November 2019 Final Grant Report for the MarXiv Repository

General Information

This document reports on the MarXiv (rhymes with “archive”) project and repository’s two years of operation beginning in October 2017. Through a generous grant from the Packard Foundation to OCTO (Open Communications for The Ocean), MarXiv was set up as the free research repository for marine conservation science and marine climate change science. By taking advantage of the “self-archiving” policies of major publishers like Elsevier and Wiley, authors would be able to legally and freely share their copyrighted scientific articles with the public: articles that traditionally cost US \$30-50 apiece without a subscription.

Executive Summary

In just two years, the MarXiv archive accrued 422 papers with 45% of those requiring a fee to be paid to the work’s publisher in order to read the full-text outside of the repository. MarXiv served 119,117 downloaded works, resulting in a cost-savings to the ocean/marine-climate fields of over \$7.5 million. The average pay-walled work shared freely in MarXiv saved \$39,595.09 in per-article access fees during this time.

We experimented with a number of approaches to grow the MarXiv corpus. Repeated, personalized email requests to authors asking for a specific work to be deposited was our most effective strategy. 42% of the works deposited in MarXiv came from a specific request, or right after thanking an author for sharing their first work (and requesting any additional papers the author might have in that thank-you note). Thankfully, 39% of the works deposited in MarXiv were unsolicited, indicating uptake by the research community.

The project supported a number of training events, talks, and presentations about Green Open Access (Green OA, also known as ‘self-archiving’), helping to educate the academic community. We found nearly everyone we approached knew little to nothing about Green OA or the difficulties accessing pay-walled research papers by those not in rich, Western, academic institutions. We hope these conversations have helped to spark change in the research community. Only by changing our everyday actions as a community can we achieve equity in the world’s access to scientific research.

Activities, outputs, and outcomes

Requesting works from authors

Requesting works directly from authors provided a plurality of MarXiv's deposits (Figure 1). To grow the repository, OCTO directly requested relevant papers from their corresponding authors, primarily over email (Figure 2). The OCTO team identified relevant academic literature added to the OpenChannels Literature Library (openchannels.org/literature). Once an article was added to our database, we would find the corresponding author's email address to assemble and send a formal request.

Sources of Papers

Figure 1: Sources of works deposited to MarXiv. At closing, there were 422 works: 31 were added as part of the setup process to “seed” the repository (Setup); 49 were deposited by the OCTO team as MarXiv Summaries (Summary); 177 works came from direct requests to authors (Requested); the remaining 165 works were deposited by authors on their own (Unsolicited).

Papers Received By Request

Figure 2: Works deposited to MarXiv by request. The majority of works were deposited after an email request ($n = 111$). A further 53 works were deposited by authors after sending a “thank-you” card by postal mail. Three works were successfully requested via Twitter, while ten came from other direct requests.

Authors were sent email requests using predefined templates that are publicly available at <https://bitbucket.org/octogroup/marxiv-templates>. Originally, the templates were rather broad: requesting authors share their work in MarXiv according to their publishers’ public self-archiving policies. However, authors rarely followed directions, which led to a number of works needing to be removed from the repository. Despite instructing authors to *not* deposit the ‘Version of Record’ (i.e. the publisher’s final, typeset, and copyrighted PDF), this occurred rather regularly. As a result, these submissions had to be rejected from MarXiv since they were posted in violation of US copyright law.

Authors were often reluctant to share their preprints (original manuscripts), and often lacked the postprint version of their work, so the OCTO team often made ‘DIY postprints’ by manually recreating published works without their copyrighted typesetting. This was a time-intensive endeavor, with each DIY postprint taking from 1-4 hours to produce depending on complexity (i.e., more tables/figures took longer).

If authors shared preprints rather than peer-reviewed text, the issues of rejecting a copyrighted version or making a DIY postprint would be avoided. As such, we continually refined the request templates to encourage authors to share preprints. Anecdotally, this seemed to be an effective strategy, though we do not have enough data to say so with statistical certainty.

Overall, we requested 422 works over email with a success rate of 26.5% (Figure 3). We can assume requests awaiting a response or in their second follow-up are failed at this point, yielding an effective failure rate of 24.9%. The ultimate fate of the outstanding requests (i.e. those just requested once or with one follow-up) is unknown at this point. However, we anticipate if we finished processing these requests we would refine our

success rate down to ~15%. We noticed a roughly 10% chance of getting a reply from an author after sending a request. Outright declining to share a paper was rare, but ‘ghosting’ (never responding to any request) was extremely common. From email tracking data, at least 50% of authors opened each request sent, so it was clear that authors were reading our requests but choosing not to respond.

Email Requests for Works

Figure 3: Status of email requests for papers. Requests had three phases: the initial request ($n = 84$), a follow-up sent roughly three weeks later ($n = 121$), and a second follow-up roughly three weeks after the last ($n = 74$). Only 12 authors explicitly declined to share their works, while 112 were successful. There are still 19 requests awaiting response from the author after our last reply. A total of 422 works were requested by email.

A number of barriers were identified that prevented authors from sharing their works in MarXiv from an email request. The most common reasons for not sharing seemed to be the author’s own ignorance, fear of publisher retaliation, or preference for only the pay-walled “pretty” version of their work:

- Authors who would not share their works often insisted their publisher would not allow sharing, despite clear and irrefutable evidence to the contrary (i.e., the publisher’s own website).
- Some authors who acknowledged they *could* legally share a work in MarXiv felt that doing so would “anger” their publisher, so they did not deposit their work due to the perceived fear of retaliation.
- Other authors refused to share their works because of restrictions set by their publisher on the version that can be publicly deposited, i.e., a version without the publisher’s formatting and typesetting. One author stated, “the pretty version is the only version”, while others expressed belief that the lack of typesetting would somehow make their work less valuable, and thus refused to have a ‘less valuable’ version of their work available for free.

- Since academic journals are usually edited and produced by academics, it is not uncommon for an author to receive financial compensation as an editor. While we have no direct evidence that financial ties to for-profit publishers makes one less likely to share their work openly, anecdotal evidence suggests this is a likely factor.
- Finally, we heard frustrations expressed by nearly every author we contacted regarding the MarXiv repository on OSF Preprints itself. Namely, authors felt the deposition process on OSF Preprints was too confusing or time-consuming, especially for entering co-authors.

Online Advertising

Requesting works from their authors directly was the most efficient way to grow our community and the repository. We used November and December 2018 to test if online advertising through Google Ads, Facebook, and Twitter could help us recruit MarXiv Ambassadors (Table 1, Figure 4). However, the ads were largely ineffective as we received only two new Ambassador applications.

Table 1. Online advertising for MarXiv Ambassadors.

Platform	Impressions	Clicks	Cost
Google	53,062	538	\$116.99
Twitter	137,779	100	\$197.85
Facebook	143,516	741	\$115.72

Figure 4. Example Google ad for MarXiv Ambassadors.

A second set of Twitter and Facebook ads targeted at sharing research in MarXiv occurred during February 2019 (Table 2). Google ads on this topic ran from February to November 2019 (Figure 5). It appears online advertising was also ineffective for stimulating researchers to share their works in MarXiv, as growth during these testing periods was minimal (Figure 6). Based on our results, we would not recommend online advertising for a similar project.

Table 2. Online advertising to submit new works in MarXiv. Google advertising ran from February to November 2019, while social media advertising was limited to February 2019.

Platform	Impressions	Clicks	Cost
Google	290,765	4,852	\$3,361.52
Twitter	155,695	130	\$300.00
Facebook	17,172	150	\$100.00

Figure 5: Example Google ad to share works in MarXiv.

Back science-based management

Make sure your research gets used by actual
marine resource managers by sharing in MarXiv

MarXiv

Works Added Over Time

Figure 6: Works deposited over time. The Marxiv repository on OSF Preprints went live on 9 November 2017. The jump in growth around April 2018 reflects a single author sharing over 20 works. Email requests were sent between January 2018 and November 2018, after which the growth rate decreases. Paid social media advertising in November-December 2018 and February 2019 seems to have made little if any impact on growth during this time. Paid Google advertising occurred from February to November 2019, which similarly had little positive impact on growth. Sustained, repeated email requests for specific papers was the most effective growth strategy.

Works in MarXiv

Preprints encompassed the largest share of works in MarXiv (Figure 7). Reports and whitepapers were also popular items to share in MarXiv, largely in thanks to Oceana, which has about a dozen reports in MarXiv. 16% of the works in MarXiv were open-access journal articles ($n = 67$), with 55% of the papers in MarXiv being freely-available outside of the repository (i.e., MarXiv Summaries, OA journal articles, and free reports).

Types of Works

- Preprint
- Report
- Postprint
- Journal Article
- Summary
- Thesis
- Poster
- Book Chapter

Figure 7: Types of works shared in MarXiv. Preprints were one quarter of shared works (n = 107).

Despite the fact that under half (45%) of the works in MarXiv were behind a paywall by their publisher, downloads from the repository reflected over US \$7.5 million in cost-savings (Figure 8). The average pay-walled paper shared in MarXiv saved the field \$39,595.09 in per-article access fees from the article's publisher.

Cost Savings and Downloads

Figure 8: Downloads and associated cost-savings over time. 45% ($n = 282$) of the works in MarXiv were “paywalled” by their publishers. As of 25 November 2019, the total cost-savings from MarXiv reflected US \$7,562,661.52 from a total of 119,117 downloads. Note that we did not record these figures by date until later in the project, so the horizontal axis jumps at the start from November 2017 (when MarXiv launched) to January 2019.

Approximately 30% of the works in MarXiv belonged to one of the project’s “focal geographies” of Chile, China, Mexico, Indonesia, Japan, and the US (Figure 9).

Other metrics of use besides download counts (e.g., pageviews, users, etc.) are unfortunately not known. The Center for Open Science (which runs OSF Preprints and MarXiv.org) was only able to provide us with a handful of data points from their Google Analytics, which regrettably do not span the full two years of the grant term.

Focal Geographies

Figure 9: Focal geographies of deposited works. The majority of works pertained to the marine environment of the United States ($n = 87$). Regrettably, no works were deposited that belonged to the Japanese focal geography.

Research summaries

A key deliverable of the MarXiv project was the summarization of deposited research for an environmental manager-focused audience. OCTO produced 49 such MarXiv Summaries. These were usually 1-2 page PDFs, but a few were also made available in podcast/audio form. Each summary was downloaded an average of 199 times. Summaries represented roughly 8% of MarXiv's total downloads, while representing approximately 12% of the repository's corpus. Summaries were shared through the MarXiv repository (marxiv.org), the MarXiv documentation website (marxivinfo.org), and OCTO's OpenChannels site (openchannels.org). Download counts were only recorded from the repository, so the true download count of MarXiv summaries is higher than what we can accurately report here.

According to personal communications with both authors and readers, the summaries were considered valuable: readers especially found value where we interviewed the author to gain more of an understanding of their work than was described in the paper. Authors liked to see their work made more 'newsworthy'. Contacting authors for summaries also helped to gain a few more papers, as authors would occasionally send additional works as part of the summary-production process.

While we planned to produce 200 summaries by the end of the grant term, we unfortunately fell short as staffing shifted to developing a successor to the OSF Preprints version of the repository.

MarXiv Ambassadors

We had hoped to have 10 MarXiv Ambassadors during each of our two years of operation. Ultimately, six Ambassadors were recruited for Year 1, while nine were recruited for Year 2. At the time of our interim report on this project, we suspected the Ambassadorships were not helping to meaningfully solicit works, so we reallocated some of these funds during Year 2 to test out online advertising.

Year-1 Ambassadors conducted two in-person training events each, based on a one-hour curriculum OCTO developed to educate scientists on Green OA, the limits of scholarly sharing with copyrighted works, and depositing a paper in MarXiv. We held an initial training at the University of Washington to test the curriculum. Participant self-surveys indicated little to no knowledge of Green OA coming in, although after the training they reported feeling more informed of their rights as authors.

Despite roughly 15 combined training events, we were unable to determine if any specific works were deposited because of a training. Furthermore, at least one training participant seemed to forget the fundamentals within just a few months. If academic institutions have not prepared scientists to navigate their publishing rights despite several years of formal training, our results show that a single, one-hour training is clearly not enough.

We estimate roughly 10 papers were gained because of the help of our Ambassadors, making the Ambassadorships likely more effective than paid online advertising, but less effective than direct and repeated email requests.

Growing awareness of MarXiv

Aside from direct email requests for papers from academic authors, we utilized native and paid social media advertising of the MarXiv repository via Facebook and Twitter. See the “online advertising” section above for more information on this topic. Conversations with academics helped us shed light on Green OA in general. However, we can attribute only three known papers that were successfully solicited by social media (Figure 2), though certainly some unsolicited deposits may have been spurred by these and related conversations.

We regularly advertised MarXiv on the OCTOPOD and Speak Up For Blue podcasts in addition to OCTO’s weekly newsletters (e.g., OpenChannels Literature Update) and listservs (e.g., the EBM Tools Network). Interactive trainings were held over Zoom meetings to walk users through the submission process while educating them on Green OA. We initially held weekly online trainings, but after a few empty sessions, we scheduled trainings one-on-one. These sorts of more targeted advertisements helped us to gain at least 10 works (Figure 2) and develop name recognition.

We had hoped attending academic conferences would help us grow the repository. However, this did not seem to be the case. In February 2018 we attended the AGU Ocean Sciences Meeting in Portland, Oregon where we had a booth in the vendor area to promote MarXiv. We also tabled at the 2018 Salish Sea Ecosystem Conference. We

helped fund a MarXiv Ambassador to attend The Coastal Ocean Environment Summer School in Ghana in July/August 2018, who was able to promote MarXiv amongst her colleagues. We also attended the 2018 Northeast Pacific Shark Symposium to reach out to the elasmobranch research community. While we cannot attest to any new direct deposits from these conferences, we did make connections with government scientists who helped us learn a great deal about US copyright laws on federally funded research. We were also able to make connections with other publishers (including PLoS and Frontiers) that helped answer a number of questions we had.

We were accepted to the 2019 IMBeR Future Oceans Conference where we were able to present on MarXiv and our initial email requests during a standard 10-minute talk. Unfortunately, the audience was dismissive: they largely took the concept of Green OA and equity to access as a joke. During a Q&A period after a proceeding talk, the audience even laughed when it was suggested the author share their manuscript in MarXiv so that the audience could read it. We believe this behavior was likely exacerbated by the fact that the audience was nearly all older males, while the presenter was a young female.

These sorts of sexist and elitist behaviors by academics were encountered throughout the project. We had to block a few academics on Twitter to ensure they would stop their harassment. We would caution any future efforts be well aware, and trained, on how to handle online bullying and harassment. It seems as though alternative publishing models (like preprints and Green OA) represent a threat to the traditional older- and male-dominated academic industry, such that the threatened individuals fight back against the new knowledge (i.e. Green OA, lack of access to pay-walled papers, etc.) to further entrench their previously-held beliefs.

Progress on custom MarXiv 2.0 repository

In December 2018, just over a year after MarXiv launched, the Center for Open Science informed all branded preprint services (like MarXiv) that the Center would start charging fees to host our services. Without paying these fees starting January 2020, our respective repositories (i.e., www.marxiv.org) would be shut down such that no new works could be added, although existing works could still be accessed and downloaded. MarXiv will need to cover \$3,999.00 in fees each year at our current size, with costs set to rise as submissions increase. At our current submission rate, these fees are over \$20 per submitted paper.

By that time, we had largely come to the realization that MarXiv.org was not working for our audience. On the administrative side of things, we as preprint moderators were unable to edit any work that we did not upload ourselves. More pressing, however, were common concerns from users that we could not address with only moderation capabilities. Most commonly these issues were:

1. **Being unable to upload the work.** The way the OSF Preprints submission form is designed, the user must first provide a title for their work before they can begin the upload process. Many users contacted us saying they could not get past the upload portion, and in all cases this was because they missed the title field. The

form design could be updated to make this more clear, but COS has chosen not to do so.

2. **Limited license options.** COS limited the license options authors could choose from (i.e., only offering the CC-BY and CC-BY-NC-ND options from Creative Commons, but no other publication-related licenses), which made contributing papers from certain publishers impossible (e.g., Nature, which does not allow any CC option). Authors who wanted a different license option either had to forgo uploading their work, or had to upload a custom license on the PDF while selecting a different (incorrect) license on the upload screen. Thus, many of the works in MarXiv say one license in the PDF but a different license on the website. (We even saw on the Open Science listserv that a group is publishing a paper soon about how commonly incorrect metadata is on papers shared on OSF Preprints.)
3. **Co-author email requirement.** Co-authors could only be added by sharing both the co-author's full name and email address. For each author on every deposit, you had to search through existing registered COS users with a similar name before you could select one of these authors or add your contributor anew. The search-then-add process frustrated a number of submitters, and as such, the majority of MarXiv papers do not list all co-authors. Instead, papers typically show the submitter as the only author.
4. **Two-website problem.** Information about MarXiv, including submission policies, our review procedures, etc. had to be hosted off-site (on www.MarXivInfo.org). This meant users had to navigate between two separate websites to first *learn* what to deposit, and then actually *deposit* the work. As a result, users often tried to submit their work on MarXivInfo.org as opposed to the repository at MarXiv.org. Many more users likely were unaware MarXivInfo.org and all its educational resources even existed.

Given a) these issues were preventing us from receiving works, b) the costs of paying COS to host MarXiv at \$20+/paper seem too high given the existing submission issues, and c) COS had (and still has) no plan to address these concerns, we started developing our own MarXiv replacement: MarXiv 2.0.

We started with a survey of existing research repository software and services. While existing software like DSpace could host metadata to make a viable replacement, the antiquated programming of the software itself made it an unattractive option. For-profit Software-As-A-Service (SAAS) options like Figshare Preprints are closed-source by nature, which conflicts with the open-source nature of the preprint repository, so these services were deemed non-viable. As a nonprofit and free SAAS, Zenodo -- specifically, Zenodo Communities -- offered an intriguing option. While migrating to Zenodo Communities would solve $\frac{3}{4}$ of our common issues, it would not solve the "two-website problem". We would still have to maintain a separate website to host MarXiv's submission policies and other resources.

Without any existing resources proving to be an ideal replacement, we started building our own web application for MarXiv 2.0. This application would be a dynamically-generated static site composed of three main parts:

1. **MarXiv Common:** The core content of the website. All user-facing text has been defined in a dictionary to be replaced according to the translation set, meaning that the entire site is translatable by default.
2. **MarXiv Front:** React is a popular Javascript framework for interactive pages. This part provides the React components for the non-static parts of the site, mainly the submission and user-registration forms.
3. **MarXiv Back:** Combines together the former packages to publish the site's static HTML files and React bundles.

The core philosophy with the replacement is that MarXiv is an *archive* for works: works that are meant to be preserved in their original form. Why use a dynamic website framework (like WordPress or Express) for content that is not meant to change? Hosting dynamic content is much more expensive than static content. Dynamic content requires a server to ask a database what content exists before that content can be fetched, routed, and displayed to the user *each time* a user requests content. Static content is simply stored in a folder: if the data (page) the user requests is available, the server can give the user that content much more quickly than it would if it first had to look up the page in a database. Databases can cost tens of thousands of dollars a year to host, so minimizing database queries can save a lot of money. This is why we started building MarXiv 2.0 to only require communicating with a database on React pages (e.g., the submission form).

MarXiv 2.0 is nearly done, but not yet a finished product. We would require a few more months of work to get it polished and adequately tested. Given the lack of funding available to continue with the MarXiv project, we have paused work at this time. However, we are releasing all of our work toward MarXiv 2.0 as open-source code. We should note that this project does not mint DOIs. Only a licensed DOI registrar like Crossref can actually register DOIs for members, like MarXiv. Thus, a package providing an API implementation for Crossref would be required before MarXiv 2.0 could actually provide DOIs. It should also be noted that Crossref requires organizations become Crossref members to mint DOIs, which at the time of writing would cost US \$1,000/year + \$0.25/preprint DOI + \$1.00/other DOI, or roughly \$1,200/year at our current submission levels.

The code base is written in NodeJS and Typescript. The entire project consists of a number of shared packages:

- MarXiv-Common: <https://bitbucket.org/octogroup/marxiv-common/src>
- MarXiv-Front: <https://bitbucket.org/octogroup/marxiv-front/src>
- MarXiv-Back: <https://bitbucket.org/octogroup/marxiv-back/src>
- HAST-Typescript: <https://bitbucket.org/octogroup/hast-typescript/src>
- This package implements the HAST specification (<https://github.com/syntax-tree/hast>) in Typescript.
- HAST-Util-To-JSX: <https://bitbucket.org/octogroup/hast-util-to-jsx/src>

- This is a fork of an existing package which fixes a bug in converting HAST elements to JSX elements.
- ReCAPTCHA V3: <https://bitbucket.org/octogroup/recaptchav3/src>
- Implementation of the Google ReCAPTCHA V3 anti-spam service.

Additionally, we published a Typescript implementation of the Zenodo API from our early testing of the Zenodo service. While this package is no longer used by OCTO, we thought it would be worth sharing: <https://bitbucket.org/octogroup/zenodoapi/src>.

The content for MarXiv 2.0 has been largely completed (Figure 10). The remaining tasks are primarily in saving submitted data to a database, and submitting works to Crossref for DOI registration. We framed the new website around education: namely, steering users toward submitting openly-licensed preprints rather than restrictively-licensed postprints.

Join the ocean conservation community in sharing your research

Dr. Samantha Andrews, Ocean
Oculus

“ If we want to cut down the barriers that allow some of us to read and share our science whilst others can't because of financial circumstances, the finances of our intuitions, or our nations, then we need to find workable solutions. Since both my science and engagement work is primarily ocean-based, supporting initiatives like MarXiv is, for me, a no-brainer. ”

Dr. Max Liboiron, Memorial
University

“ Our lab submits our preprints to MarXiv because we do science that affects people and their food webs, and community members need to be able to find our work without a paywall. One of our lab's commitments is to accessible, meaningful, impactful science and

Figure 10: Upper section of the MarXiv 2.0 homepage. The user interface focused on educating users about Green OA throughout the submission process.

Graceful shutdown

Given that the Center for Open Science will disallow new submissions to MarXiv in under a month from the time of writing, we took steps to shut down the project as gracefully as possible. The MarXiv mailing lists and Slack channel have been terminated. The MarXiv Twitter account has been preserved so none of its existing posts will be lost. The documentation website, MarXivInfo.org, has been forwarded to a shutdown notice on the OCTO website. In the event that COS is able to open MarXiv to new submissions, we could easily transfer these assets to a new moderation team.

External Events

By far, the largest external event to affect the project was the Center for Open Science's decision to start charging to host branded preprint services, like MarXiv. In our early (pre-grant) talks with the Center, there were no plans to charge for the service. However, this changed shortly after MarXiv launched. If we had known about the impending charges up-front, we likely would have chosen a different launch partner (i.e., Zenodo) or would have planned to build MarXiv 2.0 from the beginning. By the time the Center decided to charge for the preprint service, we already felt the current system was impeding our efforts -- and charging for the service with no plan to address our long-standing issues made OSF Preprints even more unattractive.

We were also helped by some external events. Namely, we learned that authors who published with Elsevier could actually share their postprints without the standard two-year embargo period thanks to their mandated CC-BY-NC-ND license. We also learned that both Canada and the US restrict copyright on federally-written research papers: for example, if the authors of a paper were both NOAA employees, and that paper was produced as part of those employees' normal job duties, then that work cannot be legally copyrighted in the US. More information on these events may be found in the MarXiv project's Interim Report (<https://doi.org/10.31230/osf.io/te9qv>).

Lessons Learned

Challenging the status quo is tough! Going into the project, we anticipated 'selling' MarXiv (i.e., explaining the access issues regarding copyrighted works and the free and legal ways to provide that access) would be much easier than it was. We assumed that academics, especially conservation and climate-focused researchers, would quickly take corrective action once they learned about the problems accessing their research from an NGO-standpoint. However, this was not the case. We repeatedly ran into the same issues as other educational/activist organizations face: people are reluctant to change closely held personal beliefs, no matter how educated they are. Academics are not immune from experiencing cognitive dissonance.

Along these same lines, we did not anticipate experiencing harassment from members of the academic community. Given the interactions we experienced during this project, we would caution that future endeavors plan and prepare for such behavior. It should be clear these 'bad actors' were small in number and do not represent the academic community as

a whole. Nevertheless, we would recommend having a concrete plan to handle communications that turn sour.

Personal touches in our communications were absolutely essential to growing MarXiv. It seems clear from the numbers that paid online advertising had little, if any, effect on encouraging deposits. One-on-one communications specific to the receiver grew MarXiv the fastest. For example, sending hand-written thank-you notes via physical postal mail (like it's 1999!) helped encourage even more deposits from authors who had only shared a single work.

We also learned that providing authors with very specific details regarding their self-archiving rights was much more effective than broad, generalized instructions. We utilized a programmatic request system ('Nick-bot') to solicit the majority of works deposited to MarXiv (Figure 1). Between March and November 2018, Nick-bot helped to grow MarXiv at its fastest rate (Figure 6). Throughout this period we continually revised our request templates (<https://bitbucket.org/octogroup/marxiv-templates/src>) to test new language. Initially, these requests were worded rather generally: authors were encouraged to share either their preprint or postprint, but that sharing the latter would require waiting a year or two. Rather than telling authors exactly what their postprint embargo period was, we linked out to this information.

Based on our results, this was not an effective strategy. Authors were reluctant to share preprints, and were not clicking through to learn more about sharing postprint. Thus, we revised the templates to explicitly state the length of the embargo period on postprints. Specific information in the original request helped to increase our success rate.

We further refined the templates to encourage authors to share their preprints, mostly because postprints are often mandated by publishers to use a specific, restrictive license. Elsevier, for example, requires that all postprints bear a CC-BY-NC-ND license, which prevents the work from being freely translated into another language (thanks to the 'ND' clause). Since only 3% of the planet is literate in English, restrictive licenses like these prevent ocean science from being read and utilized. We believe changing the templates had an effect. We even had an author contact us wishing to replace a postprint with a preprint, just so their work (written in English) could be translated into the language of the study area's participants (Italian).

We found that our requests to senior (i.e., tenured) authors were often ignored or forwarded to a lab assistant or post-doc. Based on our experience, it seems unlikely that the growth of Green OA will come from the top (i.e., senior academics). Rather, our most-supportive users were early- to mid-career academics, those employed in the nonprofit sector, and librarians. Senior academics make more hiring decisions than their early-career counterparts, so it is essential that these individuals embrace Green OA themselves to encourage the behavior. We hope that future efforts are more successful in engaging senior authors.