

Research software and beyond - a community and FAIR software:

ESMValTool for evaluations of Earth system models

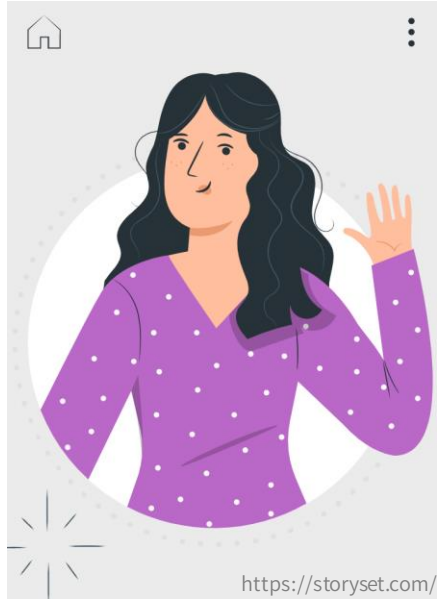
Sarah Alidoost

netherlands
eSciencecenter

DCC Event: Sustainable Research Software: Challenges & Solutions
University of Groningen, May 2023

- Why a community-driven and FAIR software

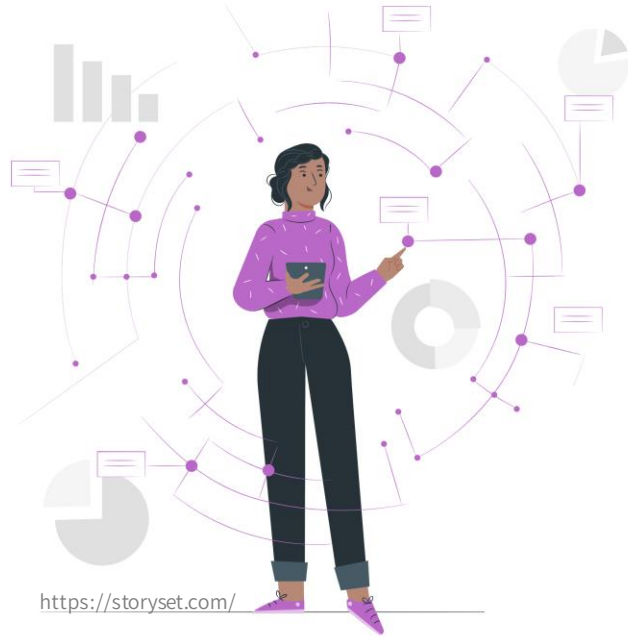
- Why a community-driven and FAIR software
- Example of a community-driven and FAIR software:
 - Earth System Model Evaluation Tool (ESMValTool)



Jane.

Researcher in climate science.



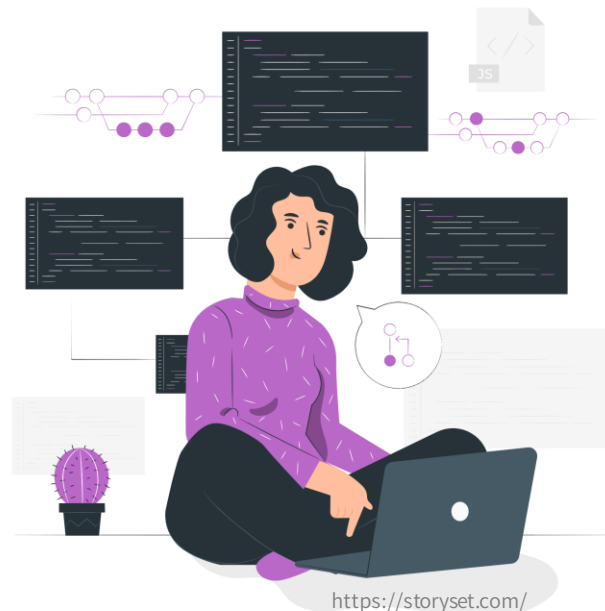


Task:

to analyze a time series of 50 years of air temperature in the past and in the future generated by 10 climate models.

Implementation:

- finding and downloading data
- checking data for correctness
- processing data
- storing results
- creating plots
- making code FAIR



Challenges:

- It takes some time and effort to develop the code.

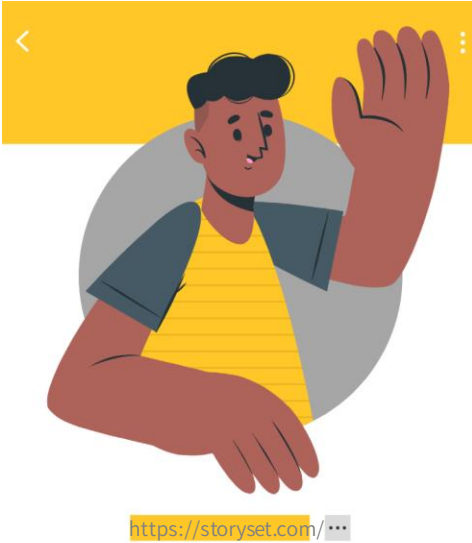


<https://storyset.com/>

Challenges:

- It takes some time and effort to develop the code.
- Applying FAIR principles is not straightforward.





Ben.

Researcher in climate science.





Task:

to analyze air temperature and precipitation simulated by 5 other different models.

Challenges:

- all the skills needed to write well-structured code.



What is ESMValTool?

- It facilitates the analysis of climate data.



Data finding



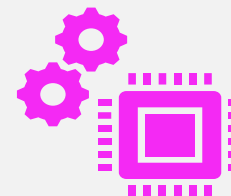
Data selection



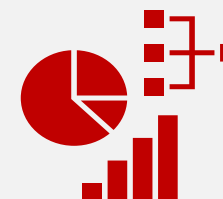
Data fixing



Variable derivation



Running preprocessors



Running diagnostics



What is ESMValTool?

- It facilitates the analysis of climate data.
- It provides a standard format for scientific analysis workflow a.k.a. "recipes".



Data finding



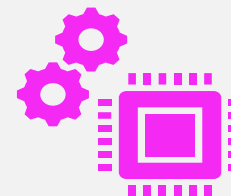
Data selection



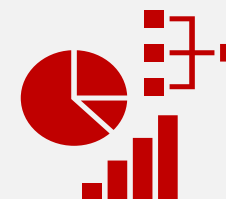
Data fixing



Variable derivation




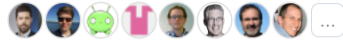
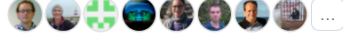





Running preprocessors



Running diagnostics

Who are ESMValGroup?

By an international community of scientists and software engineers

14 teams in the ESMValGroup organization			Visit
ESMValTool-CoreTeam	Team members can read, clone, and push to this repository.		17 members
ESMValTool-DevelopmentTeam	Team members can create new feature branches.		178 members
ESMValTool-recipe-maintainers			15 members
IPCC-maintainers	Maintainers of the AR6 repositories		4 members
science-reviewers	Scientific review team		12 members
SIG Regional	Special Interest Group on Regional Models and Evaluation		5 members
tech-reviewers	Technical review team		10 members
UserEngagementTeam	User Engagement Team		11 members

<https://github.com/esmvalgroup>

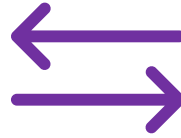
What can ESMValTool do for you?



Reciprocity



Open
development



Facilitating
exchange



Ripple effect

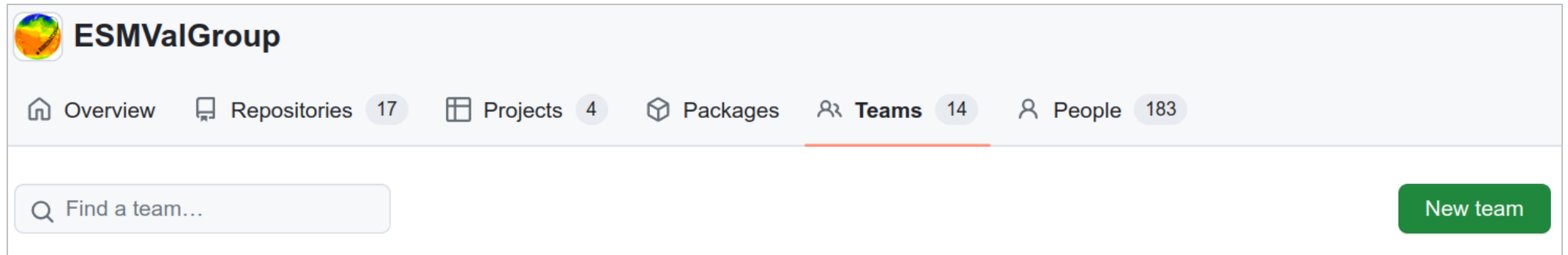


Thriving
Community



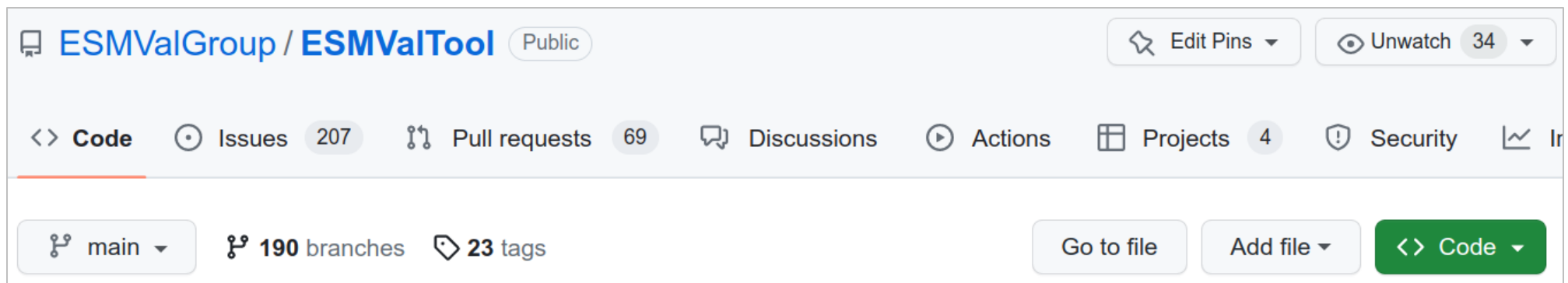
Reciprocity

- Make your work available
- Build upon others' work
- Give and receive feedback on code



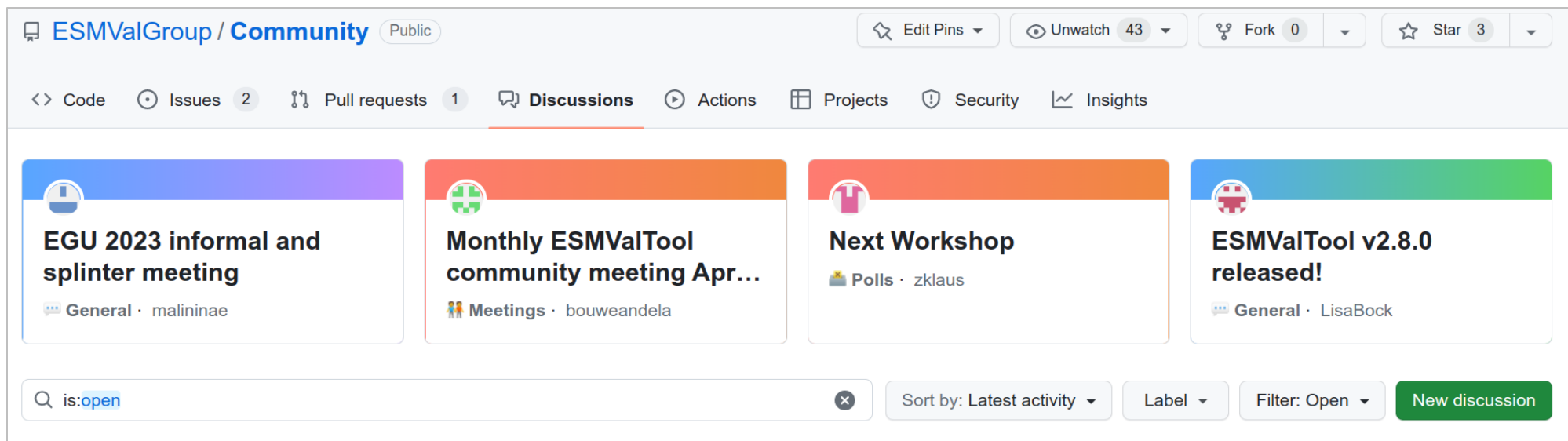
Open development

- Transparency
- Automated testing
- Review processes



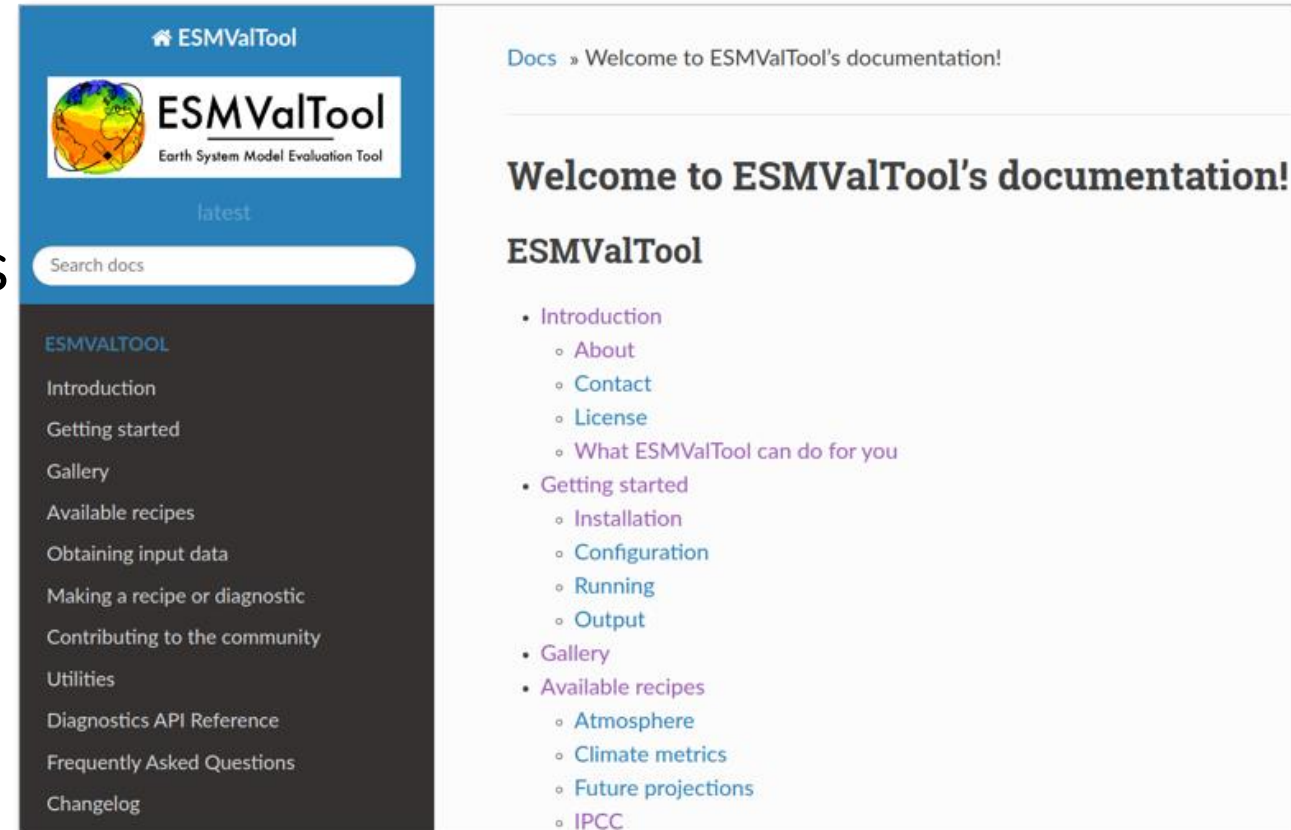
Facilitating exchange

- Public Repository
- Maintain a collection of recipes
- Open protocols and guidelines



Ripple effect

- Dissemination of best practices
- Promotion of standards
- Voice in development of dependencies



The screenshot shows the ESMValTool documentation website. The header features the ESMValTool logo and the text "Earth System Model Evaluation Tool". Below the header is a search bar labeled "Search docs". The main content area is divided into two columns. The left column contains a list of navigation links: Introduction, Getting started, Gallery, Available recipes, Obtaining input data, Making a recipe or diagnostic, Contributing to the community, Utilities, Diagnostics API Reference, Frequently Asked Questions, and Changelog. The right column displays the "Welcome to ESMValTool's documentation!" message, followed by a list of links: Introduction (with sub-links: About, Contact, License, What ESMValTool can do for you), Getting started (with sub-links: Installation, Configuration, Running, Output), Gallery, and Available recipes (with sub-links: Atmosphere, Climate metrics, Future projections, IPCC).

ESMValTool
Earth System Model Evaluation Tool

latest

Search docs

ESMVALTOOL

- Introduction
- Getting started
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Docs » Welcome to ESMValTool's documentation!

Welcome to ESMValTool's documentation!

ESMValTool

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 - Climate metrics
 - Future projections
 - IPCC

Thriving community

- Collaborate on GitHub and beyond
- Welcoming
- Fun!



www.esciencecenter.nl

f.alidoost@esciencecenter.nl



<https://www.esmvaltool.org>

[https://github.com/ESMValGroup/
Community/discussions](https://github.com/ESMValGroup/Community/discussions)