



Cloud Storage of DOE-Funded DAS Data for Public Accessibility

Nicole Taverna and Michael Rossol

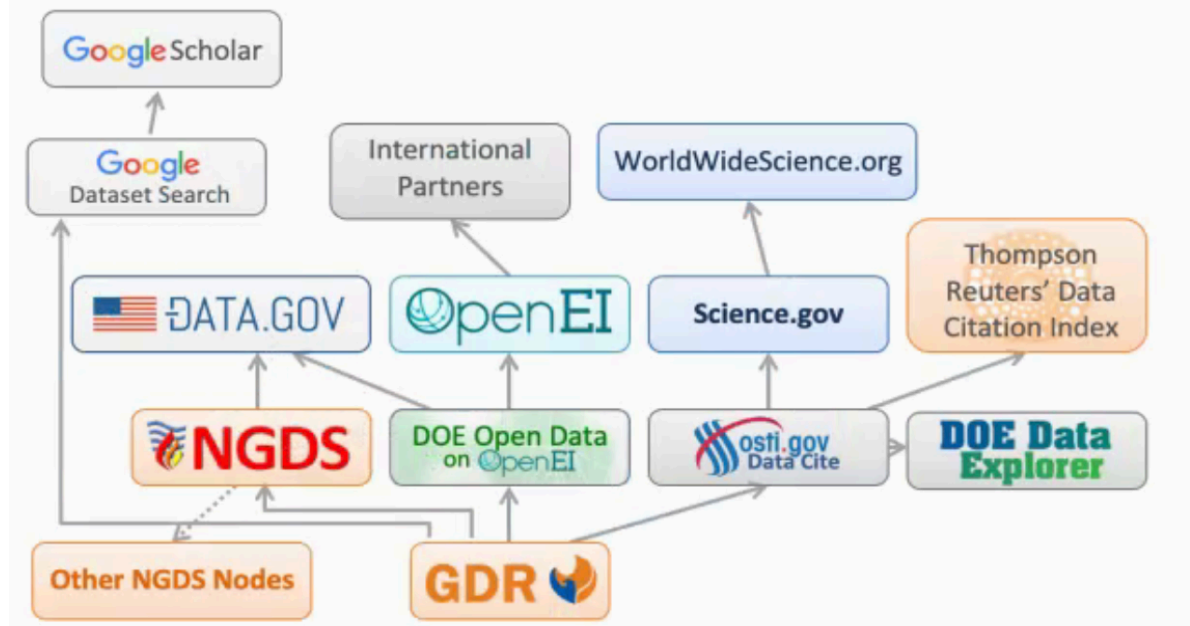
National Renewable Energy Laboratory (NREL), Golden, CO

DAS Virtual Workshop and Tutorial

August 12, 2020

Geothermal Data Repository (GDR)

- The Department of Energy's (DOE's) Geothermal Technologies Office's (GTO's) **public data repository for data associated with geothermal research**
- Data is:
 - **Submitted** by researchers
 - **Curated** by NREL
 - **Made publicly accessible** through a variety of nodes



DAS Data Storage Caveats

- Too large to efficiently upload directly to GDR
- Difficult to find an organization willing to cover storage costs indefinitely
- Storage on hard drives:
 - Drive failure is the number one cause of data loss
 - Reduces public accessibility

Amazon Web Services (AWS) Simple Storage Service (S3)



AWS S3 Explorer for the Open Energy Data Initiative

[porotomo](#) / DASH

Show entries

Object	Timestamp	Size
20160308/		
20160311/		
20160312/		
20160313/		
20160314/		
20160315/		
...		
20160321/		
20160322/		
20160323/		
20160324/		
20160325/		
20160326/		

Showing 1 to 17 of 17 entries

Open Energy Data Initiative (OEDI)



CLOUD PARTNER
RELATIONSHIPS



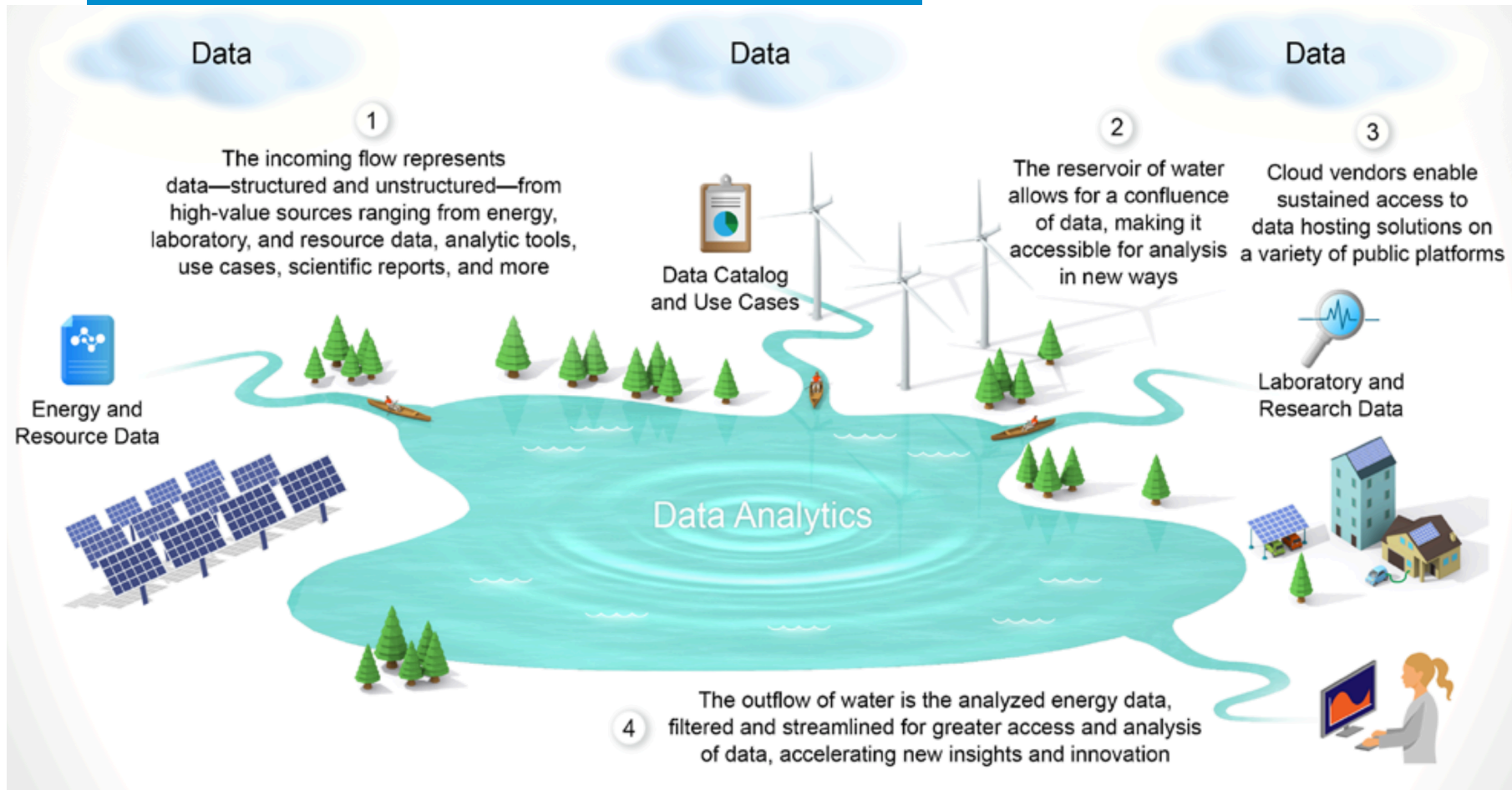
INNOVATIVE
DATASET ACCESS



DATA LAKE &
ANALYTICS

<https://data.openei.org/>

How OEDI Data Lake Works



AWS Data Lake

Datasets



AWS S3

Cloud Optimized Tools

HSDS

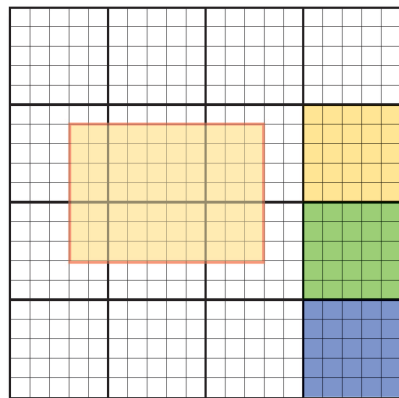


Analysis

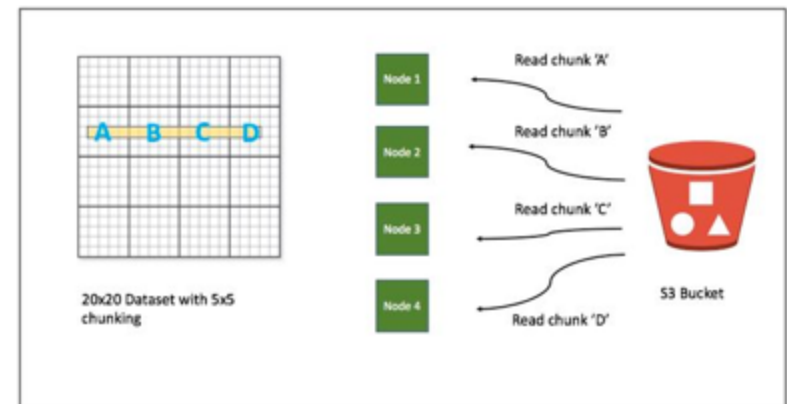
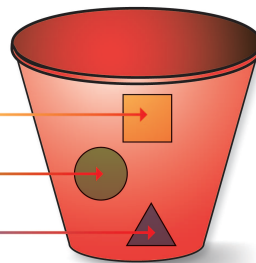


The Highly Distributed Scalable Service (HSDS) HDF on the Cloud

Big Idea: Map individual HDF5 objects (datasets, groups, chunks) as Object Storage Objects



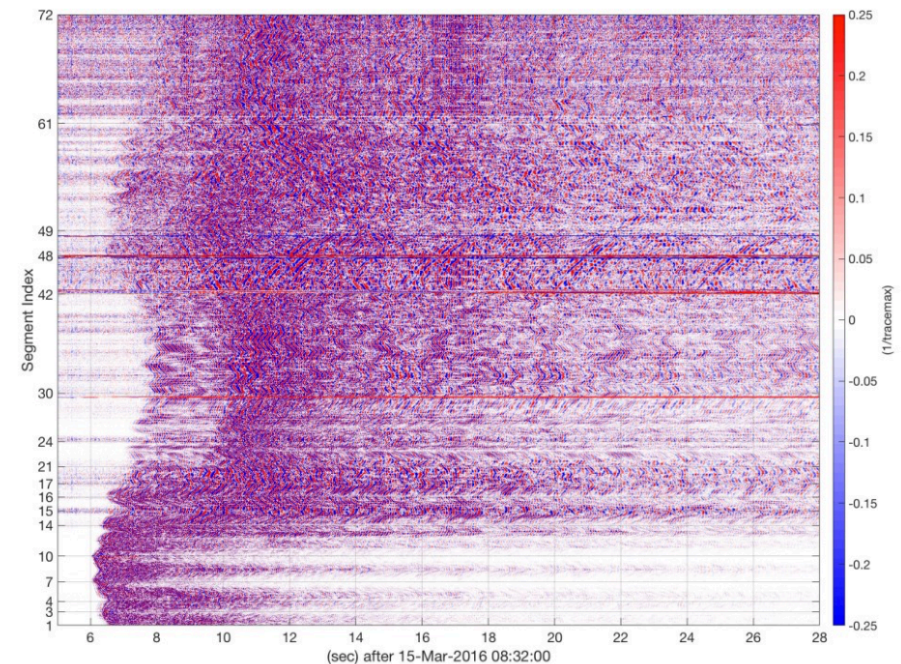
Each chunk (heavy outlines) get persisted as a separate object



Parallel requests to S3 allow the HSDS service to scale to the current service demand while not introducing bottlenecks into data flow at the point of data retrieval.
Image Credit: HDF Group.

PoroTomo DAS Dataset: Cloud Storage

- Brady's Hot Springs
- ~40 TB of horizontal array data
 - High cost of storage
- Trenched (horizontal) DAS array (DASH)
- Downhole (vertical) DAS array (DASV)
- Stored in SEG-Y and hdf5 format
 - Available via HSDS coming soon



Mystery event from PoroTomo DAS dataset (Miller et al.)

PoroTomo DAS Data on GDR

<https://gdr.openei.org/submissions/980>



Data ▾













Help ▾

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PoroTomo Natural Laboratory Horizontal and Vertical Distributed Acoustic Sensing Data

11 Resources

 DASH Data in OEDI S3 Viewer	Link to PoroTomo DASH data in Open Energy Data Initiative (OEDI) data viewer. Allows users to browse and download individual or groups of files.	 View
 DASH Data on AWS in SEG-Y format	Location of PoroTomo DASH data on Amazon Web Services S3 Management Console in SEG-Y format.	 View
 DASV Data in OEDI S3 Viewer	Link to PoroTomo DASV data in Open Energy Data Initiative (OEDI) data viewer. Allows users to browse and download individual or groups of files.	 View
 DASV Data on AWS in SEG-Y Format	Location of PoroTomo DASV data on Amazon Web Services S3 Management Console in SEG-Y format.	 View
 Interactive Jupyter Notebook DAS Tutorial	Interactive Jupyter Notebook that provides a tutorial for working with DAS data, in SEG-Y format, using the PoroTomo dataset	 View
 PoroTomo Dataset Documentation	Documentation for the PoroTomo dataset	 View

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References

Weers, Jonathan D, and Huggins, Jay V. *Getting Data Out of the Ground: Modern Data Challenges Facing EGS Collab, the DOE Geothermal Data Repository, and the Geothermal Industry*. United States: N. p., 2019. Web.

Thank You

www.nrel.gov

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