

# Open-Source Online Platform for UAS HTP Data Management

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# OVERVIEW

- How can we better manage large volumes of UAS HTP data collected in the field?
- Building an open-source platform for managing, collaborating, and visualizing spatial data
- Demonstration of current development site

# PROJECT BACKGROUND



# MOTIVATION

- Researchers today are capturing large volumes of UAS HTP at a high spatial and temporal resolution
- Research can be impeded when we don't know what data we have and how to access it
- How can we store, process, visualize, and collaborate findings with other researchers across disciplines?

# OBJECTIVE

- Build an **open-source** online platform that research groups can use as a one-stop shop to:
  - Upload, storage, and organize UAS data
  - Process and visualize the data with interactive tools
  - Collaborate with other researchers
  - Publish findings to a public central catalog

# MAJOR PLATFORM COMPONENTS

## Application Instance

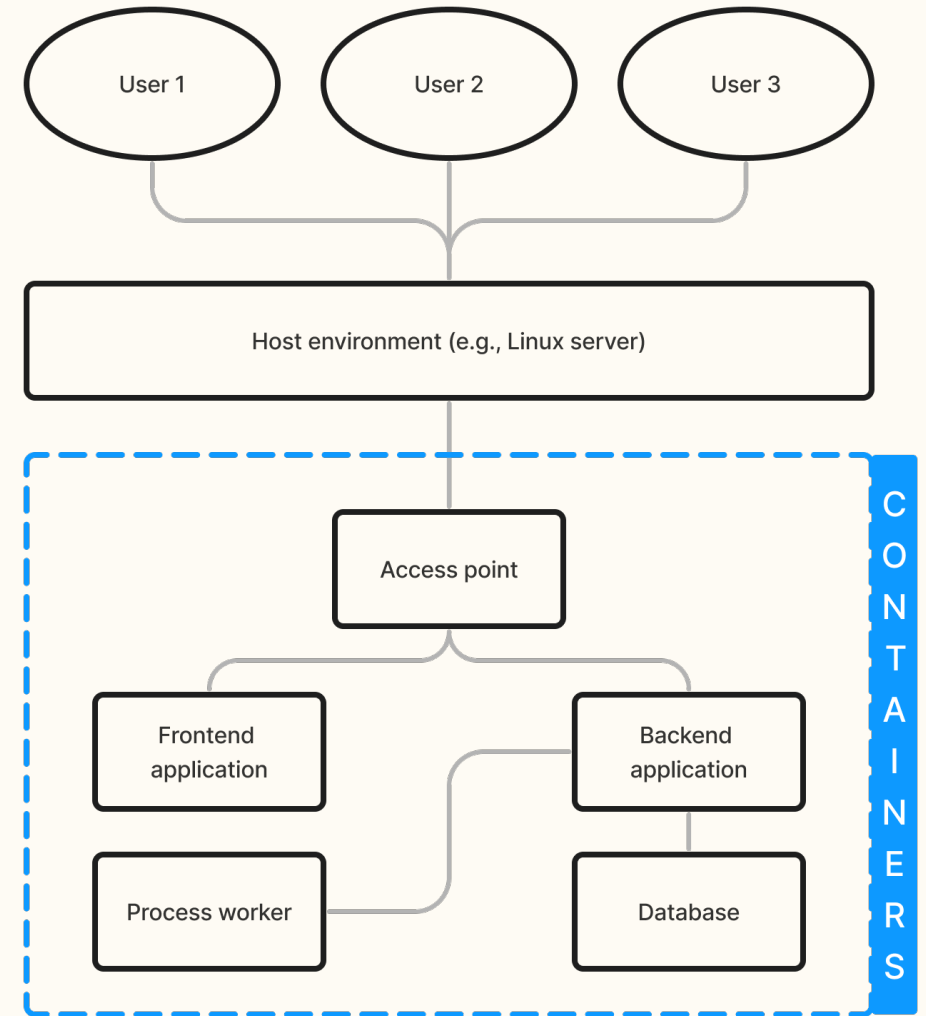
- Containerized full stack web application
  - Frontend framework
  - Backend framework
  - Database
  - Web server
- Open-source and self-hosted

## Public Central Catalog

- Queryable catalog of published assets from application instances

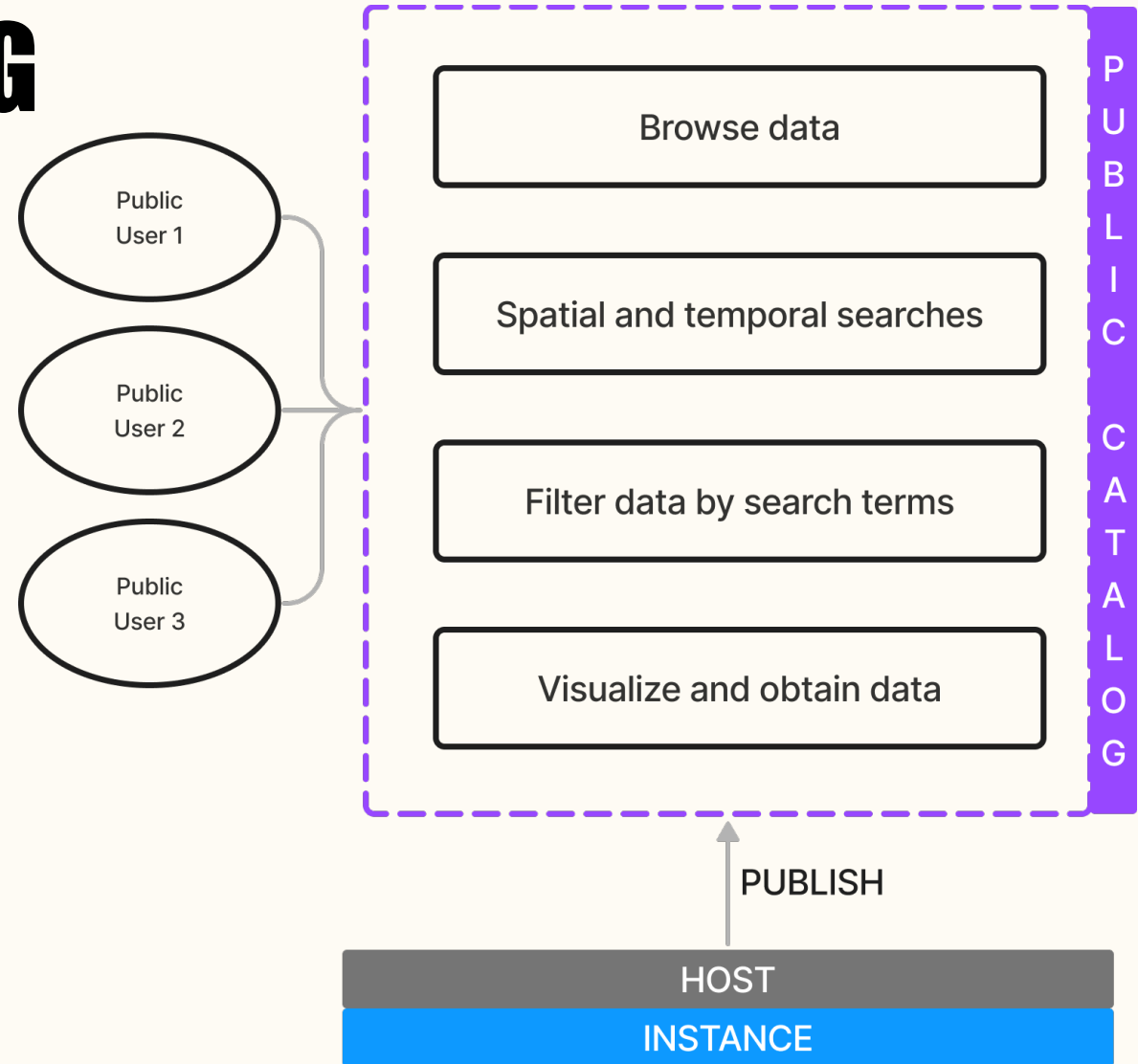
# APPLICATION INSTANCE

- Can be hosted from environments that support Docker
- Each instance consists of multiple containers with a single access point
- User data remains under host's control



# PUBLIC CENTRAL CATALOG

- Researchers can publish data from an application instance to an open public catalog
- Only metadata and URL to dataset published
- Physical dataset will remain with application instance host

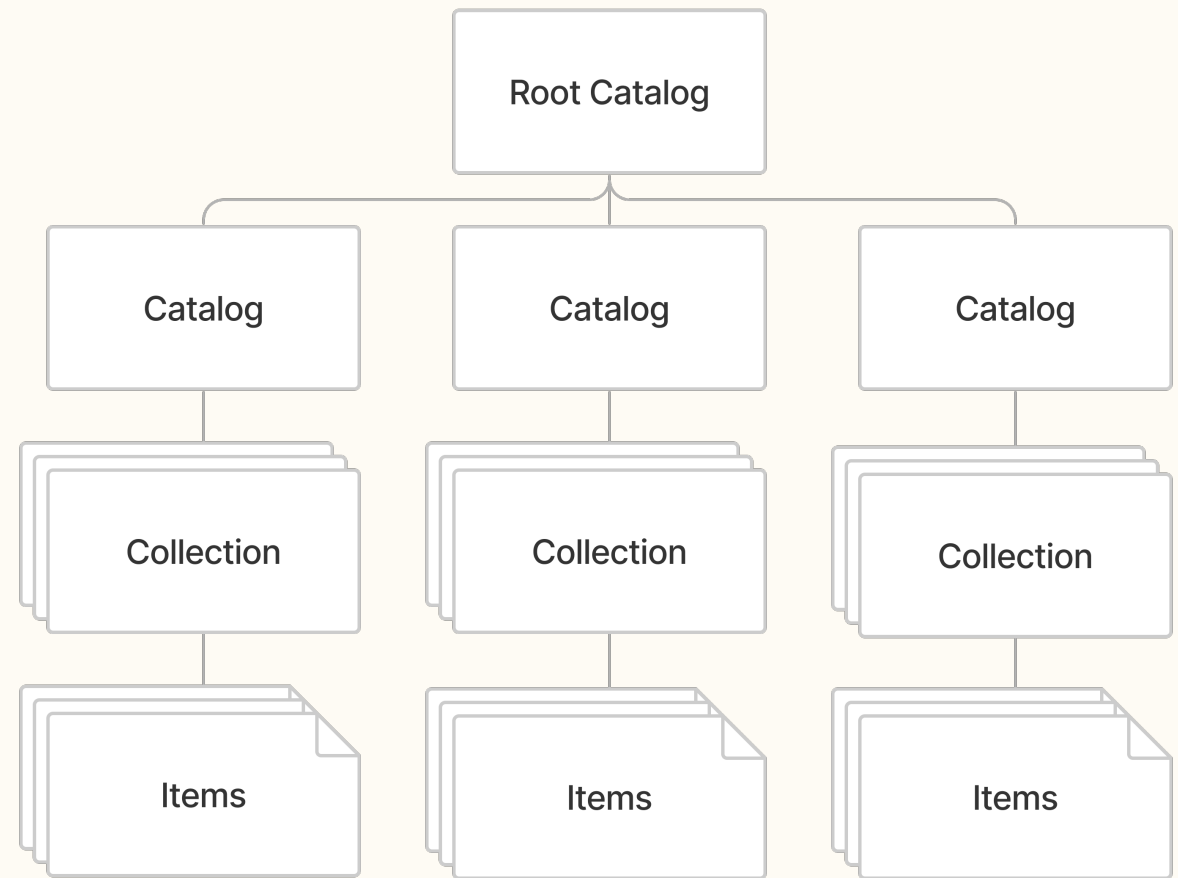






- Centralized catalog built to **S**patio**T**emporal **A**sset **C**atalog (STAC) specification
- Three primary data models: Catalog, Collection, and Item
- Involved community, large collection of tools and extensions

## STAC CATALOG STRUCTURE



# EXAMPLE STAC

- STAC for Digital Forestry
  - Indiana LiDAR and ortho datasets
- Accessible through STAC Browser and backed by STAC API
- Spatial and temporal queries supported

The screenshot shows the 'STAC for Digital Forestry' web interface. At the top, there are navigation links for 'Source', 'Share', and 'Language: English'. Below this is a search bar with 'Browse' and 'Search' buttons. The main content area is divided into two columns: 'Description' and 'Additional Resources'. The 'Description' section states 'STAC for Digital Forestry at Purdue University and Geospatial Data Science Lab'. The 'Additional Resources' section lists 'OpenAPI service description' and 'OpenAPI service documentation'. Below this is a 'Catalogs' section with a '6' icon, 'Tiles' and 'List' view options, and 'Ascending' and 'Descending' sort options. A search bar for 'Filter catalogs by title' is present. The main content area displays six catalog cards in a 2x3 grid:

DSM	High quality JPEG compressed ortho	NDHM
DSM for Indiana Statewide 1/1/2017, 12:00:00 AM UTC - 12/31/2019, 12:00:00 AM UTC	High quality JPEG compressed ortho for Indiana Statewide 1/1/2021, 12:00:00 AM UTC - 12/31/2023, 12:00:00 AM UTC	NDHM for Indiana Statewide 1/1/2017, 12:00:00 AM UTC - 12/31/2019, 12:00:00 AM UTC
DTM	Low quality JPEG compressed ortho	Uncompressed ortho
DTM for Indiana Statewide 1/1/2017, 12:00:00 AM UTC - 12/31/2019, 12:00:00 AM UTC	Low quality JPEG compressed ortho for Indiana Statewide 1/1/2021, 12:00:00 AM UTC - 12/31/2023, 12:00:00 AM UTC	Uncompressed ortho for Indiana Statewide 1/1/2021, 12:00:00 AM UTC - 12/31/2023, 12:00:00 AM UTC

# GOAL

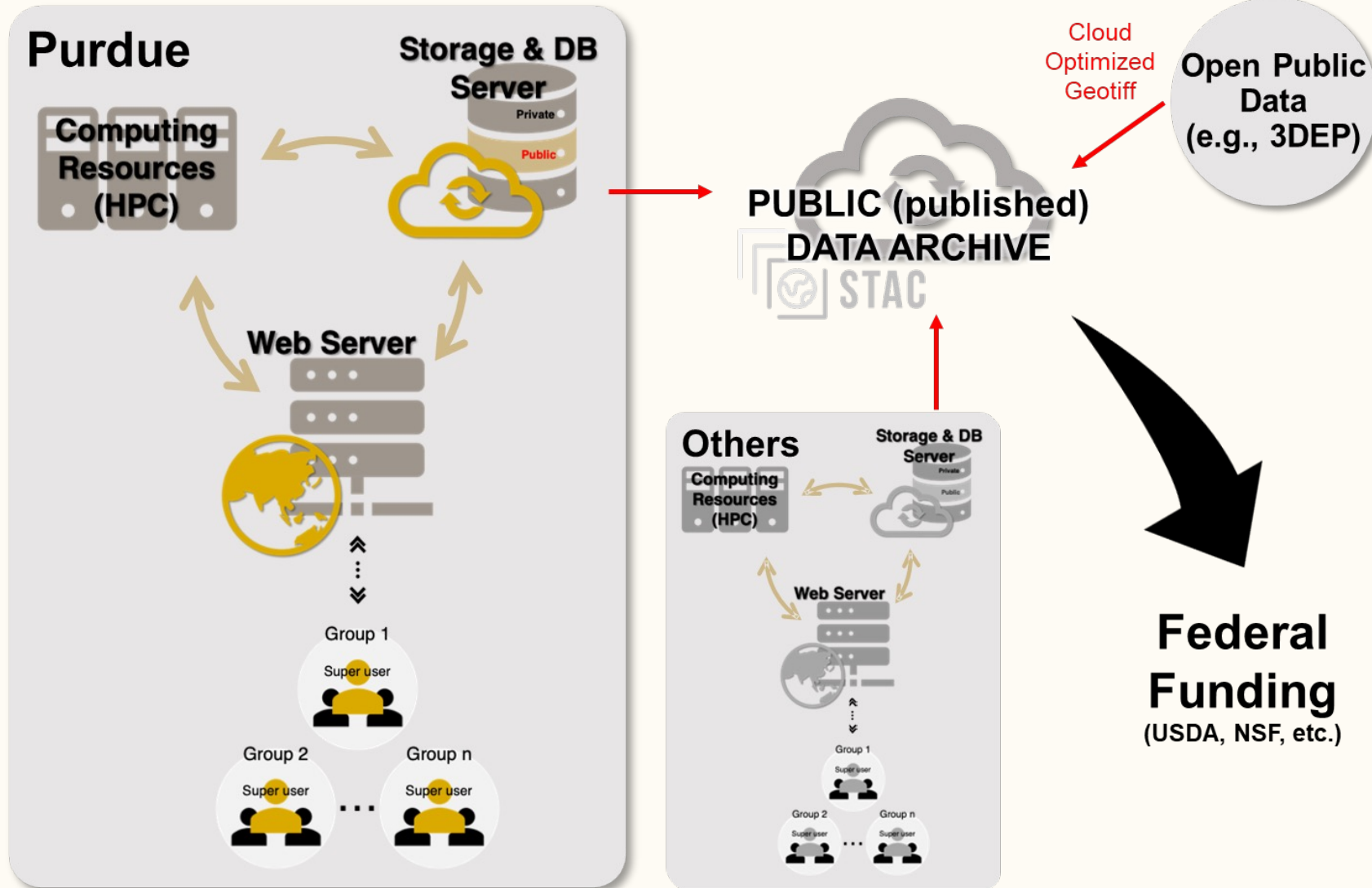
# “To make UAS HTP data FAIR and an online platform SCALABLE”

Findable

Accessible

Interoperable

Reusable



# DEVELOPMENT PROGRESS

On the path to version 0.1

# ACCOUNT MANAGEMENT

- Account registration with email confirmation
- Email alerts sent to application instance admins
- Password recovery

The screenshot displays the Data To Science web application interface. At the top, there is a navigation bar with the logo 'DS DATA TO SCIENCE' and menu items: 'HOMEPAGE', 'WORKSPACE', and 'MY TEAMS'. A user profile icon and the text 'Data To Science' are visible in the top right corner. A modal window titled 'Projects' is open, showing a message: 'You do not currently have access to any projects. Use the below button to create a new project.' Below this message is a prominent dark blue button labeled 'Add first project'. In the background, a map of Indiana is visible, showing major cities like Indianapolis, Fort Wayne, and South Bend, along with various highways and the Maumee River. At the bottom of the screenshot, there is a 'Create Account' button with a password field above it. A green checkmark is placed over the 'Create Account' button. To the right, there is a dark overlay containing an 'Approve' button, '-D2S Support' text, and buttons for 'Reply', 'Reply all', and 'Forward'.

# TEAMS

- Create or join existing team
- Team members gain access to a team's project data
- Only team owner can add and remove members, and delete the team

The screenshot displays the 'Data To Science' web application interface. The top navigation bar includes 'HOME PAGE', 'WORKSPACE', and 'MY TEAMS', along with a user profile for Benjamin Hancock. The left sidebar shows a 'Team List' with options for 'GDSL', 'ACRE Team', and 'Conference Team'. The main content area is titled 'Conference Team' and shows a description: 'Team for conference demonstration.' Below this is a table of 'Conference Team Members' with columns for Name, Email, Role, and Actions. The table lists two members: Data ToScience (dat2sci@gmail.com, Member) and Benjamin Hancock (hancob@purdue.edu, Member). At the bottom of the table, there is an 'Email\*' input field, an 'Add new member' button, and a 'Delete team' button. A large blue watermark reading 'Managing existing team' is overlaid on the bottom right of the screenshot.

Name	Email	Role	Actions
Data ToScience	dat2sci@gmail.com	Member	
Benjamin Hancock	hancob@purdue.edu	Member	

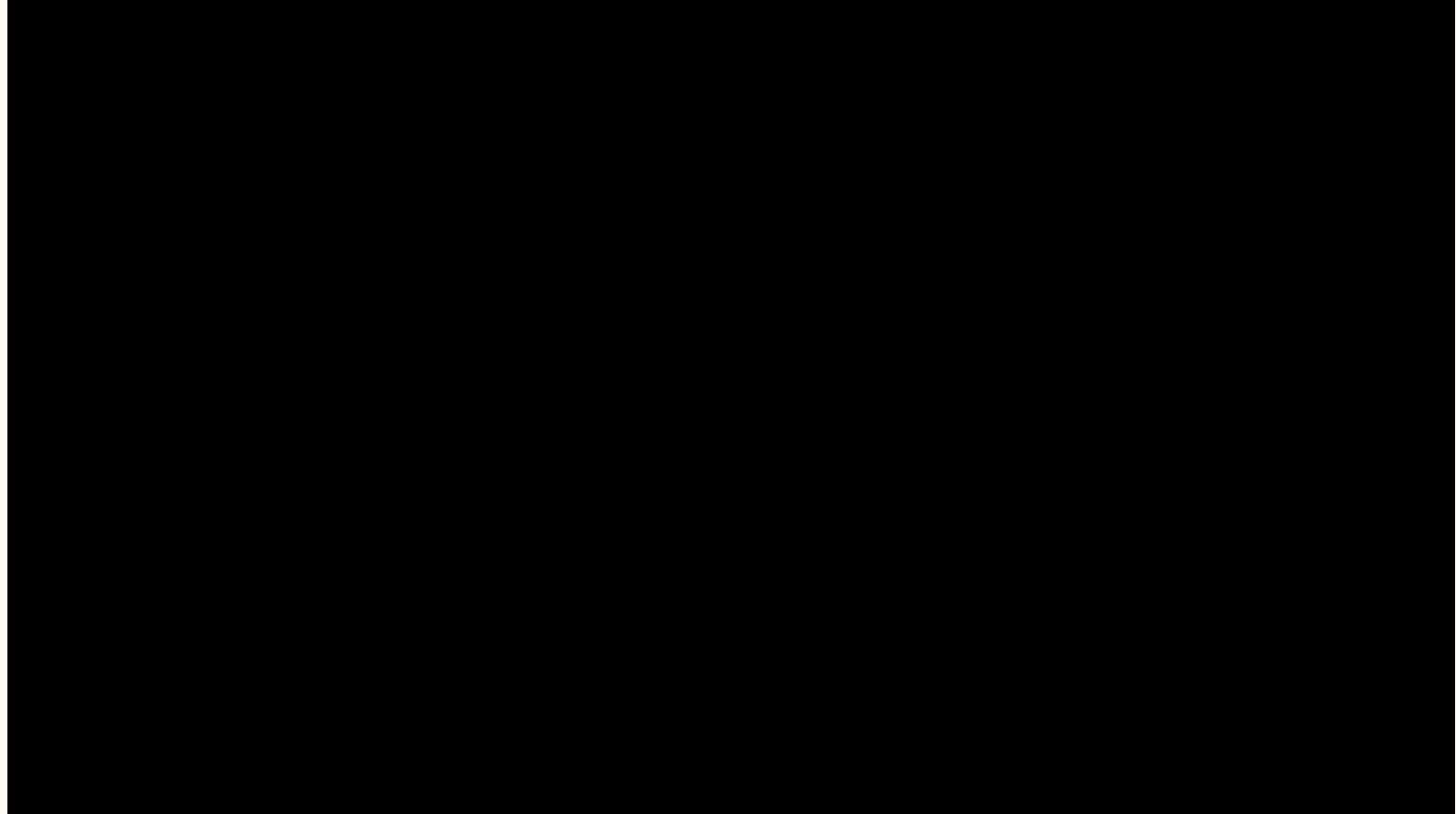
# PROJECTS

- Anyone can create a project
- Projects can be associated with an existing team
- Must provide title, description, and field boundary

The screenshot shows the 'New Project' form in the Data to Science application. The form is titled 'New Project' and has a 'Title\*' field. Below the title field is a 'Create' button. The form is divided into two sections: 'ACRE PROJECT' and 'CONFERENCE PROJECT'. The 'CONFERENCE PROJECT' section is highlighted with a green border. The 'ACRE PROJECT' section has a description 'Data collected at ACRE.' and a 'Create' button. The 'CONFERENCE PROJECT' section has a description 'Project with data for conference demonstration.' and a 'Create' button. The application header includes the 'Data to Science' logo, navigation links for 'HOMEPAGE', 'WORKSPACE', and 'MY TEAMS', and a user profile for 'Benjamin Hancock'.

# FLIGHTS

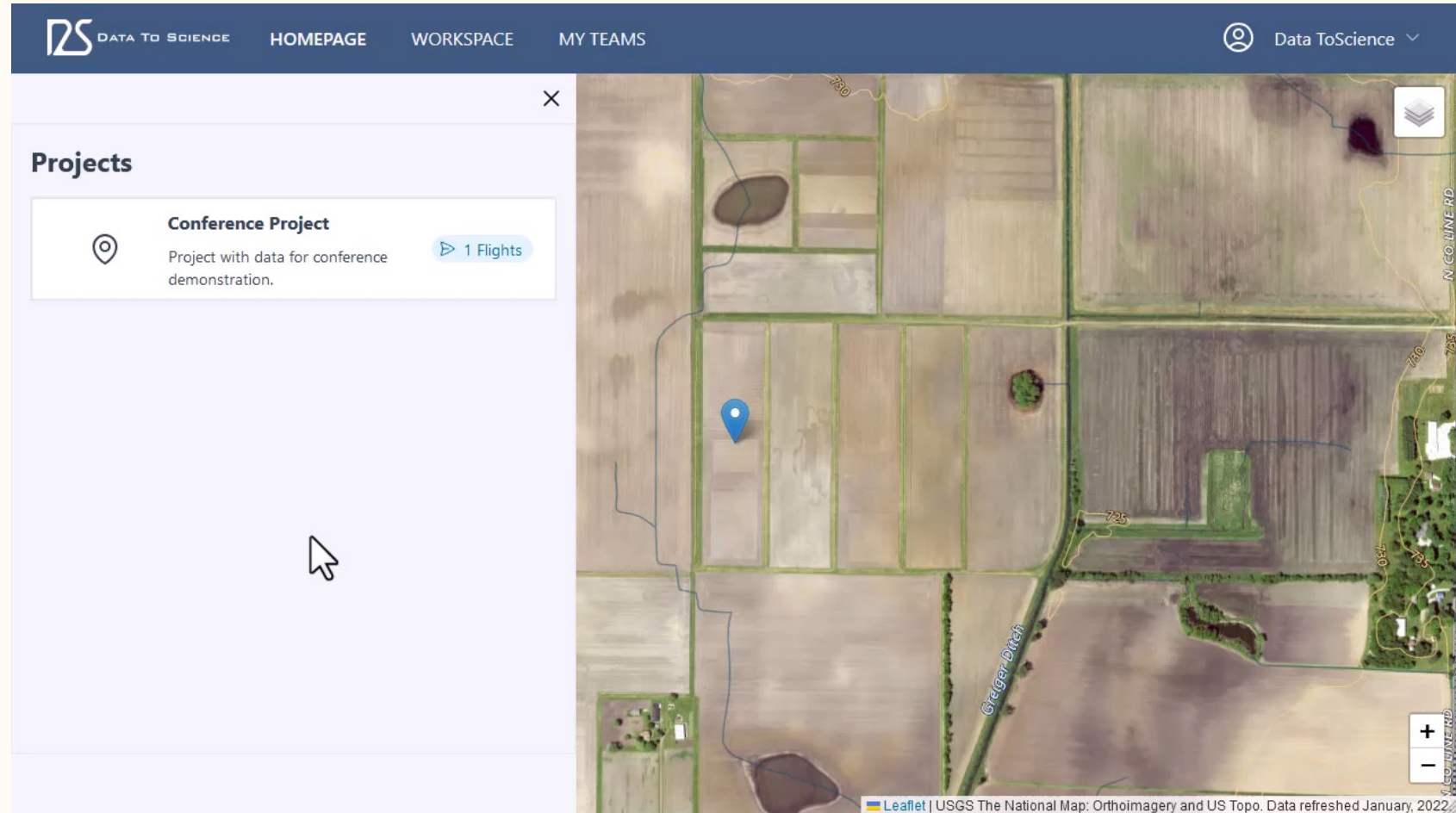
- Multiple flights can be added to a single project
- Upload raw data and data products
  - Ortho GeoTIFF
  - DSM GeoTIFF
  - Point Cloud
  - Other





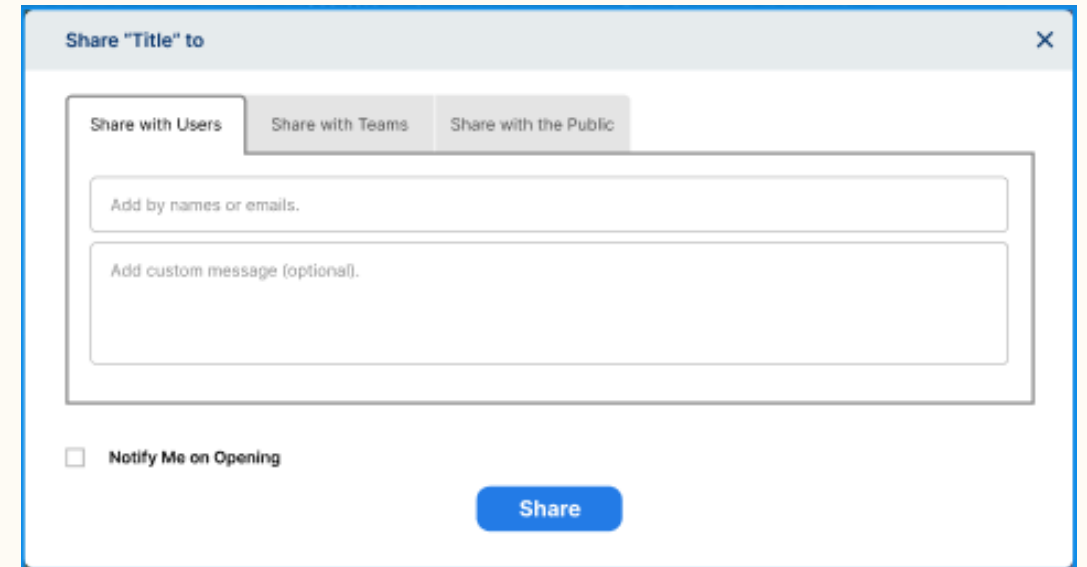
# VISUALIZING PROJECT DATA

- Projects listed in left pane
- GeoTIFFs streamed in COG format
- User specific symbology props



# SHARING MAPS

- Team members have access to the same data products, but not the same symbology settings
- Share specific symbology settings for a data product with other users
- Share visualization with non-account holders



The screenshot shows a 'Share "Title" to' dialog box with three tabs: 'Share with Users', 'Share with Teams', and 'Share with the Public'. The 'Share with Users' tab is active. It contains two text input fields: 'Add by names or emails.' and 'Add custom message (optional)'. Below the fields is a checkbox labeled 'Notify Me on Opening' which is unchecked. A blue 'Share' button is located at the bottom right of the dialog.

# ACKNOWLEDGEMENTS

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- Purdue Digital Forestry

# THANK YOU

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