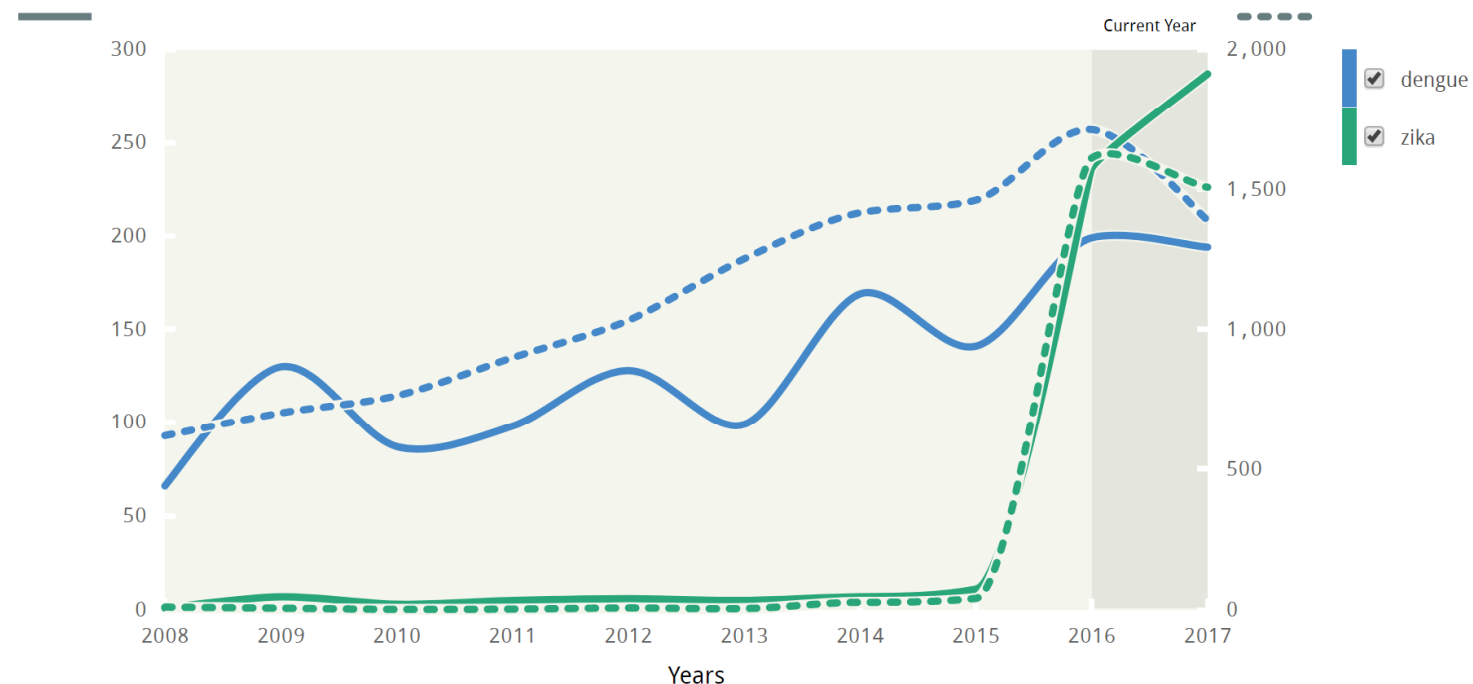


Free text in full data

Explore and compare trends in projects and publications. Enter up to three search expressions in the box above, each one separated by comma (sets of simple searches and of complex Boolean expressions are supported). The left hand facets are displayed based on the first query.

Number of projects

Number of publications





zika

Free text in full data

Top zika institutions

Publications

Funders

Journals

Publication Type

Organizations

Places

Categories

Sort by: Relevant Publications ▼

[Show metrics explanation](#)

Name Location	Relevant Publications	Citation metrics		Altmetric Attention Score	
		RCR Mean	Highly cited (i10-index)	% with attention	Median
Oswaldo Cruz Foundation Rio de Janeiro, Brazil	114	12.70	33	90.4	16.0
University of Texas Medical Branch at Galveston Galveston, Texas, United States	79	9.87	27	97.5	11.0
University of Sao Paulo São Paulo, Brazil	77	4.76	13	87.0	12.0
Johns Hopkins University Baltimore, Maryland, United States	54	9.87	14	92.6	6.0
Federal University of Rio de Janeiro Rio de Janeiro, Brazil	50	10.64	14	90.0	10.0
Hainan Medical University Haikou, China	48	0.74	3	37.5	1.0
Institut Louis Malardé Papeete, French Polynesia	47	15.61	18	93.6	16.0
Washington University in St. Louis St Louis, Missouri, United States	39	14.09	18	97.4	53.0

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zika

Free text in full data



Top zika journals

Publications

Funders

Journals

Publication Type


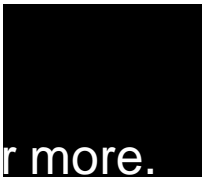
Organizations

Places

Categories

Sort by: Relevant Publications ▼

[Show metrics explanation](#)

Name		Relevant Publications	Citation metrics		Altmetric Attention Score			
			RCR Mean	Highly cited (i10-index)	% with attention	Median		
PLOS neglected tropical diseases		106	6.52	30	100.0	25.5		
BMJ (Clinical research ed.)		80	1.61	9	82.5	14.5		
Emerging infectious diseases		79	11.61	37	97.5	32.0		
MMWR. Morbidity and mortality weekly report		71	12.69	39	98.6	108.5		
Lancet (London, England)		61	12.81	29	96.7	47.0		
Scientific reports		60	2.49	6	90.0	11.5		
The Lancet. Infectious diseases		54	6.71	16	100.0	27.0		
Euro surveillance : bulletin European sur les maladies transmissibles = Europe...		47	8.10	29	59.6	11.0		
PLOS one		46	1.78	2	97.8	4.0		
The New England journal of medicine	F1000Research	15	1.01	1	100.0	5.0	92.9	319.0
	Memorias do Instituto Oswaldo Cruz	14	9.77	3	71.4	11.5		
Science (New York, N.Y.)	BJOG : an international journal of obstetrics and gynaecology	14	0.37	1	100.0	4.0	100.0	77.5
	Acta tropica	+ Add as filter	13	2.40	2	84.6		
	mBio	13	4.79	3	100.0	16.0		r more.
	Journal of infection and public health	13	4.06	1	76.9	2.5		
	Genome announcements	13	3.61	4	100.0	8.0		
	Journal of clinical microbiology	12	10.93	2	100.0	5.0		
	Revista da Sociedade Brasileira de Medicina Tropical	12	3.92	1	66.7	2.5		



r more.



Brazil x
Country

Top Brazilian journals

Publications

Funders

Journals

Publication Type

Organizations

Places

Categories

Sort by: Relevant Publications ▼

[Show metrics explanation](#)

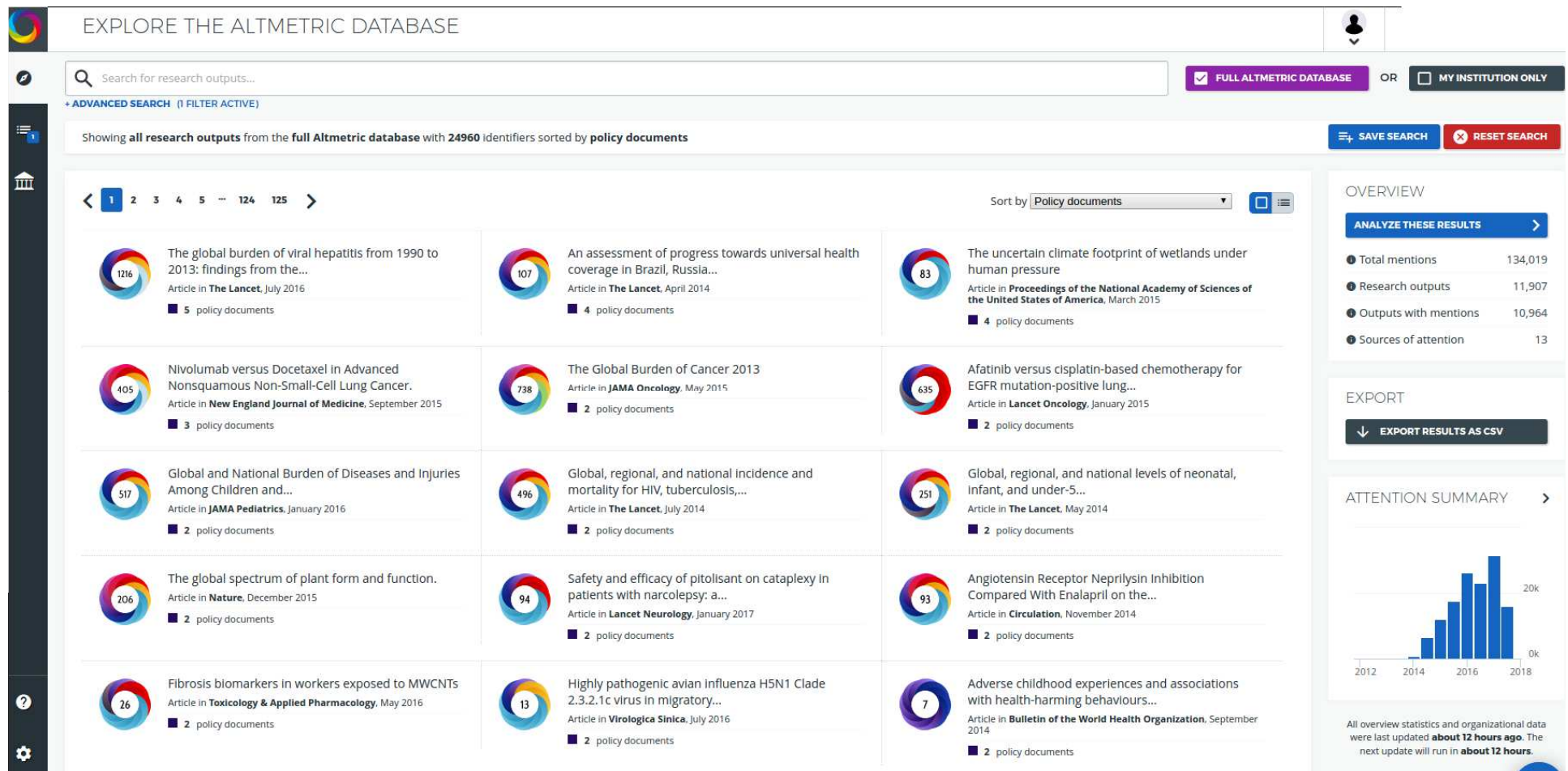
Name	Relevant Publications	Citation metrics		Altmetric Attention Score	
		RCR Mean	Highly cited (i10-index)	% with attention	Median
PloS one	4,610	1.00	972	66.4	2.0
Ciencia & saude coletiva	2,221	0.44	113	9.6	1.0
Cadernos de saude publica	2,187	0.63	359	10.9	1.0
Genetics and molecular research : GMR	1,796	0.24	74	16.5	1.0
Arquivos de neuro-psiquiatria	1,668	0.41	140	17.7	1.0
Arquivos brasileiros de cardiologia	1,552	0.30	105	12.0	1.0
Zootaxa	1,477	0.11	2	28.2	1.0
Brazilian journal of biology = Revista brasleira de biologia	1,474	0.24	34	12.1	1.0
Revista da Escola de Enfermagem da U S P	1,430	0.41	29	8.1	1.0
Revista da Sociedade Brasileira de Medicina Tropical	1,381	0.50	129	15.2	1.0
Anais brasileiros de dermatologia	1,369	0.49	75	16.9	1.0
Clinics (Sao Paulo, Brazil)	1,298	0.62	266	23.2	1.0
Revista brasileira de enfermagem	1,229	0.30	13	5.0	1.0
Revista latino-americana de enfermagem	1,171	0.51	72	10.3	1.0

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Broader impact with Altmetric Explorer

- Altmetrics (aka 'alternative metrics') have been part of the research community for twenty years ('webometrics') – although the term is new
- Altmetric discovers highly impactful documents that link or cite scholarly research
- Eg, policy papers, mainstream media, blogs, Wikipedia, social media





Broader impact with Altmetric Explorer

Showing all research outputs from the full Altmetric database with 3222 identifiers sorted by Altmetric Attention Score

SAVE SEARCH

RESET SEARCH

1 2 3 4 5 ... 27 28

Sort by Altmetric Attention Score



OVERVIEW

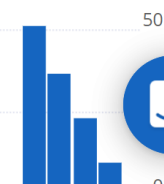
ANALYZE THESE RESULTS

Total mentions	122,74
Research outputs	2,67
Outputs with mentions	2,64
Sources of attention	1

EXPORT

EXPORT RESULTS AS CSV

ATTENTION SUMMARY



Zika Virus and Birth Defects — Reviewing the Evidence for Causality
Article in **New England Journal of Medicine**, April 2016



Zika Virus Associated with Microcephaly
Article in **New England Journal of Medicine**, February 2016



Zika Virus Infects Human Cortical Neural Progenitors and Attenuates Their Growth
Article in **Cell Stem Cell**, March 2016



Guillain-Barré Syndrome outbreak associated with Zika virus infection in...
Article in **The Lancet**, February 2016



Zika Virus Infection in Pregnant Women in Rio de Janeiro — Preliminary Report
Article in **New England Journal of Medicine**, March 2016



Zika virus has oncolytic activity against glioblastoma stem cells
Article in **The Journal of Experimental Medicine**, September 2017



Zika Virus in the Americas - Yet Another Arbovirus Threat.
Article in **New England Journal of Medicine**, January 2016



Zika Virus Infects Neural Progenitors in the Adult Mouse Brain and Alters...
Article in **Cell Stem Cell**, August 2016



Identification of small-molecule inhibitors of Zika virus infection and...



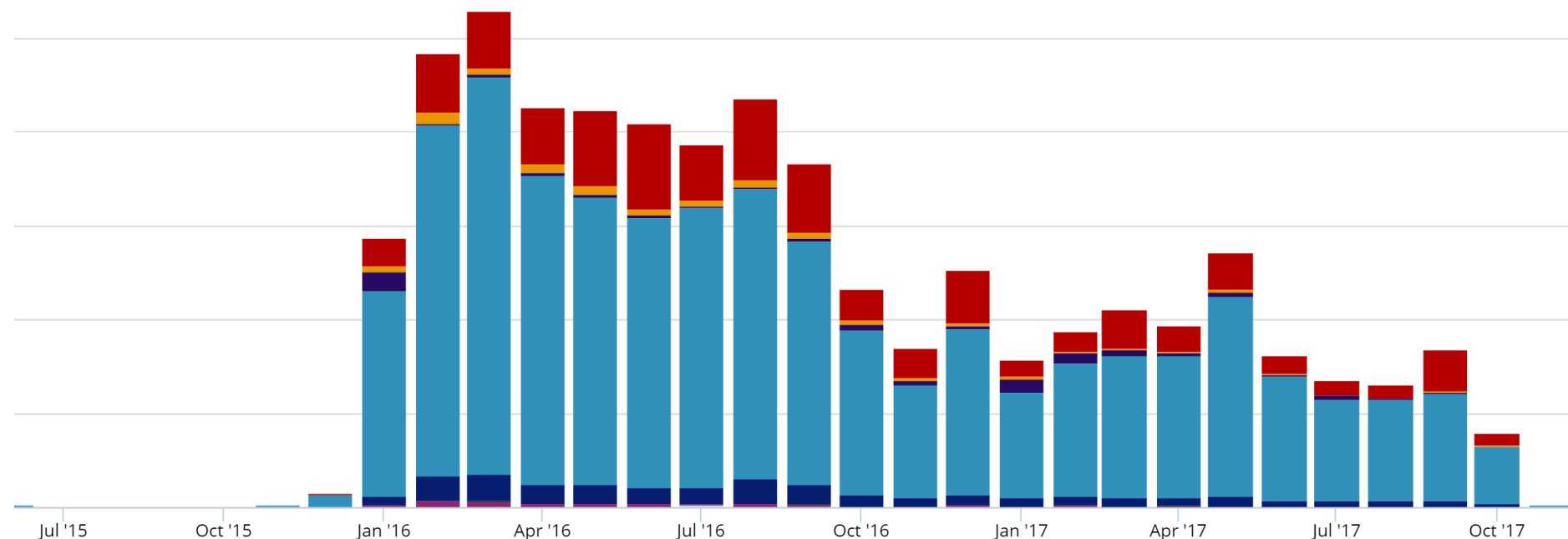
Interim Guidelines for Pregnant Women During a Zika Virus Outbreak - United...
Article in **MMWR: Morbidity & Mortality Weekly Report**, January 2016

tronic.com/explorer/

Analysis

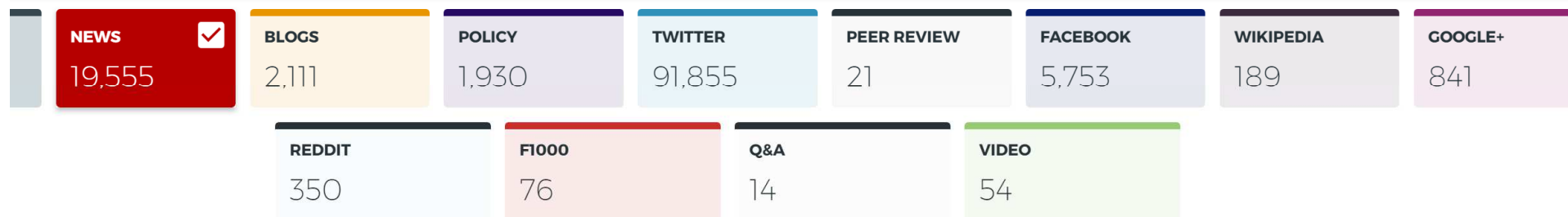
Results for all research outputs from the full Altmetric database with 3222 identifiers sorted by Altmetric Attention Score

<input checked="" type="checkbox"/>	NEWS 19,555	BLOGS 2,111	POLICY 1,930	TWITTER 91,855	PEER REVIEW 21	FACEBOOK 5,753	WIKIPEDIA 189	GOOGLE+ 841
		REDDIT 350	F1000 76	Q&A 14		VIDEO 54		

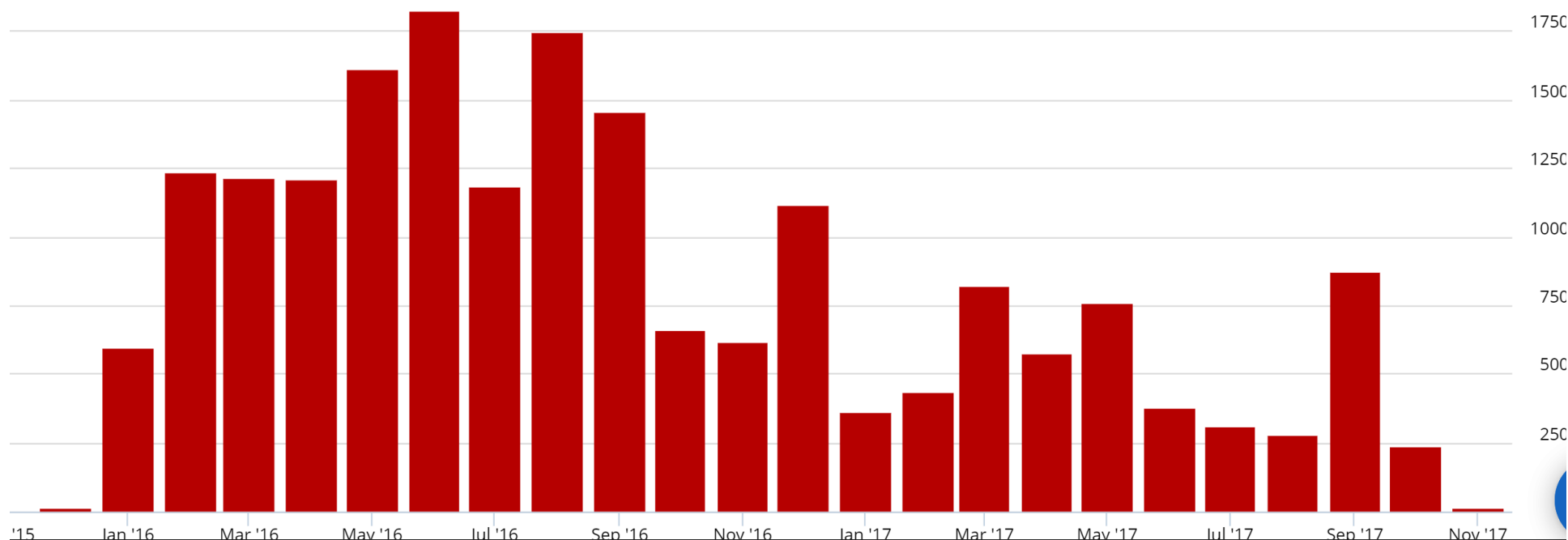


sis

for all research outputs from the full Altmetric database with 3222 identifiers sorted by Altmetric Attention Score



ek 1 month 3 months 6 months 1 year All time



Research outputs from the full Altmetric database with 3222 identifiers sorted by Altmetric Attention Score

NEWS 9,555	BLOGS 2,111	POLICY 1,930	TWITTER 91,855	PEER REVIEW 21	FACEBOOK 5,753	WIKIPEDIA 189	GOOGLE+ 841
	REDDIT 350	F1000 76	Q&A 14		VIDEO 54		

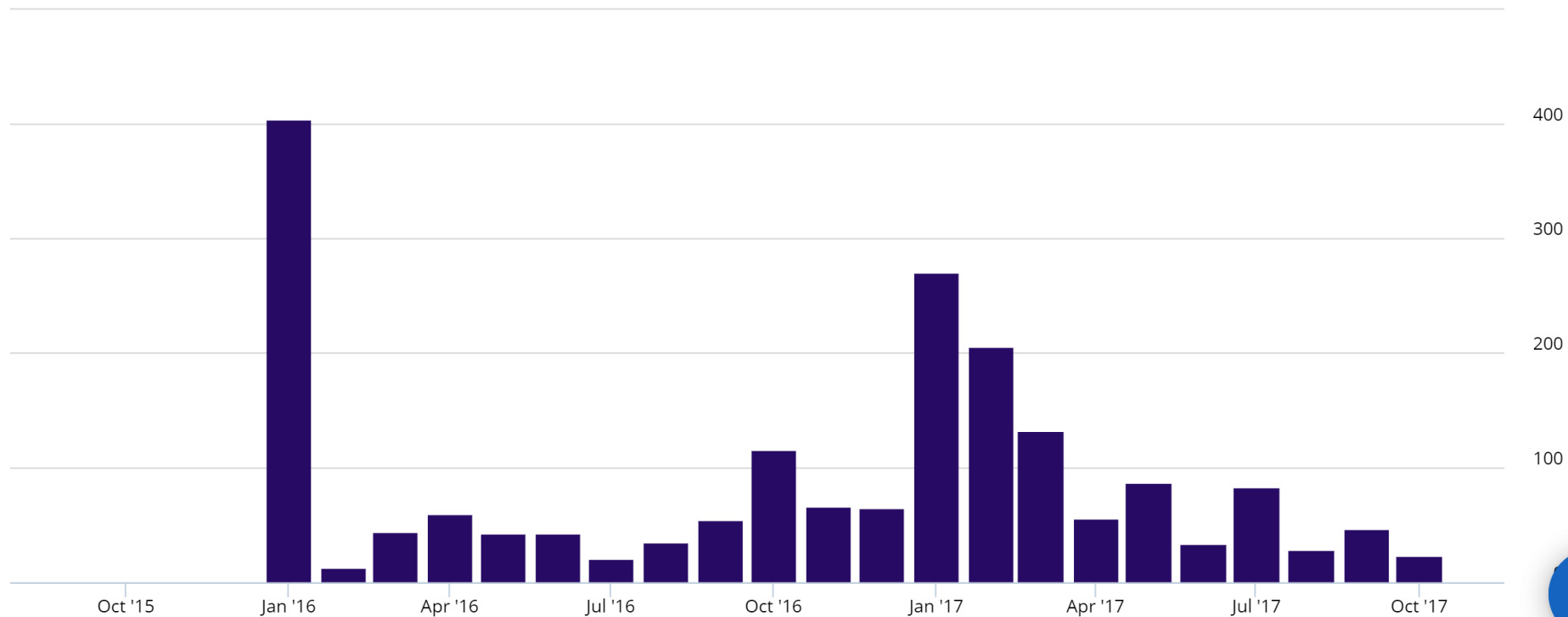
1 month

3 months

6 months

1 year

All time



Results analysis

Analyzing results for all **research outputs** from the **full Altmetric database** with **448** identifiers sorted by **Altmetric Attention Score**

SUMMARY

HIGHLIGHTS

DEMOGRAPHICS

MENTIONS

JOURNALS AND COLLECTIONS



Found **174** journals and collections in your search results. [Export journals/collections data as a CSV spreadsheet.](#)

▼ JOURNAL/COLLECTION Q e.g. Physics Letters, arXiv, figshare	▼ TOTAL MENTIONS	▼ NEWS STORIES	▼ BLOG POSTS	▼ POLICY DOCUMENTS	▼ TWEETS	▼ PEER REVIEWS	▼ WEIB POST
JAMA Neurology 3 mentioned research outputs in your search	331	43	0	59	188	0	
JAMA Pediatrics 3 mentioned research outputs in your search	656	40	2	44	486	0	
Lancet Infectious Diseases 10 mentioned research outputs in your search	960	246	23	18	629	0	
The Lancet 17 mentioned research outputs in your search	1,566	153	20	17	1,287	0	
New England Journal of Medicine 7 mentioned research outputs in your search	2,165	235	13	8	1,735	0	
Science 5 mentioned research outputs in your search	1,324	257	59	7	912	0	

Results analysis

Analyzing results for **all research outputs** from the **full Altmetric database** with **448** identifiers sorted by **Altmetric Attention Score**

Article in JAMA Pediatrics, November 2016



Congenital Zika Virus Infection: Beyond Neonatal Microcephaly

Article in JAMA Neurology, October 2016

12:00 AM UTC



Principais mensagens – doença causada pelo zika vírus : atualizado em 6 de julho de 2017

Policy document published by **Centers for Disease Control and Prevention (CDC)**



Association between Zika virus infection and microcephaly in Brazil, January to May, 2016: preliminary report of a case-co

Article in Lancet Infectious Diseases, September 2016



Characterizing the Pattern of Anomalies in Congenital Zika Syndrome for Pediatric Clinicians

Article in JAMA Pediatrics, November 2016



Congenital Zika Virus Infection: Beyond Neonatal Microcephaly

Article in JAMA Neurology, October 2016

12:00 AM UTC



Mensajes clave sobre la enfermedad por el virus del Zika : actualizado 6 de julio del 2017

Policy document published by **Centers for Disease Control and Prevention (CDC)**



Association between Zika virus infection and microcephaly in Brazil, January to May, 2016: preliminary report of a case-co

7/6/17

December 2016

KEY MESSAGES – ZIKA VIRUS

Purpose: This document is for internal messages for use in developing other n

Updated July 6, 2017


Updated information is in *blue*.

Congenital Zika Virus Infection Beyond Neonatal Microcephaly

Adriana Suely de Oliveira Melo, MD, PhD^{1,2,3,4}; Renato Santana Aguiar, PhD⁵; Melania Maria Ramos Amorim, MD, PhD^{1,2,3,6}; et al

✕ Author Affiliations | Article Information

CONTENTS



Discover

Categorize

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Workflow

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FAVORITES

Last 10 years ▾

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Selected filter not applicable

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GANIZATION

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GORIES

CATEGORY

RY

GOR

EGORY

RESEARCH AREAS CATEGORY

Keyword search | [Abstract search](#)

Save as category

★ Save as favorite

📄 Export

Q

Adriana Suely De Oliveira Melo x

Researcher

Projects

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Projects

Σ

Aggregated funding amount

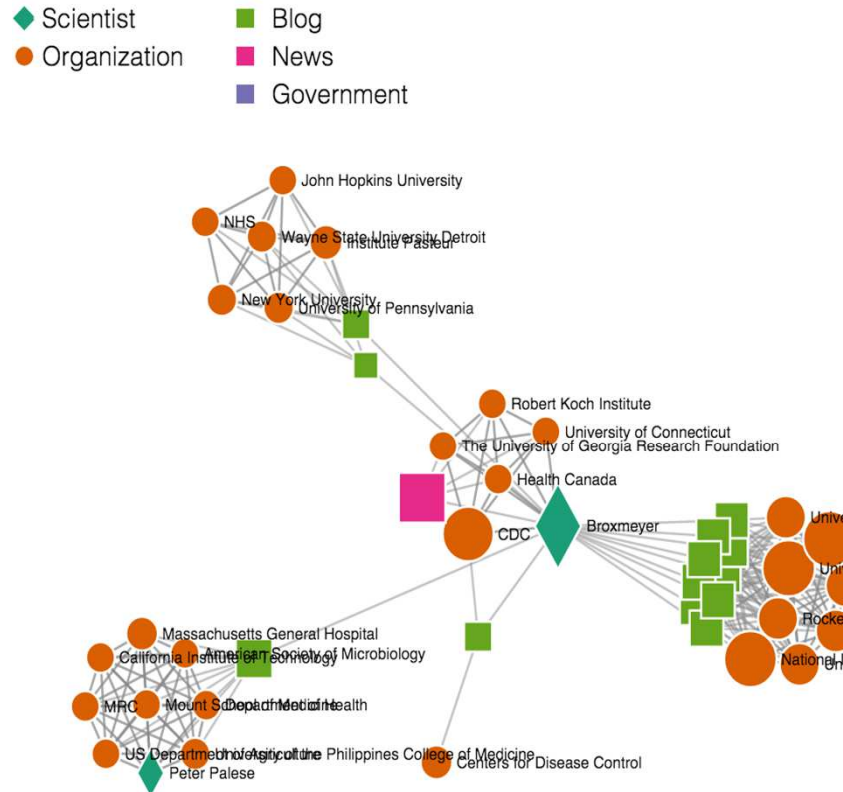
\bar{x}

Average funding amount

Sort by: Start Date ▾

Project title	Funding Amount
Funder, Principal investigator	From - Through
[Frequency and evolution of ultrasound and magnetic resonance findings in fetuses of mothers with zika virus and the association with neonatal outcomes in Campina Grande Paraiba: a cohort study] - Original in Portuguese	2017 - 2020
National Council for Scientific and Technological Development to Adriana Suely de Oliveira Melo	

Combining complex novel metrics and broader data



- SOPHIA was an experiment with University Ireland in creating complex, heterogenous graph networks; computing complex metrics but surfacing the results in easy-to-use user-interfaces
- Evidence is that complex networks can provide real insights into trends that go beyond a 'spreadsheet' analysis
- Experiments used interactive network charts, word clouds, graphs and connectivity wheels
- <https://link.springer.com/article/10.1007/s13278-017-0466-x>

In conclusion

- Metrics have strengths and weaknesses, and need context and analysis to support their use
- Assumptions on international / discipline analysis can often be misleading
- We are at the beginning of understanding 'broader impact', moving from a partial to a fuller view depends on commercial investment, open science and well-adopted infrastructure
- Insights into the mechanics of scholarly communication are at an early stage
- The data that supports complex and actionable insights is partial, but probably sufficient
- There is much research to be undertaken in gathering and processing data, computing metrics and in how people involved in funding, publishing and research policy can use this information to further societal aims.