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OPEN SCIENCE FROM INTEGRAL ONWARDS

Volker Beckmann,

Coordinator of the European Open Science Cloud (EOSC) at the

French Ministry of Higher Education, Research and Innovation (MESRI)

Overview

1. Open Science and FAIR data

a. What is Open Science?

b. What are FAIR and Open Data?

c. Why is FAIR and Open important?

2. Is Astrophysics Open Science ?

a. Are Astrophysics Data FAIR & Open ?

b. Missing Links

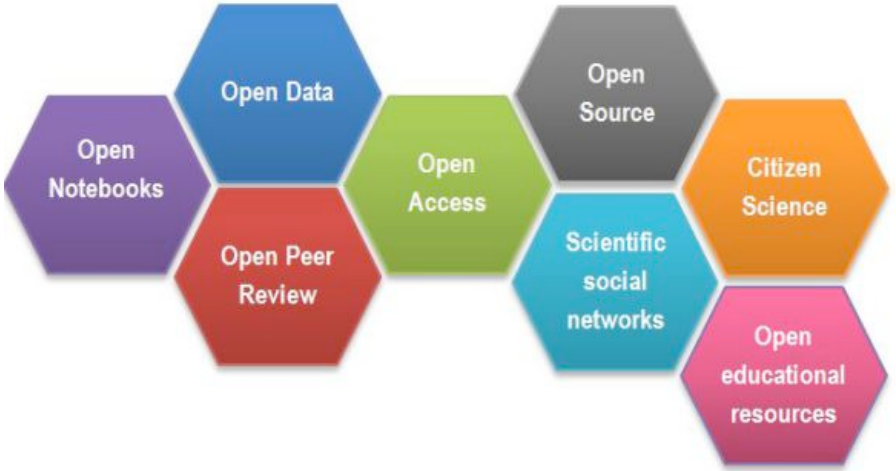
Annex

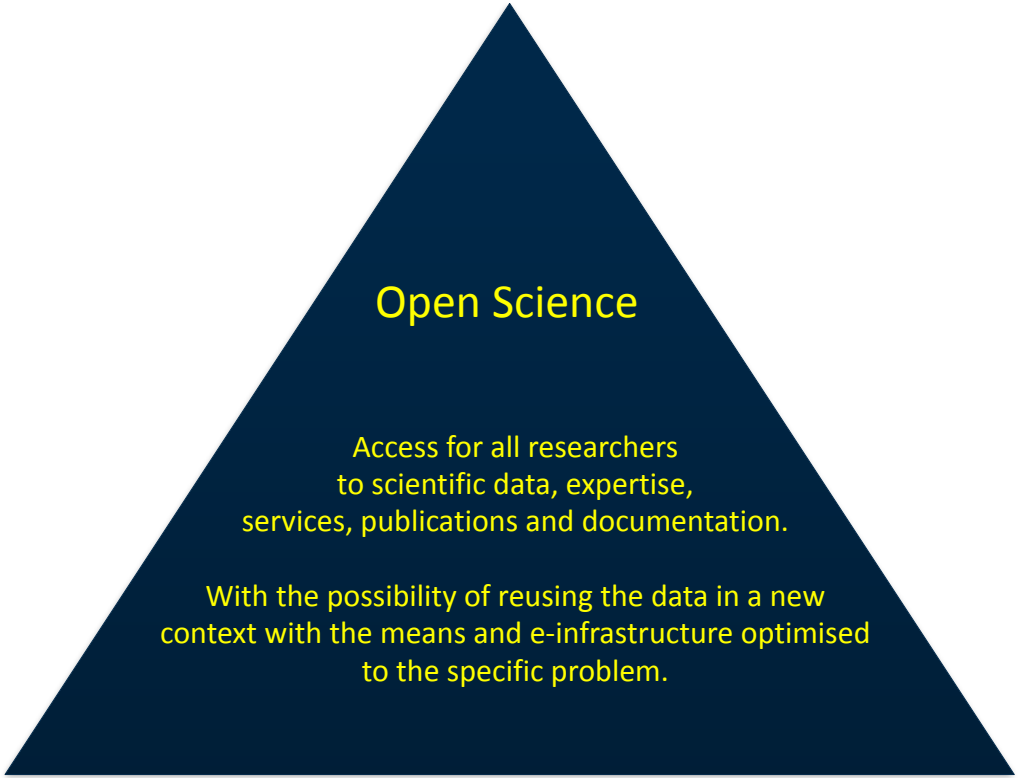
a. EOSC : Important dates

b. EOSC : Documents

c. EOSC links

1. Open Science and FAIR data




Open Science
Access for all researchers
to scientific data, expertise,
services, publications and documentation.
With the possibility of reusing the data in a new
context with the means and e-infrastructure optimised
to the specific problem.

Open Science

=

FAIR & Open Data +

Open Source +

Open Access +

Open Infrastructures

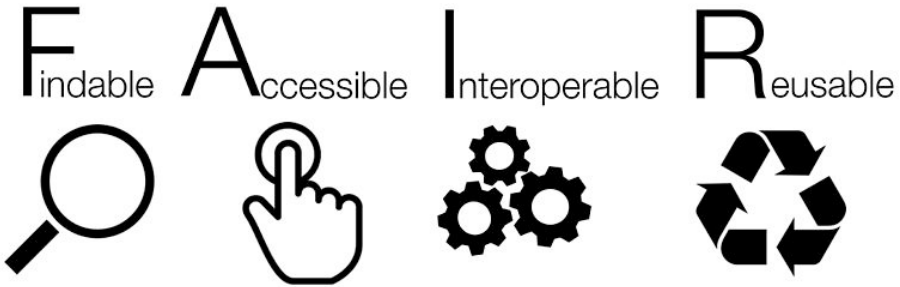
OPEN DATA

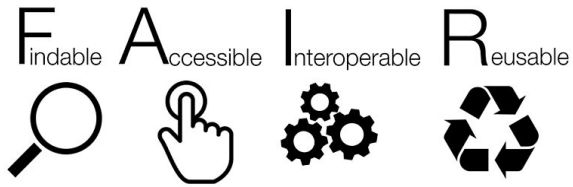
Difference between FAIR & Open Data

Open Data ≠ findable, interoperable, reusable data

FAIR: Findable, Accessible, Interoperable, Reusable

FAIR data do not need to be Open Data (e.g. INTEGRAL data within the first year of data taking)





Why FAIR & Open Data, Open Source ?

- possibility to do new science
- possibility to verify scientific results, quality control
- advertise and publicise your research

Common arguments against FAIR and Open Data and sharing source code:

"Others publish results faster with my data and using my software"

- advantage of PI/team, motivation to get results out, and what means "*my data*", *"my software"* ?

"Others don't understand my data / software and will get wrong results"

- if others cannot repeat your analysis, are results really solid? Can you repeat your analysis in a couple of years from now?

"It takes time to make data FAIR and software usable by others, to provide the necessary documentation / information"

- make it citable and see point 2

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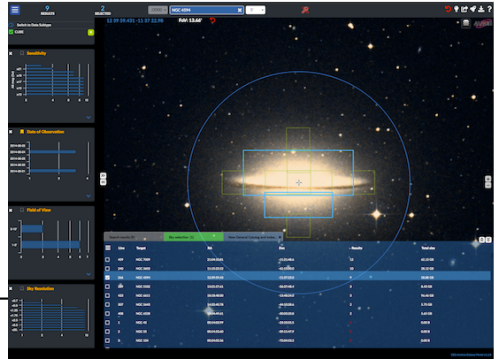
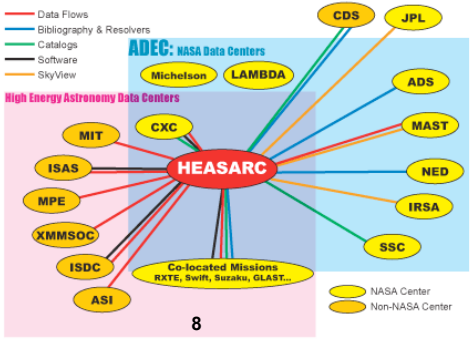
2. Is Astrophysics Open Science?





Are astrophysics data FAIR and Open ?

Space missions:

- well defined rules, good situation, still some challenges (Big Data)

Ground based:

- some show the way: e.g. ESO, SDSS, Calar Alto, LOFAR
- some have understandable difficulties to provide full Open Data: neutrino telescopes, Cherenkov Telescopes (but no excuse not to provide high-level data)
- some need to rethink their data policies

But what about …

- Research results in publications (even if based on Open Data)
- Analyses of master and PhD students
- Software / Pipelines
- …

Difficulties:

- Lack of trusted and easy to use data product repositories
- It is not enough to store resulting files as Open Data in order to make them FAIR
- Additional work for the researcher / student
- Hesitation to have others directly verify research results (e.g. reviewer, supervisor)
- Software / pipelines can be platform dependent

Open Science : establish missing links

- repositories to store and archive research results (data / software / documentation)
- e.g. IVOA applications, Software Heritage (can be e.g. linked to publications in HAL), Crossref, archiving GitHub repository in Zenodo, Inspire …
- provide and use Digital Object Identifiers (DOIs)
- use ORCID to clearly identify researchers with their research (publications, data, software…)
- provide more tools like SSDC Sky Explorer, Vizier, Aladin, … and make them inter linkable

- Work on possible connections: how to cite your resulting data / software in publications
- Discuss how to make your tools / software / data reusable
- Make sure that new projects (from PhD to international projects) are “FAIR and Open by design”
- Data Management Plans (DMPs)
- Further develop solutions so that they are useful to a wider range of researchers — EOSC can help here

Open Science and Astrophysics

- Astrophysics well advanced (wrt other domains) [didn't talk about Open Access, though]
- Work necessary: sharing analyses results, software, pipelines, ground based astrophysics, Big Data projects (reflect on what can be opened)
- Reflection necessary on project / institute level: what can be done to make research more Open Science (= more visible, successful, funded)
- European Open Science Cloud (EOSC) can provide solutions and support development
- participate as user / provider in the EOSC : https://eosc-portal.eu
- benefit from financing through Horizon Europe EOSC

volker.beckmann@recherche.gouv.fr

EOSC Calendar

Date	Event (all events online)
19.-22.10.	EGI Conference 2021: Beyond the Horizon – Shaping the Digital Future
20.10.	EOSC Workshop "From policy to practice" (by invitation)
18./19.11.	Gaia-X Summit
1./2.12.	e-IRG Workshop
10.12.	Third EOSC Association General Assembly (only for delegates of member organisations of the EOSC Association)
13.-15.12.	JCAD 2021 (for the French research community)
19.1.2022	Opening of 4 calls (30 M€) of the Horizon Europe Work Program for EOSC (deadline: April 2022)
27.6.-1.7.2022	EOSC Symposium (to be confirmed)

EOSC Key Documents

EUROPEAN OPEN SCIENCE CLOUD

- What is the EOSC / Qu'est-ce que l'European Open Science Cloud
- EOSC Executive Board final progress report
- Results of the EOSC Working Groups (2019 / 2020)
- EOSC Strategic Research and Innovation Agenda (SRIA)
- EOSC Association Statues
- Scholarly Infrastructures for Research Software
- ESFRI Science Clusters Position Statement on Open Science
- Horizon Europe Work Program for Research Infrastructures / EOSC

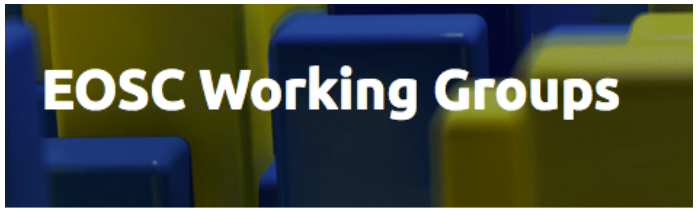
EOSC: Liens importants

EUROPEAN OPEN SCIENCE CLOUD

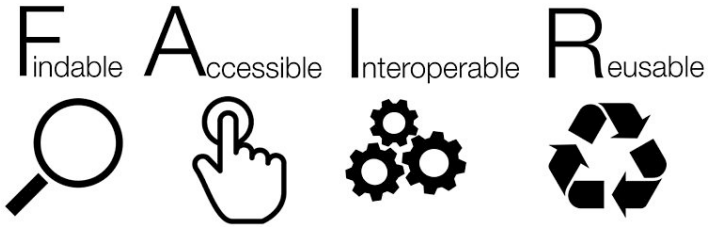
- EOSC Portal
- EOSC Association
- MESRI Horizon Europe web page
- European Commission EOSC page
- EOSC-Pillar
- EOSC-Future

EOSC-Pillar
Coordination and Harmonisation of National &Thematic Initiatives to support EOSC

Journées
EOSC France
4 / 5 Février 2021



Are Astrophysics data FAIR ?



Space mission data:

- Findable: various sites, some across many missions, few with services across all domains (e.g. CDS)
- Accessible: archives
- Interoperable: FITS as commonly used data format and includes machine readable meta-data
- Reusable: analysis tools, manuals, some online-processing provided

Ground based data:

- Findable: many sites, some across many missions, few with services across all domains (e.g. CDS) — some are not findable at all (e.g. those who have no Open Data, see next slide)
- Accessible: archives (more scattered than for space missions)
- Interoperable: FITS as commonly used data format (or high-level output format, e.g. CTA, LOFAR)
- Reusable: analysis tools, manuals, some online-processing provided, no common tools to combine optical spectra

Are Astrophysics data Open ?

Space missions:

- open immediately (e.g. Swift), after 1 year (e.g. INTEGRAL), or in pre-defined intervals (e.g. GAIA)

Ground based:

- open after one year (e.g. ESO), after project-dependent time (e.g. Calar Alto), or in releases (e.g. SDSS)
- high level products only, e.g. MAGIC, IceCube, Auger, ANTARES
- some are not open: e.g. TNG, NOT , HESS, OAR

Open Science and Big Data

- PByte science : LSST, Euclid, Gaia, LOFAR, SKA, ….
- technical difficulties to provide Open Data
- Example to tackle issue: GaiaPortalEDR3@SSDC

Work on solutions:

- what higher level data can be made open? Work from top level down.
- subsets of Open Data — also to increase understanding of and confidence in results
- learn from e.g. Fermi
- learn from High-Energy Physics / LHC (independent groups working on same data with different approaches / software to increase confidence, release subsets of data, constantly work at the limit of what's possible)