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NASA's Open Science Platform VEDA (Visualization, Exploration and Data Analytics)

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VEDA is an open-source science cyberinfrastructure for data processing, visualization, exploration, and geographic information systems (GIS) capabilities (<https://www.earthdata.nasa.gov/esds/veda>, <https://www.earthdata.nasa.gov/dashboard/>). NASA has always had open data policies, so data has always been openly accessible for anyone, but NASA hasn't constantly exposed it in friendly interfaces or analytics platforms. VEDA attempts to make NASA's Earth data mean more

As VEDA supplies data and computing services through its dashboard and JupyterHub applications and engages with communities such as EGU, it is a critical component of NASA's open science initiative. VEDA's adoption of existing and emerging standards such as STAC, Cloud-Optimized GeoTIFFs, Zarr, the Features API, and the Tiles API ensures interoperability and reusability.

In the past year, VEDA has expanded its impact in 3 ways: (1) the reuse of its infrastructure to stand up the multi-agency Greenhouse Gas Center (<https://earth.gov/ghgcenter>, announced at COP28) and NASA's Earth Information Center (<https://earth.gov/>), (2) the reuse of data APIs across applications, such as VEDA data in NASA's Enterprise GIS, and (3) the generalization of the data system architecture into a free and open source framework called eoAPI.

VEDA has also maintained and deepened its connections to the Multi-Mission Algorithm and Analysis Platform (MAAP). MAAP is a research data infrastructure (RDI) for above-ground biomass estimation. MAAP is reusing and contributing to the eoAPI data system and plans to integrate the analytics components (JupyterHub and data processing system) further.

Now that VEDA has manifested GHG Center and EIC, VEDA is a project where innovation happens. The VEDA team, composed of NASA project leads, scientists, designers, and developers, constantly works to resolve old and new challenges in managing EO architectures. For example, the team designs and implements interfaces to manage STAC metadata. eoAPI is a result of this innovative environment.

eoAPI is a new, open-source, installable combination of data catalog and associated services for earth observation and related data with a cloud-computing infrastructure first approach. eoAPI combines STAC data ingestion, data hosting (pgSTAC), and querying services (stac-fastapi) with

raster (Tiler) and vector services (TiPg). eoAPI is built for reuse and has been used beyond VEDA, GHG, and EIC to deliver MS Planetary Computer and AWS ASDI's data catalog and applications for the International Federation of the Red Cross and MercyCorps.

This presentation will demo the current capabilities of eoAPI and VEDA and discuss how these capabilities were designed and architected with the central goals of science delivery, reproducible science, and interoperability to support the re-use of data and APIs across the Earth Science ecosystem of tools. The presentation will close with VEDA and eoAPI's plans.