EDITORIAL

AMS Publications Support for Open, Transparent, and Equitable Research

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This year (2023) has been designated as the Year of Open Science (YOS) by federal agencies in the United States. The YOS is a multiagency initiative across the federal government to spark change and inspire open science engagement through events and activities that will advance adoption of open, equitable, and secure science. As part of this effort, open science has been defined as "the principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility, and equity" (see https://open.science.gov/).

Because of their global nature, the weather and climate enterprises have been at the forefront of open science activities through the implementation of foundational international data sharing and exchange agreements that have been in place since the early nineteenth century (Riishojgaard et al. 2021). Without these agreements, the significant advances that we have experienced in weather prediction and climate research would not have been possible.

The demonstrated impact of research transparency and sharing has also motivated the broader science and publishing community to embrace the use of open science practices. The Coalition for Publishing Data in the Earth and Space Sciences (COPDESS) states this well in its 2014 Statement of Commitment supporting open data and software: "Today, a research publication is much more than a manuscript on a web site or in print. All scholarly publications represent a network of interconnected resources and information that are essential to the integrity, reusability, and value of that output for both scientific and societal uses. Often, the data, software, experimental protocols and physical samples connected to a publication provide additional and even greater value in their own right."

Open science is built around the idea that research is more impactful when anyone, without the need to contact an author, can reuse and build upon the work of others to achieve significant scientific advancements versus having individuals repeatedly duplicate efforts to recreate software and data that first need to be in place to test further research ideas. In this spirit, the American Meteorological Society (AMS) has been working to promote open science principles for over two decades, starting with the adoption of its 2002 policy statement "Free and Open Exchange of Environmental Data," which has been iterated over the years to the current version of "Full, Open, and Timely Access to Data," adopted in 2019. To remain aligned with evolving community trends, AMS in 2022 complemented its open data policy statement with a professional guidance statement to include open science considerations for software: "Software Preservation, Stewardship, and Reuse."

One key to the success of open science is to ensure that the producers of data and software receive credit when others reuse and build upon these research components. AMS has highlighted this in its data policy and software best practices statements, which emphasize the need to raise the importance of data and software artifacts to the same level as peer-reviewed journal publications when considering metrics for professional advancement. Sponsors have also recognized this need. For example, the U.S. National Science Foundation (NSF) lists data, software, and models as acceptable products to be listed on a proposer's biographical sketch (National Science Foundation 2023, chapter 2).

Motivated by these community trends and the recent changes in AMS policy and promotion of open science best practices, the AMS Publications Department updated its "Data and Software Policy Guidelines" in December 2022 to include requirements for authors on both data and software sharing with the following key components that are consistent with these resources being Findable, Accessible, Interoperable, and Reusable (FAIR):

- *Archive core research outputs (data, software, samples, etc.) in valid FAIR-aligned repositories, if possible.* This includes the assignment and use of persistent identifiers such as digital object identifiers (DOIs) for as much of the relevant archived data, software, and documentation as possible.

Denotes content that is immediately available upon publication as open access.

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- *Include a data availability statement section in the submitted manuscript immediately following the acknowledgments section.* The data availability statement should describe where the data and software underlying the findings for the article are archived and documented, and how they can be accessed and reused.
- *Include in the reference section properly formatted citations to the deposited data and software mentioned in the data availability statement*. Formal citations are important for attributing proper credit for data and software creation and use.

The data and software policies are designed to be flexible enough so that *no author should be excluded from submitting to our journals*, especially because of resource limitations. In general, *data and software should be as open as possible and as closed as necessary*.

The AMS Publications Department open science expectations are aligned with policies being implemented across the scientific publishing community. They are intended to promote the use of open science principles by researchers, support equitable access to all research artifacts, and most importantly lead to greater discovery and impactful research outcomes. We welcome community feedback about our open science policies and guidelines for authors, and commenters can email datapolicy@ametsoc.org for that purpose. In addition, the AMS Board on Open Science, Data, and Software hosts an Open Science and Data Help Desk at the AMS annual meeting to explain these policies, solicit feedback, and answer attendee questions. Your participation is appreciated in helping AMS to develop and reinforce best practices not only for making data and software used in research more open and accessible but also for ensuring that proper credit is given to the creators and developers of research data and software.

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