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An Open Science Future:

from Community to National/International Perspectives

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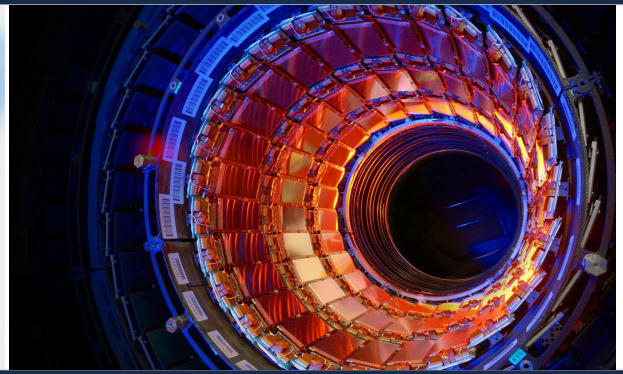
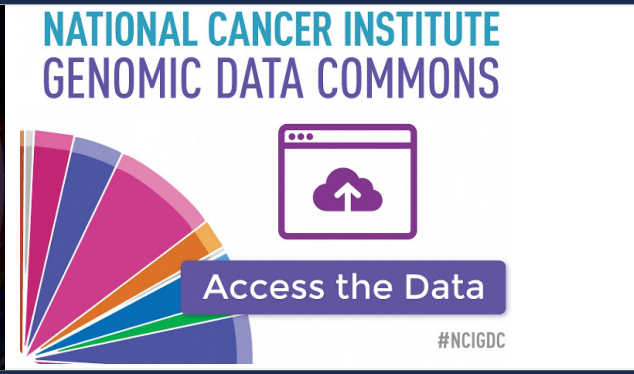
May 2022

Open Science as a Collaboration Accelerant





NIH image source: https://www.nih.gov/news-events/news-releases/newly-launched-genomic-data-commons-facilitate-data-clinical-information-sharing

Open Science

"transparent and accessible knowledge that is shared and developed through collaborative networks"

- Open Access
- Open Data
- Open Code
- Open Peer Review
- Citizen Science
- Open Source Notebooks
- FAIR Digital Objects
- New Credit Models

Vicente-Saez, Ruben, and Clara Martinez-Fuentes. "Open Science now: A systematic literature review for an integrated definition." *Journal of business research* 88 (2018): 428-436.

Overview

1. Community/Topic: MLCommons & GeoCODES
2. National & International: GO FAIR (US)
3. International: CODATA
4. Brainstorming:

Community/Topic Driven Open Science

ML Commons

Machine learning innovation to benefit everyone.

Open Access	Open Data	Open Code

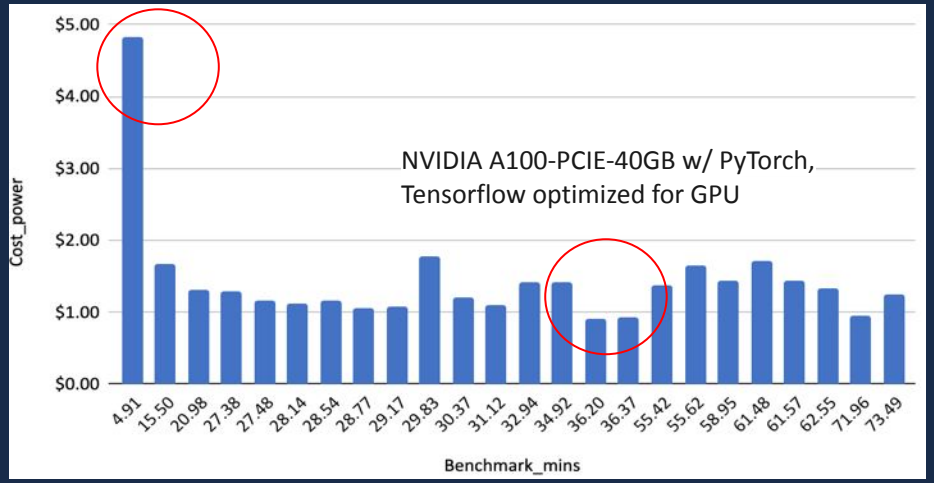
Benefits:

- Build on knowledge of other experiments for hardware, software, algorithm selection
- New ML datasets
- Unanticipated research

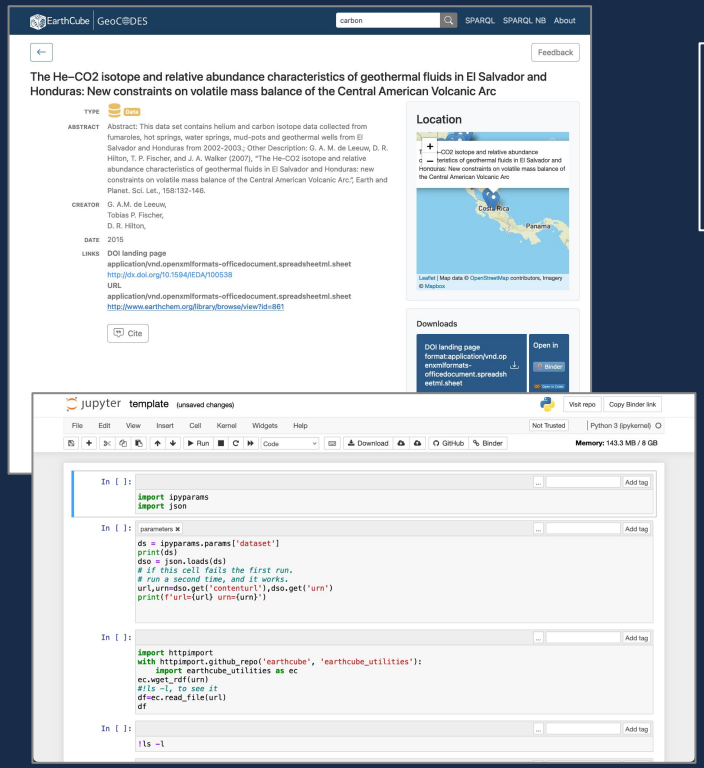
Open Science Decreases Friction for New Inquiry

Using ML performance and system logs to analyze trade offs of time vs. energy footprint of the benchmark/job (my research)

3x utilities cost for 30% time



EarthCube's GeoCODES



Open Access

Open Data

Open Code

New Credit Models

Open Source Notebooks

Benefits:

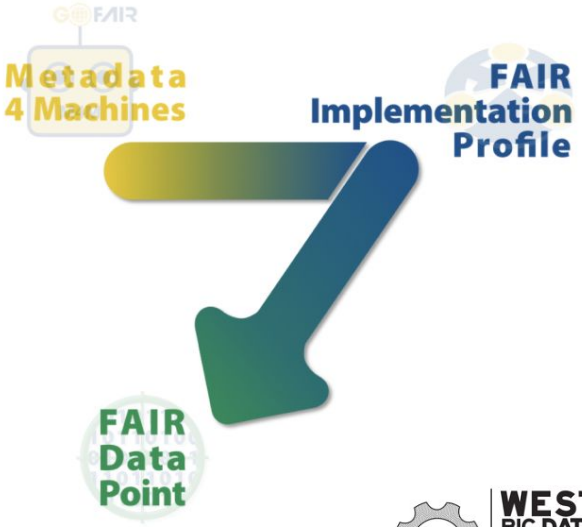
- Reinforces use of metadata standards, encourages further development
- Maps data, software, and notebooks
- Annual peer-reviewed notebook challenge

This work is supported through the NSF award #1928208.

Open Science and National/Intl Initiatives

GO FAIR.US

3-point FAIRification process



All of this is implemented in VODAN AFRICA

WEST BIG DATA INNOVATION HUB

GO FAIR US is made possible with support and partnership from several partners including SDSC, AGU, West Big Data Hub, and NSF.

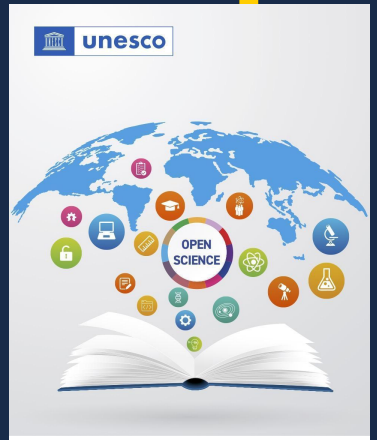
Some of the work described is supported through the NSF awards #1928208, 1916481.

SDSC SAN DIEGO SUPERCOMPUTER CENTER

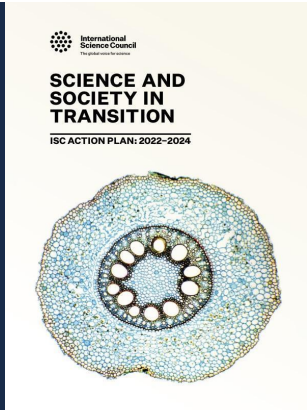
Pillar and FAIRification images from GO FAIR.

International Open Science:

- **UNESCO Recommendation :** Calls on Member States to promote ‘North-South, North-South-South and South-South collaborations to optimize infrastructure use and joint strategies for shared, multinational, regional and national **open science platforms, including through the promotion of research collaborations, sharing of open science infrastructures**, technical assistance, transfer and **coproduction of technology related to open science**’ (iii.g)
- **International Science Council Action Plan, 4.2:** encourages the creation of national or regional **Open Science platforms in the Global South**, in order ‘to position scientists and science systems in the Global South at the cutting edge of data-intensive open science’: https://council.science/actionplan/open-science/
- ISC and CODATA engagement with the African Open Science Platform, Malaysian Open Science Platform; ISC and CODATA support for the UNESCO Recommendation.
- CODATA contributing through the Open Science Commons Executives Roundtable (**OSCER**) and **GOSC**.



UNESCO Recommendation on Open Science



Slide courtesy of Simon Hodson, CODATA.

Global Open Science Cloud

- Numerous Open Science/Research Clouds/Platforms/Commons:
  - **EOSC** (European Open Science Cloud), **CSTCloud** (China Science and Technology Cloud), **ARDC** (Australian Research Data Commons), **Digital Research Alliance of Canada** (formerly NDRIO), **MOSP** (Malaysian Open Science Platform), **LA Referencia/Red Clara** (Latin America), **AOSP** (African Open Science Platform)…
- Advancing and supporting Open Science and FAIR, economies of scale, greater impact and R)I, more effective e-Infrastructures, greater realization of FAIR for established research domains and new cross-domain research areas.
- **Vertical alignment:** Bringing Open Science Infrastructures (HPC, storage and other e-Infrastructures) closer to Research Infrastructures, research groups.
- **Horizontal interoperability:** Domain research infrastructures (international and national domain data services and RIs)

Slide courtesy of Simon Hodson, CODATA.

Global Open Science Cloud (GOSC) Working Groups and Case Studies

GOSC encourages **cooperation, alignment, and interoperability**, between existing and emerging Open Science Clouds through

- thematic **Working Groups**
- a set of detailed **Case Studies** that will demonstrate how international collaborative research communities and projects can be supported by Open Science Clouds.

Five initial Case Studies, exploring practical areas for data access across clouds:

1. Incoherent scatter radar data fusion and computation
2. Open reproducible raw diffraction data for access in pandemics
3. Biodiversity and ecology information platform
4. SDG-13 climate change and natural disasters
5. Sensitive data federation analysis model in population health

- GOSC Overview: https://bit.ly/GOSC-Overview
- Join GOSC WGs, Case Studies: https://bit.ly/3jwZHNg
- Propose New Case Studies: https://bit.ly/GOSC-Propose-New-Case-Study

Slide courtesy of Simon Hodson, CODATA.

Reflection

1. Go to JamBoard: tinyurl.com/AGUSciLab
2. **To further Open Science, where should we focus? How?**
3. **Take 2 minutes to reflect and brainstorm.**