

Multi-Stage Open Peer Review:

from Atmospheric Chemistry & Physics/EGU to
arXiv.org/SciPost Physics, Wellcome Open Research/eLife
and beyond

Ulrich Pöschl

*Max Planck Institute for Chemistry
Mainz, Germany
u.poschl@mpic.de*

Outline

Introduction

- *motivation & challenges*

Atmospheric Chemistry & Physics, European Geosciences Union

- *concepts & achievements of ACP/EGU*

Development & Perspectives of Multi-Stage Open Peer Review

- *earlier & recent initiatives: SciPost, Wellcome Open Research ...*
→ *epistemic web*

Conclusions & Suggestions

- *peer review & open access*
→ *OA2020 & DEAL*

Motivation for Open Peer Review

Traditional peer review is insufficient for efficient quality assurance in today's highly diverse & rapidly evolving world of science.

Editors & Referees: limited capacities

- few editors for large subject areas \Rightarrow limited knowledge of details & specialist referees
- work overload, conflicts of interest, little reward & incentive for constructive reviews
 \Rightarrow *superficial or prejudiced review & evaluation*

Traditional Pre-Publication Peer Review: retardation & loss of information

- delay of publication, dilution of messages, hidden obstruction/plagiarism
- critical & supportive comments unpublished/lost (often as interesting as paper)
 \Rightarrow *waste of reviewer capacities as most limited resource in scientific evaluation*

Traditional Discussion: sparse & late commentaries

- laborious, delayed & diluted by review (comment/article 1978 \Rightarrow 1998: 1/20 \Rightarrow 1/100)

Replacement of traditional pre-publication review by post-publication commenting not really successful (comments/article $< 5/100$)

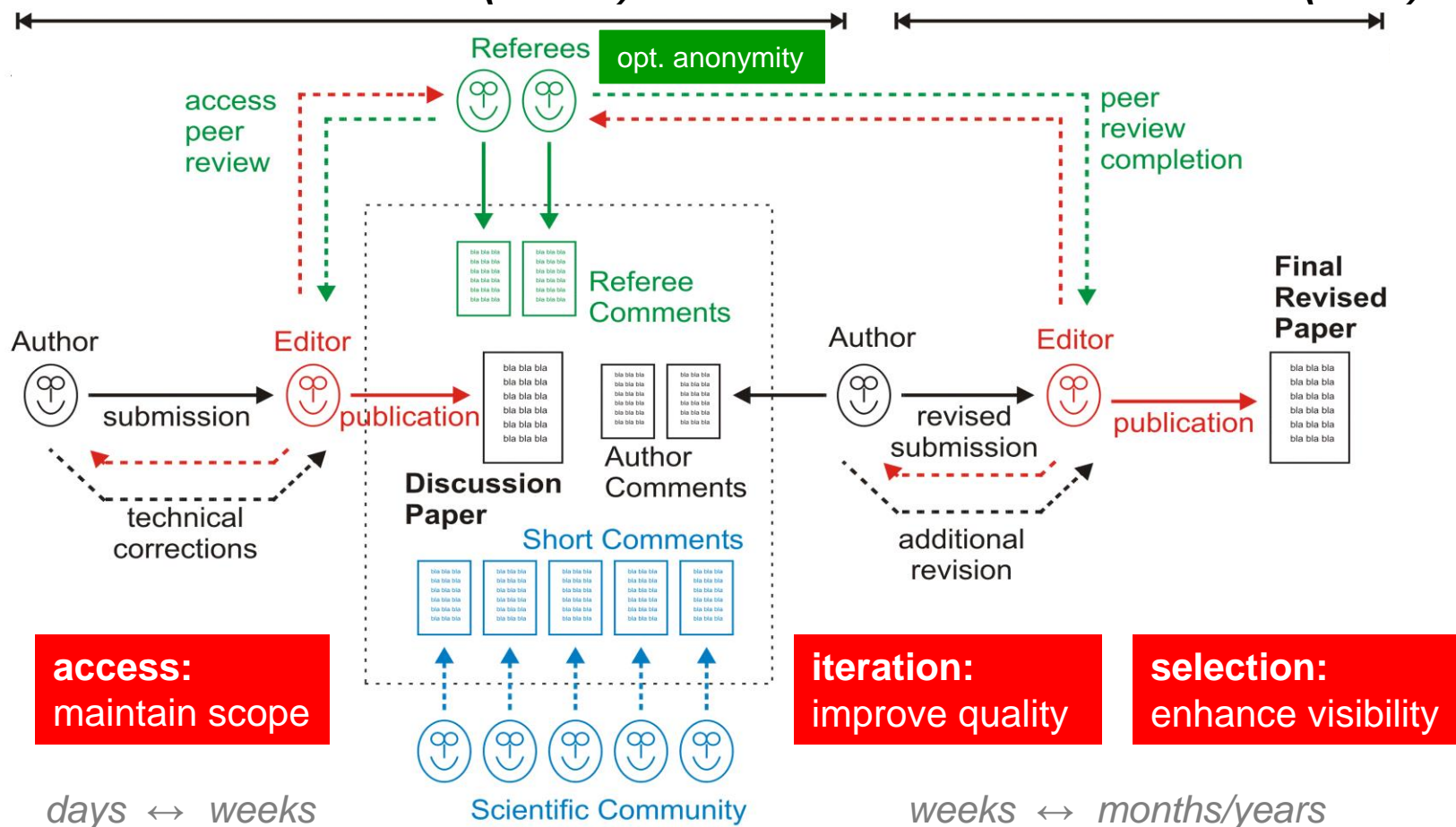
Evolution into Multi-Stage Open Peer Review: combine & integrate strengths of traditional peer review with virtues of **transparency, discussion & self regulation**

Multi-Stage Open Peer Review @ ACP/EGU

Transparent & transmissible advancement of traditional journal review:

OA Discussion Forum (ACPD)

OA Journal (ACP)



1. Pre-publication review & selection
short term

2. Public peer review & interactive discussion
mid-term, **integrative !**

3. Peer review completion
mid term

4. Post-publication review & evaluation
long-term, **ALM ...**

Advantages

All-win situation: authors, referees, editors, readers, community

Discussion Paper

- **free speech**, rapid publication, citable record (*authors, readers*)

Public Peer Review & Interactive Discussion

- direct feedback & public recognition for high quality papers (*authors*)
- prevent hidden obstruction & plagiarism (*authors, editors*)
- **foster & document scientific discourse**: critical comments, constructive suggestions, complementary information (*authors, referees, readers, editors*)
- document controversial arguments & innovations or flaws & misconduct (*referees, editors, readers*)
- deter submission of weak & false papers ⇒ **save reviewer capacities** (*referees, editors*)

Final Paper

- **maximize quality assurance & information density** through integration of peer review, public discussion & final revision (*readers*)

Achievements ACP/EGU

Atmospheric Chemistry & Physics (ACP)

launched 2001 with Nobel laureate P. Crutzen &

European Geosciences Union (EGU)

15 EGU sister journals since then:

Biogeosciences, Climate, Hydrology ...

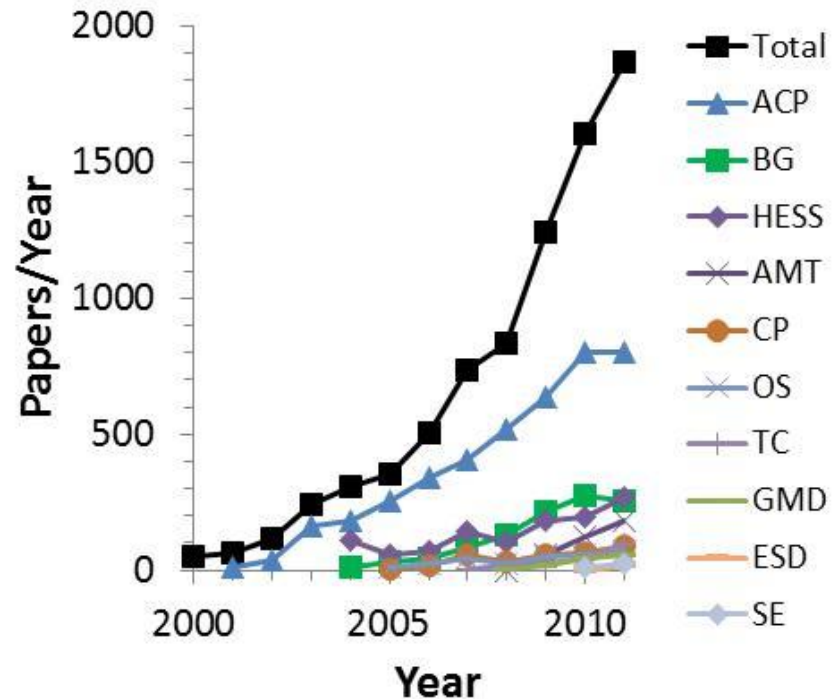
Large-scale move to interactive OA

publishing in geosciences:

> 10 000 papers; > 50 000 comments

Spread of concept to other communities/platforms:

Economics e-journal, SciPost Physics/arXiv.org, F1000 Research, Wellcome Open Research ...



Unique combination:

- top speed: 1+x weeks from submission to citable publication (discussion paper)
 - top impact & visibility (across atmos., environ. & geosciences)
 - low rejection rate (~15% vs. ~50+%)
 - large volume (~10% of geoscience journal market)
 - low cost (~1000 EUR/paper vs. ~2000-4000 EUR/paper)
 - fully self-financed & sustainable (incl. review, production, archiving & 10-20% surplus for publisher & society), 2014: ~3000 papers, ~3 MEUR turnover, ~300 kEUR surplus
- } self-regulation by transparency



Efficient handling & self-regulation of controversial papers & discussions

Volume 16, issue 6

Copernicus Publications
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■ Supplement (2930 KB)

Short summary

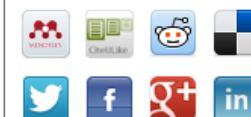
We use climate simulations, paleoclimate data and modern observations to infer that continued high fossil fuel...

► Read more

Citation

- BibTeX
- EndNote

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Atmos. Chem. Phys., 16, 3761–3812, 2016
<http://www.atmos-chem-phys.net/16/3761/2016/>
doi:10.5194/acp-16-3761-2016
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Research article

22 Mar 2016

Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous

James Hansen et al.

Download

- Final revised paper (published on 22 Mar 2016)
- Supplement to the final revised paper
- Discussion paper (published on 23 Jul 2015)
- Supplement to the discussion paper

Hansen et al. 2016: Climate Change, 110 comments, 138 000 downloads

www.atmos-chem-phys.net/16/3761/2016/acp-16-3761-2016-discussion.html

Status: closed

Interactive discussion

AC: Author comment | RC: Referee comment | SC: Short comment | EC: Editor comment

🖨 - Printer-friendly version 📄 - Supplement

- SC C5202: 'SC Two papers that conflict with section 2.2. argument for Eemian "superstorm" activity', Andrew Revkin, 26 Jul 2015 📄
SC C5522: 'Is a 10% increase in wind speed enough to increase wave heights enough to move the Bahamian boulders in the Eemian?', Michael Wehner, 31 Jul 2015 📄
AC C8101: 'Response to SC C5522', James Hansen, 15 Oct 2015 📄
AC C5615: 'Boulders in the Bahamas: Response to Comment by A. Revkin on paper Ice Melt, Sea Level Rise and Superstorms', James Hansen, 04 Aug 2015 📄
SC C5885: 'Boulders show mega-tsunamis and multi-metre sea level rise could result from rapid Arctic warming; both precautionary and preventative actions are required urgently', John Nissen, 13 Aug 2015 📄
AC C7872: 'Response to SC C5885', James Hansen, 12 Oct 2015 📄
SC C6270: 'Speculations on superstorms', Max Engel, 26 Aug 2015 📄
AC C7633: 'Reply to SC C6270 'Speculations on superstorms'', Max Engel, 26 Aug 2015', James Hansen, 06 Oct 2015 📄 📄
SC C5208: 'Evidence and validation', Erik Stabenau, 26 Jul 2015 📄
SC C6508: 'Antarctic sea ice growth', Steven Marcus, 03 Sep 2015 📄
AC C7963: 'Response to SC C6508', James Hansen, 13 Oct 2015 📄 📄
AC C7962: 'Response to SC C5208', James Hansen, 13 Oct 2015 📄 📄

- RC C5209: 'Very important but strenuous paper', David Archer, 27 Jul 2015 📄
SC C5270: 'Archer's comment on Hansen's new SLR paper', Rud Istvan, 27 Jul 2015 📄
SC C5316: 'RE: Rud Istvan's reply to 'Archer's comment on Hansen's new SLR paper'', Tim Pa
SC C5336: 'Greenland ice mass loss', Rud Istvan, 29 Jul 2015 📄
AC C7878: 'Response to SC C5336', James Hansen, 12 Oct 2015 📄
AC C7876: 'Response to SC C5316', James Hansen, 12 Oct 2015 📄
AC C7874: 'Response to SC C5270', James Hansen, 12 Oct 2015 📄

Makarieva et al. 2008, 2013: Meteorology, 33+20 comments

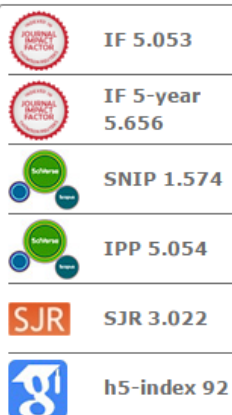
www.atmos-chem-phys-discuss.net/acpd-2008-0250/
www.atmos-chem-phys.net/13/1039/2013/acp-13-1039-2013-discussion.html

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For reviewers

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Journal metrics



► Definitions

Abstracted/indexed

- Science Citation Index

Alternative Concepts

Details & subtleties can make a difference.

Open Peer Review without Anonymity

- e.g. JIME, BMJ, BMC Medicine, BMC Biology Direct ...
- no opportunity for referees to remain anonymous
- *difficulties with critical comments & refereeing capacities*

Pre-Publication History & Post-Commenting (Peer Commentary)

- e.g. BMC Medical Journals, BBS, PLOS One, BMJ, PeerJ ...
- no integration of peer review & public discussion
- *less opportunity & incentive for community participation*

Multi-Stage Open Peer Review

- e.g. ACP & EGU/Copernicus, Economics e-journal, F1000 Research, **SciPost/arXiv** ...
- do not abandon traditional peer review but maintain its strengths & reduce its weaknesses by transparency & interactive discussion
- optional anonymity, integrate peer review & public discussion, iterate review & revision
- *evolutionary & modular approach, flexibly adjustable to different communities*

Outside Perspectives & Feedback

Bornmann et al., Is Interactive Open Access Publishing Able to Identify High-Impact Submissions?, J. Am Soc. Inform. Sci. Technol., 2013

A Study on the Predictive Validity of Atmospheric Chemistry and Physics by Using Percentile Rank Classes

All in all, our results on the predictive validity of the ACP peer review system can support the high expectations that Pöschl (2010), chief executive editor of ACP, has of the new selection process at the journal:

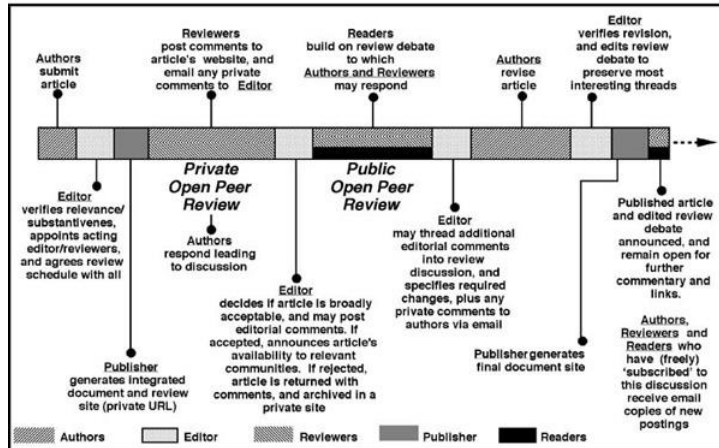
“The two-stage publication process stimulates scientists to prove their competence via individual high-quality papers and their discussion, rather than just by pushing as many papers as possible through journals with closed peer review ...”

Ho et al., Views on the peer review system of biomedical journals, BMC Med. Res. Method., 2013

Survey of 1300/28000 biomedical academics & conclusions/recommendations:

Biomedical journals may consider issuing publication ethics guidelines, offering courses for reviewers, providing authors with channels to expressing their concerns and the adoption of multi-stage open peer review.

Development & Variants of Multi-Stage Open Peer Review

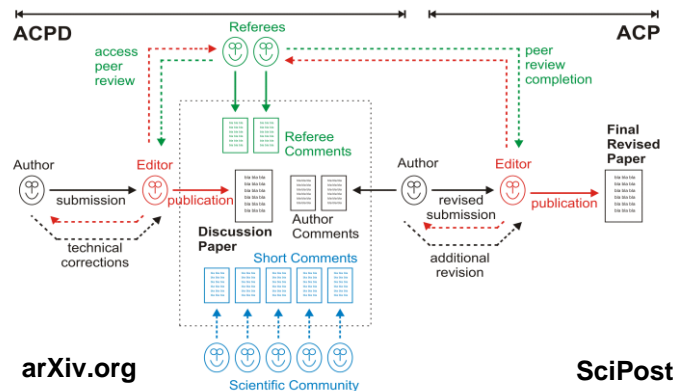


Electronic Journals (since 1996)

JIME: J. Interactive Media in Education, since 1996, returned to traditional review

ETAI: Electr. Transact. Artificial Intelligence, 1997-2002

... too complex/immature, too early ?



Forums/Repositories + Journals (since 2001)

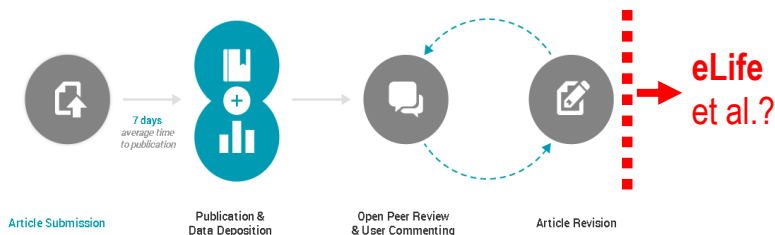
ACP & EGU: Atmos. Chem. Phys. & European Geosciences Union, 15 journals, since 2001

Economics E-Journal: since 2007

SciPost Physics/arXiv.org: since 2016

... well-defined, mature & successfully competing with traditional top journals

similar mechanics & options, why truncate ?



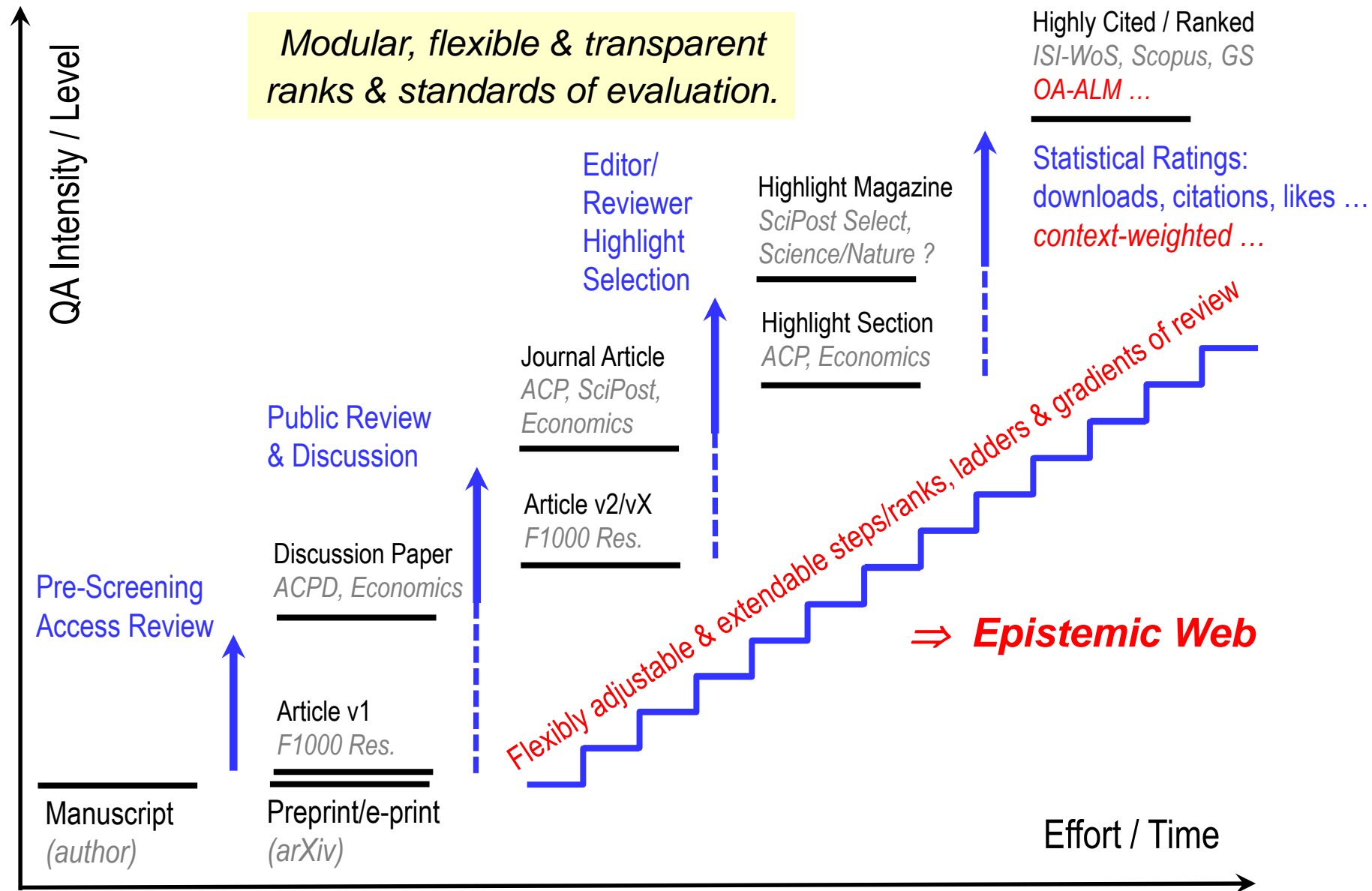
Platforms w/o Journals (since 2012)

F1000 Research: since 2012

Wellcome Open Research: since 2016

*... technical advances vs. conceptual truncation ?
how to attract & maintain high quality ?*

Adjustments & Gradients of Multi-Stage Open Peer Review



Vision

*Promote societal progress by OA & (multi-stage) OPR
in global commons of scholarly information.*

Provide access to high quality scientific publications

review & revision involving the community

⇒ *more & better information for scientists & society*

Document the scientific discourse

public record of scientific evidence, arguments & progress

⇒ *universal & traceable web of knowledge (epistemic web)*

Demonstrate transparency & rationalism

transparent & rational approach to complex questions & problems

⇒ *role model for societal decision processes*

Conclusions

Peer review as a tool for self-assessment appears essential for maintaining the freedom and self-determination of science in the context of societal demands and pressures. It should be advanced rather than abandoned or delegated to administrators or computers.

Multi-stage open peer review is well established and can be used to efficiently combine and integrate the strengths of traditional & innovative forms of peer review and publication. For example, discussion forums can be implemented in traditional journals, and repositories can be used for pre-publication and peer review of manuscripts prior to publication in a journal. In particular, [arXiv.org](https://arxiv.org) has served as a preprint server and discussion forum linked to traditional physics journals as well as highlight magazines since 1991 (e.g., APS PRL journals, Nature, Science etc.), and now it also serves as a platform for open peer review in new journals ([Sci Post](https://www.sciopen.com)). Similarly, [F1000 Research](https://www.f1000research.com), [Wellcome Open Research](https://www.wellcomeopenresearch.org) and similar platforms could attract top quality papers by enabling open review for life science journals and magazines (e.g., [eLife](https://www.e-life.org)).

Transparency is a key element that leads to self-regulation in scientific quality assurance. However, transparent handling of comments and decisions appears sufficient, while maintaining **optional anonymity** for reviewers appears beneficial for efficient peer review.

Journals and their editors may become obsolete when they receive no further input from or instead of other publishing platforms (repositories, ...). So far, however, this happened neither because of arXiv “e-prints” in physics (since 25 years) nor because of ACP/EGU “discussion papers” in the geosciences (since 15 years).

“Reinventing scholarly publishing” appears not really necessary (like re-inventing the wheel). Advancement & evolution appear far more efficient (like in nature and technology).

Suggestions & Outlook

1) Continue & promote experiments with improved forms of peer review

- build on existing models & experience rather than re-inventing the wheel
- use & expand multi-stage open peer review as flexible tool kit
- link Wellcome Open Research *et al.* to eLife *et al.* (in analogy to arXiv & SciPost)

2) Introduce & demand access to article reviews & pre-publication history

- establish new standards & proofs of quality assurance to cope with increase of scholarly articles & journals (incl. predatory OA publishers)

3) Advance & apply new metrics of publication impact & quality

- use article level metrics instead of misleading journal impact factors
- use OA to terminate intransparent & unscholarly reliance on citation counting oligopoly (WoS, Scopus, Google Scholar, ...)

4) Promote open access publishing as a basis for innovation

- continue to support new & improved forms of OA publishing
- trust principles of mass & energy conservation: OA publishing costs can be covered by conversion of subscription budgets (offsetting ...)
- **endorse OA2020 Initiative & Eol for OA Transformation of Scholarly Journals**
(see oa2020.org & B13/B14 Open Access Conferences)
- **DEAL negotiations for German National Licenses:** Wiley, Springer, Elsevier and beyond

Further References I

The following references and links provide orientation about the development and perspectives of open access in general and interactive open access publishing with public peer review and interactive discussion in particular (multi-stage open peer review as practiced at EGU).

1. Open Access Declarations & Initiatives

1.1. Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities

<http://openaccess.mpg.de/286432/Berlin-Declaration>

<http://openaccess.mpg.de/319790/Signatories>

http://openaccess.mpg.de/mission-statement_en

http://openaccess.mpg.de/1527674/Session_II

<http://openaccess.mpg.de/1528633/Session-2-Poeschl.pdf>

1.2. Bethesda Statement on Open Access Publishing

<http://legacy.earlham.edu/~peters/fos/bethesda.htm>

1.3. Budapest Open Access Initiative

<http://www.budapestopenaccessinitiative.org/>

<http://www.budapestopenaccessinitiative.org/boai-10-recommendations>

<http://www.opensocietyfoundations.org/voices/opening-access-research>

2. Development & Concepts of Interactive Open Access Publishing & Public Peer Review

2.1. Multi-stage open peer review: scientific evaluation integrating the strengths of traditional peer review with the virtues of transparency and self-regulation

<http://journal.frontiersin.org/Journal/10.3389/fncom.2012.00033/abstract>

2.2. Interactive journal concept for improved scientific publishing and quality assurance

<http://www.ingentaconnect.com/content/alpsp/lp/2004/00000017/00000002/art00005>

Further References II

2.3. A Short History of Interactive Open Access Publishing

http://publications.copernicus.org/A_short_History_of_Interactive_Open_Access_Publishing.pdf

2.4. EGU Position Statement on the Status of Discussion Papers Published in EGU Interactive Open Access Journals, European Geosciences Union 2010

<http://www.egu.eu/about/statements/position-statement-on-the-status-of-discussion-papers-published-in-egu-interactive-open-access-journals/>

2.5. Further initiatives & visions of open evaluation

<http://www.economics-ejournal.org/>

<http://f1000research.com/>

<https://www.scienceopen.com/>

http://www.frontiersin.org/Computational_Neuroscience/researchtopics/Beyond_open_access:_visions_for_open_evaluation_of_scientific_papers_by_post-publication_peer_review/137