Geophysical Research Abstracts
Vol. 21, EGU2019-9337, 2019
EGU General Assembly 2019

Progress and Challenges to Moving to a FAIR-Enabled Research Culture.

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A commitment to and enabling FAIR (findable accessible interoperable and reproducible) science has come a long way in the past few years. Thanks to multiple efforts from all stakeholders in scholarly research, practices and standards are changing are being elevated. This is seen from the acceptance and widespread use of data management plans to development of repositories at agencies and institutions worldwide, to increased requirements associated with scholarly publishing to more sessions like this one. The Enabling FAIR Data Project (see https://copdess.org) has aligned key publishers, repositories, and other stakeholders to common practices and standards to enable FAIR data in scholarly publishing in the Earth, environmental, and space sciences and similar approaches are developing in other disciplines. Yet several key challenges persist that are structural to the practice of science and need coordinated and visible efforts and attention from the international science leadership both to support the progress that has been made but more significantly implement a FAIR-enable research culture that supports integrity and scholarship in the modern research ecosystem. Some of these major challenges and opportunities include:
1. All stakeholders need a commitment to FAIR and integrity in science. Researchers, funders, and societies play a key role here in demanding standards in their roles, including as publishers, program managers, editors, and reviewers. Financial pressures associated with emerging open-access models can work antithetical to ensuring quality and need attention. Work flows need simplification while supporting FAIR science.
2. The infrastructure to support FAIR data needs to be fully funded internationally. It is not now. Institutional and general repositories can and need to support and enable domain expertise. Science is collaborative across institutions, funders, and internationally, but the repository landscape is not.
3. The reward process must recognize and incentivize FAIR Data practices explicitly, from renewals, to honors, to promotion.
4. Software, samples, and materials need to be incorporated much better into FAIR science practices. Fortunately there are good models for this.
**Acknowledgment: This presentation in large part reflects input and discussions with the Steering Committee and other participants for the Enabling FAIR Data Project.