

# Introducing open data management in Dutch space research

Jelle de Plaa, Russ Shipman



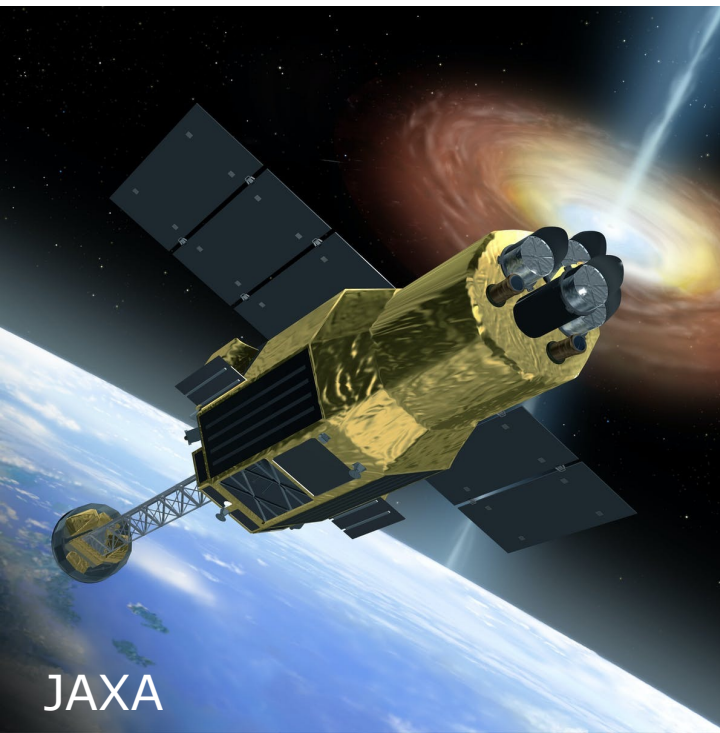
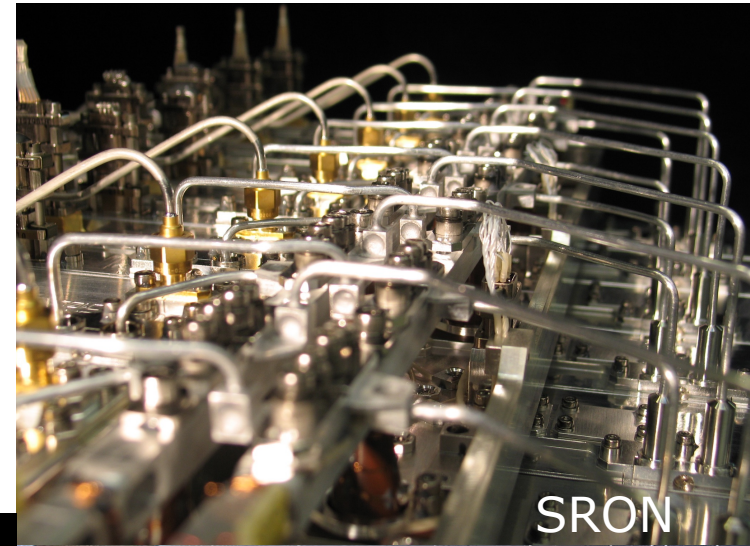
**SRON**

Netherlands Institute for Space Research

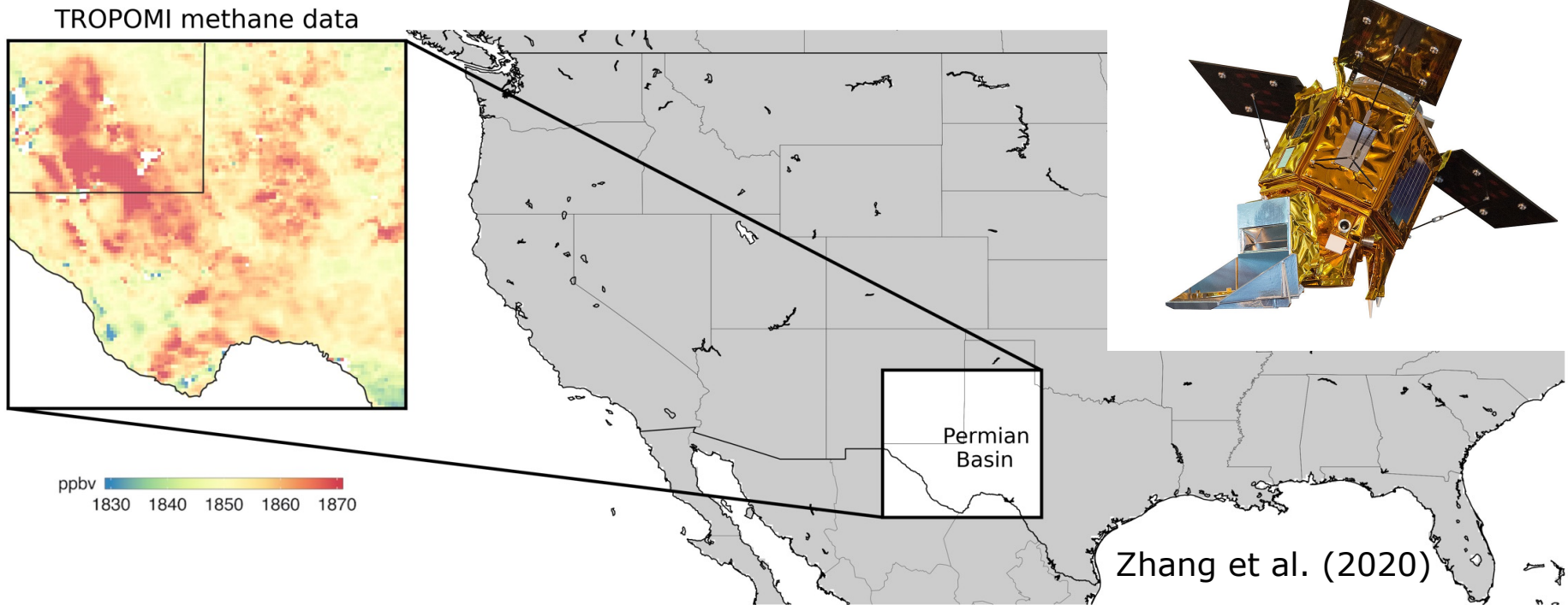
Picture: NASA

# SRON Netherlands Institute for Space Research

- Develop pioneering technology and advanced space instruments
- Use them to pursue fundamental astrophysical research, Earth science and exoplanetary research

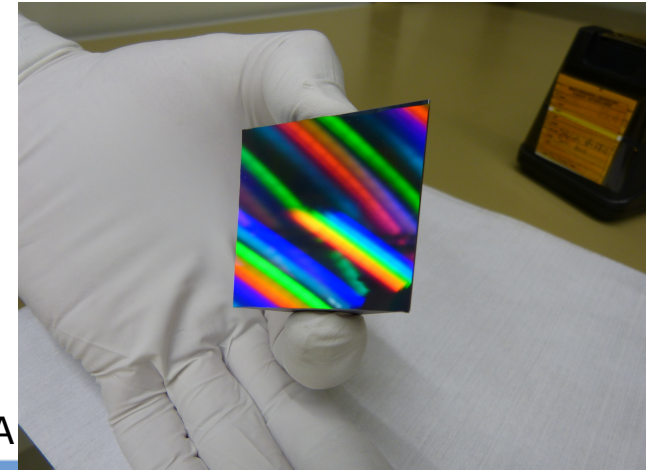


# Example: Tropomi Methane measurements



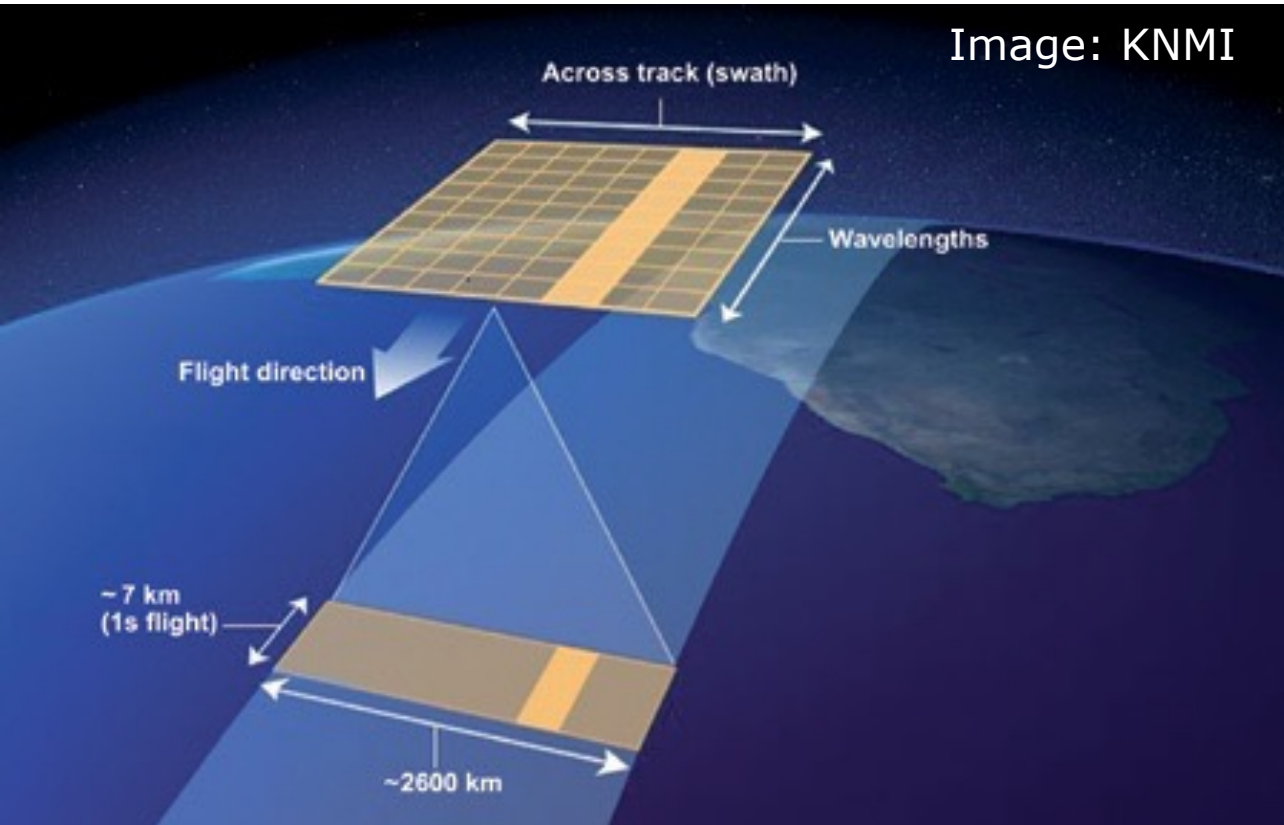
Tropomi measures trace-gas concentrations from space

Using small grating spectrometer



# Tropomi spectrum

Image: KNMI



# Tropomi spectrum

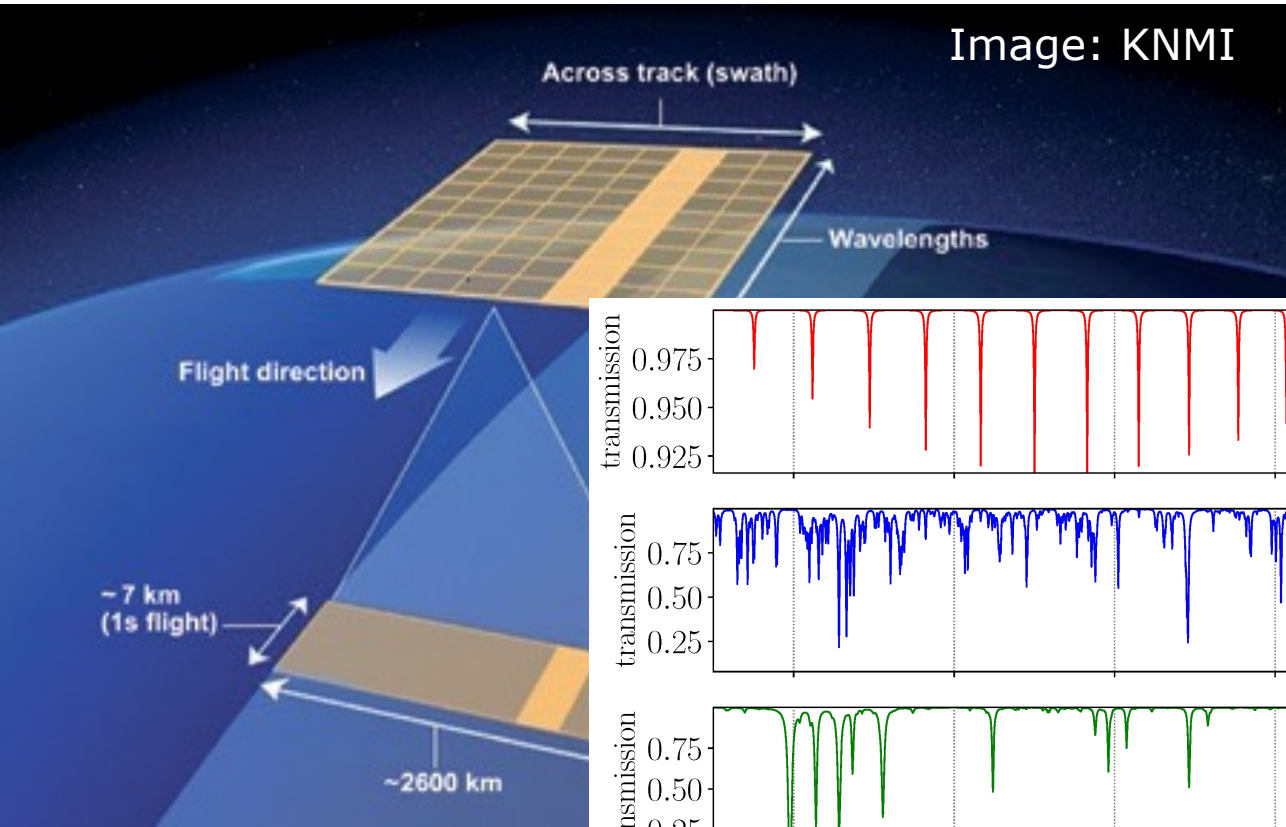
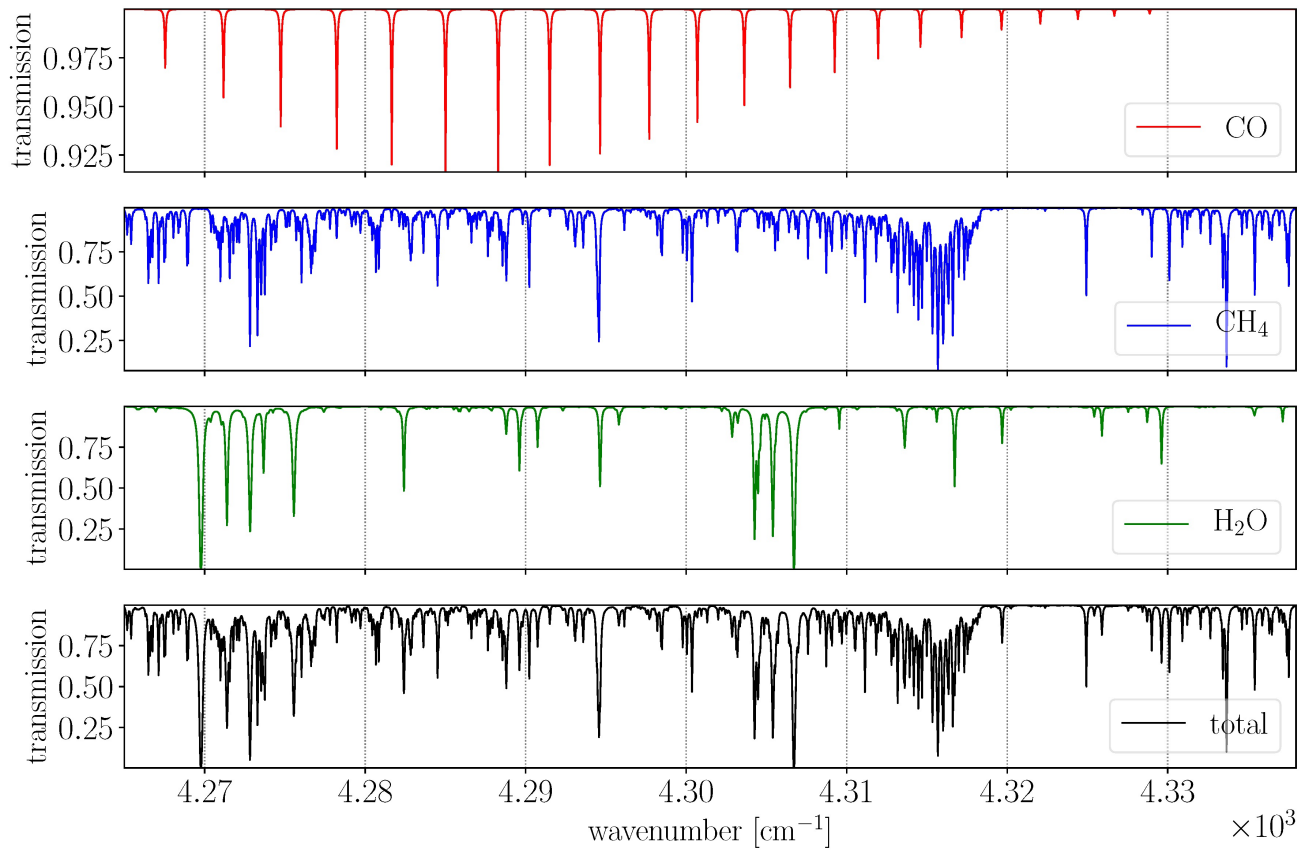
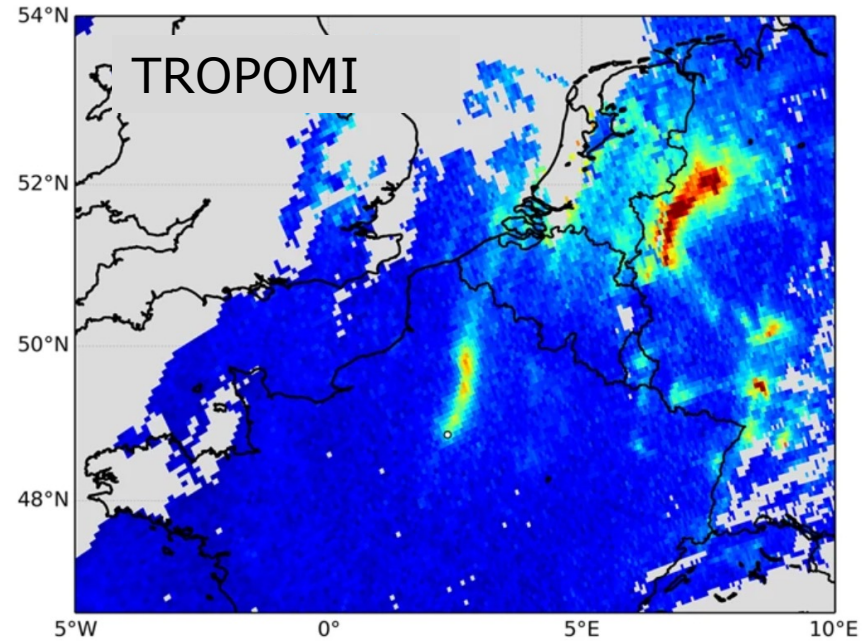
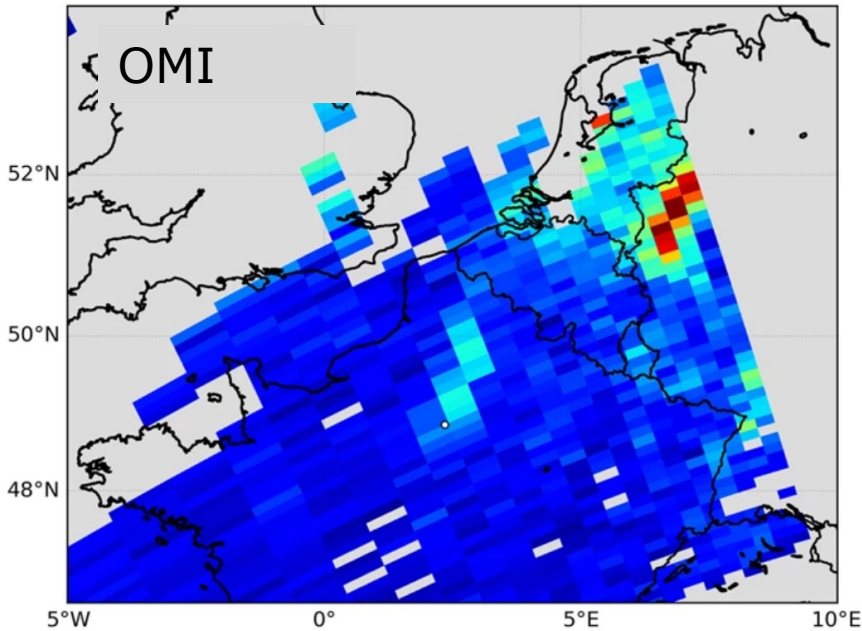


Image: KNMI

Hochstaffl et al. (2020)



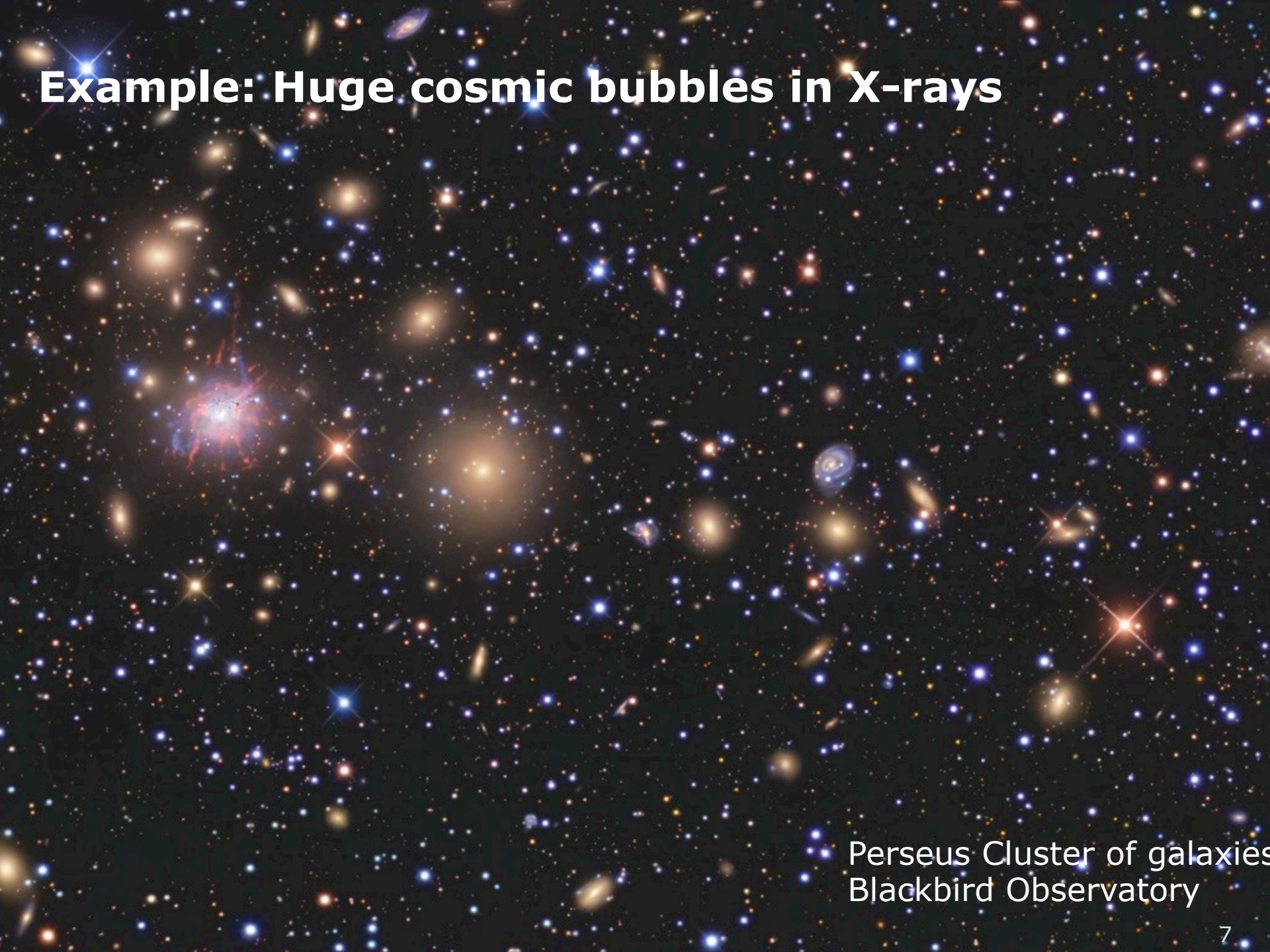
# Tropomi NO<sub>2</sub>



TROPOMI allows us to measure pollution to city level!

Lorente et al. (2019)

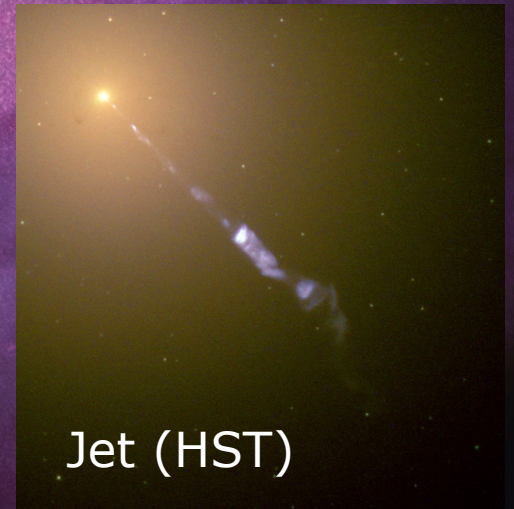
# Example: Huge cosmic bubbles in X-rays



Perseus Cluster of galaxies  
Blackbird Observatory

# Perseus in X-rays

Chandra observatory

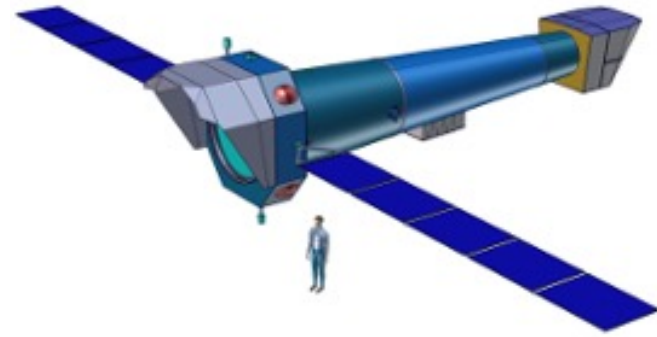


Jet (HST)

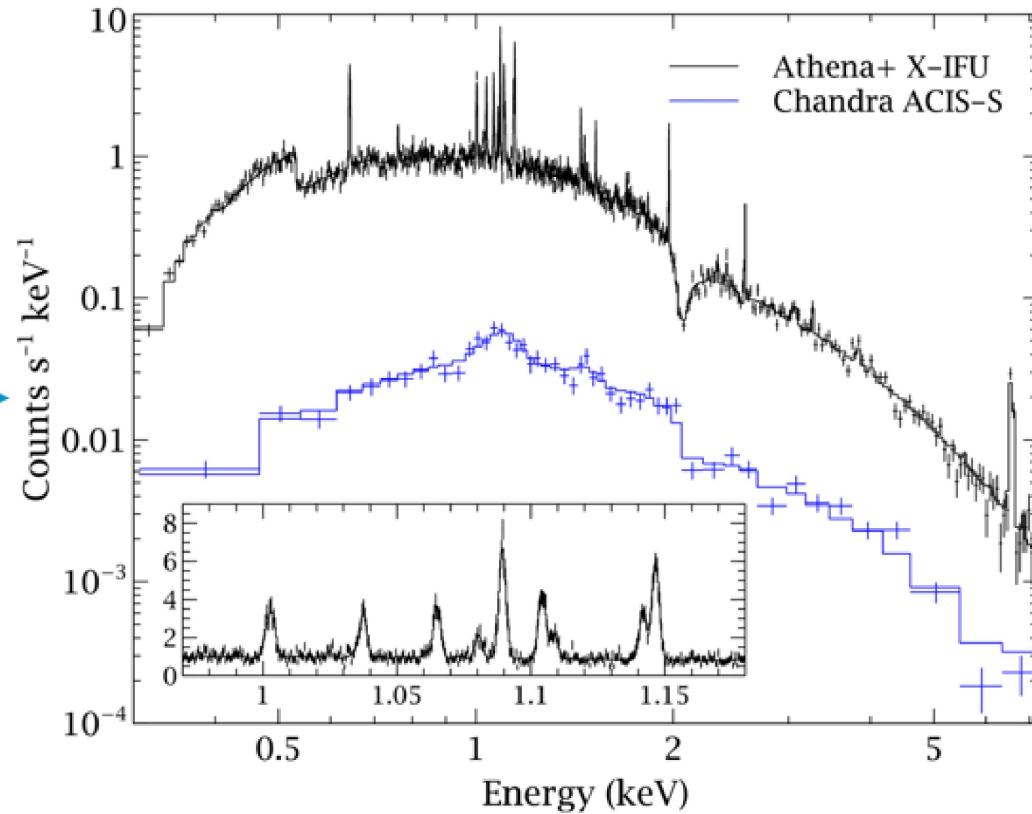
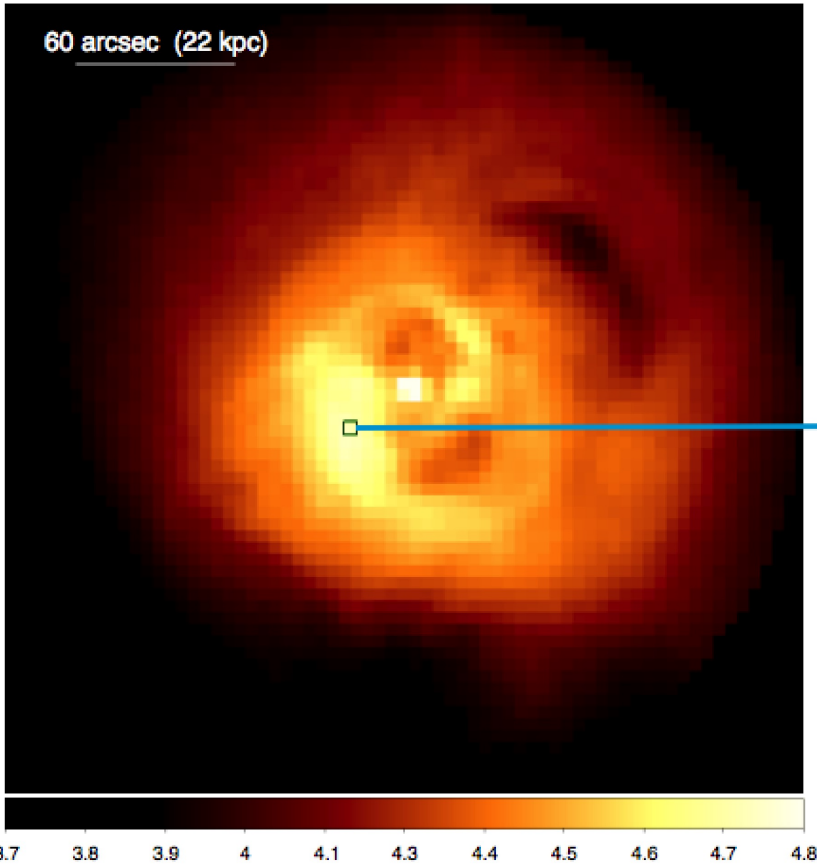


# The ATHENA observatory data

New ESA X-ray observatory (launch >2030)



60 arcsec (22 kpc)



# High-resolution spectrometer development

- Sensor development for ATHENA X-ray spectrometer
- Using superconduction in each pixel to measure energy

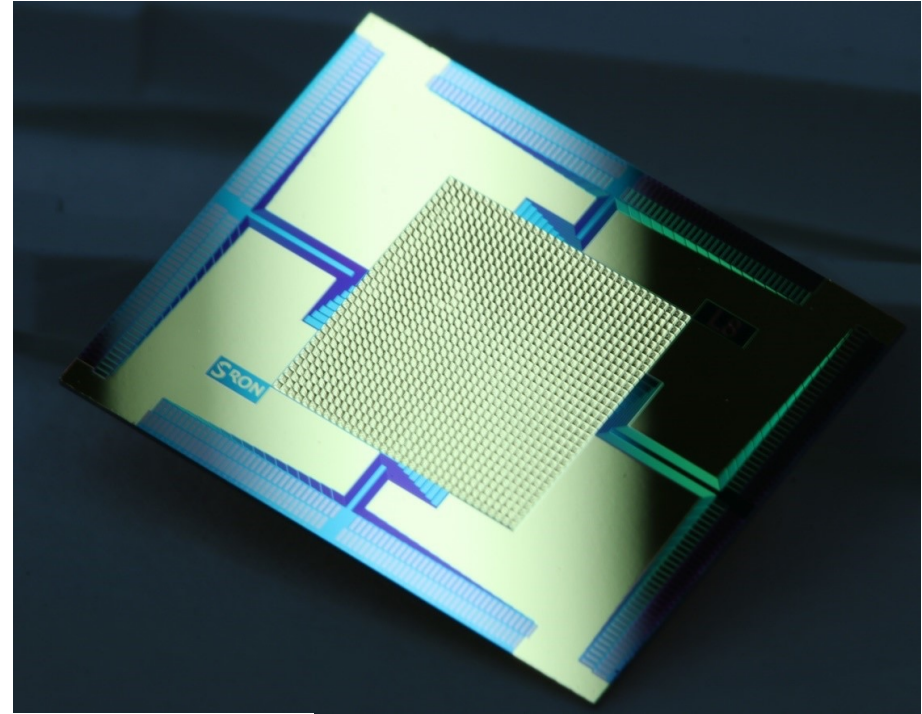
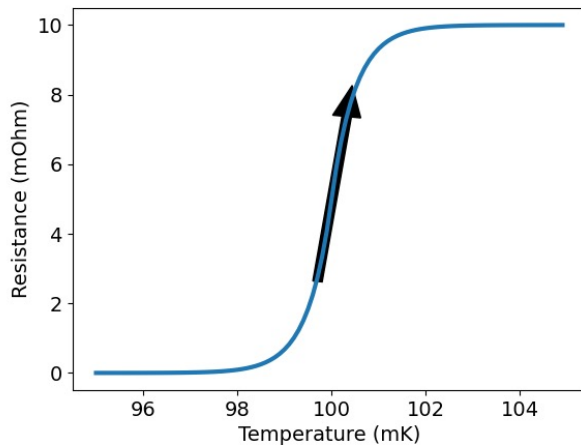
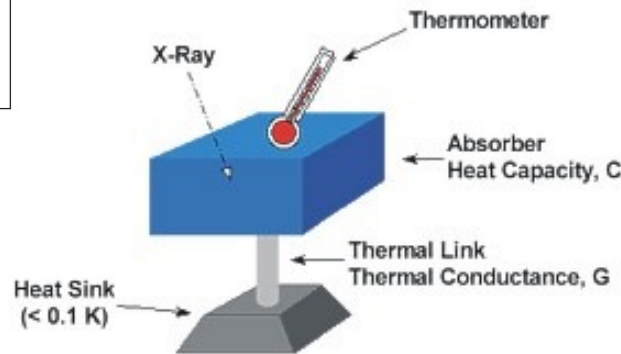


Image: SRON



# The Netherlands to Open Science

Netherlands Organisation for Scientific Research (NWO)

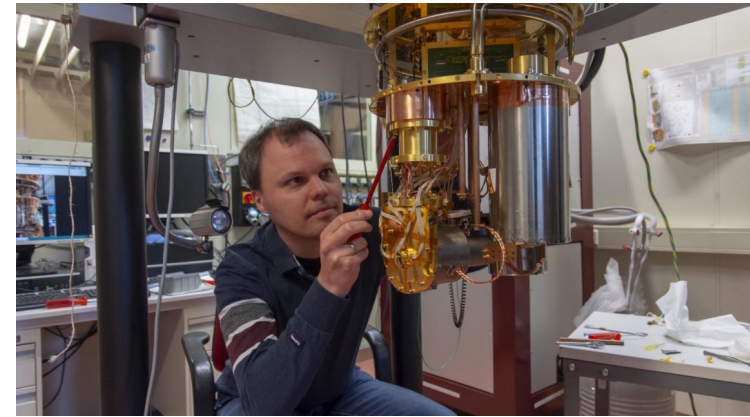
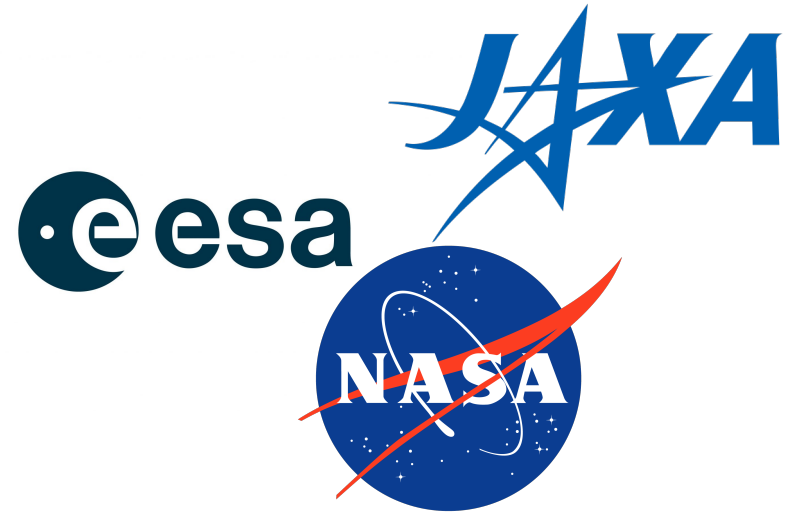
- Government science funding agency in NL
- Strategy and policy to move to open science in 2019-2022

How/why:

- Open Access for journal articles (Plan S)
- Open Data
  - Easy access to publicly funded research data
  - Accelerate science by sharing tools and knowledge
  - Solve reproducibility crisis in science
  - Helps researchers with data management

# Types of data at SRON

- Raw data from satellites
- Data from own experiments
- **Derived data for papers**
  - Images, spectra, fits, figures, etc.



**CHEERS: The chemical evolution RGS sample**

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# How to create reproduction packages?

*What would a student need to reproduce my result?*

For instance:

- Links to the raw data (ESA/NASA)
- Scripts that derive products from raw data
- The derived products (images, spectra, etc.)
- Analysis/optimization scripts that derive results
- Result tables
- Scripts to re-create the figures
- For each of the above a README file explaining how to use it.

# How to organize all this?

## Challenges:

- Researchers use multiple different programming languages
- Researchers do not want to spend a lot of time
- Researchers do not like to change the way they work (by a lot)

## Our solution:

- Data stewards help researchers with open data issues
- Data and software training
- **A simple reproduction package template** (for Zenodo)

# A simple reproduction package template

Basic directory structure:

- data
- figures
  - figure 1
  - ...
- notebooks (optional)

Readme.md

**Data:** derived data products and analysis scripts

**Figures:** data and script(s) for creating figures

**Notebooks:** Jupyter notebooks (optional)

**Readme.md:**

In all directories, one adds a Readme.md file to explain what the folder contains and how to use it. (in Markdown format)

# A simple reproduction package template II

Top level Readme.md:

## Reproduction package for ...

---

### Software prerequisites

---

To run the scripts in this package, the following software was used:

- [XMM-Newton SAS v18](#)
- [Astropy v4.0](#)
- etc.

### Data prerequisites

---

### Package contents

---

Jupyter notebooks

Data products and results

Figures



# A simple reproduction package template

## pro/cons

### Advantages:

- High flexibility/freedom
- Any type of data/software fits in the template
- Built-in guidance what to put in repro package
- Readme.md file shows nicely on Zenodo
- Load directly from git

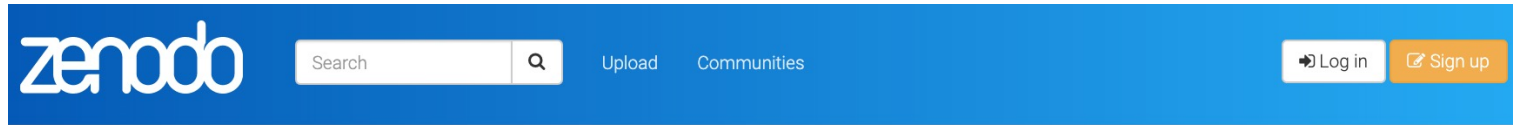
### Disadvantages:

- Not machine readable
- No built-in enforcement of FAIR requirements
- No built-in inclusion of software dependencies (but docker image could be included)

## 10 steps toward a reproduction package

1. Create a directory on your machine for your package
2. Copy and document jupyter notebooks (optional)
3. Copy figures and their creation scripts, and create Readme
4. Copy data products and analysis scripts, and create Readme
5. Finish/fill out the top-level Readme.md file
6. Show the package to a colleague or supervisor
7. Compress directories to Zip or Tar files (not top Readme.md)
8. Do a test upload in the data repository (Zenodo sandbox)
9. Do the final upload to the data repository (Zenodo)
10. Cite the DOI link in your paper (data availability statement)

# Template on Github/Zenodo



June 4, 2021

Other Open Access

## Simple open data template for researchers

Jelle de Plaa

Other(s)

van Hees, R. M.; Shipman, R. F.

This open data template is a simple template aimed at researchers who want to create a reproduction package with their paper. It provides an easy 10-step guide to organize your research data files into a reproduction package that can be uploaded to a trusted data repository (Zenodo is chosen as default here). The template is simple on purpose to allow the researcher a lot of freedom and flexibility in their data organisation, while keeping a basic standard top-level structure.

This template is based on a template developed for [SRON Netherlands Institute for Space Research](#) and has a CC0 public domain license. Feel free to copy, modify, re-use, etc. the template for your own purpose. Comments, corrections and suggestions for improvement are welcome in our [Github issue tracker](#).

Preview

open-data-template-v0.1.zip

- jdeplaa-open-data-template-a260cee
  - LICENSE 7.0 kB
  - README.md 3.9 kB
  - template
    - README.md 900 Bytes
    - data
      - README.md 0 Bytes
    - figures
      - figure1
        - README.md 0 Bytes
    - notebooks
      - README.md 0 Bytes

9 views  
0 downloads  
[See more details...](#)

Available in

Indexed in

**Publication date:**  
June 4, 2021

**DOI:**  
[10.5281/zenodo.4899847](https://doi.org/10.5281/zenodo.4899847)

**Related identifiers:**  
Supplement to  
<https://github.com/jdeplaa/open-data-template/tree/v0.1>

<https://github.com/jdeplaa/open-data-template>  
<http://doi.org/10.5281/zenodo.4899847>

# Example reproduction package

zenodo Search Upload Communities Log in Sign up

March 8, 2021

Dataset Open Access

## Reproduction Package to "Strong Reduction of Quasiparticle Fluctuations in a Superconductor due to Decoupling of the Quasiparticle Number and Lifetime"

de Rooij, Steven A. H.; Baselmans, Jochem J. A.; Murugesan, Vignesh; Thoen, David J.; de Visser, Pieter J.

This is a reproduction package to the paper "Strong Reduction of Quasiparticle Fluctuations in a Superconductor due to Decoupling of the Quasiparticle Number and Lifetime". It contains all data and code to reproduce the figures in this paper.

62 views 23 downloads  
See more details...

Indexed in  
OpenAIRE

Preview

### Reproduction Package for:

*Strong Reduction of Quasiparticle Fluctuations in a Superconductor due to Decoupling of the Quasiparticle Number and Lifetime*

[arXiv:2103.04777](#)

This is a package of data and code to reproduce the results of the paper by S. A. H. de Rooij et al. (2021). The code in this package is also on [github](#). The python code is a scaled down fork of [this repository](#). This document will explain the content of the package and the steps needed to reproduce the results.

For any questions or remarks, contact: [s.a.h.de.rooij@sron.nl](mailto:s.a.h.de.rooij@sron.nl)

### Software prerequisites

- Python 3 environment with jupyter, numpy, scipy and matplotlib
- MATLAB (2020+) with curve fitting toolbox

**Publication date:**  
March 8, 2021

**DOI:**  
DOI [10.5281/zenodo.4590731](https://doi.org/10.5281/zenodo.4590731)

**Keyword(s):**  
Generation-Recombination Noise  
Superconducting Resonator Quasiparticle Trapping  
Phonon Trapping

**Grants:**  
European Commission:

- MOSAIC - Multi object spectrometer with an array of superconducting integrated circuits (648135)

  
Nederlandse Organisatie voor Wetenschappelijk Onderzoek:

- Veni project 451-02-038 (2300131684)

**Related identifiers:**

# Conclusions

- Created very simple template to help researchers create a reproduction package for their paper

If you are interested:

- Feel free to fork and adapt the template to your needs.
- Suggestions for improvement are welcome:
  - Just create an issue on Github

The template has a CC0 license: free to do anything you want!

Link:

<https://github.com/jdeplaa/open-data-template>