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Dr. Barbier,

We are writing to communicate the views of the American Association for the Advancement of Science (AAAS), the world's largest multidisciplinary scientific society, on [NASA's Request for Information: NASA Public Access Plan for Increasing Access to the Results of NASA-Supported Research](#), published in the *Federal Register* (Document Citation: 88 FR 31827).

AAAS, a multidisciplinary nonprofit association of more than 100,000 member scientists and engineers at all levels of the scientific enterprise, publishes the *Science* family of journals. Our mission is to advance science and innovation throughout the world for the benefit of all.

The *Science* family of journals is open to the public without embargo using green open access models for five of our journals and a gold open access model for one. Our journals require published authors to make their data immediately accessible in approved repositories and authors may share their author accepted manuscripts immediately upon publication.

AAAS applauds NASA for emphasizing equity in its approach to public access policy development and for considering how to balance access to published work with the ability to publish, as well as the unintended consequences that focusing primarily on accelerating access for readers may have. AAAS is committed to collaborating with NASA, other federal research agencies, and OSTP as they refine and implement their public access policies in support of publishing models that achieve this balance and is pleased to offer our response to NASA's RFI around the five key questions below.

We thank you for your consideration of these remarks and the more detailed comments that follow and would welcome opportunities to discuss them further. AAAS would also be pleased to serve as an informational resource for questions that arise as you consider the comments you receive.

**1. How to best ensure equity in publication opportunities for NASA-supported investigators.**

AAAS applauds NASA and other agencies for emphasizing equity as a key consideration in public access policy development. Through experimentation and analysis, AAAS has found that vast differences exist in how different publishing open access models impact the ability and equity of opportunity for scientists aiming to publish their work for wide dissemination. Some models of open access lock in place and exacerbate existing inequities in the scientific enterprise. Finding the right balance between enabling access to published work and publishing opportunity will be crucial as NASA and other federal agencies move forward with refining their public access policies. AAAS supports NASA's plan to allow for submission of the author accepted manuscript (AAM), as accepted by the publisher, to approved



repositories as a means of complying with the Public Access Plan. Allowing for submission of this version of the manuscript is critical to mitigate issues associated with author- and institution-borne costs for publishing public access, including article processing charges (APCs). We continue [to hear from members of the research community](#) that APC-based publishing, over time, creates cost burdens that are more significant than anticipated.

NASA's recognition that the author-accepted manuscript (AAM) is an accepted version that can be submitted to approved repositories would directly address growing challenges that alternative open access models – for which authors pay to make their work open – create for early-career scientists, scientists at smaller schools, and scientists in underfunded disciplines, among others. It would help to ensure a diverse universe of scientists can publish important work, regardless of their economic circumstances.

This step would also require the agency to consider the role of business models more directly – some of which do not foster inclusivity – in its efforts around public access. While NASA's Public Access Plan does not address business models, it does explicitly state that “NASA allows all Article Processing Charges (APCs) to be included in the grant proposal budget.” This may work well for senior scientists who are (routinely) well-funded, tenured, and overwhelmingly male and white, but it will freeze in place and exacerbate inequities for many others, including a new generation of scientists. By channeling researchers to a limited number of commercial publishers, it will also drive further consolidation in a market that is already heavily concentrated, and where APC fees will only increase with time.

The resultant heavy cost burden will be borne not only by researchers and their institutions, including at a time when institutional research budgets are increasingly challenged, but also by funders of research (including taxpayers). Allowing all APCs to be included in a grant proposal diverts funds away from key research initiatives, post-docs, and equipment.

Finally, we urge the agency to continue to proactively communicate with publishers and authors about their policies to ensure they allow authors to deposit the author-accepted manuscript in approved repositories. This is essential to ensure that, regardless of a scientist's geographic location, institutional affiliation, academic rank, or identity, they can publish world-changing science.

## **2. Steps for improving equity in access and accessibility of publications.**

AAAS supports open-research initiatives, including text and data mining, which use technology to meet the needs of researchers. However, appropriate limitations are important to ensure such offerings remain sustainable; we have seen some initiatives lead to unintended consequences when the necessary rights have not been secured to enable their sustainability. Given the fast pace of artificial intelligence development, it is critically important to monitor the creation and adoption of guidelines for tools that can be trained on full text journal articles, including for the purposes of replicating scholarly journal content, to ensure a focus on responsible and ethical development.

*Science* family journal articles, and specifically the AAM versions of such articles, may be used for text and data mining by individuals and by nonprofit, non-commercial subscribing institutions. Sustainably increasing accessibility to publications via this route requires that publisher reuse policies are followed by federally funded researchers. AAAS encourages NASA to consider how adherence to related policies will be monitored and what administrative burdens this might create for researchers, institutions, and the agency. NASA should also endeavor to monitor how changes resulting from the public access policy, including a breadth of open license types, might facilitate and incentivize reuse that adversely impacts the



integrity and accuracy of the downstream communication of research published by federally funded researchers.

**3. Methods for monitoring evolving costs and impacts on affected communities. NASA proposes to actively monitor trends in publication fees and policies to ensure that they remain reasonable and equitable.**

We appreciate NASA's recognition that consideration of the benefits and costs associated with data management plans (DMP) and publication fees is important. Careful and continued study of publication fees and policies is essential for understanding the near- and long-term effects of changes in public access policies. AAAS encourages NASA to study the effects of data management plans at the researcher, institution, and enterprise levels. In addition, it should consider a study or studies that engage institutional leadership to estimate and report on publishing costs across institutions.

In addition to developing methods for monitoring costs, AAAS encourages NASA to develop and adopt a public reporting scheme to ensure visibility and transparency into publishing costs borne by scientists, their institutions, and ultimately the federal government. This will allow for future course correction. For example, adaptation of federal grant agreements to require reporting on the payment of publication fees and reliance on transformative agreements (in instances where authors avoid payment of a fee because their institution has a transformative agreement with their journal of choice) represents one logical approach to monitoring fees.

AAAS believes that monitoring implementation of changes to the public access policy and publishing costs paid by researchers and institutions will be critical to ensuring that these changes do not create new inequities or reinforce existing ones. All analysis of and reporting on publication costs should examine potential variability in costs across disciplines, career stages, and institution type, as well as based on researchers' backgrounds and characteristics. Analysis and reporting should assess if and how changes in NASA's Public Access Plan may affect the volume of research publications authored by scientists who are early career or are from smaller, lesser-funded, and historically underrepresented institutions, including Historically Black Colleges and Universities, Hispanic-Serving Institutions, EPSCoR, and other Minority-Serving institutions. Furthermore, it should assess where researchers choose to publish, and potential variability in effects across different research disciplines including, but not limited to, the physical sciences, engineering, mathematics, life sciences, social sciences, and humanities.

Finally, it may be valuable for NASA and other federal agencies to conduct a survey, as AAAS did on a smaller scale in 2022 (<https://www.aaas.org/news/aaas-survey-many-researchers-face-difficulties-paying-open-access-fees>), and/or develop a public reporting scheme about scientist-borne publishing-associated costs and related tradeoffs.

**4. Input on considerations to increase findability and transparency of research.**

Access and transparency are foremost considerations at AAAS, where one of our visions includes communicating science accurately, broadly, and in such a way to ensure the scientific community can reanalyze and reproduce new works. In recognition, AAAS supports the peer-reviewed author-accepted version of a paper being broadly and immediately shared and the flexibility afforded by NASA's intention to accept this version of the article as a means of complying with its updated public access policy. At AAAS, however, we believe that publisher oversight of a final version (the version of record, or VoR) is essential not only to maintaining the quality and accuracy of scientific research but also to advancing the



subsequent work from which new research stems. Only the final version of a manuscript overseen by a publisher committed to maintaining the accuracy of the scientific record can be counted on to be corrected, retracted or otherwise updated with clear notation for the global scientific research community. Ensuring that publication repositories clearly distinguish between multiple versions of articles (i.e., ensuring that singular publication records point to the VoR, where the AAM is deposited first) will be critical, as NASA moves forward. Finally, we support NASA's policy that digital object identifiers (DOIs) be assigned to all datasets supporting peer-reviewed publications. However, we believe that this policy should also extend to the author's accepted manuscripts to include a DOI pointing to the VoR. Indeed, at AAAS, our instructions for authors depositing AAMs require them to include a link to the VoR.

With respect to metadata, linkages between publishers and organizations such as the Research Organization Registry (ROR), Open Researcher and Contributor ID (ORCID), Crossref, and data repositories are aimed at increasing robustness of metadata by providing persistent identifiers and connecting them to research outputs. As a publisher, AAAS monitors and implements best practices for both metadata collection (e.g., on institutions and funders) and metadata propagation in the VOR and associated research objects.

All *Science* family journal papers include details about funding, author contributions, competing interests, data and materials availability, and license information. The publisher oversees accuracy of important associated metadata after publication, including in cases where authors request to change their names in previously published papers, as one example. As a criterion to publish, AAAS requires authors to make their data publicly accessible. AAAS has also piloted a partnership with Dryad, an international open-access data repository; we encourage such partnerships because they help ensure that publishers and repositories share the same metadata, thus providing better linkage between the data and the research paper. NASA may wish to consider implementing guidelines for data availability in publications. These guidelines could include a clear set of criteria for data deposition and ease of linking to that data, which publishers could help enforce. As a best practice, NASA could also encourage connections between publishers and data repositories of various kinds (general or field-specific, or both).

## **5. Suggestions on sharing and archiving of software.**

As stated above, access and transparency are foremost considerations at AAAS. In recognition, *Science* family journal editors discuss data and code release with authors for every paper prior to acceptance. As a criterion to publish, all *Science* family journal authors must make their data and code available for purposes of reproducing or extending the analysis. What is more, the journals support authors making data and code available during the pre-publication process and encouraging the broader research community to standardize preparation of code for publication long prior to submission of any related work. This is essential to facilitating a more transparent and efficient peer review process.

If the software used in an analysis is commercially available or the source code is already publicly archived, it should be referenced in an appropriately formatted citation – with the version included. Author-written source code that is not yet publicly available should be archived in a permanent public repository prior to publication and likewise cited. With respect to code used on supercomputers, it is worth noting that community-wide standards regarding what code is required for reproducibility have not yet been established.



When custom computational methods go beyond simple fitting routines or common algorithms that can be described succinctly in plain English, all *Science* family journals require that the underlying code be deposited in a permanent repository such as [Zenodo](#). Because GitHub libraries may be modified later by authors in ways that could complicate reproducibility, any code stored on GitHub should be archived in its current form in a permanent public repository ahead of publication (straightforward instructions for doing so can be found [here](#)), and that version should be cited in the paper. In the interest of tracking data and code reuse and accordingly allocating credit, the *Science* family journals include citations of datasets and archived code with DOIs in the reference list, using [DataCite](#) formatting conventions. A consensus guide to citing software, by a working group of multiple publishers, can be found [here](#). These references should be cited in the Data and materials availability section of the acknowledgments, where repository-specific accession codes should also be disclosed.

NASA may wish to consider implementing guidelines for code availability in publications. These guidelines could include a clear set of criteria for code deposition and ease of linking to code, which publishers could help enforce. As a best practice, NASA could also encourage connections between publishers and code repositories of various kinds. With respect to code used on supercomputers – an important domain where community-wide standards have not yet been established – NASA could work with other stakeholders to help develop such standards. Finally, NASA may wish to consider requiring that labs they fund use current versions of software.

### **In Closing.**

AAAS agrees with NASA that “[i]ncreasing access to publications and data resulting from federally funded research offers many benefits to the scientific community and the public.” As an experienced nonprofit, scientific society publisher of research and the one of the largest associations of scientists globally, AAAS maintains strong bonds with the scientific community. We support this community and its needs and goals with publications and programming that promote quality and transparency, by contributing to the accurate record of published scientific content, and by facilitating public understanding and global exchange of new research. Access to quality scientific and technical information supports science and innovation globally and is central to the mission of AAAS and the *Science* family of journals.

We appreciate the interest of NASA in improving access to and curation of technical information, as well as its commitment to equity, and we welcome the opportunity for further engagement about how related transformations can be realized.