

Open Science Coffee Lectures



Bibliometrics – h-index, impact factor and more

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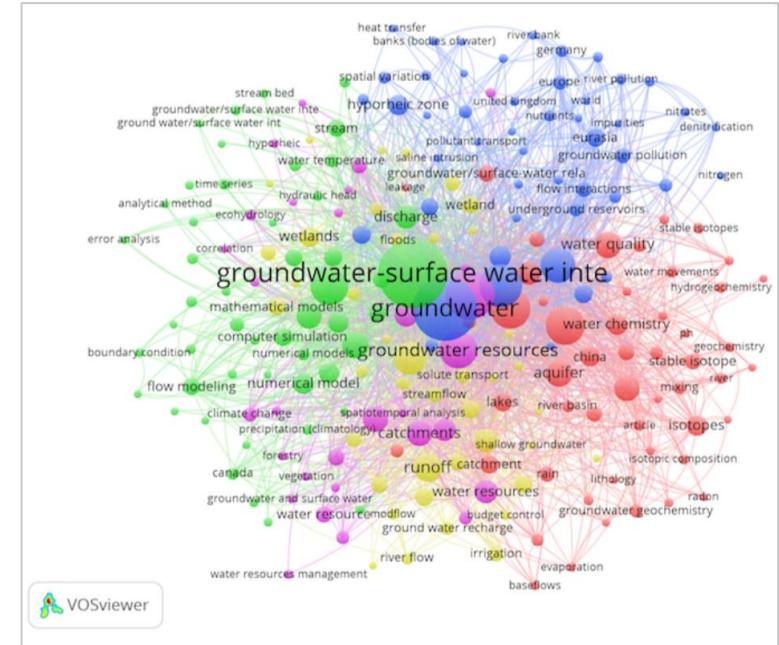
June 2023

What is bibliometrics?

Various ways of measuring certain indicators for the quantitative analysis of scientific output.

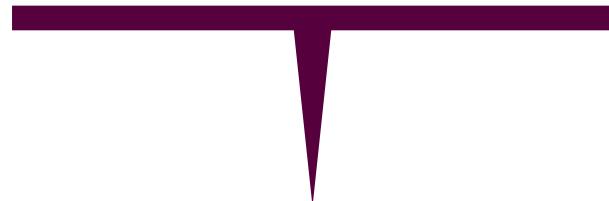
Fundamental assumptions:

- The central result of scientific research is the production of knowledge.
- Scientific literature is the manifestation of this process.
- Citations demonstrate how scientific works are received.



What does bibliometrics measure?

- Who
- When
- How often
- By whom



Publications

- in a journal
- of an author/institution

Single publications

are cited



Scientific Impact

Bibliometric indicators

Journals

e.g. Journal Impact Factor

People, Institutions

e.g. h-index

Articles

e.g. Altmetrics,
article level metrics

Journal indicators – example: **Journal Impact Factor (JIF)**

- Database: Web of Science (WoS): only journals referenced in WoS have a JIF.
- calculated yearly
- published in Journal Citation Reports (JCR)

Example: *American Economic Journal: Macroeconomics*

Journal Impact Factor™ is calculated using the following metrics:

Citations in 2021 to items published in 2019

(334) + 2020 (190)

524

— = — =

6.718

Number of citable items in 2019 (40) + 2020

(38)

78



Journal Impact Factor (JIF): use carefully!

JIF depicts a mean for an entire journal

- Not a statement about the quality of a single article
- Mean is strongly influenced by outliers

Subject-specific citation habits

- Comparison only for journals on the same subject

Some journals „do exceptionally well“

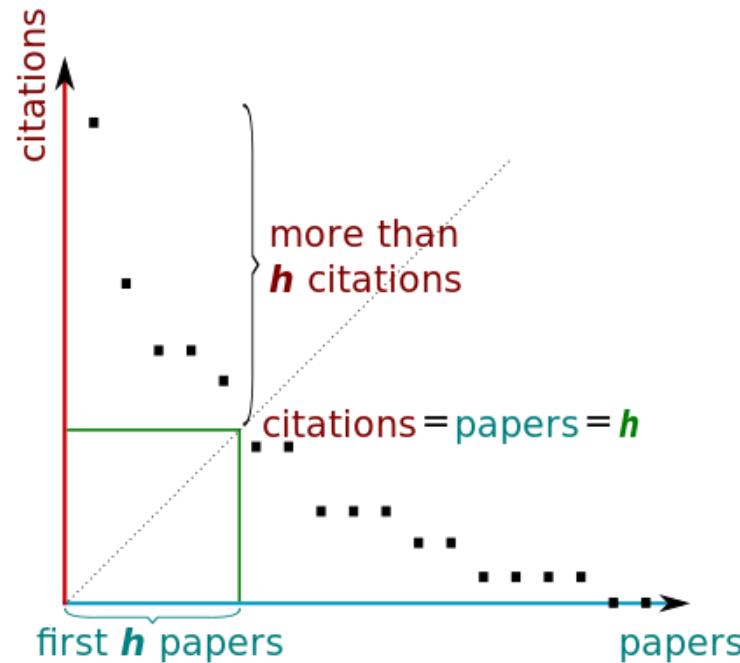
- Interdisciplinary journals
- Review journals
- „brand name“



Author indicators – example: h-index

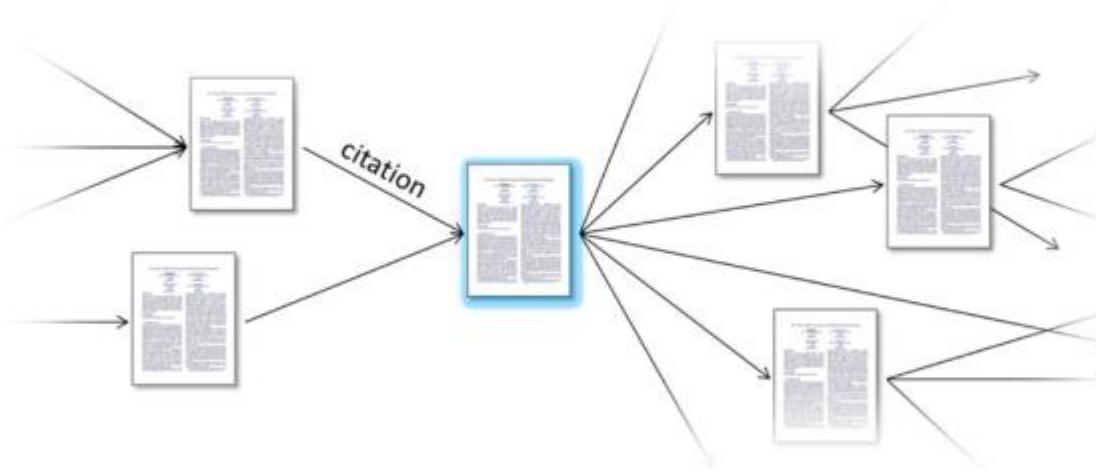
- describes the scientific output of an author
- Can be retrieved from citation databases (e.g. WoS, Scopus, Google Scholar)
- Calculated values differ (depending on time of the analysis and database)
- Older authors are at an advantage

Number of publications	Number of citations (highest first)
1	31
2	28
3	24
4	23
5	17
6	12
7	5
8	5
9	0



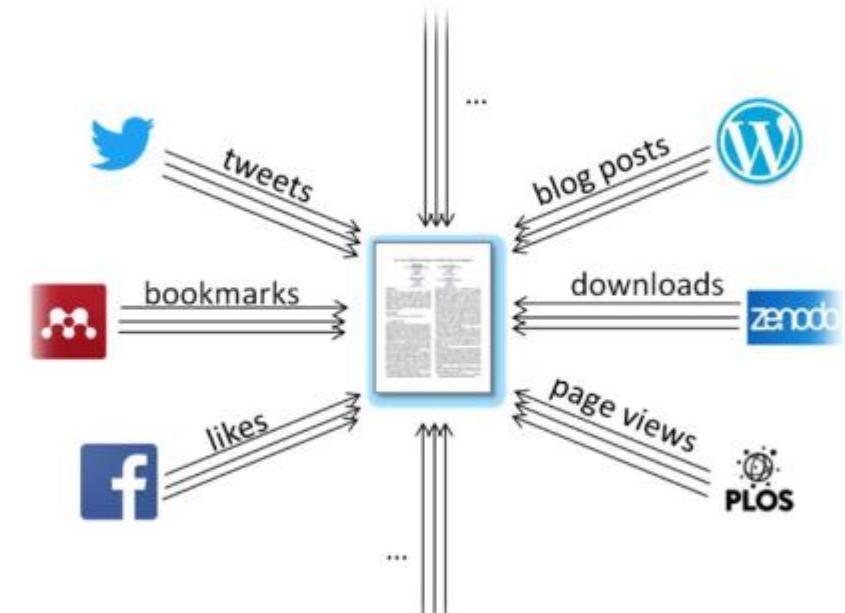
What are other ways to measure the impact of a publication?

Bibliometrics



How often is a publication cited by another scientific publication?

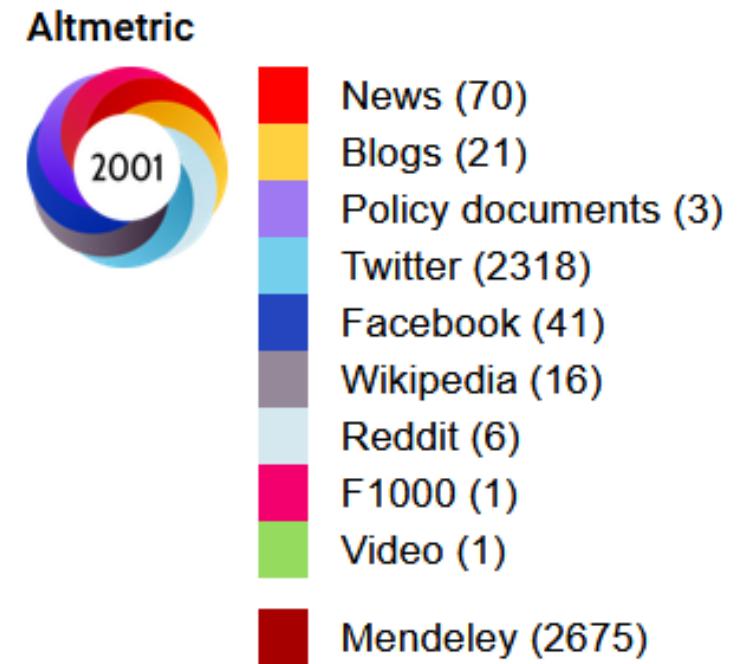
Altmetrics/usage metrics



How often do users interact with the publication online?

Altmetrics

- Early indicators for impact: faster than citations
- Informal scientific communication (often via social media) is taken into account
- Database is extended to all document types (conference contributions, monographs, research data etc.) and all subjects



Article level metrics

Example PLOS ONE

PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Iron Limitation Modulates Ocean Acidification Effects on Southern Ocean Phytoplankton Communities

Clara J. M. Hoppe, Christel S. Hassler, Christopher D. Payne, Philippe D. Tortell, Björn Rost, Scarlett Trimborn

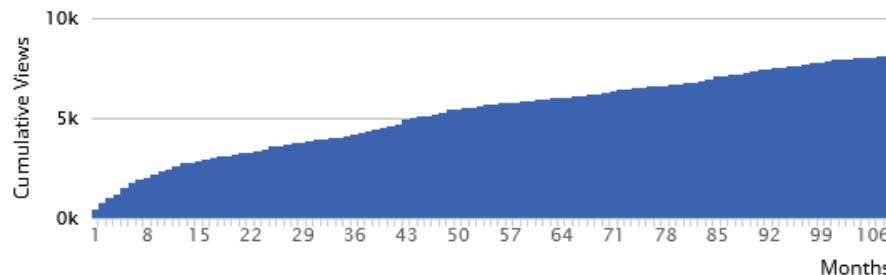
Published: November 20, 2013 • <https://doi.org/10.1371/journal.pone.0079890> 

Article	Authors	Metrics	Comments	Media Coverage
		▼		

Viewed

Total Article Views	HTML Page Views	PDF Downloads	XML Downloads	Total
8.109	6.167	1.822	120	8.109
29,544 % of article views led to PDF downloads				

Nov 20, 2013 (publication date)
through Oct 24, 2022 *



*Although we update our data on a daily basis, there may be a 48-hour delay before the most recent numbers are available.

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Issues with bibliometric indicators

- Validity depends on the quality of the underlying database
- Temporal delay of often several years
- Consider subject-specific publication and citation habits
- Check the scope of the sources evaluated:
 - Only English language?
 - Subjects covered?
 - Only journals or also books, conference papers,...?

Goodhart's Law:

When a measure becomes a target it ceases to be a good measure.



Open Science Myth? Busted!



Articles in a journal with a JIF of 10 are undoubtedly of better quality than articles in journals with lower JIFs.

Journal indicators should not be used to draw conclusions about single articles or authors. See also:

DFG's Code of Conduct “Safeguarding Good Research Practice” - Guideline 15: Publication medium:
The scientific/academic quality of a contribution does not depend on the medium in which it is published.

Further Information

- DFG's Code of Conduct "Safeguarding Good Research Practice" (2019)
- Hicks, D., Wouters, P., Waltman, L. et al. Bibliometrics: The Leiden Manifesto for research metrics. *Nature* **520**, 429–431 (2015). <https://doi.org/10.1038/520429a>
- San Francisco Declaration on Research Assessment (2013): <https://sfdora.org/read/>, zuletzt geprüft am 21.10.2020



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