Open Science in Astronomy

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EWASS/NAM 2018 – S6d: Software in Astronomy – Room 11A – Thurs, 5 April @ 9:00

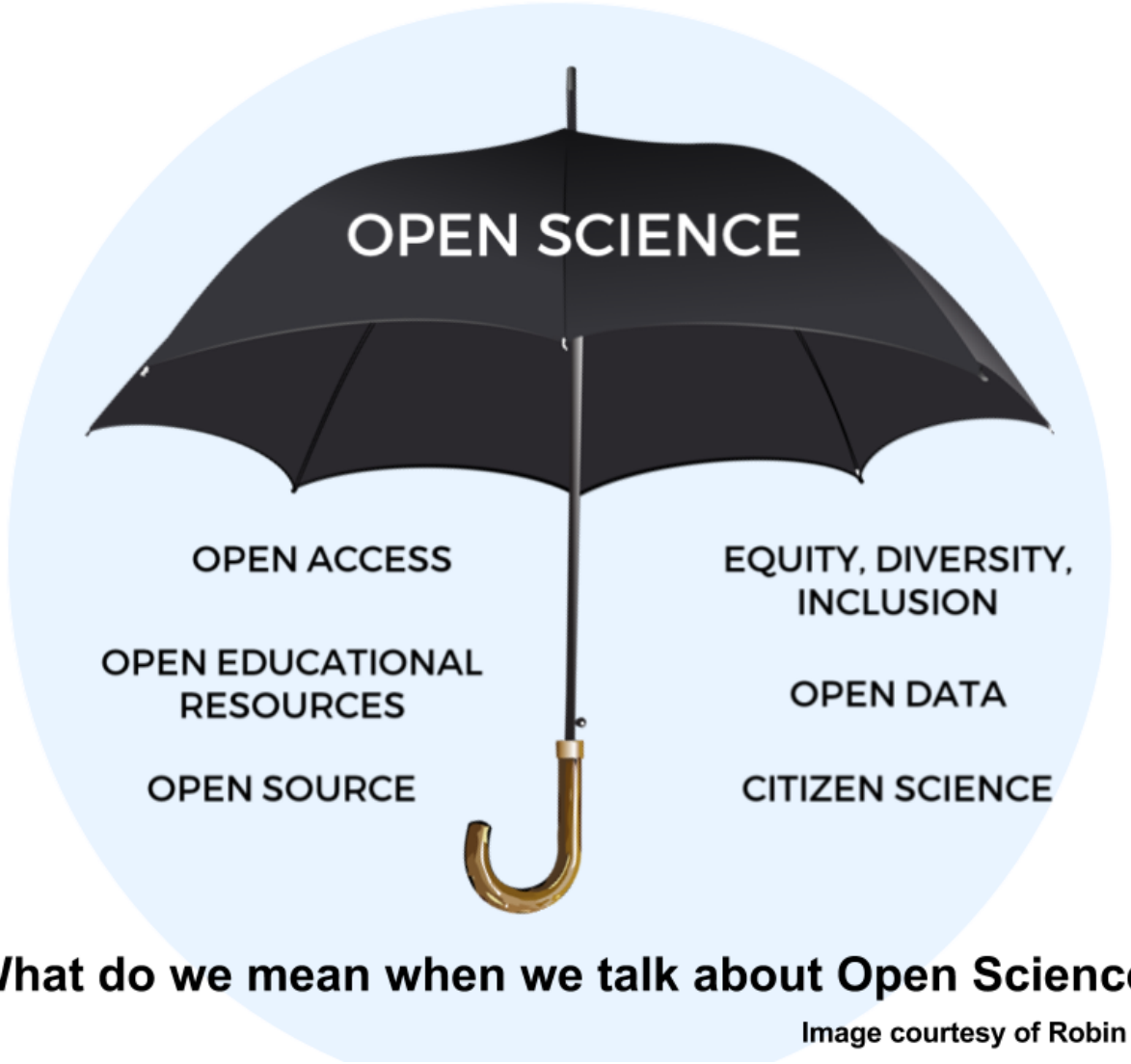
Outline

- What is Open Science?
- Barriers to Open Science
- Why research openly?
- Platforms to help you open up your research workflow
- Mozilla Open Leaders project: Resources for Open Science in Astronomy
- Open Science projects in Astronomy

What is Open Science?

The concept of transparency at all stages of the research lifecycle, combined with free and open access to data, publications, source code, etc. to ensure that anyone can fully reproduce your results.

…but isn't this just science?



What do we mean when we talk about Open Science?

Image courtesy of Robin Champieux

Barriers to Open Science

From Tennant, Jon (2017): Barriers to Open Science for junior researchers. https://doi.org/10.6084/m9.figshare.5383711.v1

- Fear of
  - Scooping or ideas being stolen
  - Not being credited for ideas
  - Errors and public humiliation
  - Risk to reputation
  - Reduced scientific quality
  - Information overload
- Lack of awareness and training
- Cultural inertia and misinformation
- Challenging the establishment
- Follow the status quo to succeed
- Perceived lack of reward

https://doi.org/10.6084/m9.figshare.5558653

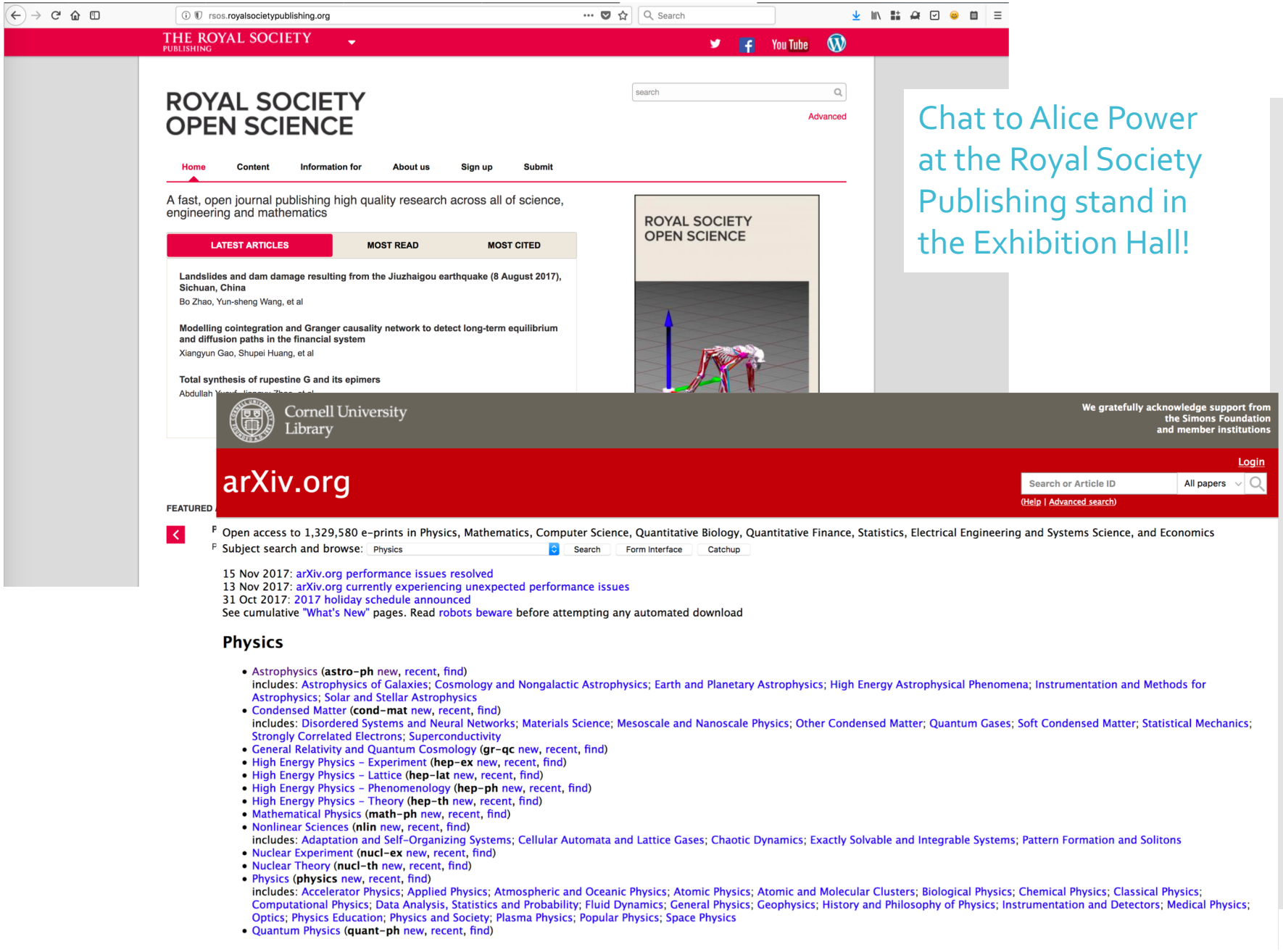
Why research openly?

Making research results more accessible contributes to better and more efficient science, and to innovation in the public and private sectors (EU Commission, Horizon 2020).

McKiernan+ (2016, DOI: 10.7554/eLife.16800) demonstrated that open research is associated with increases in citations, media attention, potential collaborators, job opportunities and funding opportunities.

Open Access

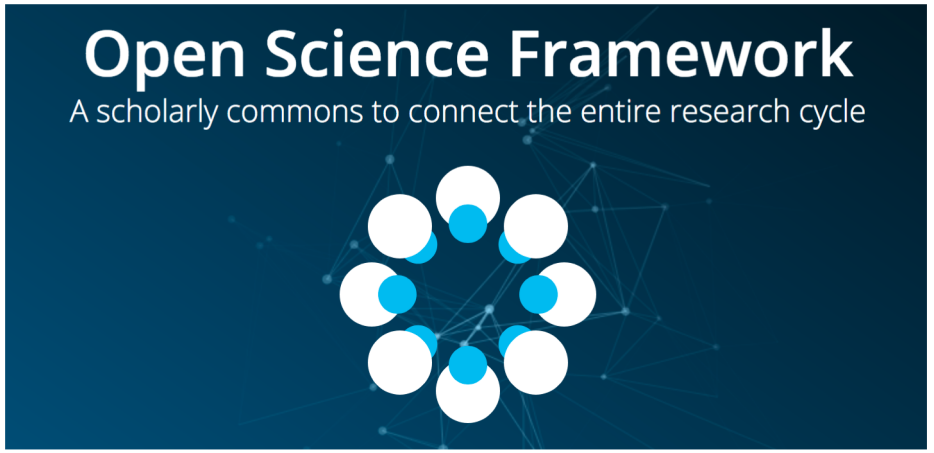
- Gold route: Royal Society Open Science journal
  - Open access, open data & open peer review
  - Author retention of copyright & liberal reuse rights via CC BY 4.0
- Green route: arXiv.org
  - Provides open access to 1,329,580+ e-prints in (Astro)Physics & many other fields
  - Started in August 1991
  - Consider posting pre-prints (vs post-prints) to arXiv to gain community insight before peer review!



Chat to Alice Power at the Royal Society Publishing stand in the Exhibition Hall!

Open repositories

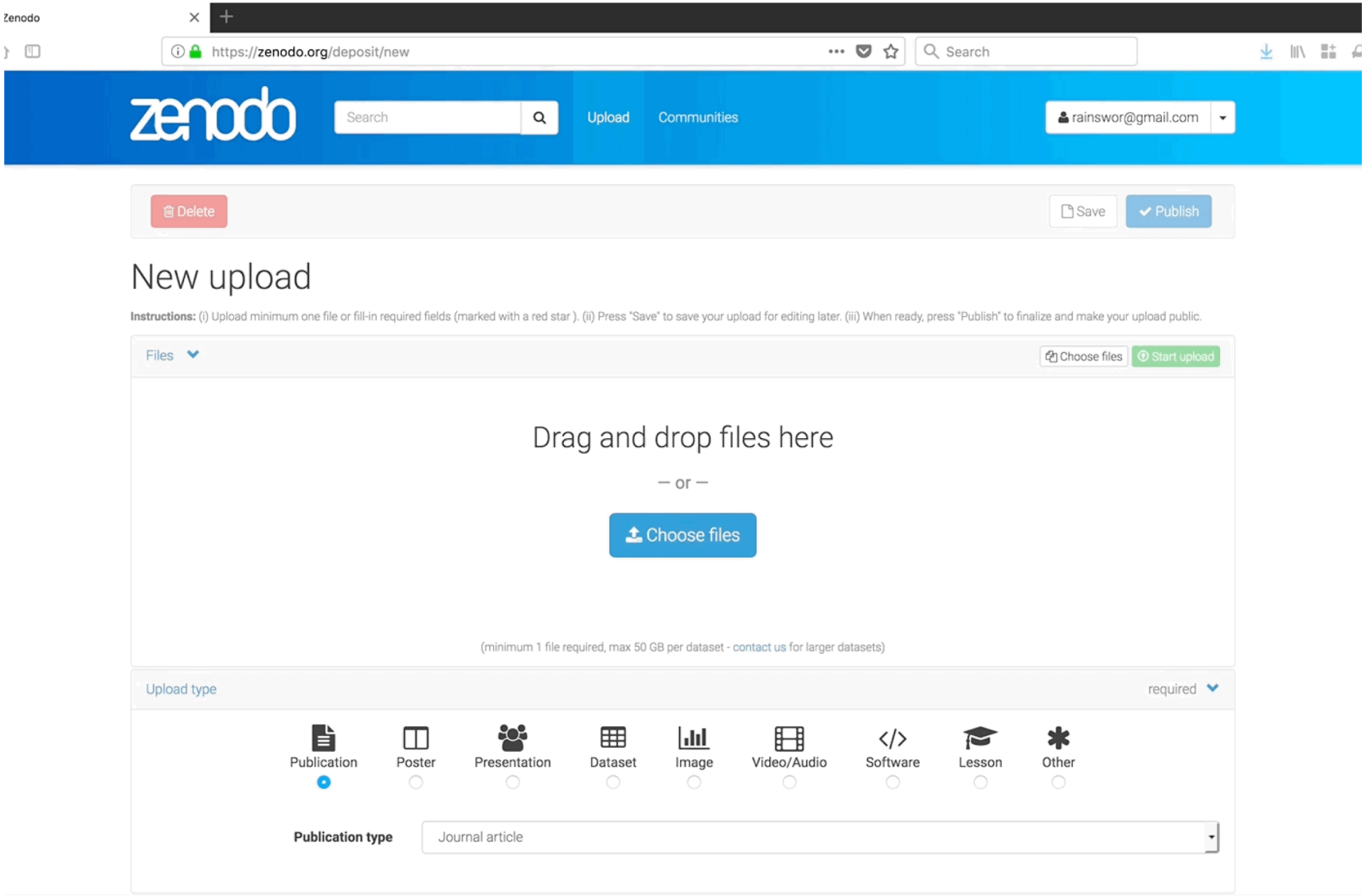
GitHub



zenodo

A catch-all repository that enables researchers, scientists, projects & institutions to:

- Share research results in a wide variety of formats including text, datasets, audio, video & images across all fields of science
- Display their research results & get credited by making the research results citable & integrating them into existing reporting lines to funding agencies like the EU
- Easily access & reuse shared research results



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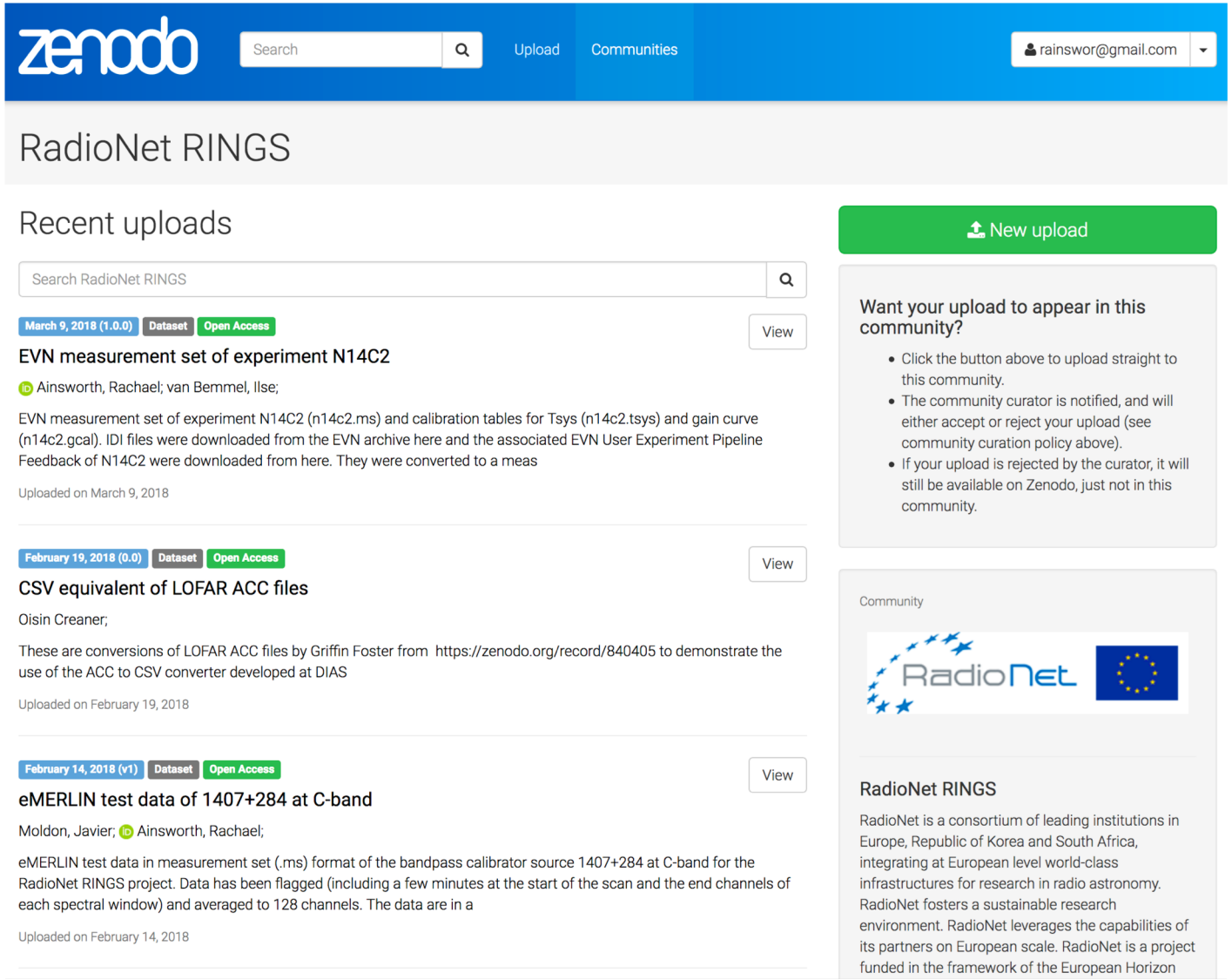
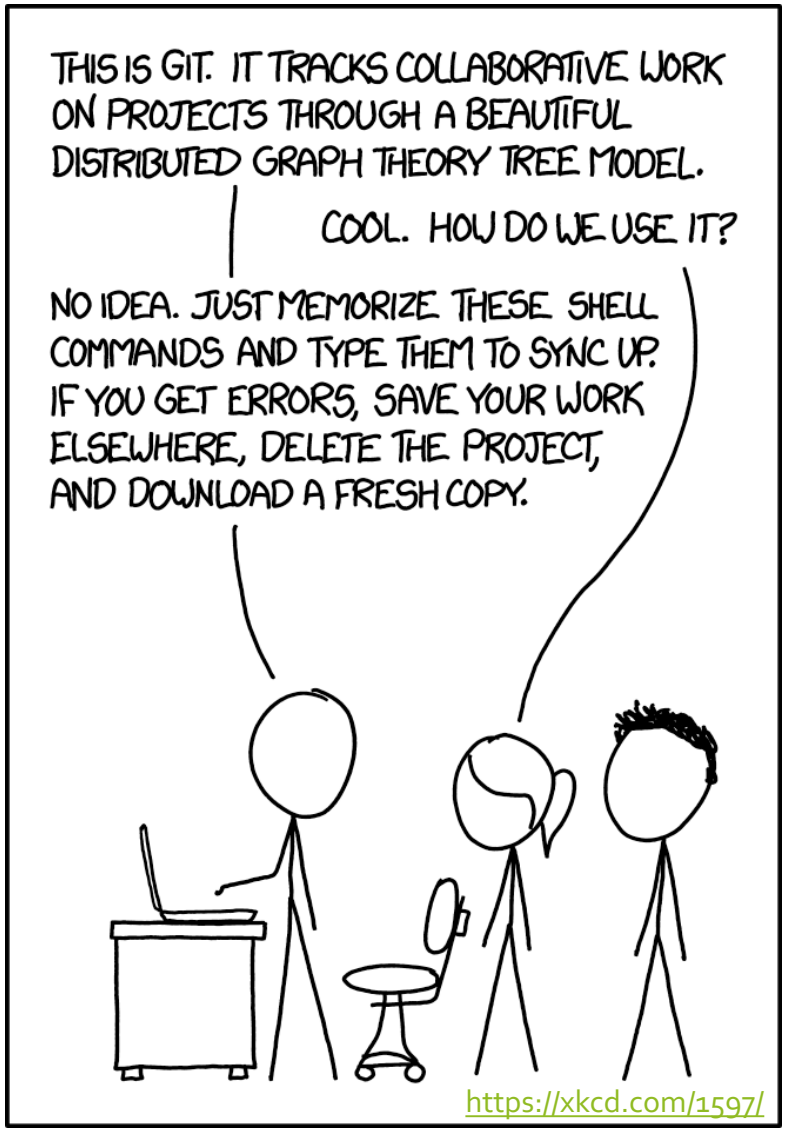
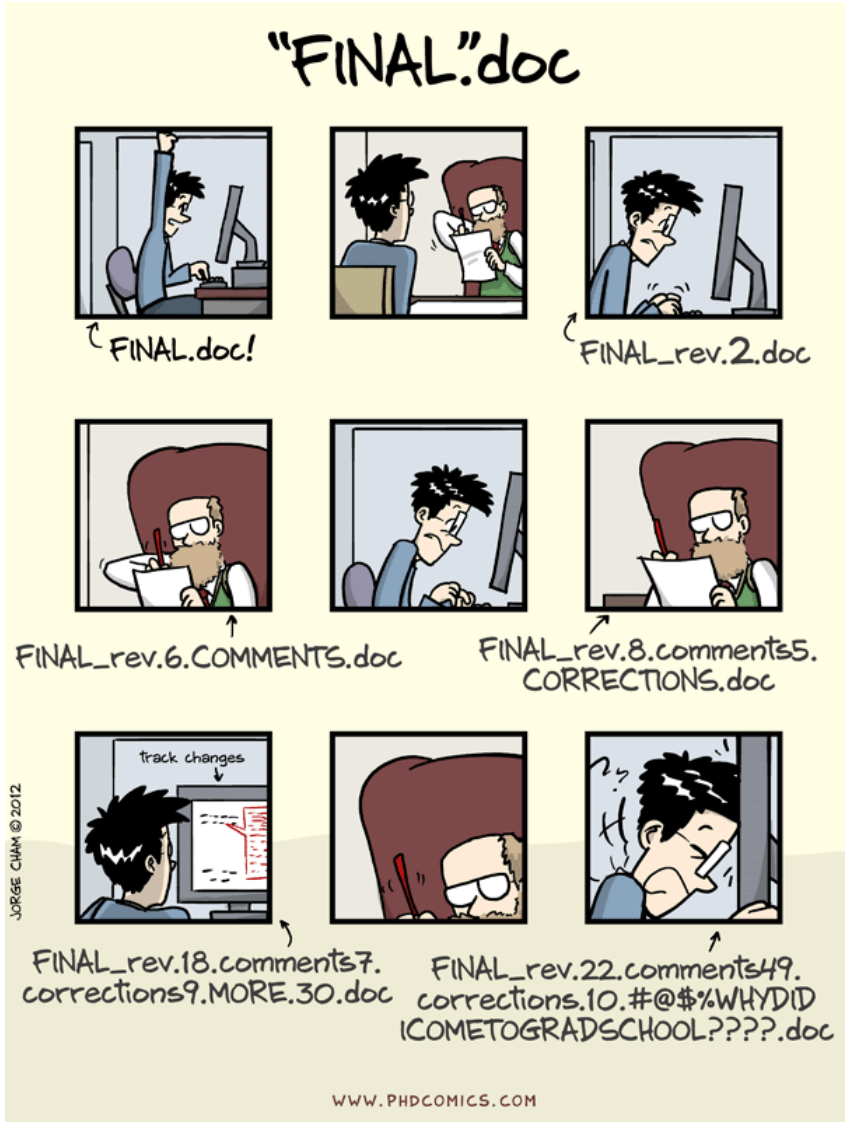


GitHub

- Git is an open source program for tracking changes in text files (version control)
- GitHub is a code hosting platform for version control & collaboration. It lets you & others work together on projects from anywhere
- Open & reproducible science/code/research!
- Online portfolio & webpage for your research
- Archive your repo & make citable with Zenodo





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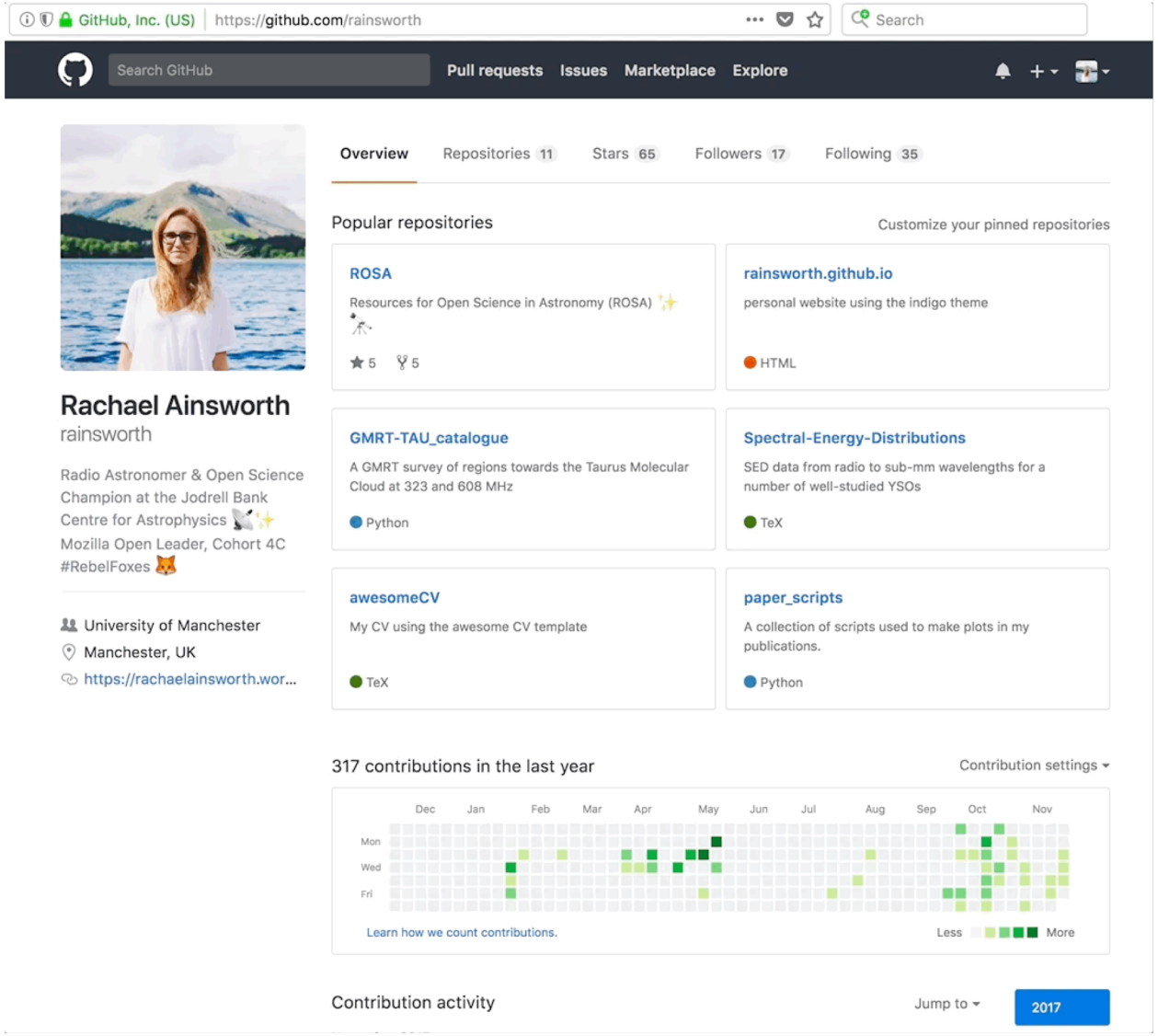

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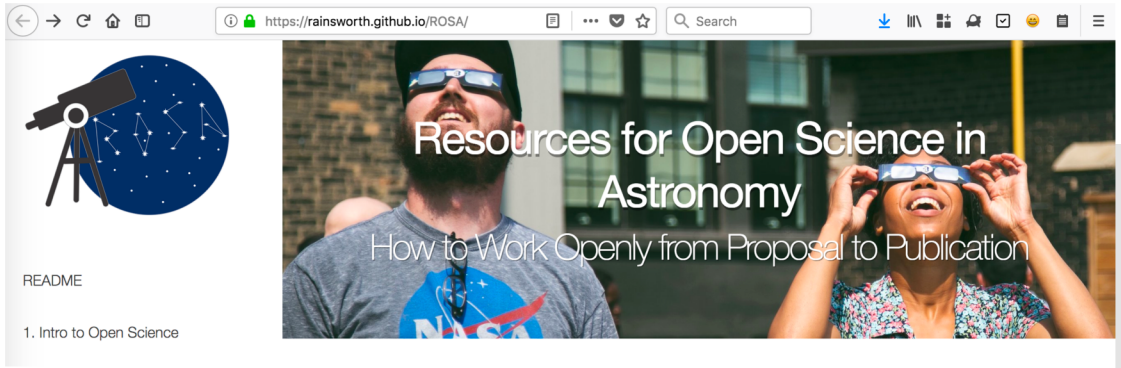
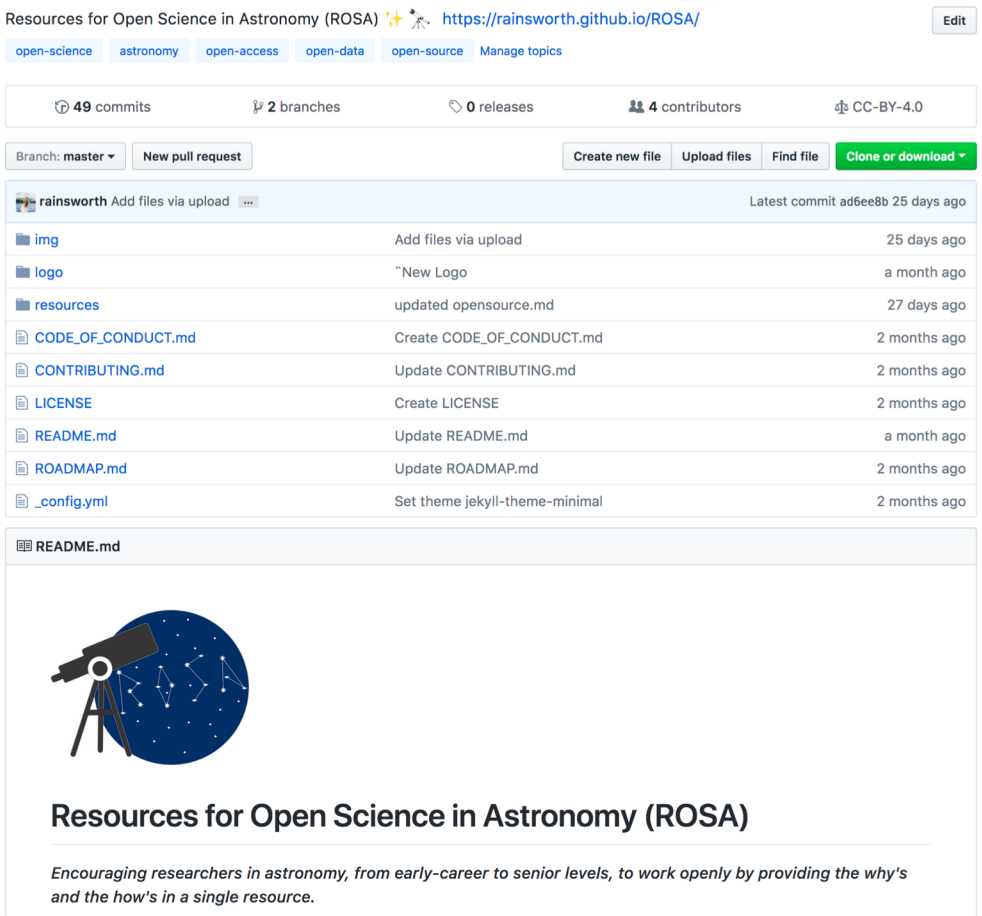
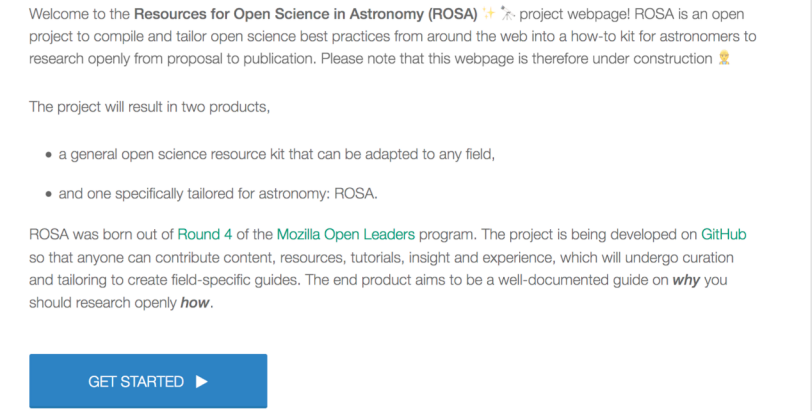
Open Leaders Round 4 project: Resources for Open Science in Astronomy (ROSA)

- github.com/rainsworth/ROSA
- An open project to compile & tailor open science best practices from around the web into a how-to kit for astronomers to research openly from proposal to publication.
- A guide to help astronomers comply with Horizon 2020 open science mandates!





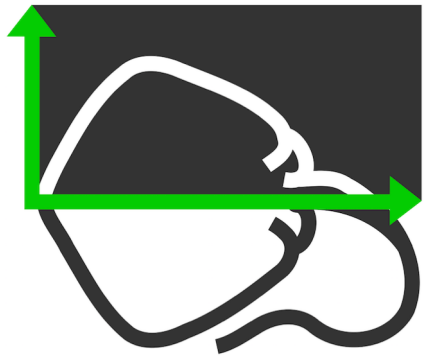


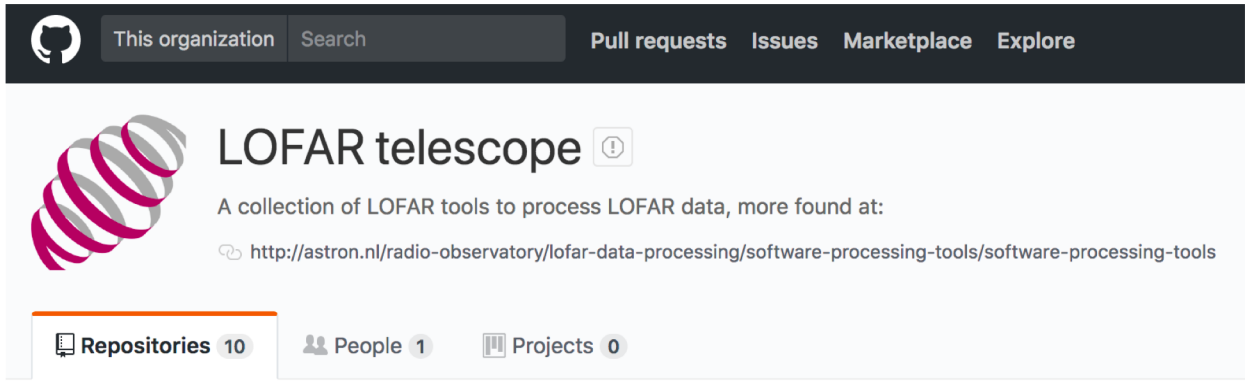
Mozilla Global Sprint

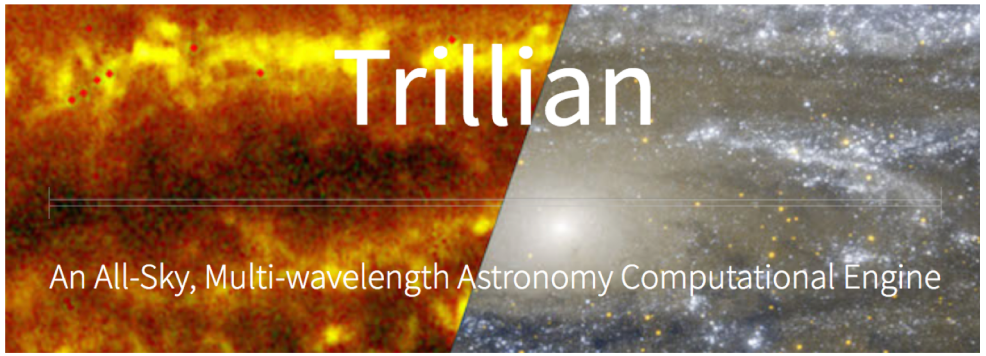
Join this fun, two-day collaborative hackathon
May 10-11 to contribute to this or many other open projects!

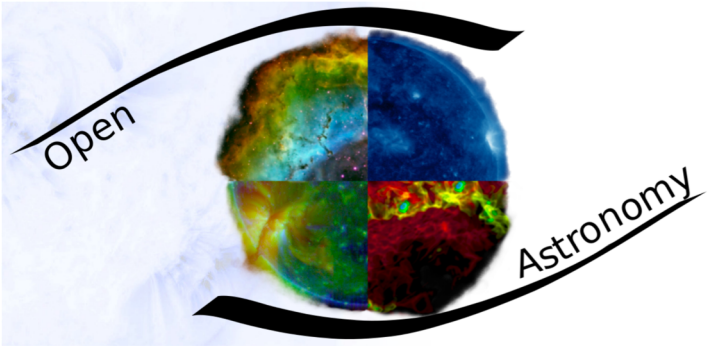
https://mzl.la/global-sprint

Open Projects in Astronomy









Summary

- Open Science is making research outputs freely available and accessible for others to use in order to increase efficiency, maximize impact, encourage collaboration, and promote inclusion, equity and diversity in science. (You also get more citations.)
- Further reading:
  - Tennant JP, Waldner F, Jacques DC *et al.* The academic, economic and societal impacts of Open Access: an evidence-based review. *F1000Research* 2016, **5**:632 (doi: 10.12688/f1000research.8460.3)
  - McKiernan EC, *et al.* Point of View: How open science helps researchers succeed. eLife 2016;5:e16800 (doi: 10.7554/eLife.16800)
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  - GitHub - @rainsworth
  - Twitter - @rachaelevelyn
  - Resources for Open Science in Astronomy: https://github.com/rainsworth/ROSA/