

Open Science in Astronomy

Dr. Rachael E Ainsworth

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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



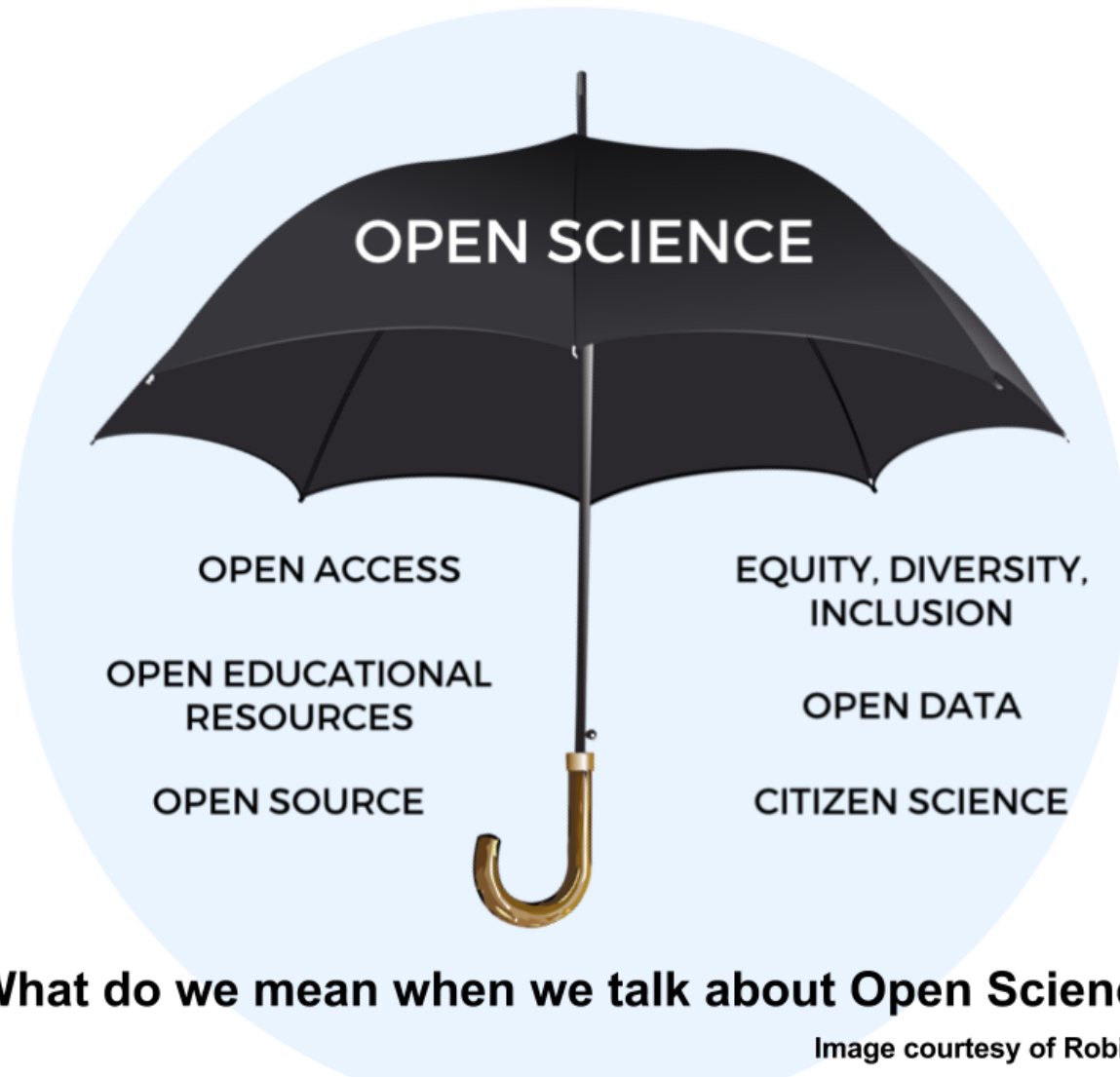
Outline

- 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/mg.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/mg.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 top screenshot is of the Royal Society Open Science website, featuring a red header with the Royal Society logo and navigation links. Below the header, there's a search bar and a navigation menu. The main content area displays 'LATEST ARTICLES' with three entries: 'Landslides and dam damage resulting from the Jiuzhaigou earthquake (8 August 2017), Sichuan, China', 'Modelling cointegration and Granger causality network to detect long-term equilibrium and diffusion paths in the financial system', and 'Total synthesis of rupestone G and its epimers'. To the right, there's a featured article image showing a 3D model of a protein structure. The bottom screenshot is of the arXiv.org website, showing the Cornell University Library logo and the arXiv.org text. Below that, there's a search bar and a navigation menu. The main content area displays 'Open access to 1,329,580 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance, Statistics, Electrical Engineering and Systems Science, and Economics'. Below this, there's a list of recent updates and a section titled 'Physics' with a detailed list of sub-fields and their corresponding codes.

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

We gratefully acknowledge support from the Simons Foundation and member institutions

arXiv.org

Search or Article ID All papers

Open access to 1,329,580 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance, Statistics, Electrical Engineering and Systems Science, and Economics

Subject search and browse: Physics

15 Nov 2017: [arXiv.org performance issues resolved](#)
13 Nov 2017: [arXiv.org currently experiencing unexpected performance issues](#)
31 Oct 2017: [2017 holiday schedule announced](#)
See cumulative "What's New" pages. Read [robots beware](#) before attempting any automated download

Physics

- Astrophysics ([astro-ph new, recent, find](#))
includes: Astrophysics of Galaxies; Cosmology and Nongalactic Astrophysics; Earth and Planetary Astrophysics; High Energy Astrophysical Phenomena; Instrumentation and Methods for Astrophysics; Solar and Stellar Astrophysics
- Condensed Matter ([cond-mat new, recent, find](#))
includes: Disordered Systems and Neural Networks; Materials Science; Mesoscale and Nanoscale Physics; Other Condensed Matter; Quantum Gases; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
- General Relativity and Quantum Cosmology ([gr-qc new, recent, find](#))
- High Energy Physics - Experiment ([hep-ex new, recent, find](#))
- High Energy Physics - Lattice ([hep-lat new, recent, find](#))
- High Energy Physics - Phenomenology ([hep-ph new, recent, find](#))
- High Energy Physics - Theory ([hep-th new, recent, find](#))
- Mathematical Physics ([math-ph new, recent, find](#))
- Nonlinear Sciences ([nlin new, recent, find](#))
includes: Adaptation and Self-Organizing Systems; Cellular Automata and Lattice Gases; Chaotic Dynamics; Exactly Solvable and Integrable Systems; Pattern Formation and Solitons
- Nuclear Experiment ([nucl-ex new, recent, find](#))
- Nuclear Theory ([nucl-th new, recent, find](#))
- Physics ([physics new, recent, find](#))
includes: Accelerator Physics; Applied Physics; Atmospheric and Oceanic Physics; Atomic Physics; Atomic and Molecular Clusters; Biological Physics; Chemical Physics; Classical Physics; Computational Physics; Data Analysis, Statistics and Probability; Fluid Dynamics; General Physics; Geophysics; History and Philosophy of Physics; Instrumentation and Detectors; Medical Physics; Optics; Physics Education; Physics and Society; Plasma Physics; Popular Physics; Space Physics
- Quantum Physics ([quant-ph new, recent, find](#))

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, positioned to the right of the Zenodo logo.The Open Science Framework logo features the text "Open Science Framework" in a white, bold, sans-serif font, centered at the top of a dark blue rectangular box.

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



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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

Oisín 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.

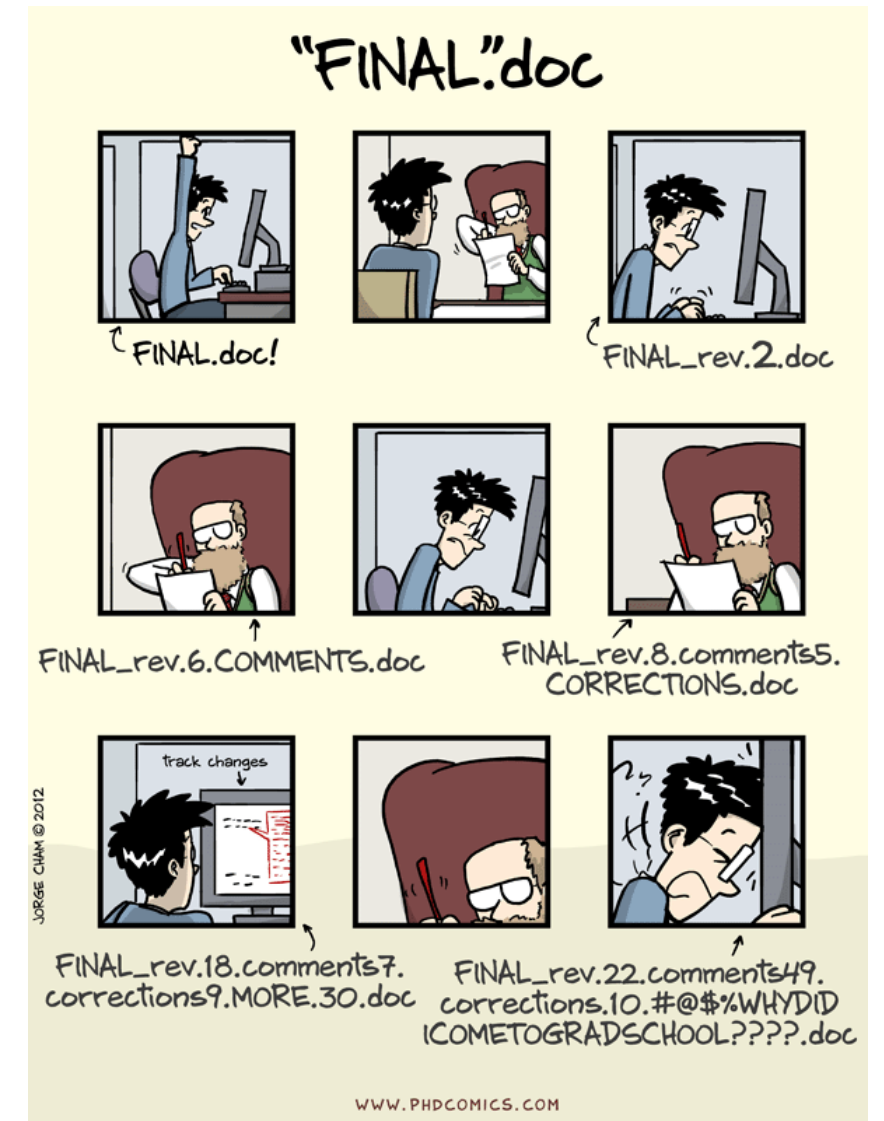
Community

RadioNet 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 page for Rachael Ainsworth. The browser address bar displays "https://github.com/rainsworth". The navigation bar includes "Search GitHub", "Pull requests", "Issues", "Marketplace", and "Explore". The profile header shows "Overview", "Repositories 11", "Stars 65", "Followers 17", and "Following 35".

Rachael Ainsworth
rainsworth
Radio Astronomer & Open Science Champion at the Jodrell Bank Centre for Astrophysics 🐱🌟
Mozilla Open Leader, Cohort 4C
#RebelFoxes 🦊

👤 University of Manchester
📍 Manchester, UK
🔗 <https://rachaelainsworth.wor...>

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												
Wed												
Fri												

Learn how we count contributions. Less [] More

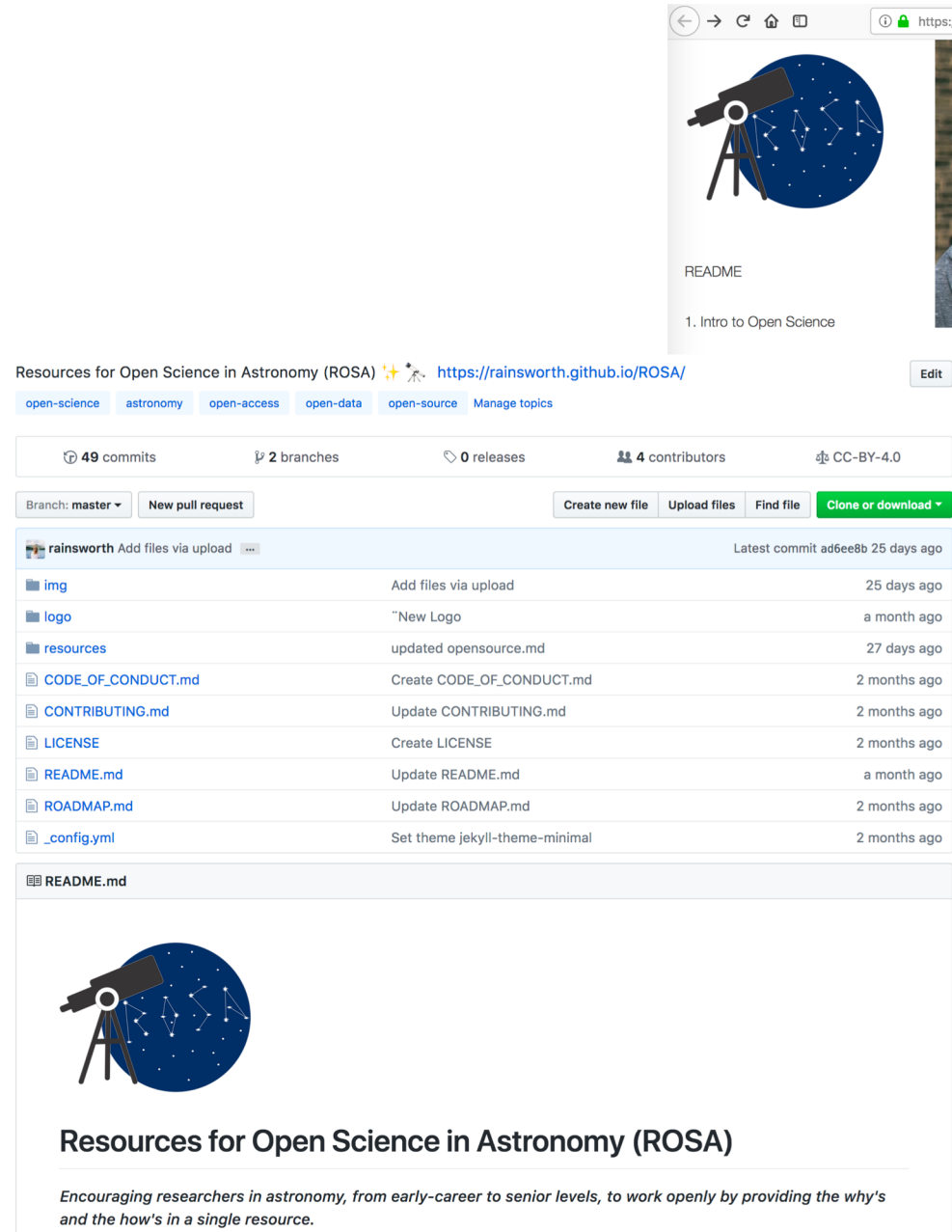
Contribution activity Jump to ▾ **2017**

moz://a

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

- github.com/rainsworth/ROSA
- 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!

5 April @ 9:00 - Room 11A - S6d



Resources for Open Science in Astronomy (ROSA) <https://rainsworth.github.io/ROSA/>


open-science astronomy open-access open-data open-source Manage topics

49 commits 2 branches 0 releases 4 contributors CC-BY-4.0

Branch: master New pull request Create new file Upload files Find file Clone or download

File	Commit	Time
img	Add files via upload	25 days ago
logo	"New Logo	a month ago
resources	updated opensource.md	27 days ago
CODE_OF_CONDUCT.md	Create CODE_OF_CONDUCT.md	2 months ago
CONTRIBUTING.md	Update CONTRIBUTING.md	2 months ago
LICENSE	Create LICENSE	2 months ago
README.md	Update README.md	a month ago
ROADMAP.md	Update ROADMAP.md	2 months ago
_config.yml	Set theme jekyll-theme-minimal	2 months ago

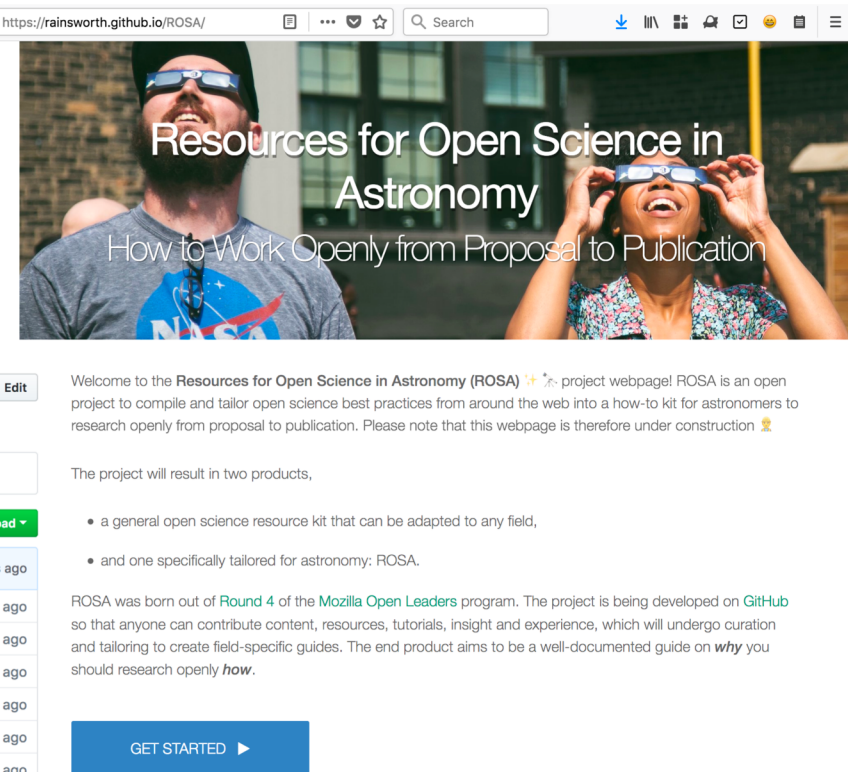
README.md



Resources for Open Science in Astronomy (ROSA)

Encouraging researchers in astronomy, from early-career to senior levels, to work openly by providing the why's and the how's in a single resource.

Dr. Rachael Ainsworth - @rachaelevelyn - EWASS/NAM 2018



Resources for Open Science in Astronomy

How to Work Openly from Proposal to Publication

Welcome to the Resources for Open Science in Astronomy (ROSA) project webpage! ROSA is an open project to compile and tailor open science best practices from around the web into a how-to kit for astronomers to research openly from proposal to publication. Please note that this webpage is therefore under construction.

The project will result in two products,

- a general open science resource kit that can be adapted to any field,
- and one specifically tailored for astronomy: ROSA.

ROSA was born out of Round 4 of the Mozilla Open Leaders program. The project is being developed on GitHub so that anyone can contribute content, resources, tutorials, insight and experience, which will undergo curation and tailoring to create field-specific guides. The end product aims to be a well-documented guide on why you should research openly *how*.

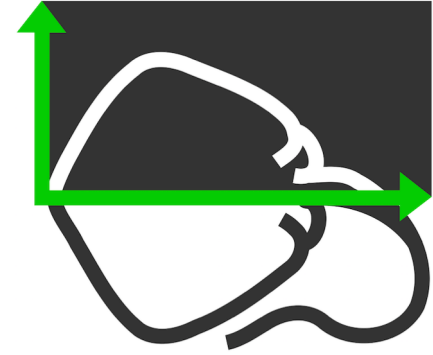
[GET STARTED](#)

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



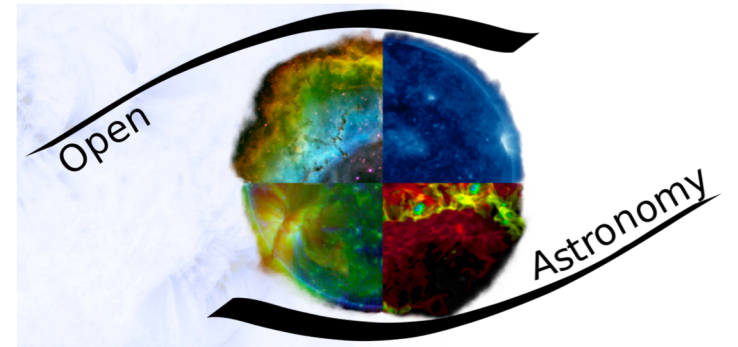
This organization Search Pull requests Issues Marketplace Explore

 **LOFAR telescope** ⓘ

A collection of LOFAR tools to process LOFAR data, more found at:

<http://astron.nl/radio-observatory/lofar-data-processing/software-processing-tools/software-processing-tools>

Repositories 10 People 1 Projects 0



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
 - GitHub - @rainsworth
 - Twitter - @rachaelevelyn
 - Resources for Open Science in Astronomy: <https://github.com/rainsworth/ROSA/>