Implementing an Open & FAIR data sharing policy—A case study in the earth and environmental sciences

Matthew Cannon,1* Andrew Kelly,1 and Chris Freeman2

1Taylor & Francis Group, Abingdon, UK
2Taylor & Francis Group, Melbourne, Australia

ORCID:
M. Cannon: 0000-0002-1496-8392
A. Kelly: 0000-0002-5785-4782
C. Freeman: 0000-0001-9114-359X

*Corresponding author: Matthew Cannon, Taylor & Francis Group, Abingdon, UK.
E-mail: matthew.cannon@tandf.co.uk

Abstract
This paper outlines the impact of the introduction of an Open & FAIR (findable, accessible, interoperable, and reusable) data sharing policy on six earth and environmental science journals published by Taylor & Francis, beginning in November 2019. Notably, 18 months after implementing this new policy, we observed minimal impacts on submission, acceptance rates, or peer-review times for the participating journals. This paper describes the changes that were required to internal systems and processes in order to implement the new policy, and compares our findings with recent literature reports on the impact of journals introducing data-sharing policies.

INTRODUCTION
Taylor & Francis has been involved in discussions about open access for more than 15 years, beginning with the launch of our first open access policy in 2003. We have offered open access on subscription journals (hybrid journals) since 2006 and began converting select journals from a subscription model to fully open access in 2012. During this time, we have launched an open access imprint Cogent (in 2013), with the born OA publishers CoAction and Dove Medical Press joining T&F in 2016 and 2017.

As the discussion has broadened into one around Open Research, our colleagues have attended OASPA, STM, and RDA events, and we are fully committed to supporting open as the direction of travel.

We rolled out our suite of data sharing policies in 2018 and, within 12 months, had successfully implemented our ‘basic’ policy on more than 1600 journals. As set out by Jones et al. in their case study (Jones, 2019), our policies were informed by both FAIR (findable, accessible, interoperable, and reusable) data principles (Wilkinson, 2016) and by the TOP Guidelines (Nosek et al., 2015); however, as a publisher of Humanities research under the Routledge imprint, as well as Science and Technology and Medical content, we required a range of policies that covered the breadth of attitudes to data sharing within the different research areas. As such, we adopted a tiered approach, with increasing levels of prescription in each policy (Table 1).

Following discussions in the run-up to the Fall meeting of the American Geophysical Union (AGU) meeting in Washington DC in 2018, we began to look at the work of Coalition for Publishing Data in the Earth and Space Sciences (COPDESS; COPDESS, n.d.-b) and how we could support the ambitions of their Enabling FAIR Data project (https://www.copdess.org/enabling-fair-data-project/), in facilitating and promoting the adoption of best practices around open data.

After signing the Commitment to Enabling FAIR Data in the Earth, Space and Environmental Sciences (https://www.copdess.org/enabling-fair-data-project/commitment-statement-
in-the-earth-space-and-environmental-sciences/signatories/) in March 2019, we began planning a pilot, in which we would move a selection of journals onto our most open data-sharing policy, which most closely aligned with the goals of the COPDESS project. We felt that this pilot would allow us to understand more about the impact of implementing an open data-sharing policy in our journals, as well as what system updates would be required to facilitate wider roll-out of this policy, and what resources our journal editors and authors would need to comply with the guidelines.

Herein, we discuss the impact of implementing the most open policy on the framework, which is called ‘Open & FAIR’. We also cover the changes that were required to our systems and processes. We also share feedback from the editors of the participating journals regarding their experiences during the pilot.

**METHODS AND IMPLEMENTATION**

**Scope and ambitions for the pilot**

As outlined above, Taylor & Francis first published their suite of data policies in 2018, but, at that time, our focus had been on encouraging our editors and society partners to adopt our ‘basic’ policy. While this policy does encourage data sharing and raises the question of depositing and citing data sets in the Instructions for Authors, no specific actions are required. In line with other research in this area, we found that very few authors proactively shared their research data as a result of implementing this policy (Giovanni Colavizza, 2020). By signing up to the Enabling FAIR Data initiative and moving a pilot group of journals onto our Open & FAIR data policy, we would be testing our workflows, systems and author/editor communications on the most-open policies in the Taylor & Francis framework. We felt that using these processes on a small group of journals would give us some feedback on the effectiveness of these resources and leave us better placed to roll-out our more-open policies more widely.

Finally, we collected and analyzed information about the participating journals in the pilot in order to contribute to the wider understanding about the effect of introducing data-sharing policies on journal metrics. In recent months, publications on this topic have shown diverse range of effects of introducing data sharing policies causing both an increase in citations (Giovanni Colavizza, 2020) and a reduction in submissions (Vines, 2018). We were interested to see if our findings aligned with either of these studies.

**Scope of the pilot**

Taylor & Francis publishes a large portfolio of more than 100 titles in the Earth and Environmental Sciences. Therefore, we developed a set of criteria to identify suitable titles for the pilot. These included:

- Alignment with subjected areas covered by the Enabling FAIR data project
- The use of an online submission system
- Already-established administrative support for the academic editors, so as not to add to their already busy workload

Using these criteria, we selected suitable journals and began discussions with the editors. At this stage, we were very pleased to be joined by the AGU’s Director of Research Data, Shelley Stall, for a joint webinar to explain more about the Enabling FAIR Data project to our editors and to answer any questions or field any comments they may have.

We also received some interest from editorial teams of journals that did not have the desired administrative support in place. We were clear about the extra work that would be required in checking the papers and corresponding with authors and were delighted when a couple more journals joined the pilot.

Following the webinar and further discussions, the list of participating titles was finalized as follows:

- Australian Journal of Earth Sciences
- Big Earth Data

---

**TABLE 1**  Taylor & Francis data-sharing policies

| Policy Name       | Policy Summary                                                                 |
|-------------------|-------------------------------------------------------------------------------|
| Basic             | Authors are encouraged to share their data, but there are no formal requirements. |
| Share upon request| Authors agree to share their data on receipt of a request from a reader. Authors have to include a Data Availability Statement with details of how to request access. |
| Publicly available| Authors are required to share their data in a repository, but can choose a more restrictive licence. |
| Open data         | Authors are required to share their data in a repository under an open licence, such as the CC-BY or CC0 Creative Commons Licences. |
| Open & FAIR       | Authors are required to share their data in a repository that support the FAIR principles under an open licence such as CC-BY or CC0. |

Note: The full table of policy information is available online here [https://authorservices.taylorandfrancis.com/wp-content/uploads/2019/04/Author-Services-Data-sharing-policies.pdf](https://authorservices.taylorandfrancis.com/wp-content/uploads/2019/04/Author-Services-Data-sharing-policies.pdf).
Ambitions for the pilot

Compared with other areas of scientific research, we felt that the kinds of data that we would be asking our authors to share would be relatively low risk (although there are always exceptions). A lot of the data that are used in the research that is published in the participating journals is free of personal information, GDPR concerns (European Commission, 2018) and (in some areas) may already be openly available online [e.g., held in the NASA data centre (https://www.science.nasa.gov/national-space-science-data-center)]. With this in mind, we expected that there would be good uptake by authors, if not at submission but when prompted by administrators or editors—however, we did still expect to meet some levels of resistance.

We expected some authors to be philosophically opposed to sharing their data (many of the common reasons why authors are opposed to data sharing are covered in the State of Open Data; Baynes, 2020). However, we anticipated that others would be open to sharing, but might lack information about the key practical elements, such as how to write a data availability statement (DAS) or how to select a repository, which would limit compliance at the point of submission. Indeed, we still expect to encounter this issue for the next few years, while funders and research institutions roll-out data-management plans more widely and open research practices become more commonplace. The first time many authors consider sharing their data are when prompted by a journal. As funders and other stakeholders adopt data policies, this will happen earlier in the process and authors should become better informed and better prepared at the point of submitting to a journal.

The impact of implementing the new policy on our editors was a key concern as well. Mainly, that extra work generated by ensuring compliance with the new policy could reduce the time available for other valuable journal-development tasks, such as strategic planning. We were also aware of the administrative support needed to check compliance by authors at the point of submission, and the fact that these teams work across a range of journals and are not subject specialists. We were concerned that this would also generate a high volume of queries for both our teams and our editors. We were also prepared for regional variations on knowledge of data-sharing practices, given the global spread of our authors.

Alongside implementing the policies, this initiative was designed to track the influence of the new policy on our pilot journals. We monitored the number of new article submissions to assess if such a prescriptive data-sharing policy would cause authors unsure about sharing their data (for either practical or ideological reasons) to choose to submit their work to another journal. In this regard, we encouraged our journal editors to be as ‘open as possible, but as closed as necessary’ in their discussions with existing and potential authors, to mitigate the negative impact on submissions.

Secondly, we were prepared to field queries from potential authors and the need to address circumstances in which authors had not shared their data and included a DAS within their submission. This additional back-and-forth could significantly increase the volume of email correspondence for our academic editors, who are also juggling teaching and research obligations, in addition to their journal responsibilities. We did not want this initiative to add further demands on their time.

To pre-emptively address this challenge, we asked our editors to reach out to their contacts at Taylor & Francis should they encounter additional queries, and we provided templates to assist with replying to common queries. We created and shared a new email address to assist with data-related queries from potential authors, which would be monitored by our Open Research team.

Aims of the participating journal editors

To include our editors’ experiences in this paper, we asked them a series of questions via email to allow them to share why they chose to participate in the pilot, what their experiences have been since implementing the policy on their journal, what feedback they have received, and what advice they may have to offer other journal editors who are considering adopting a similar policy. The editors have given their consent to include their names and quotes from their responses.

Firstly, to explain why they chose to participate in the pilot, we asked the following questions and present some examples of their responses:

1. How important is open data (and open research more widely) in your subject area?
   a. ‘It is important as open data can provide the reproducibility of proposed approaches or insight of a certain problem. It should be noted that many methods proposed in the past are not used any more: scientists often fail to mimic existing methods or data, simply because they were not provided or readily available.’ – Jungho Im, GIScience & Remote Sensing
   b. ‘Sharing data and codes is very important to assure validity and advances in GIScience research.’ – May Yuan, International Journal of Geographical Information Science

2. Were you aware of the COPDESS Enabling FAIR data project before discussions began with T&F about joining the pilot?
   a. ‘No. However, I was aware of various movements for open science.’ – May Yuan, International Journal of Geographical Information Science

3. Why did you choose to participate in the pilot?
   a. ‘I wanted to know how effective open data policy is for the journal audience and potential authors.’ – Jungho Im, GIScience & Remote Sensing
   b. ‘I think we were pushed along by T&F. The Society Board actually voted for something a lot looser, but it seemed time
to sign up for something with teeth.’ – Nick Chrisman, Cartography and Geographic Information Science

‘Big Earth Data is a data journal; therefore, why would we not participate in the pilot! I think it is very good to be a member. I hoped that we could gain experience from participating and also give feedback to Taylor & Francis.’ – Linlin Guan, Big Earth Data

‘I believe that this is a very important step for advances in GIScience.’ – May Yuan, International Journal of Geographical Information Science

Implementation

Once the final list of participants had been agreed, we implemented the necessary changes to the journal workflows so that we could inform submitting authors about the new policy and ensure that we captured the necessary information on submission. This process involved updating the Instruction for Authors text on the journal website to include specific information about the policy (Fig. 1).

Participating journals added a new question to their submission systems to provide policy-specific information to authors. When the new policy was launched, this question asked the authors to add the DOI of their data to the submission system and to confirm that they had included a DAS in their manuscript.

In addition, we overhauled our Author Services pages on Data Sharing (https://www.authorservices.taylorandfrancis.com/data-sharing-policies/) to provide updated guidance on our suite of data-sharing policies, along with new guidance on how to write a DAS and how to select a suitable data repository.

We rolled out our new data-sharing policy on the pilot group of journals on 12 November 2019, which was coordinated with an update to the journal websites, the online submission systems and some promotional messaging over our social media channels.

Iterative refinement

Since we began our pilot, we have updated a number of our processes and policies as a direct result of feedback that we received from our editors and internal colleagues, as described below.

Online submission systems

In the first few weeks following the implementation of the new policy, we closely monitored the number of original submissions to the pilot journals, as well as encouraging feedback from the editors and submitting authors to our data-sharing inbox.

We were especially alert for any negative feedback, in terms of author experience or submission ‘pain points’, and we were pleased to receive almost no such responses. As the pilot progressed, and we

FIGURE 1 Excerpt from instructions for authors of Australian Journal of Earth Sciences.
continued to monitor the performance of the participating journals, we became more comfortable that we were not going to see a significant negative impact from implementing the policy, but were concerned by the minimal feedback that we had received. We then looked more closely at the submissions that were coming through. On further analysis, we found that very few of the submitting authors had been appropriately engaging with the policy and complying with its requirements at the point of submission. This had led to an increase in the workload for the journal administrators and editors in encouraging authors to comply with the new policy.

We then undertook a review of the new workflows, and amended the question in the submission systems to be more explicit about what we wanted authors to do. We clarified our messaging to ensure that submitting authors included a DAS in their manuscript, which included a link to their data set, which had been deposited in a suitable (FAIR-aligned) repository. In this regard, we changed the wording from:

- This journal has an open data policy and authors are required to post their data in a suitable repository and link to it from the article (subject to restrictions on sharing due to data ownership or the inclusion of personally identifiable information). See further information here [https://www.authorservices.taylorandfrancis.com/data-sharing-policies/open-data/]
- Please provide the DOI, pre-reserved DOI or other persistent identifier for your data.

To:

- This journal has an Open Data policy and authors are required to post their data in a suitable repository, link to it from the article and include information in a Data Availability Statement (highlighting any restrictions on sharing due to data ownership or the inclusion of personally identifiable information). See further information here [https://www.authorservices.taylorandfrancis.com/data-sharing-policies/open-and-fair/]
- Please provide the DOI, pre-reserved DOI or other persistent identifier for your data.

**Data availability statement (DAS)**

Authors are required to provide a data availability statement, detailing where data associated with a paper can be found and how it can be accessed. The DAS should be submitted within the article manuscript, before the ‘References’ section. If data cannot be made open, authors should state why in the data availability statement.

The table below contains some template statements which comply with our open and FAIR policy. This is not an exhaustive list however, and an individual data set might warrant a different type of statement.

| Availability of data | Template for data availability statement |
|----------------------|------------------------------------------|
| Data openly available in a public repository (that supports FAIR principles) that issues datasets with DOIs under open licence (e.g. CC0) | The data that support the findings of this study are openly available in [repository name e.g. "figshare"] at http://doi.org/[doi], reference number [reference number]. |

Please confirm you have included a DAS in your manuscript containing information on the data set linked with this submission—Yes/No.

*(If no, please pause submission and add this in—see for guidance on writing a Data Availability Statement see here [https://www.authorservices.taylorandfrancis.com/data-sharing-policies/data-availability-statements/]*)

*Please provide the DOI, pre-reserved DOI or other persistent identifier for your data.*

We felt that the new question, despite being a little longer, would give our authors a much clearer instruction of what is needed to comply with the policy.

**Data availability statement**

This change caused the changes in author behaviour that we were looking for with more authors including DAS in their submissions. As shown above, in our guidance to authors, we included a link to our Author Services website, which provided general instructions on how to prepare a suitable DAS, along with requirements for the DAS texts for each of our policies.

However, while this increased the number of DAS being submitted, not all were compliant with the policy. We found that some authors were selecting the DAS text that they found easiest to comply with (often ‘data are available on request’), rather than a template that was compatible with the policy. Therefore, we updated our guidance in two ways. Firstly, we added examples of compliant DAS to each policy page (Fig. 2). We also added a column to the table on our DAS guidance page, which clearly listed with policy/policies each template text, was compatible.

**Administrative checks**

Some of the journals that participated in the pilot received additional administrative support, which included performing checks of the submitted article files to ensure that the authors had provided everything that was required and had complied
with the submission requirements as laid out by the journal. For the start of the pilot, we included an additional step in the instructions for participating journals to ask the administrator to check whether a DAS had been included. Early indications were that this step was working well. However, we wanted to see if we could enhance these checks so that they were more useful to our editors.

Therefore, we prepared a workflow for the administrators to follow so that they could conduct more detailed checks. Not only whether an author had included a DAS in their manuscript, but also whether the DAS was compliant with the journal’s data-sharing policy (Fig. 3). To accompany this new workflow, we also prepared three new email templates that the administrators could use in their correspondence with the authors to ask them to add or amend their DAS.

We realize the limitations of this new workflow and understand that these steps will not ensure that every submitted DAS is fully compliant with the new policy. However, we felt that this should address the most common errors that we had encountered and allow the academic editors and peer reviewers to focus on the subject-specific details of the DAS and whether it complied with the policy.

Journals that did not receive administrative support approached this differently, since the administrative checks were undertaken by the journals’ editors. For one of these journals, editors checked for a DAS only once a manuscript was accepted for publication, as returning manuscripts to authors for a DAS to be included was deemed burdensome when some of those manuscripts would then be rejected.

Editors who used this process developed template emails to send to authors of accepted manuscripts that did not already include a DAS, asking them to add one. This step was estimated by editors to add ~15 min to the handling time of each accepted manuscript, as there were often multiple rounds of correspondence required. Because this step occurred only after acceptance, it also raised a dilemma for editors around whether to insist on the inclusion of a DAS where this may cause especially resistant authors to withdraw their manuscripts. Having already undertaken the handling work of these papers, the editors were more inclined to grant exceptions to the data-sharing policy if authors were unwilling to comply, even after requests from the editor.

Repository guidance

While most of the journals that had opted to participate in the pilot program operated single-anonymized (single-blind) peer review, two of the journals operated a double-anonymized (double-blind) system. To ensure these peer review workflows were respected we had to ensure that we included guidance for authors who would be required to share their data, but also needed to keep their identity anonymous. Initially, we suggested that authors consider depositing their data in Figshare (https://www.figshare.com/) or Dryad (https://www.datadryad.org/), as repositories which both offer the functionality to create an anonymized link to the deposited data to facilitate double-anonymized peer review. However, one of the participating journals continued to experience quite a few issues relating to failing compliance with the double-anonymized peer-review process, and so the editor chose to directly ask authors to use one of these two repositories when sharing their data.

**Guidance for checking DAS on Publicly Available; Open and Open and FAIR data policies**

- **No DAS? Return manuscript to author using Template 1.**
- **DAS gives information about data, but no direct link to location or link is dead.**
  - **Locate the Data Availability Statement (DAS) in the article.**
  - **No statement?**
    - **Does the DAS contain a live link to the data set?**
      - **Yes: proceed**
      - **No: Option 1**
        - **DAS says the data is not available for legal/ethical/commercial reasons?**
          - **No: Option 2**
            - **Return to author – Template 2**
          - **Yes: proceed**
    - **Return to author – Template 2**
- **Any other information in DAS that states why data is not available?**
  - **Return to author – Template 3**
- **Proceed with submission**

**FIGURE 3** Example of the new workflow for the journal administrator.
Alongside the implementation of the pilot, we also updated our metadata feed to Crossref (https://www.crossref.org/) to include specific tags for data citations. This update was the culmination of a long process, which required changes to our internal processes, as well as working with external parties, including our typesetters and our platform provider. By providing this information to Crossref, we are putting the metadata links in place between articles and data sets. This will enable authors of data to be able to see how data sets are being cited and get credit for the data that they create as well as the research articles.

RESULTS AND DISCUSSION

Following the completion of the first year of operating an Open & FAIR data-sharing policy on the pilot cohort of journals, we analyzed a series of key metrics to evaluate the health of our journals and the impacts, both positive and negative, of implementing the policy. These metrics included the number of original submissions, the journal’s acceptance rates, and their peer-review turnaround times. Notably, the 12-month period measured here (November 2019–November 2020) overlapped with the start of the COVID-19 pandemic and included the capture of data during periods of lockdown across the world. The restrictions of movement, trade and learning that were placed on individuals and institutions during this time affected all areas of life, including scientific research and publishing, and so any conclusions drawn from this data need to be understood in this context.

The other key factor was editor engagement. While this was an opt-in pilot that our editors chose to participate in, we saw variable levels of engagement by the editors, in particular around how strictly they enforced the policy. Finally, some of the participating journals had administrative support provided by the publisher, which allowed us to introduce checks on policy compliance (such as the inclusion of a DAS) on submission, but this was not the case for all of the participating journals.

Original submissions and acceptance rates

Across all of the participating journals in the pilot, the number of original submissions remained consistent in 2020 compared with the previous year and current trend (Fig. 4). Each journal had its own trajectory, owing to a range of factors, but we confidently believe that introducing the Open & FAIR data-sharing policy did not have a negative effect on the number of original submissions to the participating journals. Considered alongside the feedback received from our journal editors, we can conclude that authors in this subject area have generally been willing and able to comply with the new policy and to share their data prior to the submission of their research article.

We also considered the number of articles accepted by the participating journals, along with their acceptance rates. In this regard, the acceptance rate was determined to be the percentage of articles that were ultimately accepted for publication in the journal (following any revisions and/or resubmissions). As before, each journal again had its own trajectory of acceptance rates, but we once again found no clear influence of the new data sharing policy on the acceptance rates of the participating journals, which indicated that the implementation of an Open & FAIR data-sharing policy was neither a driver of, nor a barrier to, the submission of quality research.

Peer-review times

We monitored peer-review times for the journals that were involved in the pilot (Fig. 5). Specifically, we compared the median number of days to first decision and the median number of days to final decision. We also monitored the number of papers that were withdrawn post-submission for the pilot journals.

FIGURE 4  Journal submissions and acceptances 2018, 2019 and 2020.
Of the six participating journals, five showed a shortening in the number of days to first decision compared to the corresponding times in 2019, while the other journal only showed a very small increase (0–3 days) in 2020.

The picture was more varied for the number of days to final decision: one journal showed an increase in the number of days to final decision of over 30 days, while two journals showed smaller changes (±7 days), and two showed sizable reductions (30 and 40 days).

We have prepared a (journal anonymized) sheet of the raw data which is available on Zenodo, see Cannon et al. (2021a, 2021b).

Article citations
Finally, we were interested in investigating the extent to which the deposition and citation of underlying data supports—and perhaps enhances—the usability of an article. To understand this, we felt that any increased visibility and reuse/iteration of a piece of work that might result from the sharing of underlying data might be inferred from citations to the main research article in which the work was reported, as well as from citations to the data deposit or accompanying published data note, if any. Therefore, we also wanted to investigate any changes in citation performance of the participating journals, following the implementation of the pilot.

However, citations of a journal article take time to accrue, as the work must first be published following peer-review, and then disseminated, read, and finally iterated upon or critiqued, with an accompanying citation. Traditional citation metrics allow for this delay time by considering citations to an article in the subsequent years following publication. For our purpose, this means that we can only expect to gain a fuller understanding of the influence of adopting an Open & FAIR data-sharing policy over the coming few years. However, we were still interested to see whether there were any notable short-term changes to the citation patterns for the participating journals, and so we used the 2020 Web of Science Immediacy Index, released in June 2021, to look for any signs of an impact on citations (Fig. 6). Big Earth Data was not indexed in Web of Science at the time of the pilot and so had no associated Immediacy Index data.

While there are a number of influencing factors that contribute to the overall citation activity of journal articles, we felt able to infer a couple of tentative conclusions: First, the journal which adhered most strictly to the new data-sharing policy exhibited the most-pronounced positive change in Immediacy Index, which may indicate a causal relationship between data sharing and article citation. Second, all of the journals that participated in the pilot exhibited an increase in their Immediacy Index in 2020, which may indicate that data sharing at least does not negatively impact the publication of citable articles. We look forward to

FIGURE 5 Peer review times for 2019 and 2020 (note that the figures for journal three are correct, due to a large number of unsubmitted articles due to data issues).
drawing clearer implications on the relationship between an Open & FAIR data-sharing policy and citation performance as more data become available.

LIMITATIONS OF THE RESEARCH

In reviewing the results of our study, we are confident that, at the very least, introducing a more open data policy on a journal does not have significant negative impacts. However, there are some limitations of our study that should be noted. Firstly, the pilot only involved a very small sample size of six journals. More research would need to be done with larger cohorts of journals to validate this outcome. Secondly, each of the journals in the pilot is on its own trajectory in terms of submissions and acceptances—this has multiple contributing factors, such as the age of the journal, its size (articles published each year), editorial strategy, status of special or thematic issues and trend in Impact Factor and ranking. Not all of the journals saw an increase or even a plateau in submissions or acceptances following the implementation of the policy, but none of the journals saw a dramatic change from their recent trajectory as a result. Finally, another important consideration should be the subject area of the journals involved. The wider Earth and Space Science community and leading societies have done a lot of work in promoting the benefits and values of data sharing to their members. This, alongside the movement of many journals to similar policy at the same time, has helped accelerate the shift in community expectations around data sharing and prepare authors to share their data prior to article submission. In addition, the kind of data discussed in some of these research areas is conducive to sharing—often these include measurements from the air, earth or water or outputs from instruments. There is little interaction with human subjects, which mitigates concerns around personal data or GDPR, which affect other areas and limit sharing activity.

Feedback from our editors

As part of the review of the success of the new Open & FAIR data-sharing policy, we asked the participating journal editors about their experiences during the pilot, as shared below:

1. How much additional time would you estimate you spend per submission as a result of implementing this policy?
   a. “likely 15 minutes more per submission”—May Yuan, International Journal of Geographical Information Science
   b. “In the beginning it took an extra round of feedback to make authors comply. We had to sharpen the stick and corral authors into a clear pathway.” - Nick Chrisman, Cartography and Geographic Information Science
2. What feedback have you had from: Authors?
   a. ‘Some authors resisted to share data and codes but eventually complied. An author withdrew a submission.’—May Yuan, International Journal of Geographical Information Science
3. What feedback have you had from: Reviewers?
   4. ‘Reviewers appreciated the opportunities to check data and codes.’—May Yuan, International Journal of Geographical Information Science
5. What feedback have you had from: The wider community?
   a. ‘Discussions at conferences were very positive and supportive.’—May Yuan, International Journal of Geographical Information Science
   b. ‘No feedback from the journal authors and reviewers. My colleagues think it would be beneficial to researchers.’—Jungho Im, GIScience & Remote Sensing
   c. ‘I think most researchers will support open data policy especially large publishers and high-impact journals request them to do so. It will pave a new way for research collaboration.’—Linlin Guan, Big Earth Data
   d. ‘Not a lot yet, many authors seem happy to provide software and data on repositories. Reviewers used to deal with supplements, but now the arcane rules of the repositories make it harder for them to see the future open data, due to the shields for anonymity. We have a long way to go to make this smooth. Authors have no real incentive to anonymize their data, software and web services for review.’—Nick Chrisman, Cartography and Geographic Information Science
6. Do you think it has been worth it: for the journal? (thinking about effect on submissions, etc.)
   a. ‘There is no sign of negative effects on submissions to the journal. We have had one withdrawal out of almost one thousand submissions (new and revised) since implementing the policy.’—May Yuan, International Journal of Geographical Information Science
   b. ‘We have begun to attract submissions with ‘standard’ datasets. Perhaps this came from the push toward open data.’—Nick Chrisman, Cartography and Geographic Information Science
7. Do you think it has been worth it: for the research community? (to see the journal take a lead on this)
   a. ‘Discussions at conferences were very positive. While I don’t have the statistics to support my perceived increase in the views to papers at our journal website.’—May Yuan, International Journal of Geographical Information Science
8. Do you think it has been worth it: personally? (has the extra effort been worth it to you?)
   a. ‘absolutely’—May Yuan, International Journal of Geographical Information Science
   b. ‘Maybe. It keeps the journal on cutting edge. My workload is infinite anyway.’—Nick Chrisman, Cartography and Geographic Information Science
   c. ‘I believe data and code sharing is good and very effective to facilitate research activities and often improves the reproducibility and transferability of research.’—Jungho Im, GIScience & Remote Sensing
9. How has implementing the policy compared with your expectations?
   a. ‘Very well. Although we should continue to observe the effect of participating for a longer time to see if it has an influence on citations or other metrics.’—Linlin Guan, Big Earth Data
   b. ‘It took a lot more working out than expected. Now it is going a lot smoother. The Peer Review service is helping a lot in enforcing the rules, now that we have clarified them.’—Nick Chrisman, Cartography and Geographic Information Science
   c. ‘The public repositories, like Code Ocean and FigShare, ease the implementation significantly.’—May Yuan, International Journal of Geographical Information Science
10. Is there anything you wish you would had known or anything you still need to support you implementing this policy?
    a. ‘We now have the workflow in place for implementation. The most time-consuming task is to check anonymity in codes and data.’—May Yuan, International Journal of Geographical Information Science
    b. ‘T&F had to take responsibility for the mixed message buried all around their website. That took some time. I had to learn a lot about repositories. The model was that some kind of discipline-based model would emerge. I see no sign of that (yet). I suspect this early period is a lot like PURL. It will not work and be replaced by something else (eventually). There is a lot of learning still to do.’—Nick Chrisman, Cartography and Geographic Information Science
    c. ‘It would be also good to have a survey to the authors of the accepted papers and get some feedback about the open data policy. That would help a lot.’—Jungho Im, GIScience & Remote Sensing
11. What next for the journal?
    a. ‘We will improve our submission guidelines, in particular for data articles and software articles, and work on peer-review guidelines for these two article types.’—Linlin Guan, Big Earth Data
    b. ‘Code Ocean allows reviewers to run codes directly on the site without download the codes and data. They also allow the codes and data to run online to reproduce graphs and maps with the paper when published. This seems ideal, but the procedures to set up Code Ocean capsules are much more cumbersome than FigShare, Dryad, and GitHub. I hope that Code Ocean can improve over time to simplify the submission process, or other similar sites will be available to support sharing data and codes with capabilities of online execution.’—May Yuan, International Journal of Geographical Information Science

CONCLUSION

As part of our activity to support the commitment to enabling FAIR data in the earth, space and environmental sciences, we began a pilot in November 2019, in which we implemented our most-open data-sharing policy, ‘Open & FAIR’, on a small group of Earth and Environmental Sciences journals. Our ambition was to investigate the impact of implementing an open data-sharing
policy in these journals, as well as to better understand what system updates would be needed to facilitate the wider roll-out of our open data sharing policies and what resources would be required for our journal editors and our authors to support compliance with the guidelines. We also saw this pilot as an opportunity to improve the quality of our journals by increasing the transparency of the research that we published, and to move together with the Earth and Environmental Sciences research community towards greater adoption of best practices around open data.

Following the completion of the pilot, we investigated the impact of implementing our most-open data-sharing policy on a range of parameters, including the number of original submissions and accepted articles, the journal’s acceptance rate, the peer-review times (median number of days to first and final decisions), and citations to published articles. Pleasingly, within the context of the relative recent trajectory for the participating journals, we found that introducing an Open & FAIR data-sharing policy did not have a notable effect on either the number of submitted or accepted articles, in line with the results reported by Giovanni Colavizza (2020) et al., and in contrast to the findings reported by Vines in The Scholarly Kitchen. We also did not notice a consistent trend in the peer-review times for the participating journals following the implementation of the pilot. Interestingly, we noticed a potential positive influence on article citation, although it will take some time for this picture to become clearer.

Following the completion of the pilot, we have continued to develop our workflows and practices to facilitate best practice on data sharing, the handling of metadata and data citation. Work in this regard, as well as the implementation of more-open data-sharing policies on a wider range of journals, is ongoing.

ACKNOWLEDGEMENTS

We thank the journal editors and society partners who participated in the pilot for their support, enthusiasm, and understanding as we embedded new open science practices in their journals. We also thank those who work in an administrative capacity to support the pilot journals for their hard work as they adapted to new workflows, and Amy Drew for her help with data visualization.

CONFLICT OF INTEREST

All the authors are employees of Taylor & Francis Group, and this paper describes activity taken under that employment. No other conflicts are declared. This article has been posted as a preprint on Zenodo (Cannon et al., 2021b).

DATA AVAILABILITY STATEMENT

The data that we collected pertaining to the journals published by Taylor & Francis are confidential. However, we have prepared a journal-anonymised sheet of the raw data, which is available in Zenodo, Cannon et al., 2021a.

REFERENCES

Baynes, G. (2020). State of Open Data survey 2020. https://doi.org/10.6084/m9.figshare.13274744.v1
Cannon, M., Kelly, A., & Freeman, C. (2021a). Submission and acceptance data for journals involved in the Taylor & Francis FAIR data pilot. Zenodo. https://doi.org/10.5281/zenodo.5283977
Cannon, Matthew, Kelly, Andrew, & Freeman, Chris. (2021b). Implementing an Open & FAIR Data-Sharing Policy – A Case Study in the Earth and Environmental Sciences. https://doi.org/10.5281/zenodo.5284257
COPDESS. (n.d.-b). Enabling FAIR data project. Retrieved from Coalition for Publishing Data in the Earth and Space Sciences https://copdess.org/enabling-fair-data-project/
European Commission. (2018). EU data protection rules. Retrieved from European Commission https://ec.europa.eu/info/law/law-topic/data-protection/eu-data-protection-rules_en
Giovanni Colavizza, I. H. (2020). The citation advantage of linking publications to research data. PLoS One, 1-18, e0230416. https://doi.org/10.1371/journal.pone.0230416
Jones, L. R. (2019). Implementing Publisher policies that inform, support and encourage authors to share data: Two case studies. Insight, 32, 1-11. https://doi.org/10.1629/uksg.463
Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., Buck, S., Chambers, C. D., Chin, G., Christensen, G., Contestabile, M., Dafoe, A., Eich, E., Freese, J., Glennerster, R., Goroff, D., Green, D. P., Hesse, B., Humphreys, M., … Yarkoni, T. (2015). Promoting an open research culture. Science, 348, 1422–1425. https://doi.org/10.1126/science.aab2374
Vines, T. (2018). Does Adopting a Strict Data Sharing Policy Affect Submissions? Retrieved from The Scholarly Kitchen https://scholarlykitchen.sspnet.org/2018/09/25/does-adopting-a-strict-data-sharing-policy-affect-submissions/
Wilkinson, M. D. (2016). The FAIR guiding principles for scientific data management and stewardship. Scientific Data, 3, 1-9. https://doi.org/10.1038/sdata.2016.18