

# Open Science in Astronomy

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Jodrell Bank Centre for Astrophysics, University of Manchester

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

MANCHESTER  
1824

The University of Manchester



**moz://a**



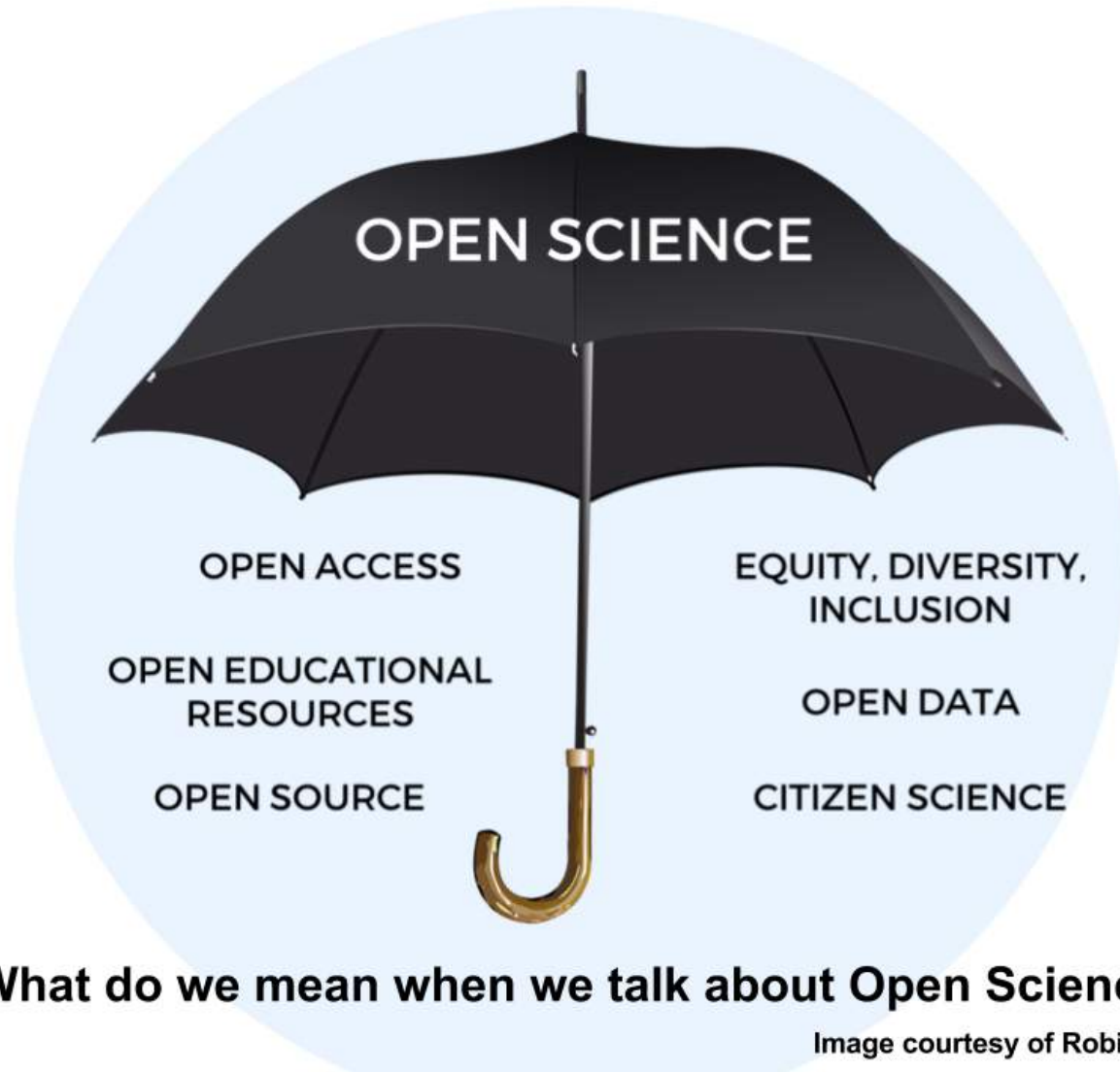
# Outline

- 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.



CC-BY Danny Kingsley & Sarah Brown

# 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!

The image shows two overlapping web browser screenshots. The background screenshot is the Royal Society Open Science website, which features a red header with the Royal Society logo and navigation links. The main content area includes a search bar, a navigation menu, and sections for 'LATEST ARTICLES', 'MOST READ', and 'MOST CITED'. The foreground screenshot is the arXiv.org website, which has a red header with the arXiv logo and a search bar. The main content area includes a navigation menu, a search bar, and a list of featured articles.

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



# Open repositories

The Zenodo logo consists of the word "zenodo" in a white, lowercase, sans-serif font, centered on a solid blue rectangular background.The GitHub logo features the word "GitHub" in a large, bold, black, sans-serif font.The Open Science Framework logo features the text "Open Science Framework" in a white, sans-serif font, centered at the top of a dark blue rectangular background.

A scholarly commons to connect the entire research cycle





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

zenodo

Search

Upload Communities

rainswor@gmail.com

Delete Save Publish

## New upload

Instructions: (i) Upload minimum one file or fill-in required fields (marked with a red star). (ii) Press "Save" to save your upload for editing later. (iii) When ready, press "Publish" to finalize and make your upload public.

Files

Choose files Start upload

Drag and drop files here

— or —

Choose files

(minimum 1 file required, max 50 GB per dataset - contact us for larger datasets)

Upload type required

Publication Poster Presentation Dataset Image Video/Audio Software Lesson Other

Publication type Journal article





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zenodo Search Upload Communities rainswor@gmail.com

## RadioNet RINGS

### Recent uploads

Search RadioNet RINGS

March 9, 2018 (1.0.0) Dataset Open Access View

**EVN measurement set of experiment N14C2**

Ainsworth, Rachael; van Bommel, Ilse;

EVN measurement set of experiment N14C2 (n14c2.ms) and calibration tables for Tsys (n14c2.tsys) and gain curve (n14c2.gcal). IDI files were downloaded from the EVN archive here and the associated EVN User Experiment Pipeline Feedback of N14C2 were downloaded from here. They were converted to a meas

Uploaded on March 9, 2018

February 19, 2018 (0.0) Dataset Open Access View

**CSV equivalent of LOFAR ACC files**

Oisin Creaner;

These are conversions of LOFAR ACC files by Griffin Foster from <https://zenodo.org/record/840405> to demonstrate the use of the ACC to CSV converter developed at DIAS

Uploaded on February 19, 2018

February 14, 2018 (v1) Dataset Open Access View

**eMERLIN test data of 1407+284 at C-band**

Moldon, Javier; Ainsworth, Rachael;

eMERLIN test data in measurement set (.ms) format of the bandpass calibrator source 1407+284 at C-band for the RadioNet RINGS project. Data has been flagged (including a few minutes at the start of the scan and the end channels of each spectral window) and averaged to 128 channels. The data are in a

Uploaded on February 14, 2018

New upload

Want your upload to appear in this community?

- Click the button above to upload straight to this community.
- The community curator is notified, and will either accept or reject your upload (see community curation policy above).
- If your upload is rejected by the curator, it will still be available on Zenodo, just not in this community.

Community

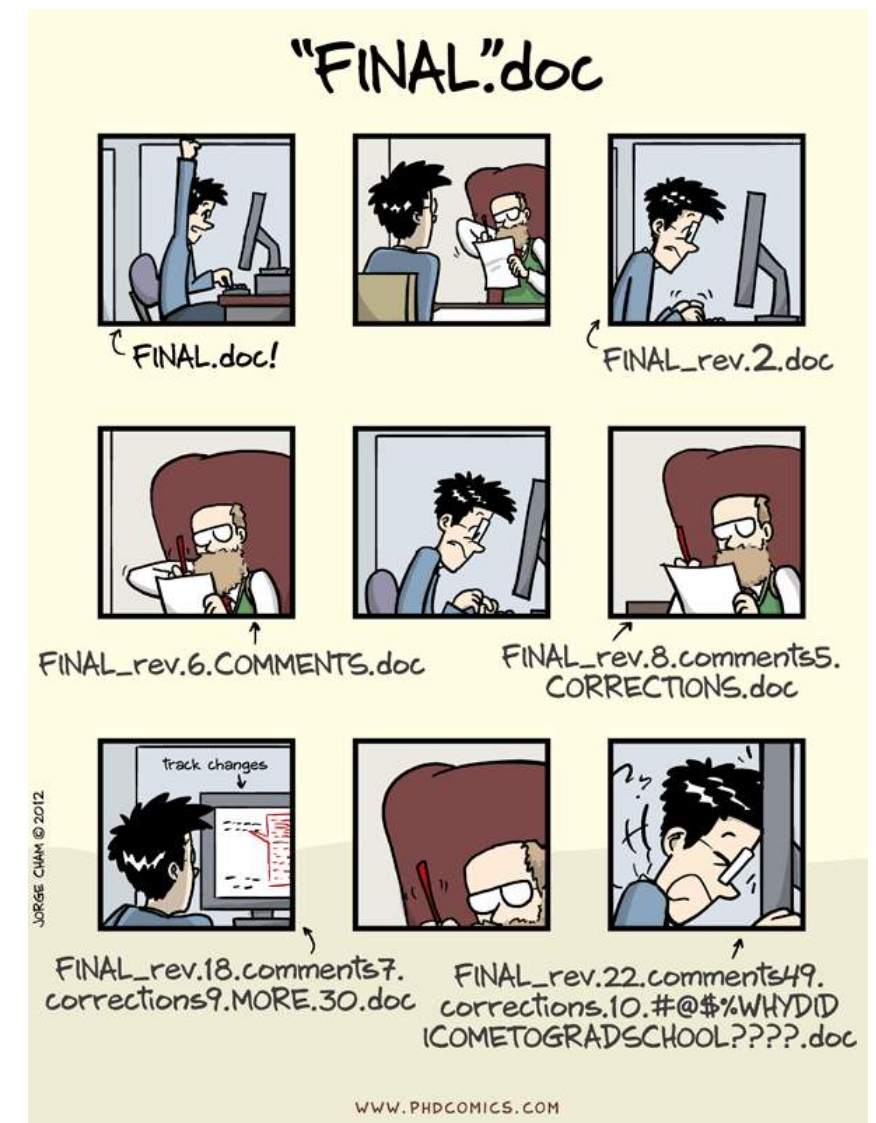
RadioNet

**RadioNet RINGS**

RadioNet is a consortium of leading institutions in Europe, Republic of Korea and South Africa, integrating at European level world-class infrastructures for research in radio astronomy. RadioNet fosters a sustainable research environment. RadioNet leverages the capabilities of its partners on European scale. RadioNet is a project funded in the framework of the European Horizon

# 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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The screenshot shows the GitHub profile of Rachael Ainsworth (username: rainsworth). The profile includes a bio: "Radio Astronomer & Open Science Champion at the Jodrell Bank Centre for Astrophysics", affiliations with the University of Manchester, and a list of popular repositories. The repositories shown are ROSA, rainsworth.github.io, GMRT-TAU\_catalogue, Spectral-Energy-Distributions, awesomeCV, and paper\_scripts. A contribution graph shows 317 contributions in the last year, with a legend indicating the number of contributions per day. The page also features a search bar, navigation links for Pull requests, Issues, Marketplace, and Explore, and a search bar for the repository.

GitHub, Inc. (US) | <https://github.com/rainsworth>

Search GitHub

Pull requests Issues Marketplace Explore

Overview Repositories 11 Stars 65 Followers 17 Following 35

**Popular repositories** Customize your pinned repositories

- ROSA**  
Resources for Open Science in Astronomy (ROSA) ✨  
★ 5 🍏 5
- rainsworth.github.io**  
personal website using the indigo theme  
● HTML
- GMRT-TAU\_catalogue**  
A GMRT survey of regions towards the Taurus Molecular Cloud at 323 and 608 MHz  
● Python
- Spectral-Energy-Distributions**  
SED data from radio to sub-mm wavelengths for a number of well-studied YSOs  
● TeX
- awesomeCV**  
My CV using the awesome CV template  
● TeX
- paper\_scripts**  
A collection of scripts used to make plots in my publications.  
● Python

**317 contributions in the last year** Contribution settings ▾

Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov

Mon  
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Learn how we count contributions. Less More

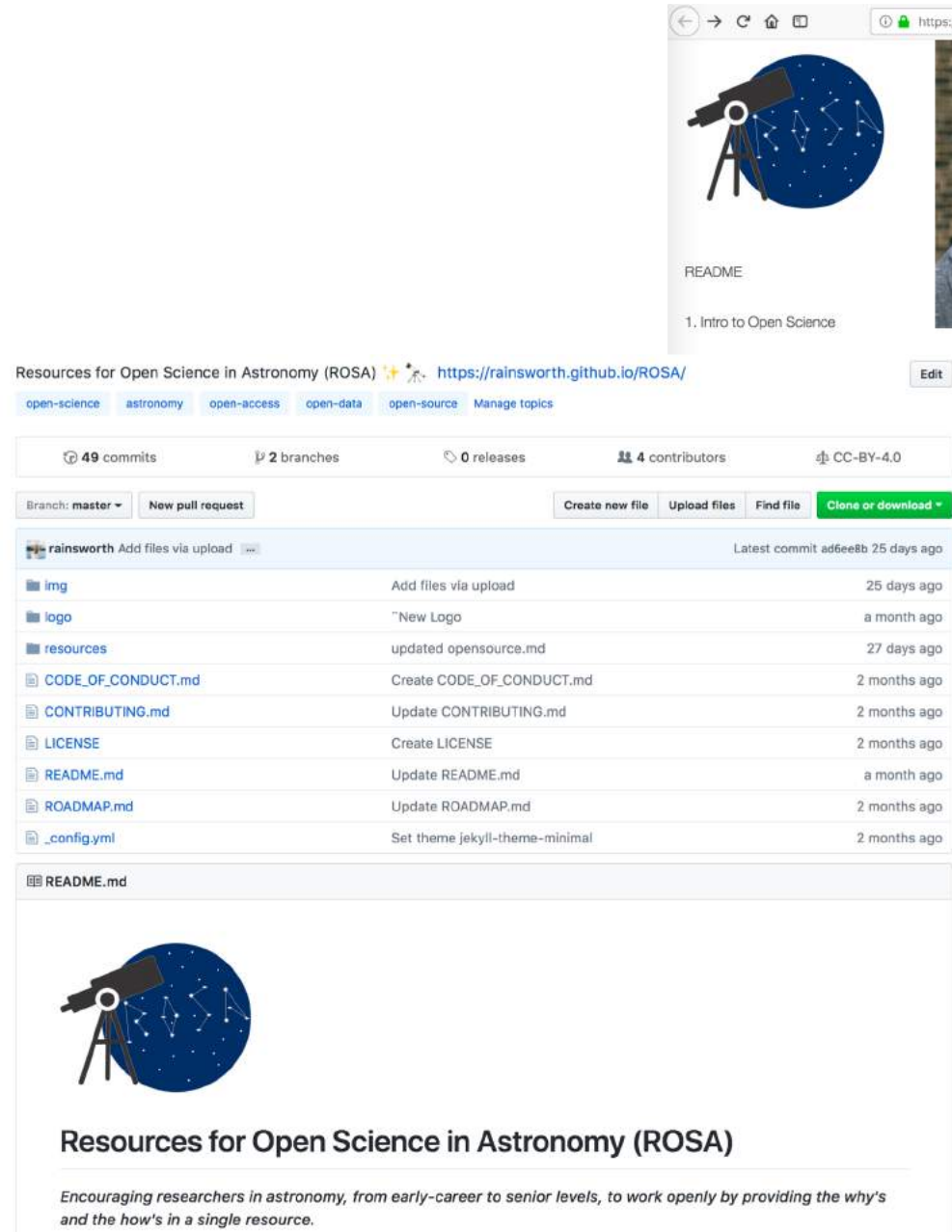
Contribution activity Jump to ▾ 2017



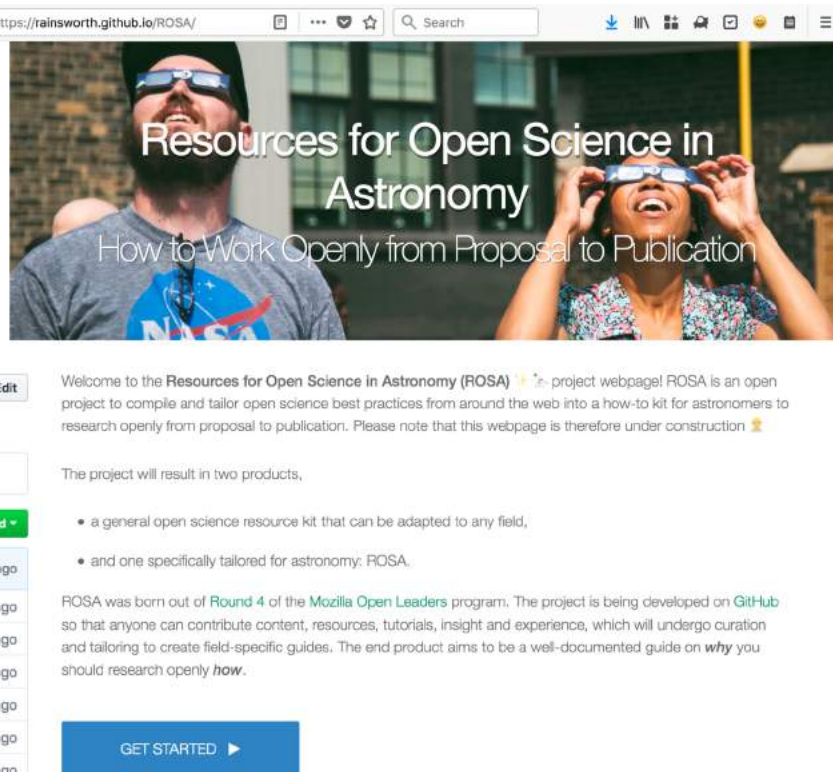
# moz://a

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

- [github.com/rainsworth/ROSA](https://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!



The screenshot shows the GitHub repository for 'Resources for Open Science in Astronomy (ROSA)' by rainsworth. The repository has 49 commits, 2 branches, 0 releases, 4 contributors, and is licensed under CC-BY-4.0. The file list includes: img, logo, resources, CODE\_OF\_CONDUCT.md, CONTRIBUTING.md, LICENSE, README.md, ROADMAP.md, and \_config.yml. The README.md file is selected, showing a preview of the project's landing page. The landing page features a header with the title 'Resources for Open Science in Astronomy' and the subtitle 'How to Work Openly from Proposal to Publication'. It includes a 'GET STARTED' button and a description of the project's goals.



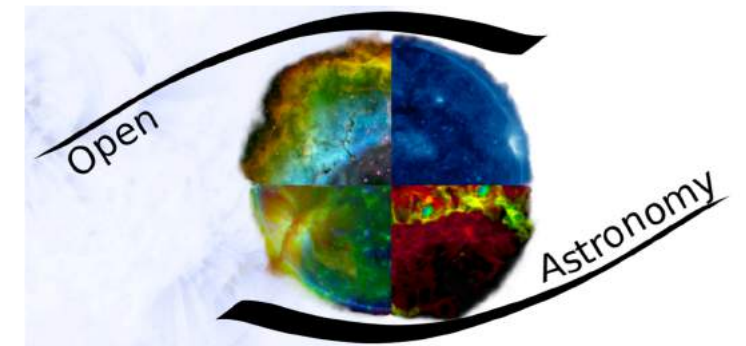
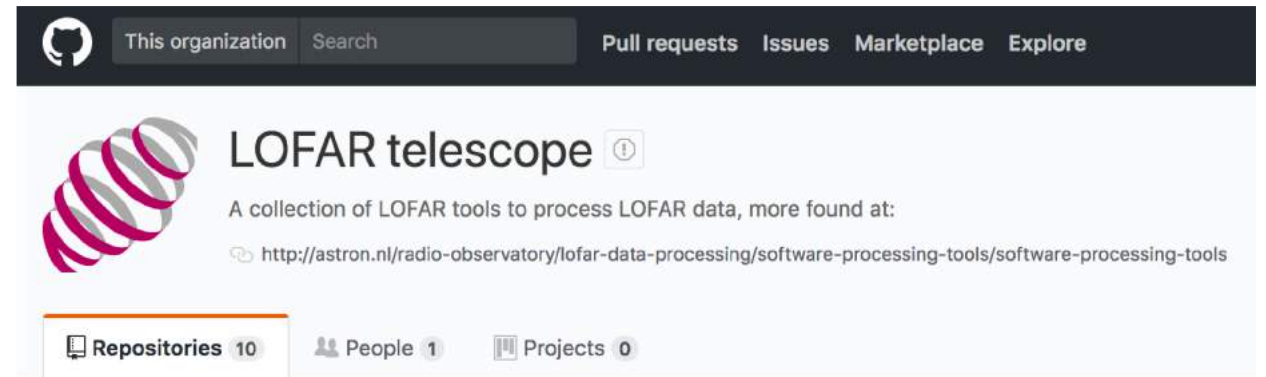
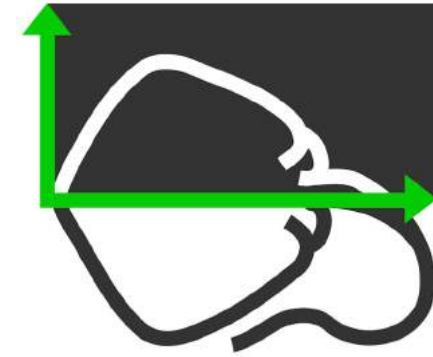
The screenshot shows the project webpage for 'Resources for Open Science in Astronomy (ROSA)'. The page has a header with the title 'Resources for Open Science in Astronomy' and the subtitle 'How to Work Openly from Proposal to Publication'. It includes a 'GET STARTED' button and a description of the project's goals. The page also mentions that the project is under construction and will result in two products: a general open science resource kit and one specifically tailored for astronomy.

## 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](https://doi.org/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](https://doi.org/10.7554/eLife.16800))
- Contact:
  - Email - [rachael.ainsworth@manchester.ac.uk](mailto:rachael.ainsworth@manchester.ac.uk)
  - GitHub - @rainsworth
  - Twitter - @rachaelevelyn
  - Resources for Open Science in Astronomy: <https://github.com/rainsworth/ROSA/>