The rise of preprints in earth sciences

Olivier Pourret, Daniel Enrique Ibarra

OPINION ARTICLE

REVISED The rise of preprints in earth sciences [version 2; peer review: 2 approved, 1 approved with reservations]

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v2 **First published:** 30 May 2023, **12**:561
https://doi.org/10.12688/f1000research.133612.1
Latest published: 10 Jul 2023, **12**:561
https://doi.org/10.12688/f1000research.133612.2

Abstract

The rate of science information's spread has accelerated in recent years. In this context, it appears that many scientific disciplines are beginning to recognize the value and possibility of sharing open access (OA) online manuscripts in their preprint form. Preprints are academic papers that are published but have not yet been evaluated by peers. They have existed in research at least since the 1960s and the creation of ArXiv in physics and mathematics. Since then, preprint platforms—which can be publisher- or community-driven, profit or not for profit, and based on proprietary or free and open source software—have gained popularity in many fields (for example, bioRxiv for the biological sciences). Today, there are many platforms that are either disciplinary-specific or cross-domain, with exponential development over the past ten years. Preprints as a whole still make up a very small portion of scholarly publishing, but a large group of early adopters are testing out these value-adding tools across a much wider range of disciplines than in the past. In this opinion article, we provide perspective on the three main options available for earth scientists, namely EarthArXiv, ESSOAr/ESS Open Archive and EGUsphere.

Keywords

Open Access, Preprint, Open Science

This article is included in the Future of Research (FoR) collection.

Open Peer Review

Approval Status ✓ ? ✓

	1	2	3
version 2 (revision) 10 Jul 2023	✓ view		✓ view
version 1 30 May 2023	? view	? view	? view

1. **Blanca Rodriguez-Bravo**, University of León, León, Spain
2. **Zhiqi Wang**, Dalian University of Technology, Dalian, China
3. **Daniel J. Dunleavy**, Florida State University, Tallahassee, USA

Any reports and responses or comments on the article can be found at the end of the article.

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Author roles: Pourret O: Conceptualization, Data Curation, Formal Analysis, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Ibarra DE**: Conceptualization, Formal Analysis, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: OP is a Community Gateway Advisor for Earth and Environmental Sciences on Open Research Europe. DEI was a founding advisory board member for EarthArXiv.

Grant information: The author(s) declared that no grants were involved in supporting this work.

How to cite this article: Pourret O and Ibarra DE. **The rise of preprints in earth sciences [version 2; peer review: 2 approved, 1 approved with reservations]** F1000Research 2023, **12**:561 https://doi.org/10.12688/f1000research.133612.2

First published: 30 May 2023, **12**:561 https://doi.org/10.12688/f1000research.133612.1

REVISED **Amendments from Version 1**

We have refined the article as proposed by the three reviewers. We thank them.

Briefly, we have reworked the introduction where we have added some nuances regarding preprint definition as proposed by reviewer 3 and added some references. We have added some details in the introduction regarding the preprint history as also suggested by reviewer 3 and added some references.

As proposed by reviewers 2 and 3, we have detailed the three preprint servers; we have added details in the form of short paragraphs on each of the 3 preprint servers mentioned in our submission.

We have added some details on the methodology.

We have added some details on the advantage of using discipline specific preprint servers as compared to general ones.

As pointed out by the three reviewers, we have balanced positive and negative aspects of using preprints and thus expanded the drawbacks section. We have added some more bullets and have considered the proposed references. We also further cite the pioneer work of Ginsparg (2016).

We have added a few more examples dedicated to Earth Sciences.

We have added a sentence on future development of preprints in our discipline in conclusion.

We have added some words in the acknowledgment section regarding the EarthArXiv preprint version of this opinion paper that let us be invited to submit this paper to F1000Research.

Any further responses from the reviewers can be found at the end of the article

Introduction

A research article's preprint is its initial draft shared online, which is frequently (but not always) created before submission to a journal and formal peer review (Sarabipour *et al.*, 2019). Though it includes manuscripts that are best described as an "initial draft shared online", the term preprint (somewhat unfortunately) appears to encompass many different things (including post-print manuscripts and materials and resources never intended for publication) (see discussion in Tennant *et al.*, 2018). Preprint archiving services have existed since the 1960s, and thus are not a recent invention (Ginsparg, 2016). In 1961, the USA National Institutes of Health launched a program called Information Exchange Groups, designed for the circulation of biological preprints, but this was shut down in 1967 (Confrey, 1966; Cobb, 2017). Some other alternatives were launched (Wykle, 2014) but were unsuccessful. A centralized online network called arXiv, pronounced "är kv" (from the Greek letter "chi"), was created in August 1991 to exchange physics preprints (Bourne *et al.*, 2017). For more than 30 years, arXiv has assisted the fields of physics, mathematics, and computer science, during which time the rate of scientific knowledge dissemination rapidly accelerated (Ginsparg, 2016; Tennant *et al.* 2019).

A range of cross-domain or discipline-specific preprint platforms now exist, with exponential growth these last ten years (Kirkham *et al.*, 2020). Preprints as a whole only represent a very small fraction of scholarly publication, but a strong group of early adopters is starting to adopt their use, which is adding value across a much wider range of disciplines than before. Preprint archiving may aid in the modernization of Earth Sciences publishing by removing obstacles to widespread scientific engagement and stumbling blocks to the development of an open and transparent research culture (Pourret *et al.*, 2022).

In this Opinion Article, we further look at the evolution of three main options for earth scientists, namely EarthArXiv, ESSOAr/ESS Open Archive and EGUsphere and provide opinion on benefits and issues using preprints in earth sciences.

Preprints in earth sciences

Preprints have recently gained popularity across a wider range of academic fields, including the Earth Sciences (Nature Geoscience Editorial Board, 2018). The three main preprints servers in Earth Sciences are EarthArXiv, ESSOAr/ESS Open Archive and EGUsphere.

(i) EarthArXiv (Narock *et al.*, 2019). Active since 2017, EarthArXiv is a preprint server devoted to open scholarly communication. EarthArXiv publishes articles from all subdomains of Earth Science and related domains of planetary science. EarthArXiv does not evaluate the scientific quality of submissions. Instead, EarthArXiv serves as a volunteer community-driven platform for free hosting and rapid dissemination of scientific results. EarthArXiv partners with California Digital Library (part of the University of California

system) as their server host and submission platform using a system called Janeway (developed at Birkbeck, University of London). EarthArXiv also receives a continued support from the Earth Science Information Partners.

(ii) ESSOAr was started in 2018, and recently evolved into the ESS Open Archive. The Earth and Space Science Open Archive is a community server established to accelerate the open discovery and dissemination of earth, environmental, and space science research by archiving and sharing early research outputs, including preprints, presentations from major scientific meetings, and important documents of scholarly societies. ESS Open Archive is governed by a partnership among the following societies (American Geophysical Union, AGU; American Society of Agronomy; Association for the Sciences of Limnology and Oceanography; Crop Science Society of America; Ecological Society of America; Society of Environmental Toxicology and Chemistry; Soil Science Society of America) and Wiley and Authorea. Financial and technical support is provided by AGU and Wiley. ESS Open Archive also allows researchers to preserve their posters or slide presentations from recognized scientific conferences. ESS Open Archive allow, and encourages, linking to data sets in leading repositories or other online resources such as posters and videos. Jupyter notebooks can also be included as supplements. ESS Open Archive also provides an archive for official materials of scholarly societies.

(iii) Earth Scientists who have published in the many journals of the European Geosciences Union (EGU) have already become accustomed to such openness and are posting their work prior to peer-review as a discussion on the Copernicus platform (Voosen, 2017). More than 20 years ago, EGU introduced the unique concept of open discussion and transparent peer review in which preprints were posted online; they now have a centralized preprint service EGUsphere, the not-for-profit open scientific repository of the European Geosciences Union (EGU), brings together preprints in the domain of Earth, Space, and Planetary sciences in a diverse, inclusive, and systematic collection of contributions, including conference abstracts, conference presentations and preprints to their articles (mostly) submitted to an EGU journal. EGUsphere is transparent and interactive, giving authors of presentations and preprints the opportunity to receive attributed comments from the public aimed at stimulating discussion, cooperation, and to revise their materials in open review.

All content posted on these three preprint servers receives a DOI and is citable and freely accessible. Preprints will, where possible, link and resolve to the official published version of record, once available.

Cumulative numbers of preprints from EarthArXiv, ESS Open Archive and EGUsphere were sourced from preprint servers individually (data accessed on January 02 2023). As the numbers are not readily accessible on each servers, the numbers were searched, filtered and counted for each year to generate the total number of preprints. As illustrated on Figure 1, the cumulative numbers of preprints from EarthArXiv, ESSOAr/ESS Open Archive and EGUsphere increased this last five past years; EarthArXiv published 3,429 preprints in five years, ESSOAr/ESS Open Archive published 7,436

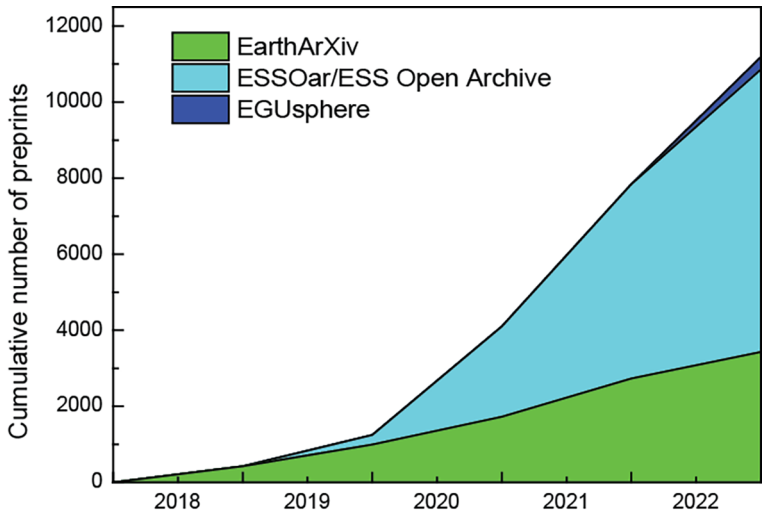

Figure 1. Cumulative numbers of preprints from EarthArXiv, ESS Open Archive and EGUsphere (data sourced from preprint servers individually, accessed on January 02 2023).

Table 1. Number of preprints by preprint server by year (data sourced from preprint servers individually, accessed on January 02 2023).

	2018	2019	2020	2021	2022
EarthArXiv	425	570	731	1006	697
ESSOAr/ESS Open Archive	-	253	2123	2738	2322
EGUsphere	-	-	-	-	326

in four years and EGUsphere published 326 preprints in less than a year (see Table 1 for details). These numbers still continue to grow and are following a similar track that preprints in biomedical disciplines did ten years ago (Penfold and Polka, 2019) but are not exponential as in medicine during COVID-19 pandemic (Watson, 2022).

Some specific more biological subjects may be submitted to bioRxiv or some more specific and rather confidential servers like for paleontology PaleorXiv. Moreover, some other regional preprint services also exist as well as more general ones (e.g. Irawan *et al*., 2022); a list can be found here (Kirkham *et al*., 2020). Like for the scientific literature in general, the main advantages of discipline-specific servers, compared to using any number of other "generic" platforms (e.g., Zenodo or simply OSF Preprints) is to be specific to the discipline.

Benefits and issues using preprints

Preprints have numerous, well-established advantages for both researchers and the general audience (e.g., Bourne *et al*., 2017; Sarabipour *et al*., 2019; Pourret and Irawan, 2022). It is the author's opinion that preprints, for instance, allow:

- The quick dissemination of research findings, which is important for time-sensitive studies (such as those conducted after natural disasters), for early-career researchers (ECRs) applying for jobs, or for any academic applying for grants or a promotion, given that journal-led peer review can take months or even years (Nguyen *et al.*, 2015);

- Increased visibility and accessibility for research outputs due to the preprint's free uploading and viewing, especially for individuals who do not have access to paywalled journals or who have restricted access because of remote working (such as during lockdowns);

- Increased visibility may also lead to increased interdisciplinary or transdisciplinary work in fields that would benefit from collaboration between Earth scientists and other disciplines (e.g., Dwivedi *et al*., 2022). Examples include geologic carbon dioxide removal strategies, water resources management and critical minerals.

- Authors benefit greatly from feedback from interested readers, contributing to improved versions of articles. This is important, since later versions of articles that are simultaneously submitted to journals can benefit from both the journal-mediated peer review and the "crowdsourced" review (Ginsparg, 2016).

- Peer feedback that goes above and beyond what is offered through journal-led peer review (Tennant and Ross-Hellauer, 2020), increasing the likelihood of collaboration through community input and discussion; ECRs can also trained and write their first peer-review of preprints without being asked to.

- Researchers to set priority (or a precedent) for their findings to reduce the possibility of being "scooped" by being assigned a digital object identifier (DOI). Some researchers may be afraid or unable to present their results at conferences. Additionally, abstracts available in conference books and proceedings might not always reflect what is presented on the day of the conference. Preprints allow research output to exist, be known and be stored in the digital world;

- Dismantling of silos that traditional journals sustain by exposing us to a wider range of research than we might otherwise encounter and providing a home for works that do not clearly have a traditional peer-review publication as their intended destination (*i.e.* sharing diverse types of outputs such as data, research code, or methods);

- Openness and transparency in research, with a focus on enhancing the overall standard, reliability, and reproducibility of findings.

- Authors always have the option of submitting revised versions, with corrections, or they can post a withdrawal notice with explanation for the action taken. In either case, all previous versions remain archived and accessible for comparison, with their original date-stamps (Ginsparg, 2016).

Despite these benefits, some authors point out that preprints without peer review raise a host of issues that may vary by discipline and publication type (e.g. Meinert, 2020):

- They may come with a caveat that interpretations are subject to change and that they may or may not lead to actual peer reviewed publication;

- The increased dissemination effect has the potential to be used to promote non-reproducible scholarship or fake news and adds an extra potential burden on readers (e.g. Pourret *et al*. 2020). But fake news has plagued climate and environmental science for decades (e.g. Nature Communications Editorial Board, 2017) and it is not specific to just preprinted papers. While the original intent of the preprint servers was rapid dissemination, it very quickly became the go-to place for archival access as well, and this has evolved to become an important component of its utility and popularity. Authors are understandably determined to propagate correct information whenever possible, so rather than let readers be misinformed or confused, they ideally make immediate corrections to a latest version, since that's what many readers access, either before or after publication elsewhere. This is the inevitable consequence if preprint servers come to be regularly used for archival access (Ginsparg, 2016);

- ECR may wary of publications that do not pass prior quality control. Therefore, they often hold back from publishing preprints, and not just because coauthors, senior researchers, prefer to publish in traditional journals. ECRs, due to the competitive circumstances of their career stage, are sometimes more opposed to publishing preprints that do not lead to a traditional publication than other already tenured researchers (Nicholas *et al.*, 2022);

- Posting preprints is advantageous for ECRs because they can be shared, cited, and demonstrate productivity. However, the decision to preprint a manuscript must be made by all of the co-authors, and ECRs are frequently not the decision-maker due to power dynamics associated with academia (Ettinger *et al.*, 2022). As a result, ECRs could encounter circumstances in which they are eager to deposit a preprint but are unsure of how to contact their co-authors or bring up the possibility of preprinting to their advisors. It is especially important for those of them leaving their research group after a contractual term. Indeed, in a short time it is not always possible to fully write a research paper in this particular field, as the process of conducting a field study, sampling and geochemical analyses could take years;

- Preprints may have some other disadvantages, including information overload, insufficient quality assurance, political influence, and outsized impact (e.g. Smart, 2022).

Based on policies collated on Sherpa Romeo of the earth sciences journals, a majority of those journals do accept manuscripts preprinted prior to or during submission. As an example 84% of journals in geochemistry allow for preprinting (Pourret *et al*., 2020). The journals that do not offer a preprint option often do that because their thematic articles are mostly invited, generally review papers, and very rarely include the release of new data. This discrepancy is an example where the style and purpose of a given journal or magazine may influence editors and editorial boards to treat preprints differently based on the objectives of that scientific publication. Eventually, preprint philosophy slightly evolves as some servers include peer-review more or less in an official manner (see Table 2 in Ettinger *et al.*, 2022). As an example, Peer Community In should be highlighted as an option but none such community exists in Earth Sciences yet.

Concluding remarks

Overall, preprints have played a crucial role in advancing science for the benefit of humanity during the pandemic, according to the opinions of medical and scientific communities as well as the general people (Besançon *et al*., 2021). They are now included in some major bibliographic databases. Even if not always allowed by some funding agencies (e.g. Australian Research Council, Lanati *et al*., 2021), preprints are now a recognized step in the publication of scientific research and will continue to be used. For example, on Open Research Europe, the open access platform of Horizon 2020, Horizon Europe and Euratom funded projects, submitted articles are published prior to peer review, similar to preprints. Indeed, preprints are assisting in the modernization of our disciplines by reducing structural hurdles that prevent taxpayers, who frequently support knowledge development, from accessing science and knowledge, as well as by making research findings rapidly available to anybody who might benefit from them. The preprint landscape is

moving fast, in early December 2022 *PLOS* announced in a press release a new partnership with *EarthArXiv*. Despite being new to many if not most Earth Scientists, all these announcements should help to increase the use of preprint in our community.

Additionally, *PLOS*, in partnership with *DataSeer*, has just released the first Open Science Indicators dataset, which uses large-scale Natural Language Processing to analyze published research articles to identify and track Open Science practices (Public Library of Science, 2022). The first three indicators included are: data sharing, code sharing, and preprint posting. Importantly, these metrics are not intended to rate or rank journals or publishers, but rather to set benchmarks, monitor changes over time, and better understand the research community's use of Open Science practices such as preprinting. Even if bioRxiv reports up to 53% of preprints that are later published as papers (Abdill and Blekhman, 2019), Eckmann and Bandrowski (2023) estimated a bigger conversion from preprints to published articles. It is the author's opinion that preprints are certainly here to stay!

Data availability

No data are associated with this article.

Acknowledgments

A preprint version of this article has already been published on EarthArXiv and can be accessed at https://doi.org/10.31223/X5936H. We thanks Ruth Fisher for sharing our preprint, we thanks Jack Brook for inviting us to submit our preprint as an opinion to F1000Research. We thanks Alain Queffelec for his comments on our preprint. We thanks Blanca Rodriguez-Bravo, Zhiqi Wang and Daniel J Dunleavy for their thorough and constructive reviews of our submitted version.

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Open Peer Review

Current Peer Review Status: ✔ ? ✔

Version 2

Reviewer Report 21 July 2023

https://doi.org/10.5256/f1000research.152594.r185628

✔ **Blanca Rodriguez-Bravo**
Department of Library and Information Science, University of León, León, Castile and León, Spain

I congratulate the authors for the new version of the article that is more complete with the information added to the introduction about the preprint servers, mainly. Besides, I thank them for the full consideration of my comments. I can see the issues of using preprints more complete and both benefits and issues better balanced.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Scientific communication; Information behaviour; Knowledge organization

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 11 July 2023

https://doi.org/10.5256/f1000research.152594.r185630

✔ **Daniel J. Dunleavy**
Center for Translational Behavioral Science, Florida State University, Tallahassee, Florida, USA

I thank the authors for their consideration of my previous comments and questions. Overall, I was satisfied with the responses to the feedback from both myself and the other reviewers.

(1) I think the discussion of the three preprint servers in the Earth Sciences is markedly improved.

(2) The authors say that, "Like for the scientific literature in general, the main advantages of discipline-specific servers, compared to using any number of other “generic” platforms (e.g., Zenodo or simply OSF Preprints) is to be specific to the discipline."

I still think this point could still be fleshed out in more detail. I intuitively understand what is meant by the statement - but feel that the point could be articulated more fully.

(3) Re: Benefits of preprints. Something that is tacitly discussed is the concept of version control. This could be unpacked just a bit more, in my opinion. While some journals and platforms (e.g., F1000) readily support version control, one of the biggest benefits of (most) preprint platforms, in my estimation, is the ability to continuously update/expand/refine/etc. - such that manuscripts become more of a living-document, rather than the "final word" on a project or subject.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: I am an academic social worker by training (PhD) with an extensive record of publishing on issues related to open science, peer review, and issues in scholarly publishing.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 20 June 2023

https://doi.org/10.5256/f1000research.146618.r175863

?

Daniel J. Dunleavy
Center for Translational Behavioral Science, Florida State University, Tallahassee, Florida, USA

The authors have written an opinion piece outlining the rise and use of preprints in the earth sciences. They briefly describe the history of preprints, identify three common preprint platforms used in the field, and articulate the strengths and limitations for researchers and scholars of posting preprints.

I found the manuscript to fill a somewhat niche, but relevant area of discussion. Its strengths lie in its overall exposition of the strengths and limitations of preprints and overview of the *EarthArXiv, ESSOAr/ESS Open Archive,* and *EGUsphere* platforms.

I hope the following comments, questions, and suggestions help strengthen the overall quality of

the manuscript. Additionally, please be advised that any and all references included in this review are suggestive and not meant to be viewed as compulsory.

Introduction

(1) I somewhat disagree with the opening sentence. Though it includes manuscripts that are best described as an "initial draft shared online", the term preprint (somewhat unfortunately) appears to encompass many different things (including post-print manuscripts and materials and resources never intended for publication). There's a brief, but decent discussion here:

https://scholarlykitchen.sspnet.org/2017/04/19/preprint-server-not-preprint-server/ (see also the comments)

and here:

https://doi.org/10.31222/osf.io/796tu.

You might consider adding a sentence or two acknowledging this and emphasizing whatever definition you prefer to in the context of this discussion.

(2) Similarly, though not "necessary", the introduction might also make further mention of the history of preprints prior to *arXiv*. This might help further contextualize and possibly contrast the historical, professional, and institutional factors that (have and continue to) motivate scientists to engage with or refrain from sharing via preprint servers.

See: https://doi.org/10.1371/journal.pbio.2003995,
https://doi.org/10.1002/meet.2014.14505101036,

and

https://www.science.org/doi/10.1126/science.154.3751.843.a

Preprints in the earth sciences

(3) This section felt particularly "thin". I think it would be strengthened by comparing and contrasting the three servers/platforms in greater detail. As a reader, I did not feel I got a good understanding how these platforms differed and what benefits one might offer over another (in terms of visibility, content moderation, indexing, tools, support, etc.).

(4) What's more, this section might be improved by a brief discussion of the advantages of discipline-specific servers, compared to using any number of other "generic" platforms (e.g., Zenodo or simply OSF Preprints).

Benefits and issues using preprints

(5) You've already cited Ginsparg, 2016 - but I think their work provides a nice (if somewhat opinionated) place for expanding and more fully elaborating upon the strengths and limitations of sharing via preprint (see FAQ9 and FAQ15, for example).

Data and materials

(6) The manuscript may benefit from another sentence or two describing how the data for Table 1 and Figure 1 were sourced. As the numbers don't appear (to me) to be readily accessible from the preprint servers, I imagine each site was searched, by year, to generate the total number of preprints. Whatever the case, a bit more explanation may be helpful for enhanced transparency and reproducibility.

Miscellaneous comments

(7) I can appreciate that the manuscript was previously published as a preprint on *EarthArXiv*. If applicable, it might be useful to include a statement or two about whether and how doing so benefited its development or dissemination, if at all.

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Is the topic of the opinion article discussed accurately in the context of the current literature?

Yes

Are all factual statements correct and adequately supported by citations?

Yes

Are arguments sufficiently supported by evidence from the published literature?

Partly

Are the conclusions drawn balanced and justified on the basis of the presented arguments?

Partly

Competing Interests: Disclosure: Though the lead author (OP) and I are not active collaborators it should be acknowledged that we have both previously contributed to a multi-author preprint in this topic area. The interested reader can find the manuscript here: Tennant, J., Agarwal, R.,

Baždarić, K., Brassard, D., Crick, T., Dunleavy, D. J., ... Yarkoni, T. (2020). A tale of two 'opens': intersections between Free and Open Source Software and Open Scholarship. SocArXiv. https://doi.org/10.31235/osf.io/2kxq8

Reviewer Expertise: I am an academic social worker by training (PhD) with an extensive record of publishing on issues related to open science, peer review, and issues in scholarly publishing.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 04 Jul 2023

Olivier Pourret

Thank you for all your comments and suggestions. We have reworked our article as follows.

- We have reworked the first paragraph and added some nuances as proposed by reviewer 3. “Though it includes manuscripts that are best described as an "initial draft shared online", the term preprint (somewhat unfortunately) appears to encompass many different things (including post-print manuscripts and materials and resources never intended for publication) (see discussion in Tennant *et al.*, 2018). “
- We have added some details in the introduction: “In 1961, the USA National Institutes of Health launched a program called Information Exchange Groups, designed for the circulation of biological preprints, but this was shut down in 1967 (Confrey, 1966; Cobb, 2017).”
- As also suggested by reviewer 2, we have added details on the 3 preprint servers mentioned in our submission.
- We have added some details of the advantages of discipline-specific servers, compared to using any number of other "generic" platforms.
- We have added some details on Benefits and issues using preprints and further cite the work of Ginsparg (2016).
- We have added a sentence on the methodology on how the numbers were generated.
- We have added some words in the acknowledgment section stating that our previous preprint at EarthArXiv let us being invited to submit this opinion paper at F1000Research.

Competing Interests: No competing interests were disclosed.

Reviewer Report 20 June 2023

https://doi.org/10.5256/f1000research.146618.r175864

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Zhiqi Wang
WISE Lab, Dalian University of Technology, Dalian, Liaoning, China

The opinion paper offers insights into the rise of preprints in earth sciences, focusing on three main preprint servers: EarthArXiv, ESSOAr/ESS Open Archive, and EGUsphere. The authors highlight an increasing trend in the cumulative numbers of preprints posted on these servers, indicating the growing popularity of preprints in the field. They further discuss the benefits and issues associated with preprint publishing.

To enhance the overall content, I would suggest the following improvements:

1. Regarding the first research problem addressed, the trend in preprint publishing, I suggest the authors to consider additional factors beyond cumulative numbers. In my opinion, factors such as submission rate, citations, and social attention attracted by the preprints can provide a more comprehensive and reliable assessment of the trend.

2. For the three preprint servers mentioned, I think it would be valuable to outline their distinct features. This information would help readers understand how to choose the most suitable server for posting or searching preprints.

3. As an opinion paper, I suggest the authors to give more further discussion on the specific benefits and challenges unique to preprint publishing in the field of earth sciences, as compared to other disciplines. Considering that the readers of the paper likely come from the field, addressing this topic would provide them with valuable insights. And in the concluding remarks section, the paper will benefit for including comments on the future development of preprints in the field of earth sciences.

Is the topic of the opinion article discussed accurately in the context of the current literature?
Yes

Are all factual statements correct and adequately supported by citations?
Yes

Are arguments sufficiently supported by evidence from the published literature?
Partly

Are the conclusions drawn balanced and justified on the basis of the presented arguments?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Scientometrics, science of science, scientific communication, preprint, S&T management

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 04 Jul 2023

Olivier Pourret

Thank you for your comments, we have refined our article following your suggestions.

- The comment is very pertinent, unfortunately we do not have access to data like submission rate, citations, and social attention attracted by the preprints. Certain publishers linked to preprint servers (e.g., AGU journals published in Wiley linked to ESSOAr/ESS Open Archive) would be able to collate such data, but that is outside the scope of our analysis here.

- Agreed, we have added details in the form of short paragraphs on each of the 3 preprint servers mentioned in our submission.

- We have added a few more examples dedicated to Earth Sciences and added a sentence on future development of preprints in our discipline in conclusion. Thank you again for all your comments.

Competing Interests: No competing interests were disclosed.

Reviewer Report 15 June 2023

https://doi.org/10.5256/f1000research.146618.r175861

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Blanca Rodriguez-Bravo
Department of Library and Information Science, University of León, León, Castile and León, Spain

Congratulations to the authors for this paper, that is relevant. This is an opinion article that begins by defining and briefly discussing the history of preprints and then focuses on the evolution of three preprint repositories in the field of earth sciences. The article provides quantitative data that confirms the growing interest in the aforementioned platforms, and then addresses the advantages and disadvantages of publishing through preprints. The information about the three

preprints platforms is interesting.

The authors' vision seems adequate to me, although I believe that in the search for greater symmetry the issues should be presented as the benefits -by means of bullets and with a more complete argumentation-. My view is that benefits are clearly and completely highlighted but this is not the case of the drawbacks. The problems derived by a less formal or less complete peer review process may be expanded as it is the case of information overload, insufficient quality assurance, or non-reproducible research. The main problem can be that the reader is not aware that he/she may have been reading a paper that no one has evaluated yet. I am not familiar with the field of earth sciences but in general there is still a high lack of knowledge about preprints as some of them are eventually published in journals and others are not.

In the case of Early Career Researchers (ECRs), to which the authors pay special attention, it is true that the quick dissemination of research findings is a clear advantage for ECRs. However, they are also wary of publications that do not pass prior quality control. Therefore, they often hold back from publishing preprints, and not just because coauthors, senior researchers, prefer to publish in traditional journals. ECRs, due to their competitive circumstances, are sometimes more opposed to publishing preprints that do not lead to a traditional publication than other already tenured researchers. Check, for instance, the paper by Nicholas et al. (2022) published in Profesional de la información, v.31, n.4, e310418.

The conclusions are appropriate. Open science is a necessity and preprints, as one of its manifestations, are growing in importance as both the subscription model of journals and the APCs model are more and more questioned.

To sum up, although the paper is well structured and well argued, the paper will benefit for expanding the "still" negative aspects of preprints taking into account the points of view of authors -with particular attention to ECRs- and readers.

References

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Is the topic of the opinion article discussed accurately in the context of the current literature?

Yes

Are all factual statements correct and adequately supported by citations?

Yes

Are arguments sufficiently supported by evidence from the published literature?

Partly

Are the conclusions drawn balanced and justified on the basis of the presented arguments?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Scientific communication; Information behaviour; Knowledge organization

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 04 Jul 2023

Olivier Pourret

Thank you for your comments and have reworked our article following your suggestions.

- We have expanded the drawbacks section (see next response as well).
- We have added a bullet and have considered the proposed reference: “ECR may wary of publications that do not pass prior quality control. Therefore, they often hold back from publishing preprints, and not just because coauthors, senior researchers, prefer to publish in traditional journals. ECRs, due to their competitive circumstances, are sometimes more opposed to publishing preprints that do not lead to a traditional publication than other already tenured researchers (Nicholas et al., 2022)”

Overall, we have refined our article as proposed and expanded the negative aspects of preprints, thank you again.

Competing Interests: No competing interests were disclosed.