

Cooperative Institute for Research to Operations in Hydrology (CIROH)



CIROH DevCon 2025

CIROH Hydroinformatics & Research  
Cyberinfrastructure  
Tools & Technologies

Accelerating Hydrologic Research  
Across 28 institutions



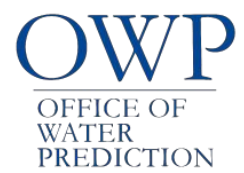
Dan Ames  
BYU  
Professor



Arpita Patel  
AWI – UA - DevOps  
Manager &  
Enterprise Architect



2025 CIROH Developers Conference sponsors:





# CIROH 2024 Productivity Measures

82

Published Journal Articles



58

New Data Sets



605

Presentations



93

New Software Tools/Systems



132

User-Inspired Projects



454

Faculty and Research Staff

185

Post Docs and Graduate Students

35  
States Directly Benefitting  
from Research Products



\$113M

Research Funding



# What CIROH Offers You!

## OUTREACH & EDUCATION

- DocuHub, Portal, HydroLearn, Research Paper

4

Community engagement  
and educational  
resources

## HYDROLOGY MODELING

- Community NextGen, NGIAB, Evaluation, Visualization
- Calibration, DataStream, Community FIM

3

Modeling frameworks  
for hydrologic  
simulations

## DATA & APPLICATIONS

- Portal, HydroShare, AWS S3, On-Prem Storage

2

Data storage and  
sharing platforms  
for research data

## INFRASTRUCTURE

- GitHub, DockerHub, Cloud - AWS, GoogleCloud, 2i2c JupyterHub
- On-premise: Pantarhei, Wukong, OpenStack, NSF ACCESS

1

Cloud and on-premises  
services and collaboration  
tools for development

# DEVCON 2025

## Part 1: CIROH Cyberinfrastructure DevOps



# CIROH Cyberinfrastructure DevOps Team



# Partners

UA OIT



2i2c



Google Cloud



Google Cloud

AWS



Microsoft Azure



NSF



Cooperative Institute for Research  
to Operations in Hydrology

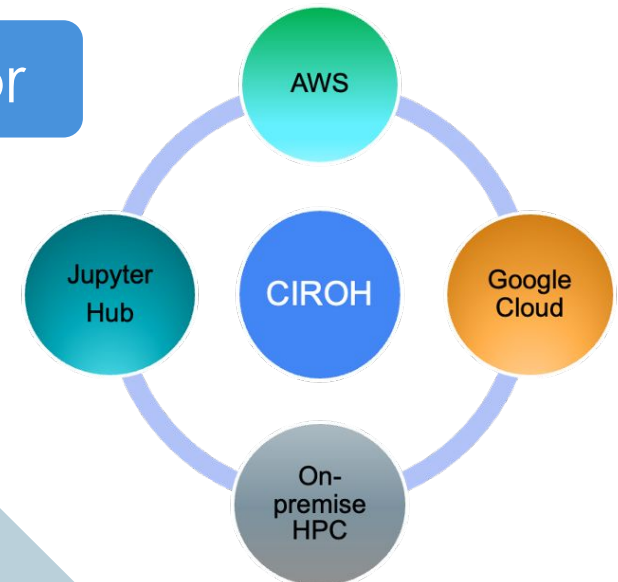


2025 CIROH Developers Conference sponsors:



Sponsor

Sponsor



# DevCon IT Support

## CIROH DevCon 2025

Infrastructure is

LIVE!

12 Workshops



### CIROH 2i2c JupyterHub on Google Cloud

Platform for interactive computing

131 attendees



### NSF ACCESS JetStream2

NextGen water modeling

105 NextGen inst.



### AWS

Cloud infrastructure platform

100 attendees



### Google Cloud BigQuery

Data analytics platform

50 attendees

12

Total Workshops

200

Total Attendees

4

Cloud Platforms

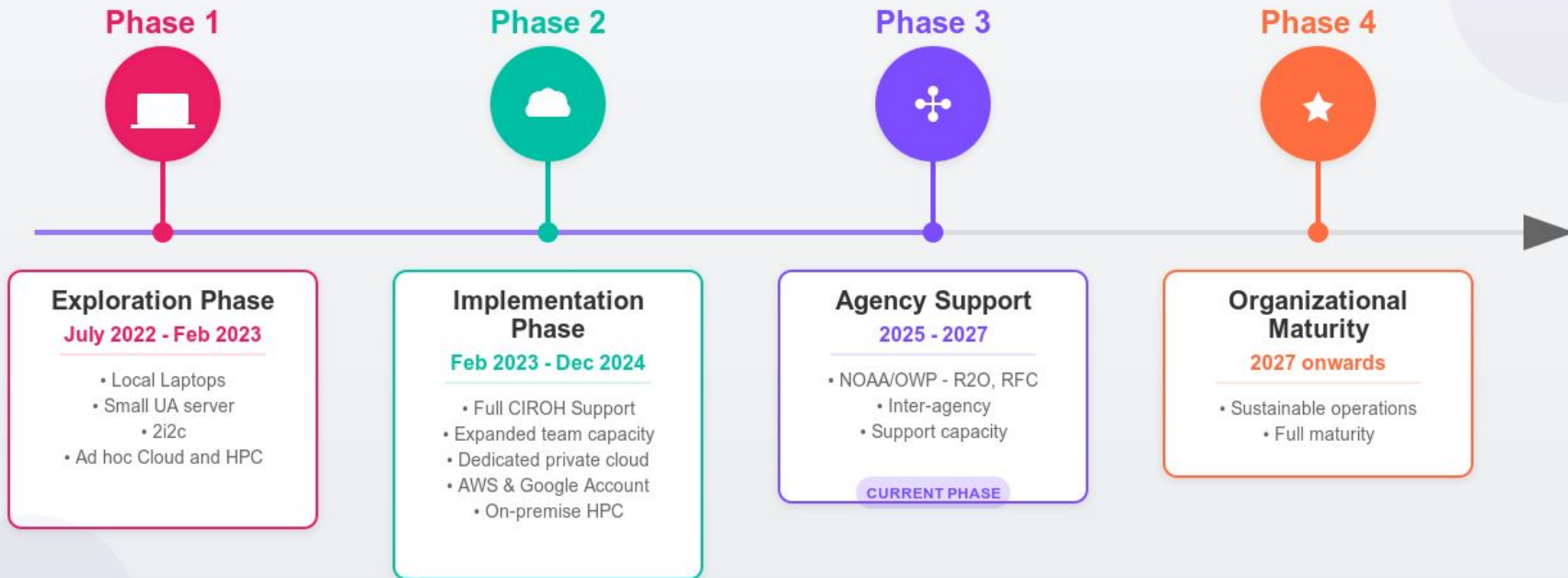
Ready to power  
water science innovation!

#DevCon2025 #CloudComputing #WaterScience



# How did we get here?

## CIROH CYBERINFRASTRUCTURE ROADMAP



# CIROH Cyberinfrastructure (CI)

## Research Impact

**400+**

Active Researchers

**130**

Research Projects

*Empowering innovation through collaboration*



**AWS**

Active Projects

Active Users

**24**  
**60**



**On-premise HPC**

Active Projects

Active Users

**20**  
**50**



**Google Cloud Platform**

Active Projects

Active Users

**50**  
**171**



**NSF Access**

Active Projects

Active Users

**7**  
**27**

# Key Projects using CIROH CI












# Other Projects deployed on CIROH AWS via Tethys Portal

## Native Applications 🏠

Built using [Tethys Portal](#)

Application	Description
 <a href="#">TethysDash</a>	Interactive dashboard for hydrological data visualization
 <a href="#">Water Data Explorer</a>	Multi-source water data analysis tool
 <a href="#">HydroCompute Demo</a>	University of Iowa's statistical analysis showcase
 <a href="#">SWEML</a>	Snow Water Equivalent visualization platform
 <a href="#">Grace Groundwater Tool</a>	GRACE satellite data analysis for groundwater
 <a href="#">Snow Inspector</a>	MODIS satellite snow cover analysis
 <a href="#">CSES</a>	National Water Model evaluation system

📌 Access all native apps: [Tethys Portal](#)

# CIROH Cyberinfrastructure DevOps

## Key Initiatives



### DevCon

2023, 2024, 2025



### Education Programs

Summer Institute 2024, 2025  
REU 2024, 2025



### Various CIROH Projects

Research & Development Initiatives



### User Support

- AWS Office Hours
- Slack and Email Support
- DocuHub Monthly Blog and News Updates

# CIROH JupyterHub Images

jupyterhub Home Token

## Server Options

☒

**Small**  
5GB RAM, 2 CPUs  
Image

NextGen National Water Model(NWM)

SHAP for ML Interpretation  
TEVA for Feature Selection  
LightGBM for Forecast  
ML for Hydro Model Outputs  
HydroGeoSpatial Modeling  
NextGen National Water Model(NWM)

☐

**Medium**  
11GB RAM, 4 CPUs  
Image

NextGen National Water Model(NWM)

☐

**Large**  
24GB RAM, 8 CPUs  
Image

NextGen National Water Model(NWM)

☐

**Huge**  
52GB RAM, 16 CPUs  
Image

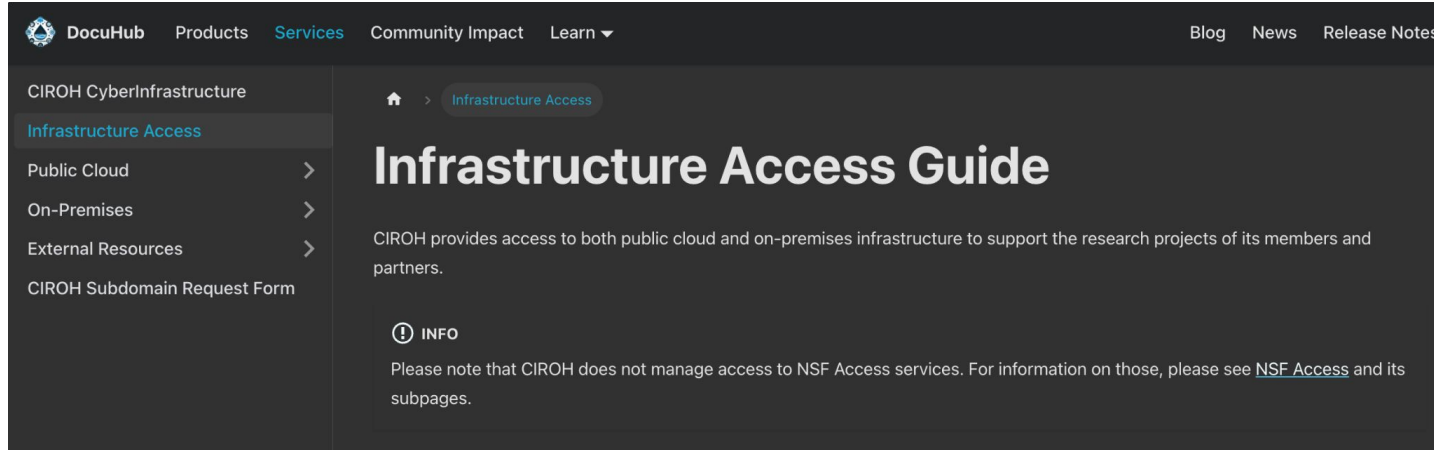
NextGen National Water Model(NWM)

Start

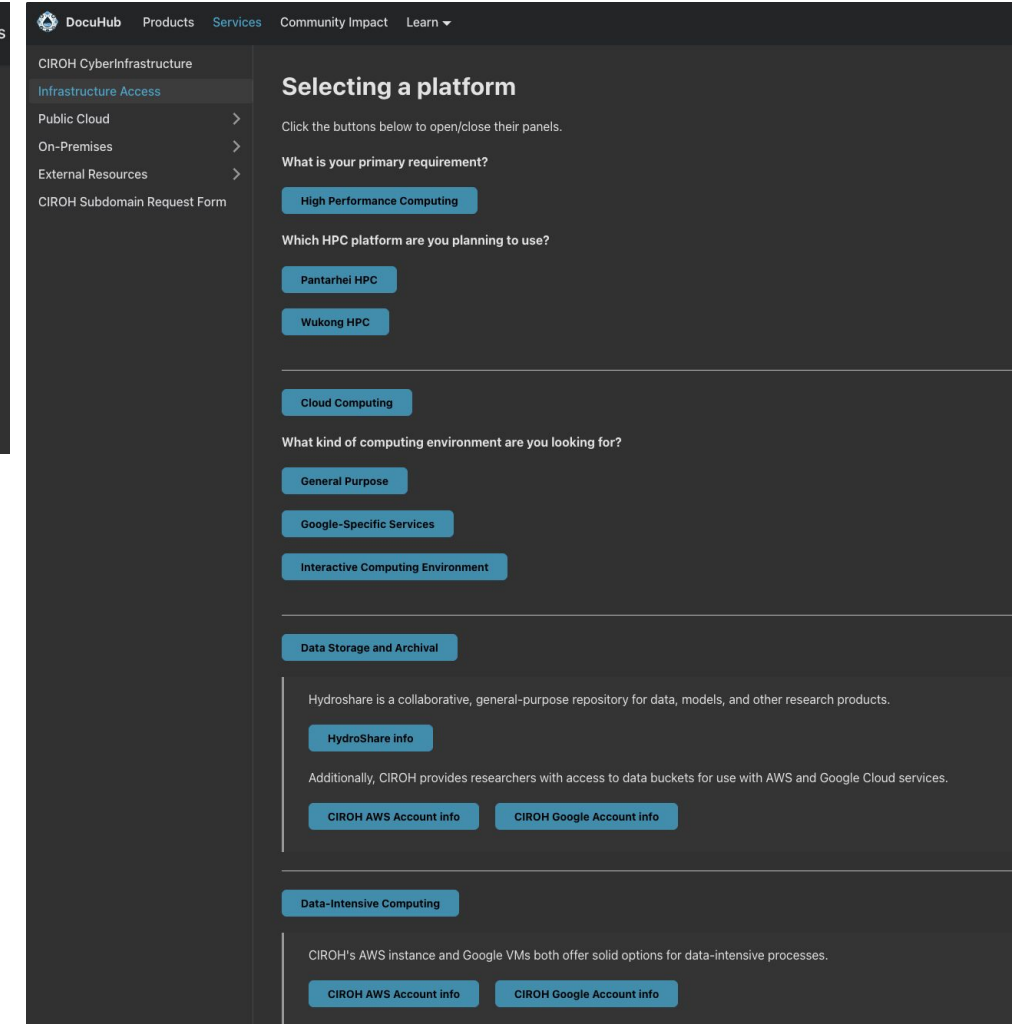
Available to  
any CIROH  
researcher  
(free)



# How to get access?



The screenshot shows the CIROH CyberInfrastructure website. The top navigation bar includes DocuHub, Products, Services, Community Impact, and Learn. The left sidebar lists Infrastructure Access, Public Cloud, On-Premises, External Resources, and CIROH Subdomain Request Form. The main content area is titled 'Infrastructure Access Guide' and includes a home icon, a breadcrumb for 'Infrastructure Access', and a paragraph stating that CIROH provides access to both public cloud and on-premises infrastructure. An 'INFO' icon and a note are also present, stating that CIROH does not manage access to NSF Access services and directing users to the NSF Access subpages.



The screenshot shows the 'Selecting a platform' page on the CIROH CyberInfrastructure website. The left sidebar is identical to the previous screenshot. The main content area is titled 'Selecting a platform' and includes instructions to click buttons to open/close panels. It asks for the primary requirement, listing 'High Performance Computing' and 'Cloud Computing'. It then asks for the HPC platform, listing 'Pantarhei HPC' and 'Wukong HPC'. It also asks for the computing environment, listing 'General Purpose', 'Google-Specific Services', and 'Interactive Computing Environment'. The 'Data Storage and Archival' section describes HydroShare and provides links for 'HydroShare info', 'CIROH AWS Account info', and 'CIROH Google Account info'. The 'Data-Intensive Computing' section describes CIROH's AWS and Google VMs and provides links for 'CIROH AWS Account info' and 'CIROH Google Account info'.

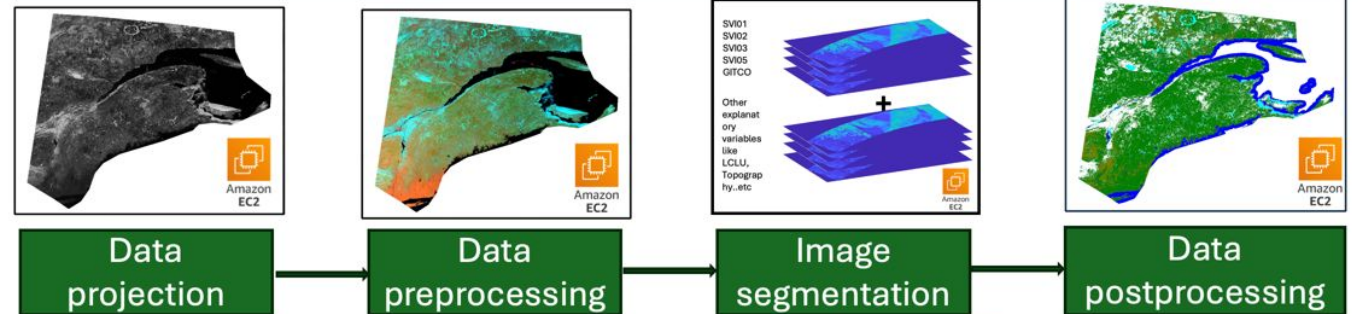
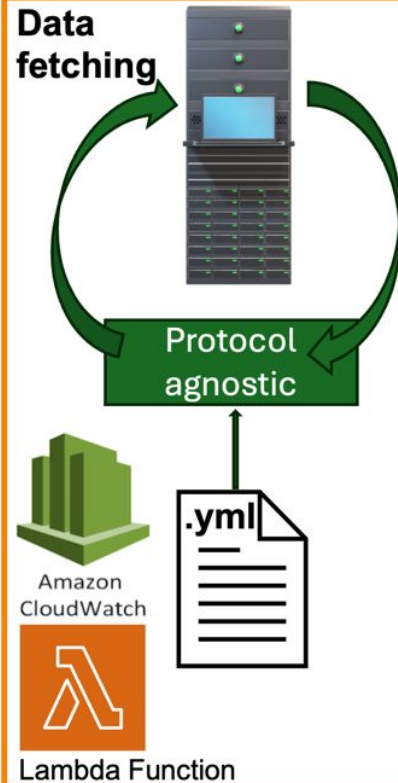
1. [docs.ciroh.org](https://docs.ciroh.org)

2. Go to “Services”

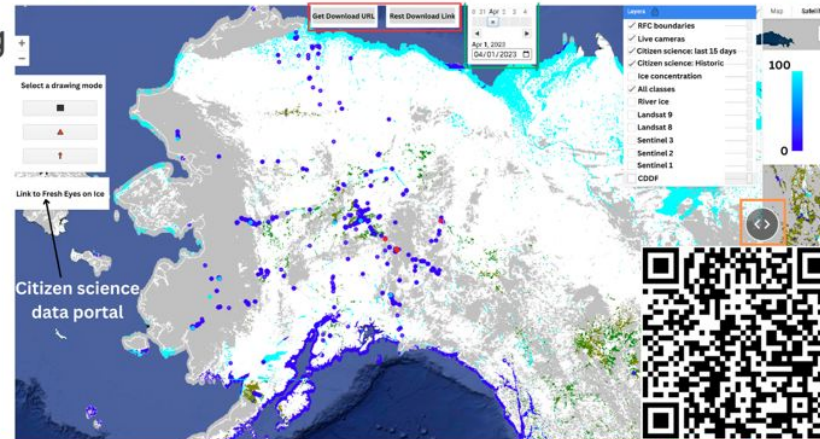
# Real-time satellite monitoring of river ice conditions on CIROH AWS

**Advancing Research in Cold Regions Hydrology to Support the Modeling and Mapping of Ice-induced Flood Inundation**

## Identity and Access Management (IAM)



- Automated River Ice Monitoring Using VIIRS Satellite Imagery.
- The system has been fully migrated to cloud-based infrastructure, leveraging CIROH Cyber Infrastructure AWS services.



# DEVCON 2025

## Part 2: UA HPC Update



# The Future : UA HPC

## \$96M HPC Facility at UA



### High Performance Computing and Data Center Construction Ready to Begin

November 12, 2024 • Written by **Jessica Nelson** • 2 min read



The University of Alabama Board of Trustees gave final approval on Friday for the plans to build the new [High Performance Computing and Data Center](#) on the eastern edge of campus. Construction can now begin with a projected completion date in late 2026.



**NIST** NATIONAL INSTITUTE OF  
STANDARDS AND TECHNOLOGY  
U.S. DEPARTMENT OF COMMERCE



[hpc.ua.edu](http://hpc.ua.edu)

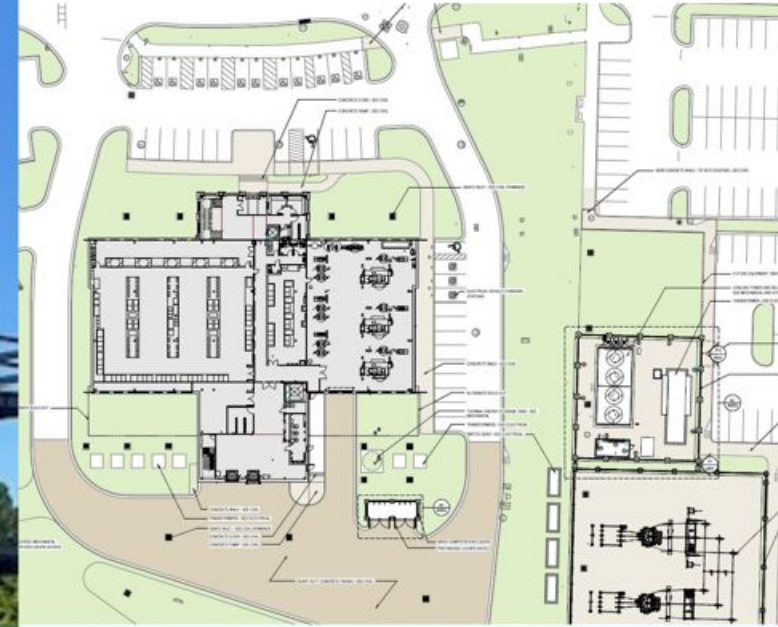


Opens  
January  
2027





# UA HPC Facility









# DEVCON 2025

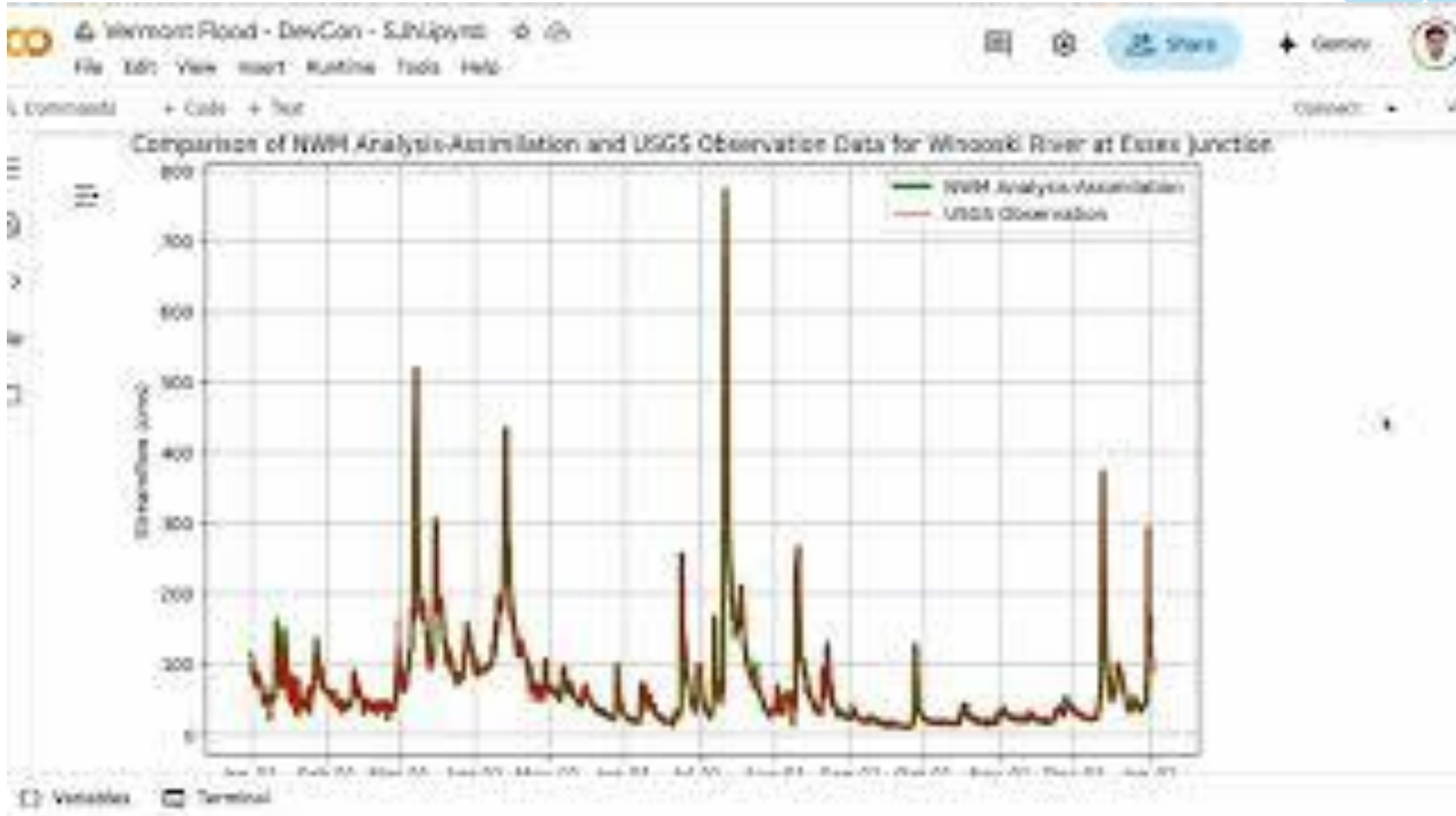
## Part 3: DATA & APPLICATIONS

# DEVCON 2025 - NWM BIGQUERY API

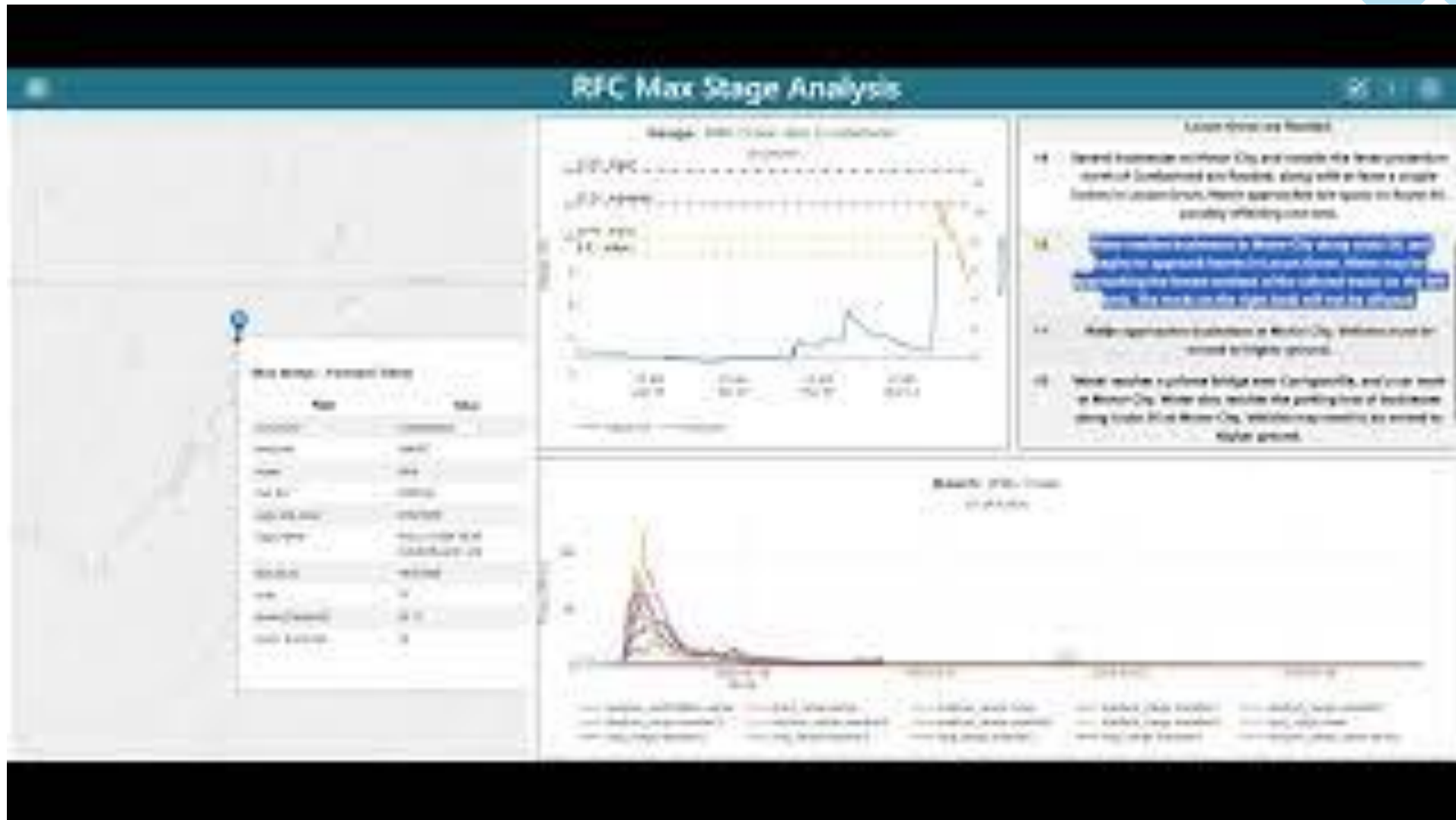




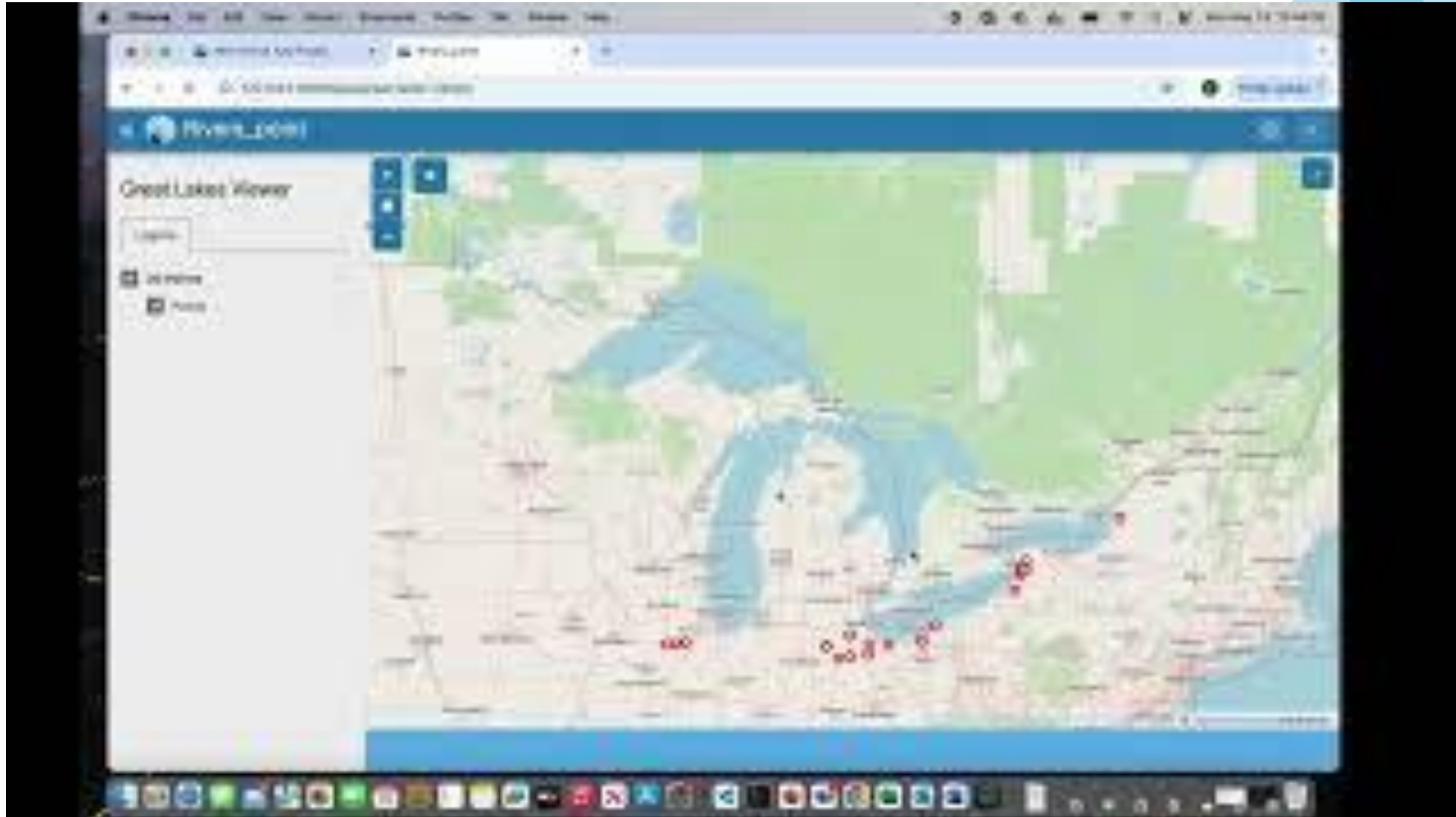
# DEVCON 2025



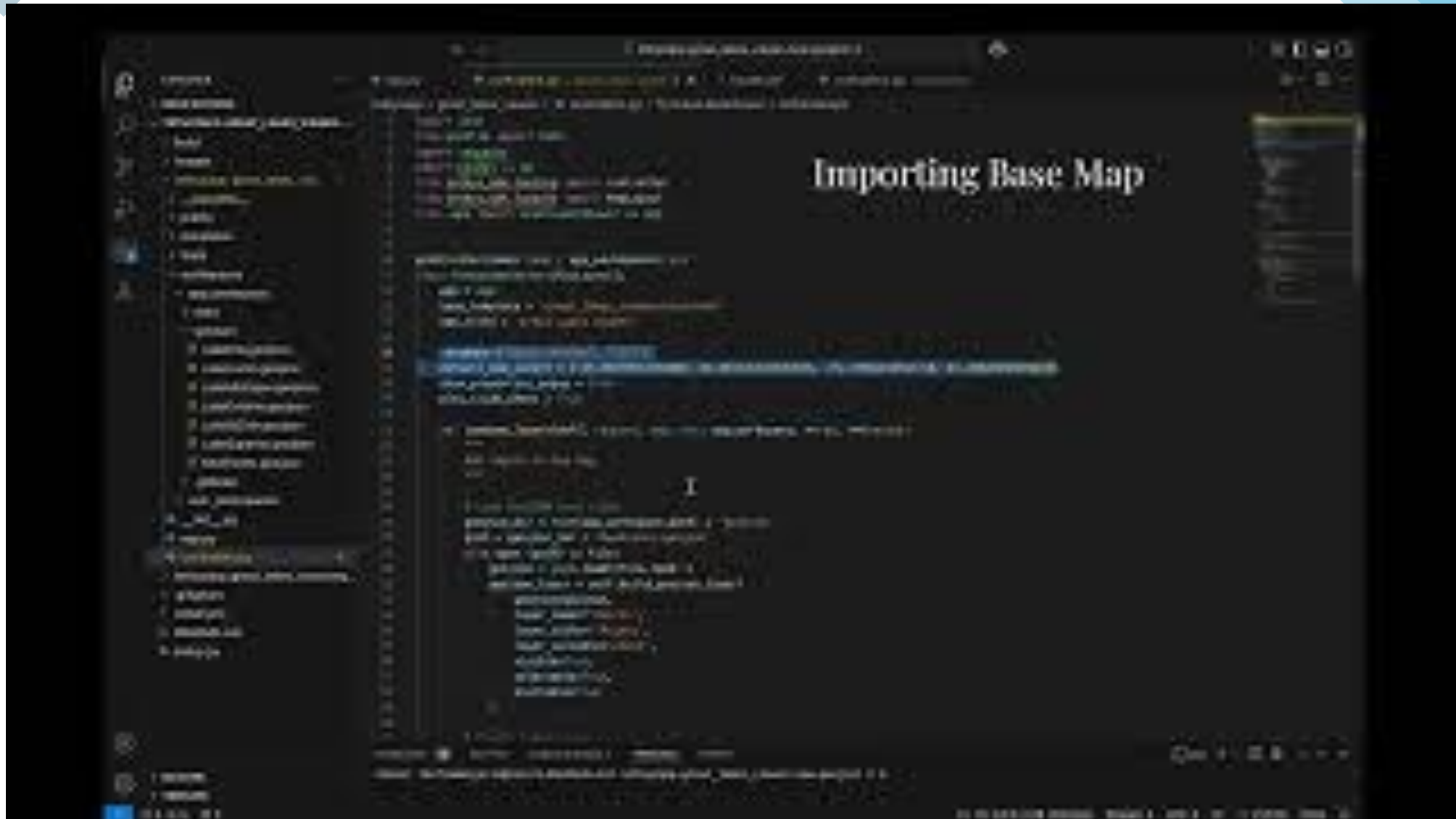
# DEVCON 2025 - TETHYS APP



# DEVCON 2025 - RIVERS\_POINTS



# DEVCON 2025 - RIVERS\_POINTS

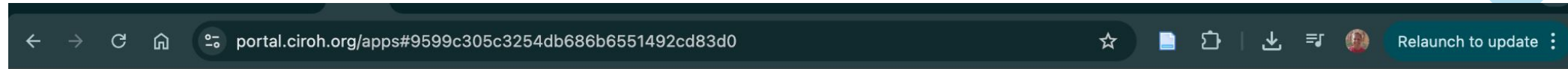


DEVCON 2025





# DEVCON 2025



## FIM (Flood Information Map Visualization) Deck

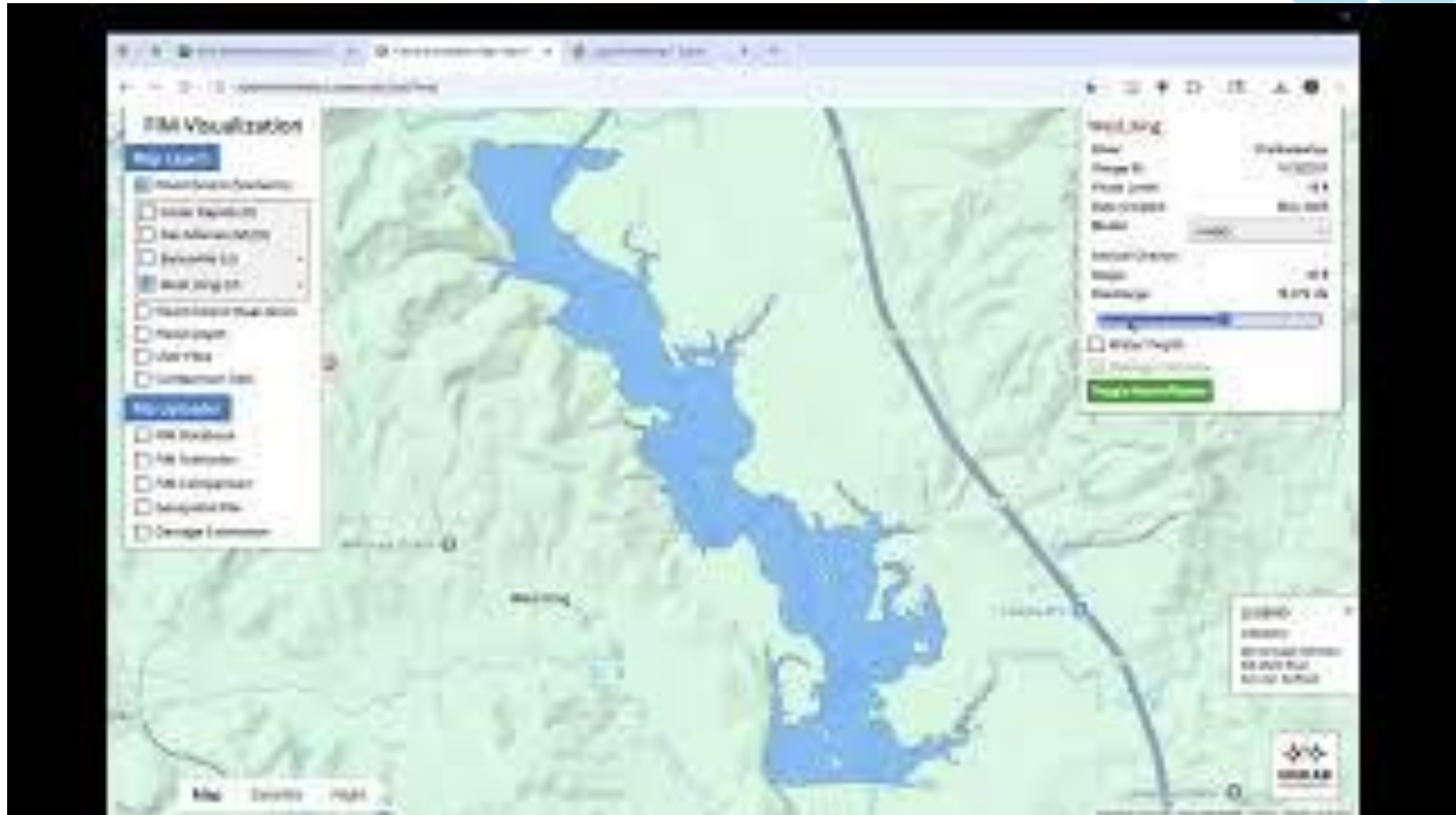
The Flood Inundation Mapping (FIM) Visualization Deck is a web-based application designed to display and compare flood extent and depth information across various temporal and scenario conditions. It provides a front-end interface for accessing geospatial flood data and interacting with mapped outputs generated from hydraulic modeling. Core Functions:

- **Flood Extent Mapping:** Visualizes flood extents from modeled scenarios (e.g., 2-year, 10-year, 100-year events) and real-time conditions based on streamflow observations or forecasts.
- **Flood Depth Visualization:** Displays depth rasters over affected areas, derived from hydraulic simulations (e.g., HEC-RAS).
- **Scenario Comparison:** Allows side-by-side viewing of multiple FIM outputs to support calibration or decision analysis.
- **Layer Management Toolbox:** Users can toggle basemaps, adjust layer transparency, load datasets, and control map

# FLOOD IMPACT MAP COMMON DATABASE

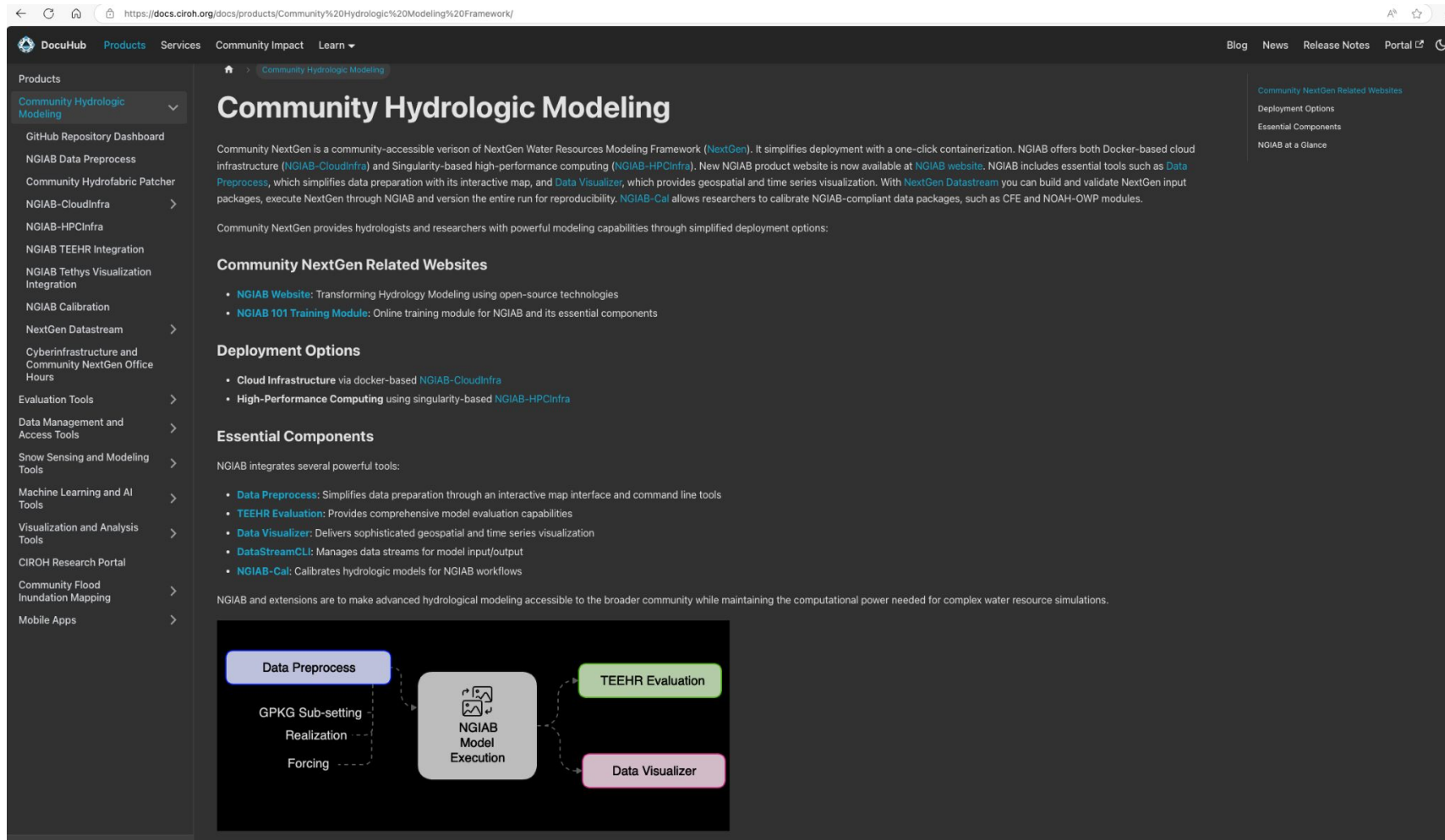
# DEVCON 2025

# FIM Visualizer



# DEVCON 2025

## Part 4: Hydrology Modeling



The screenshot shows the CIROH website's documentation for the Community Hydrologic Modeling framework. The page is titled "Community Hydrologic Modeling" and is part of the "Community Hydrologic Modeling" product category. The left sidebar lists various products and tools, including "Community Hydrologic Modeling", "GitHub Repository Dashboard", "NGIAB Data Preprocess", "Community Hydrofabric Patcher", "NGIAB-CloudInfra", "NGIAB-HPCInfra", "NGIAB TEEHR Integration", "NGIAB Tethys Visualization Integration", "NGIAB Calibration", "NextGen Datastream", "Cyberinfrastructure and Community NextGen Office Hours", "Evaluation Tools", "Data Management and Access Tools", "Snow Sensing and Modeling Tools", "Machine Learning and AI Tools", "Visualization and Analysis Tools", "CIROH Research Portal", "Community Flood Inundation Mapping", and "Mobile Apps".

The main content area is titled "Community Hydrologic Modeling" and contains the following sections:

- Community NextGen** is a community-accessible version of NextGen Water Resources Modeling Framework ([NextGen](#)). It simplifies deployment with a one-click containerization. NGIAB offers both Docker-based cloud infrastructure ([NGIAB-CloudInfra](#)) and Singularity-based high-performance computing ([NGIAB-HPCInfra](#)). New NGIAB product website is now available at [NGIAB website](#). NGIAB includes essential tools such as [Data Preprocess](#), which simplifies data preparation with its interactive map, and [Data Visualizer](#), which provides geospatial and time series visualization. With [NextGen Datastream](#) you can build and validate NextGen input packages, execute NextGen through NGIAB and version the entire run for reproducibility. [NGIAB-Cal](#) allows researchers to calibrate NGIAB-compliant data packages, such as CFE and NOAA-OWP modules.
- Community NextGen provides hydrologists and researchers with powerful modeling capabilities through simplified deployment options:
- Community NextGen Related Websites**
  - [NGIAB Website](#): Transforming Hydrology Modeling using open-source technologies
  - [NGIAB 101 Training Module](#): Online training module for NGIAB and its essential components
- Deployment Options**
  - [Cloud Infrastructure](#) via docker-based [NGIAB-CloudInfra](#)
  - [High-Performance Computing](#) using singularity-based [NGIAB-HPCInfra](#)
- Essential Components**

NGIAB integrates several powerful tools:

  - [Data Preprocess](#): Simplifies data preparation through an interactive map interface and command line tools
  - [TEEHR Evaluation](#): Provides comprehensive model evaluation capabilities
  - [Data Visualizer](#): Delivers sophisticated geospatial and time series visualization
  - [DataStreamCLI](#): Manages data streams for model input/output
  - [NGIAB-Cal](#): Calibrates hydrologic models for NGIAB workflows
- NGIAB and extensions are to make advanced hydrological modeling accessible to the broader community while maintaining the computational power needed for complex water resource simulations.

The diagram at the bottom illustrates the workflow:

```
graph LR; subgraph Inputs; DP[Data Preprocess]; end; subgraph Core; G[GPKG Sub-setting]; R[Realization]; F[Forcing]; end; subgraph Outputs; TE[TEEHR Evaluation]; DV[Data Visualizer]; end; DP --> Core; Core --> TE; Core --> DV;
```

# NEW!! NGIAB portfolio website

## NextGen In A Box

Revolutionizing Water Modeling

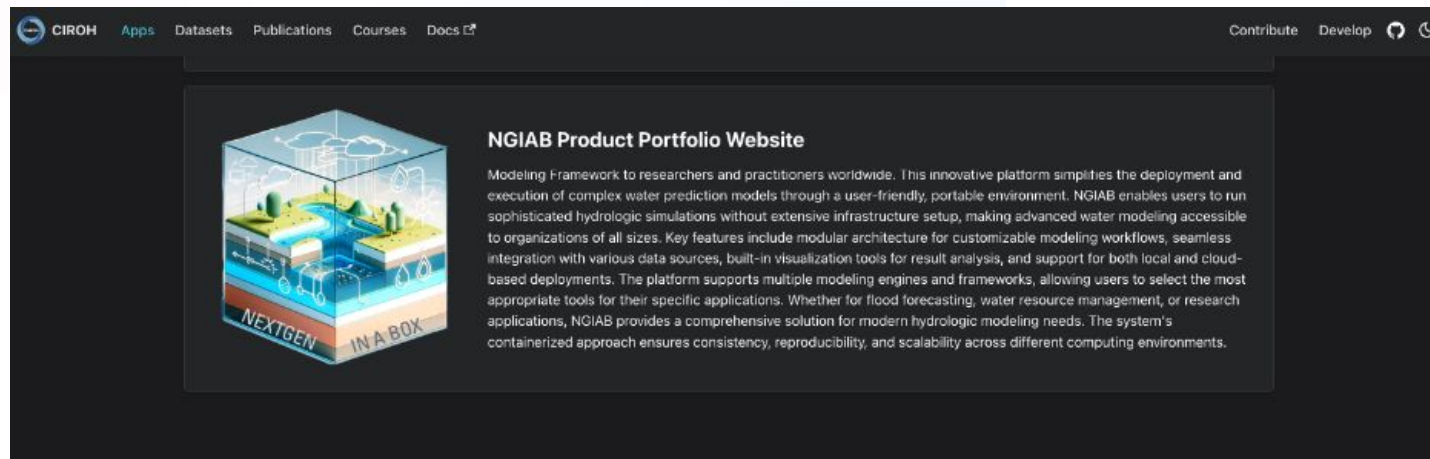
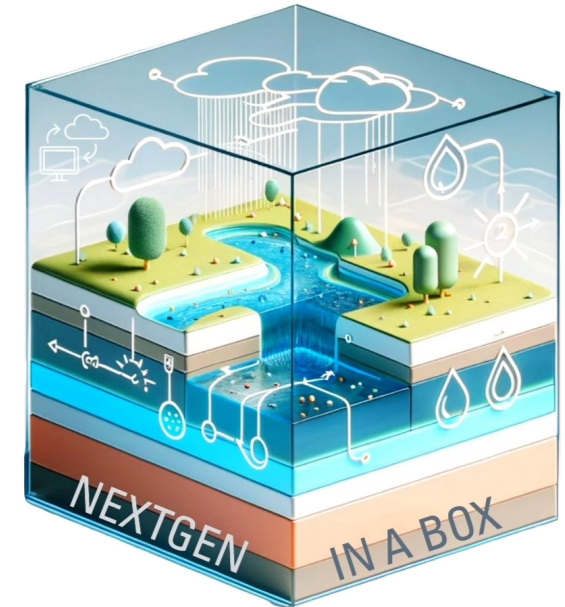
# NGIAB

Transforming complex hydrological modeling into accessible solutions

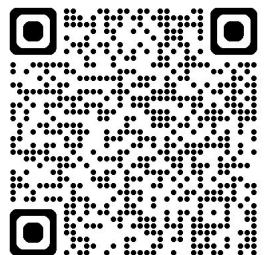
30-Minute Setup

Open Source

[ngiab.ciroh.org](https://ngiab.ciroh.org)

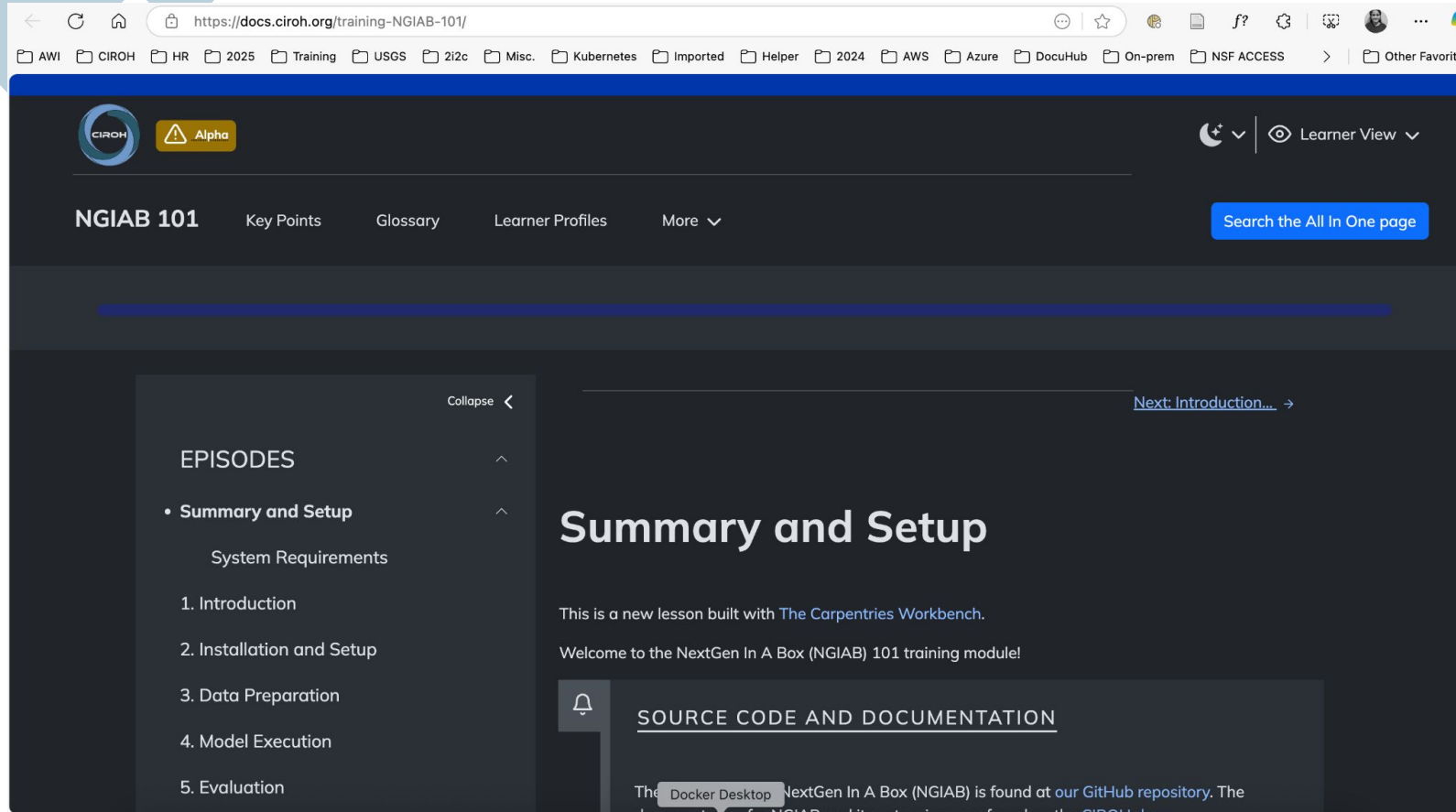


DEMO

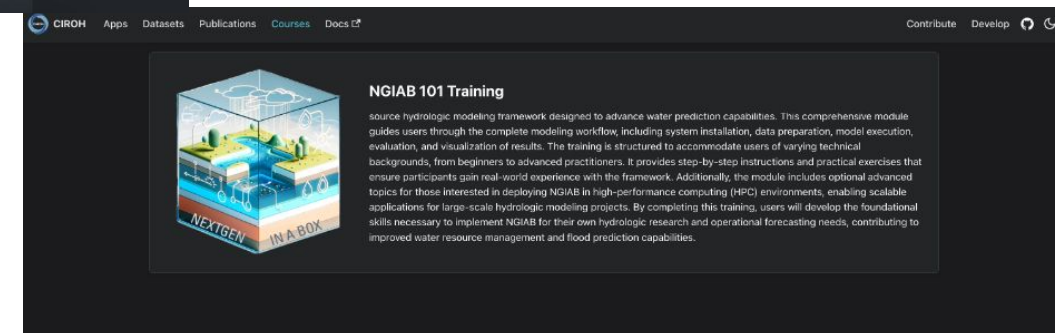
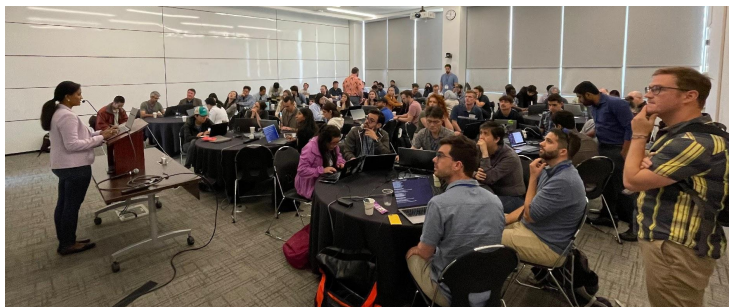
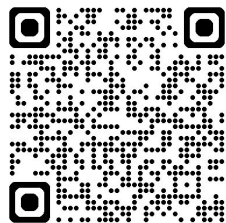




# NEW!! NGIAB 101 Training Module



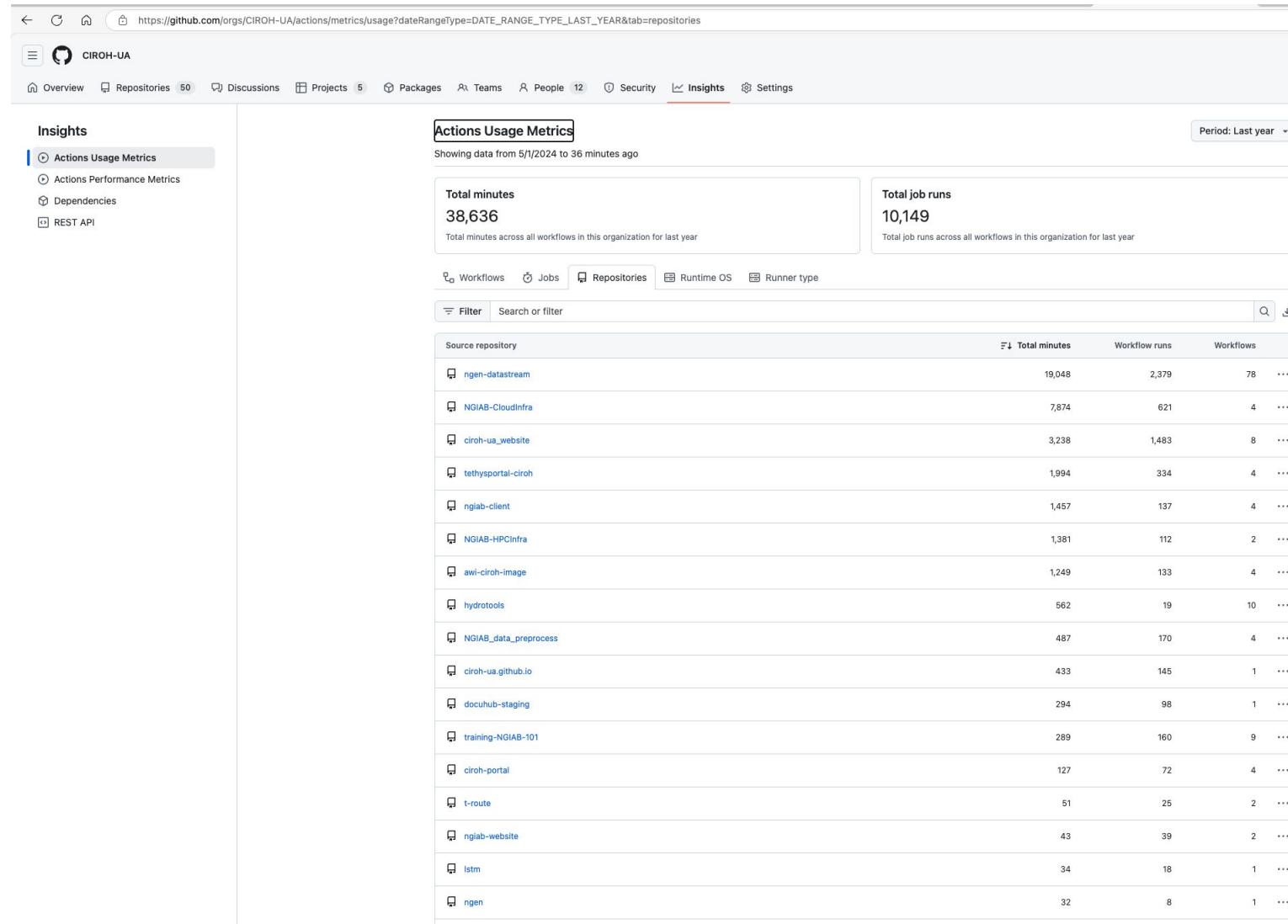
The screenshot shows the web interface for the NGIAB 101 training module. The browser address bar displays <https://docs.ciroh.org/training-NGIAB-101/>. The page features a dark blue header with the CIROH logo, an 'Alpha' badge, and a 'Learner View' toggle. Below the header, a navigation bar includes links for 'NGIAB 101', 'Key Points', 'Glossary', 'Learner Profiles', and a 'More' dropdown. A search bar is also present. The main content area is divided into a left sidebar and a main panel. The sidebar, titled 'EPISODES', lists the following topics: 'Summary and Setup', 'System Requirements', '1. Introduction', '2. Installation and Setup', '3. Data Preparation', '4. Model Execution', and '5. Evaluation'. The main panel displays the 'Summary and Setup' section, which includes a welcome message: 'This is a new lesson built with The Carpentries Workbench. Welcome to the NextGen In A Box (NGIAB) 101 training module!'. Below this, there is a section for 'SOURCE CODE AND DOCUMENTATION' with a link to the GitHub repository.



The screenshot shows the 'NGIAB 101 Training' page. It features a 3D graphic of a box labeled 'NEXTGEN IN A BOX' containing a cityscape and a river. The text describes the training module as a comprehensive framework designed to advance water prediction capabilities, guiding users through the complete modeling workflow, including system installation, data preparation, model execution, evaluation, and visualization of results. The training is structured to accommodate users of varying technical backgrounds, from beginners to advanced practitioners. It provides step-by-step instructions and practical exercises that ensure participants gain real-world experience with the framework. Additionally, the module includes optional advanced topics for those interested in deploying NGIAB in high-performance computing (HPC) environments, enabling scalable applications for large-scale hydrologic modeling projects. By completing this training, users will develop the foundational skills necessary to implement NGIAB for their own hydrologic research and operational forecasting needs, contributing to improved water resource management and flood prediction capabilities.



# CIROH-UA GitHub Actions Usage Metrics



Shows computational resources used by CIROH-UA CI/CD pipelines.

Shows significant CI/CD activity with over 10,000 automated runs and 38,636 minutes so far in last year alone!

# AWICIROH DockerHub Stats



## CIROH DockerHub Stats

(awicroh) Docker Image Pull Count

1

NGIAB

8,800

pulls

2

tethys-portal

1,800

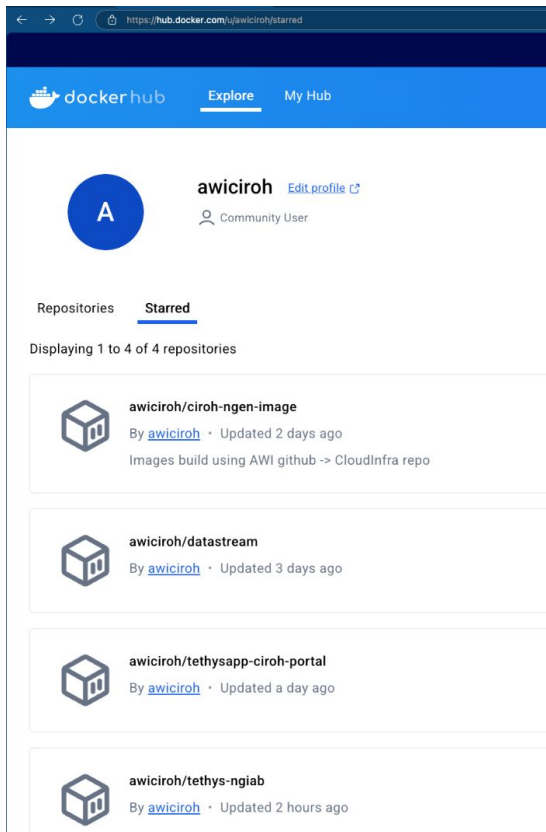
pulls

3

datastream

1,200

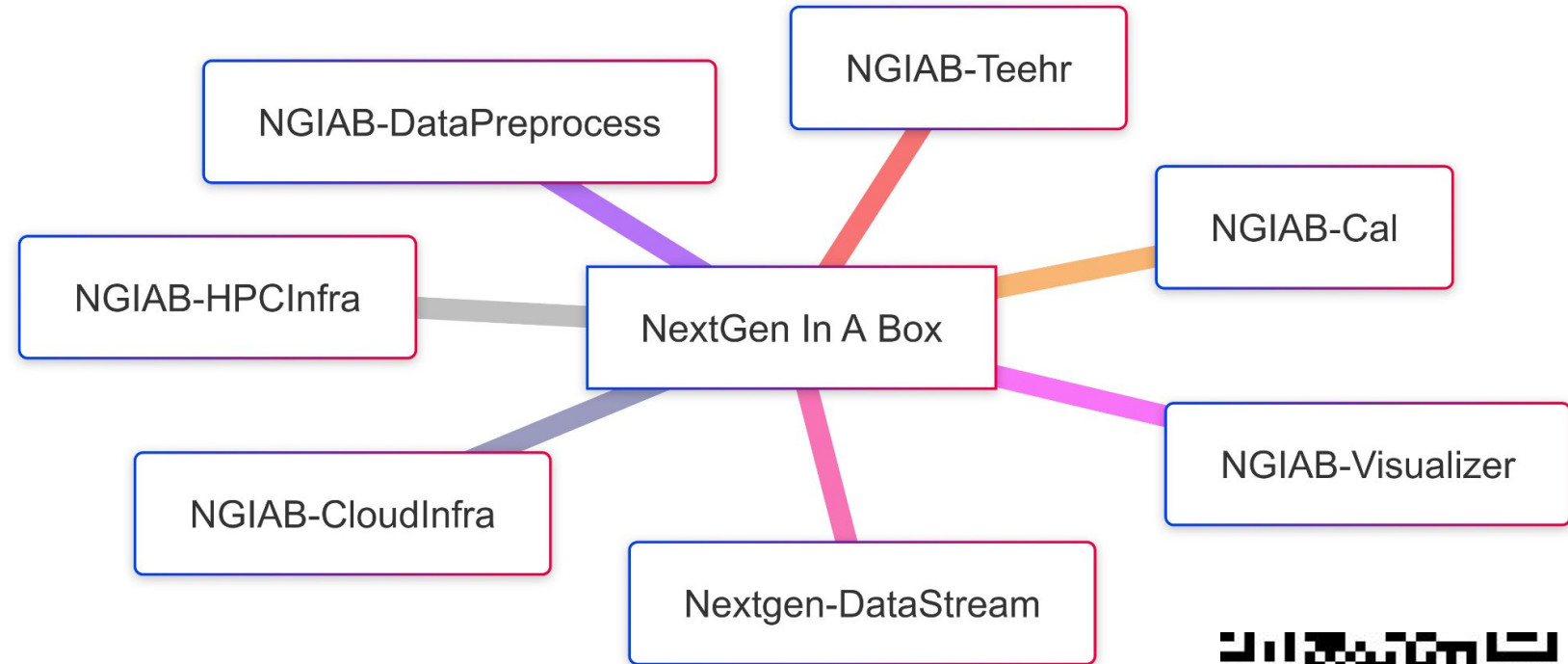
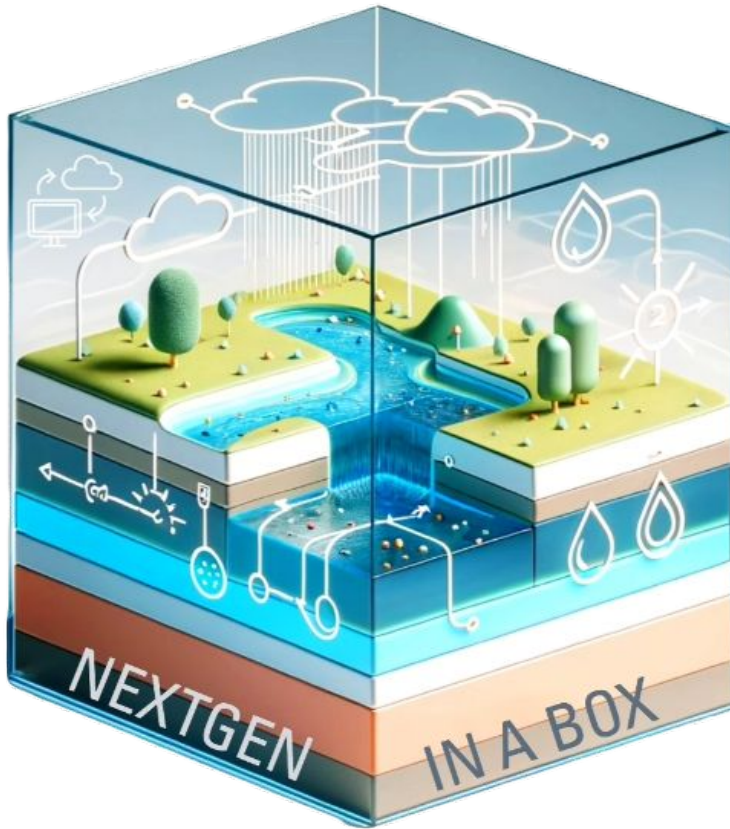
pulls



The screenshot shows the DockerHub profile for the user 'awicroh'. The profile includes a blue circular avatar with the letter 'A', the username 'awicroh', and a link to 'Edit profile'. Below the profile information, there are tabs for 'Repositories' and 'Starred', with 'Starred' being the active tab. The page displays '1 to 4 of 4 repositories'. The list of repositories includes:

- awicroh/ciroh-ngen-image**: By [awicroh](#) · Updated 2 days ago. Images build using AWI github -> CloudInfra repo. Download: 8.8K, Stars: 3.
- awicroh/datastream**: By [awicroh](#) · Updated 3 days ago. Download: 1.2K, Stars: 1.
- awicroh/tethysapp-ciroh-portal**: By [awicroh](#) · Updated a day ago. Download: 1.8K, Stars: 1.
- awicroh/tethys-ngiab**: By [awicroh](#) · Updated 2 hours ago. Download: 2.0K, Stars: 1.

# NGIAB ECOSYSTEM



# NGIAB ECOSYSTEM

## Products

### Community Hydrologic Modeling ▾

- GitHub Repository Dashboard
- NGIAB Data Preprocess
- Community Hydrofabric Patcher
- NGIAB-CloudInfra >
- NGIAB-HPCInfra
- NGIAB TEEHR Integration
- NGIAB Tethys Visualization Integration
- NGIAB Calibration
- NextGen Datastream >
- NextGen on CIROH JupyterHub
- Cyberinfrastructure and Community NextGen Office Hours
- Evaluation Tools >
- Data Management and Access Tools >
- Snow Sensing and Modeling Tools >
- Machine Learning and AI Tools >
- Visualization and Analysis Tools >
- CIROH Research Portal
- Community Flood Inundation Mapping >
- Mobile Apps >



## NGIAB at a Glance

Explore NextGen In A Box (NGIAB) and extensions through the interactive tabs below.

Click on Key Features, Capabilities, or Access Methods to learn more.

[Key Features](#) Capabilities Access Methods

NGIAB and Extensions	Key features	NOAA-OWP Tools/Libraries Utilized
<a href="#">Data Preprocess</a>	<ul style="list-style-type: none"><li>Specializes in initial data preparation</li><li>Handles subsetting and forcing processing</li><li>Supports basic data processing tasks</li><li>Helps with running NGIAB</li></ul>	<ul style="list-style-type: none"><li>t-route</li><li>hydrotools</li><li>hydrofabric tools</li></ul>
<a href="#">NGIAB Implementation (Cloud, HPC)</a>	<ul style="list-style-type: none"><li>Focused specifically on model execution</li><li>Core engine for running simulations</li><li>Does not handle pre/post-processing tasks</li></ul>	
<a href="#">TEEHR Evaluation</a>	<ul style="list-style-type: none"><li>Handles both input and output processing</li><li>Supports full workflow, from data preparation to cloud deployment</li></ul>	Built to evaluate OWP model outputs
<a href="#">Data Visualizer</a>	<ul style="list-style-type: none"><li>Focused on analysis and validation</li><li>Supports data processing and output analysis</li></ul>	Designed for OWP hydrofabric visualization
<a href="#">DataStreamCLI</a>	<ul style="list-style-type: none"><li>Complete workflow for creating inputs for and executing NGIAB and managing outputs</li><li>Backend of the NextGen Research DataStream</li><li>Discrete tooling for tasks like forcing processing and BMI file generation</li></ul>	<ul style="list-style-type: none"><li>ngen-cal</li><li>t-route</li><li>hydrofabric tools</li></ul>
<a href="#">NGIAB-Cal</a>	<ul style="list-style-type: none"><li>Simplifies hydrologic model calibration for NGIAB workflows</li><li>Creates calibration directory and configurations within the NGIAB folder structure</li><li>Runs calibration process using Docker</li><li>Copies calibrated parameters to model configurations</li></ul>	<ul style="list-style-type: none"><li>ngen-cal</li></ul>

OBS

# NGIAB - DATA PREPROCESS MAP + RUN

```
System Information as of Sun May 26 16:31:08 UTC 2024

System Load: 0.32                               Processes: 431
Usage of /: 48.2% of 57.84GB                     Users logged in: 8
Memory usage: 8%                                  IPv4 address for host: 26.9.209.242
Swap usage: 0%

=> There is 1 pending process.

-----https://jststreamstatus.ca-----

Overall Jststream2 Status: Operational

Offline Status Times:
  - Source availability of all resources

-----

=====2024-05-26 16:31:08 UTC=====
src --from ngiab_data_preprocess cli -l cat-481208 --subset --start 2018-01-01 --end 2018-01-02 --forcing --realization --
run

2018-01-01 16:31:12, 513 - INFO - Running all missing steps required to run ngiab.
2018-01-01 16:31:12, 513 - INFO - Subset folder does not exist, enabling subset, forcing, and realization.
2018-01-01 16:31:12, 513 - INFO - Processing cat-481208 in /home/robert/ngiab_data_preprocess/output/cat-481208
2018-01-01 16:31:12, 513 - INFO - Subsetting catchments: 1821
2018-01-01 16:31:12, 513 - INFO - Subsetting hydrologic
2018-01-01 16:31:12, 513 - INFO - Subsetting tables: ['divides', 'divide-attributes', 'flupath-attributes', 'flupath-attri-
butes-ml', 'flowpaths', 'hydroscalars', 'names', 'pdp', 'lakes', 'network']
2018-01-01 16:31:12, 513 - INFO - Subset complete for 4008 features (CATCHMENTS + 4000)
2018-01-01 16:31:12, 513 - INFO - Subsetting complete.
2018-01-01 16:31:12, 513 - INFO - Generating forcings from 2018-01-01 00:00:00 to 2018-01-02 00:00:00...
2018-01-01 16:31:12, 513 - INFO - No cache found
2018-01-01 16:31:12, 513 - INFO - Selected time range and clipped to bounds
2018-01-01 16:31:12, 513 - INFO - Downloading and caching forcing data, this may take a while
```



# NGIAB - TEEHR + TETHYS + VISUALIZER

```
~/NGIAB-TEEHR-Visualizer$ ./Visualizer.sh

=====
|  CIROH: Mention in A box (NGIAB) - Tethys |
|  Datastream Model Output Visualization |
=====

- Developed by CIROH

- Last used data directory: /home/username/ngiab_preprocessed_output/NGIAB-TEEHR
  - Use this path? [Y/n]: Y
  ✓ Using previously configured path
  ✓ Path saved for future use.

  PASSING VISUALIZATION HYPERLINK
  https://localhost:8080/NGIAB-TEEHR-Visualizer/

  ✓ Copied to /home/username/ngiab_visualizer/uri:8080
  Checking for /home/username/ngiab_visualizer/ngiab_visualizer.json...
  ✓ Model uri "uri:8080" registered (D000001-0000-0000-0000-123000000000)
  - Directory /home/username/datastream_ngiab doesn't exist - creating it...
  - No existing datastream cache found - a fresh download will be used.

  LAUNCHING TETHYS VISUALIZATION

Specify the Tethys Image tag to use
  - Tag (e.g. v0.2.0, default: latest)
  - Found local image awc/cirs/tethys-ngiab:latest
  - Use local copy [L] or Pull latest from registry [P] (L/P):
```

# Community NextGen Updates

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## Community NextGen Updates

**Stay connected with the latest developments in NextGen water modeling!** This news hub brings you updates, breakthroughs, and opportunities from across our community of practice.

Discover how researchers and practitioners are applying NextGen frameworks to solve pressing water challenges, learn about upcoming training events, and explore new resources to enhance your modeling workflow. Our community-driven approach ensures you'll always be informed about the innovations that matter most.

[Click to collapse](#)

News

## April 2025 Updates

### **feature** New NGIAB-Calibration Feature 🎉

⚙️ Major update to NextGen In A Box! It now supports extended calibration for CFE and NOAA OWP modules. The new calibration framework provides more flexible parameter tuning and improved model performance.

👤 Uses ngen-cal branch: [https://github.com/CIROH-UA/ngen-cal/tree/ngiab\\_cal](https://github.com/CIROH-UA/ngen-cal/tree/ngiab_cal)

📖 For detailed instructions on how to use the new calibration capabilities, please check out: [https://github.com/CIROH-UA/ngen-cal/tree/ngiab\\_cal#how-to-use-this](https://github.com/CIROH-UA/ngen-cal/tree/ngiab_cal#how-to-use-this)

[Read more...](#)

### **news** New NextGen In A Box Product Website

🎉 We're excited to announce the launch of our new NGIAB dedicated website! Visit our NGIAB website at <https://ngiab.ciroh.org/> to explore all NGIAB tools, documentation, and resources all in one place.

# NGIAB Calibration

## Products

### Community Hydrologic Modeling ▼

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NGIAB Data Preprocess

Community Hydrofabric Patcher

NGIAB-CloudInfra >

NGIAB-HPCInfra

NGIAB TEEHR Integration

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### NGIAB Calibration

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TEEHR

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Data Access >

Water Prediction Node

HydroServer

NETWA >

HydroShare

NWM BigQuery API

🏠 > Community Hydrologic Modeling > NGIAB Calibration

## NGIAB Calibration

### NOTE

Below content is rendered from [https://github.com/CIROH-UA/ngiab\\_cal/blob/main/README.md](https://github.com/CIROH-UA/ngiab_cal/blob/main/README.md)

## ngiab-cal

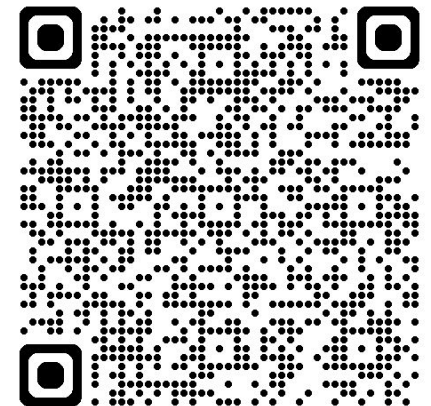


A Python CLI tool to simplify hydrologic model calibration for NextGen In A Box (NGIAB) workflows.

### Table of Contents



- [What is this?](#)
- [Installation](#)
- [Requirements](#)
- [Basic Usage](#)
- [Advanced Options](#)
- [Calibration Process](#)
- [Calibration Configuration File](#)
- [Example: Calibrating CAMELS Basins](#)
- [How It Works](#)
- [How is ngen-cal running?](#)
- [Development](#)
- [License](#)
- [Acknowledgments](#)






[illegible]



The screenshot displays the HoloLens and OculusQuest interface. On the left, there is a sidebar with a title "HoloLens and OculusQuest Interface" and a description: "The following interface is designed for visualization of network data on HoloLens and OculusQuest. The interface is designed to be used on HoloLens and OculusQuest. The interface is designed to be used on HoloLens and OculusQuest." Below the description, there are several input fields and a "Generate" button. The main area shows a 3D visualization of a network graph with blue and red nodes and a timeline at the bottom.

# NGIAB (Singularity Image) for HPC



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Community Hydrofabric Patcher

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NGIAB-HPCInfra

NGIAB TEEHR Integration

NGIAB Tethys Visualization Integration

NGIAB Calibration

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NGIAB-HPCInfra

## NGIAB-HPCInfra

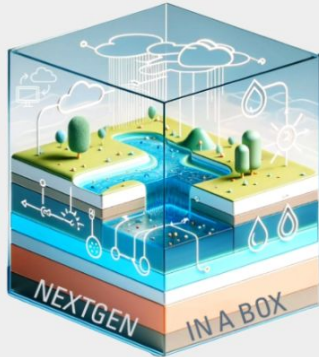
NOTE

Below content is rendered from <https://github.com/CIROH-UA/NGIAB-HPCInfra/blob/main/README.md>


## NextGen In A Box (NGIAB)

Run the NextGen National Water Resources Modeling Framework locally with ease.

NGIAB provides a containerized and user-friendly solution for running the NextGen framework, allowing you to control inputs, configurations, and execution on your local machine.



NextGen In A Box



Funding for this project was provided by the National Oceanic & Atmospheric Administration (NOAA), awarded to the Cooperative Institute for Research to Operations in Hydrology (CIROH) through the NOAA Cooperative Agreement with The University of Alabama (NA22NWS4320003).

Why NextGen In A Box?

# NGIAB Data Preprocess and NextGen on CIROH JupyterHub i.e integrated with HydroShare

## Working with HydroShare, AORC data, HydroFabric and NextGen on CIROH JupyterHub Tutorial

**Authors:** David Tarboton | Homa Salehabadi | Ayman Nassar | Furqan Baig | Anthony M. Castronova | Irene Garousi-Nejad | Arpita Patel

**Owners:** David Tarboton

**Type:** Resource

**Storage:** The size of this resource is 8.4 MB

**Created:** May 26, 2025 at 3:03 a.m.

**Last updated:** May 26, 2025 at 7:01 p.m.

**Citation:** [See how to cite this resource](#)

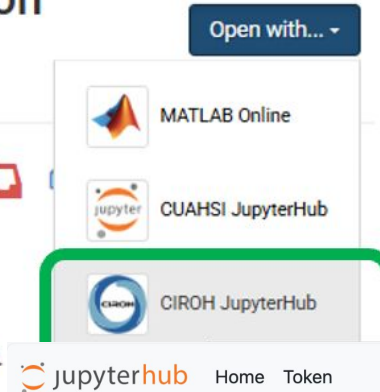
**Sharing Status:** Public

**Views:** 15

**Downloads:** 0

**+1 Votes:** Be the first one to +1 this.

**Comments:** No comments (yet)



## Server Options

### Small

5GB RAM, 2 CPUs

Image

NextGen National Water Model(NWM)

```
source /ngen/.venv/bin/activate
```

Virtual environment

```
python -m ngiab_data cli -i "gage-10109001" -s
```

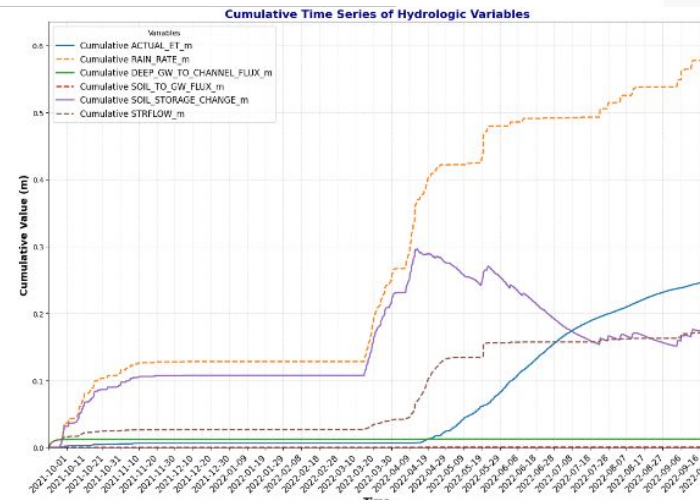
```
python -m ngiab_data cli -i "cat-2861446" -s
```

Hydrofabric

```
python -m ngiab_data cli -i "cat-2861446" -f --start "2021-10-01" --end "2022-09-30"
```

```
python -m ngiab_data cli -i "cat-2861446" -r --start "2021-10-01" --end "2022-09-30"
```

```
/dmod/bin/ngen-serial config/cat-2861446_subset.gpkg all config/cat-2861446_subset.gpkg  
config/realization.json
```





# FIM as a Service on CIROH JupyterHub

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- Visualization and Analysis Tools
- CIROH Research Portal
- Community Flood Inundation Mapping
- FIM as a Service
- FIM Evaluation Framework
- FIM Database for Multi-Model Visualization
- Mobile Apps

Community Flood Inundation Mapping > FIM as a Service

## FIM as a Service

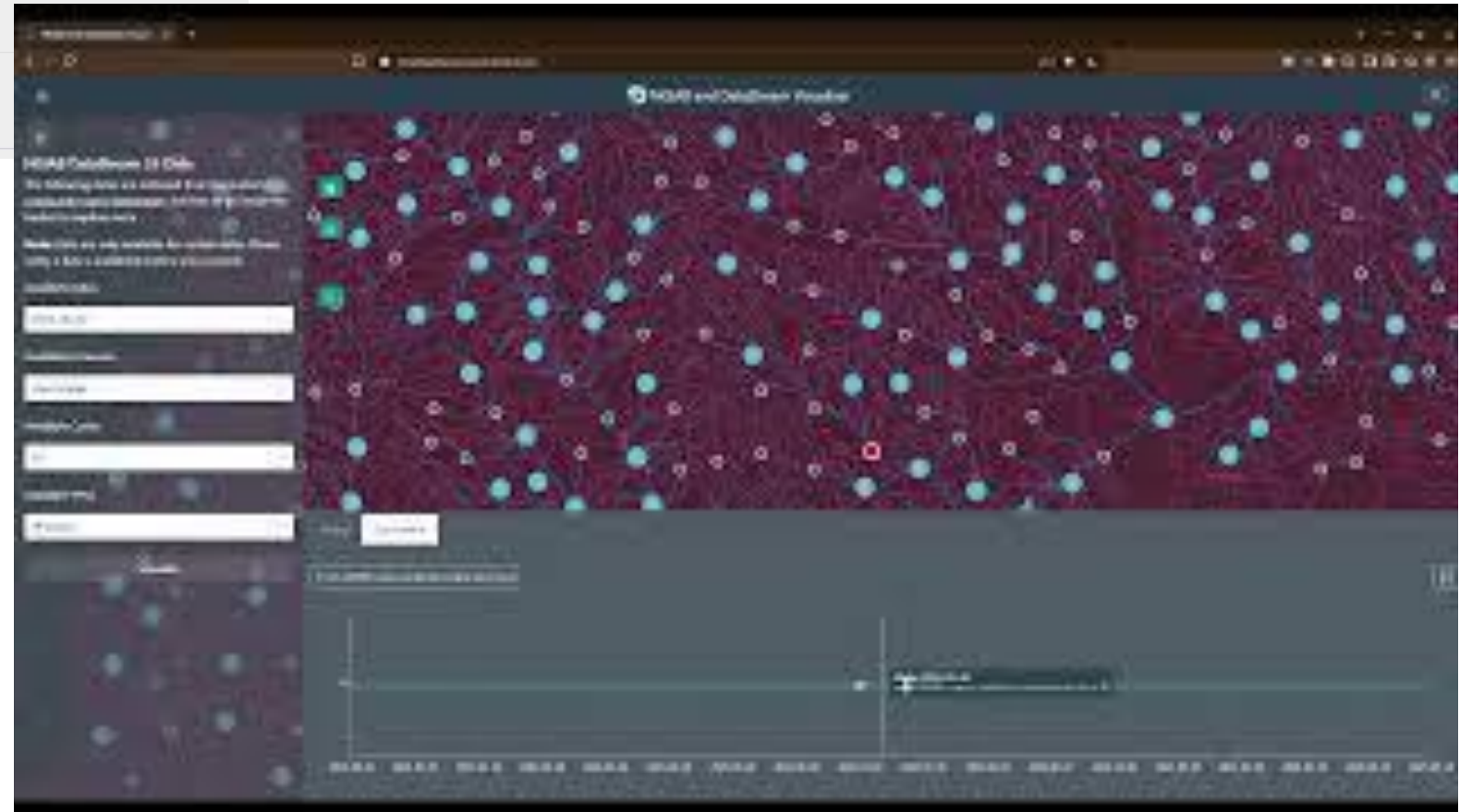
NOTE

Below content is rendered from <https://github.com/sdmkua/FIMserv/blob/main/README.md>

### Flood Inundation Mapping Tool using the OWP HAND-FIM operational framework

release v0.1.0 issues 0 open License GPLv3 pyPI package 0.1.0 downloads 1k Package Build and Test passing

OWP HAND-FIM 'as a service' (FIMserv)





# FIM Visualizer



Cooperative Institute for Research  
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# DEVCON 2025

## Part 5: Outreach and Education

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portal.cirrh.org



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Markert · da Silva · Ames · Maghami · Williams · Nelson · Halgren · Patel · Santos · Ames

*Environmental Modelling & Software*

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Abdelkader · Temimi · Mendez · Miano · Macneil

*Climate Dynamics*

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10.1007/s00382-024-07550-2

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Ramírez Molina · Frame · Halgren · Gong

*Journal of Geophysical Research: Machine Learning and Computation*

doi

10.1029/2024JH000405

### JOURNAL ARTICLE

Published on 2025

**Machine Learning for a Heterogeneous Water Modeling Framework**

Frame · Araki · Bhuiyan · Bindas · Rapp · Bolotin · Deardorff · Liu · Haces-Garcia · Liao · Frazier · Ogden

*JAWRA Journal of the American Water Resources Association*

doi

10.1111/1752-1688.70000

### JOURNAL ARTICLE

Published on 2024-12-12

**On the predictability of turbulent fluxes from land: PLUMBER2 MIP experimental description and preliminary results**

Abramowitz · Ukkola · Hobeichi · Cranko Page · Lipson · De Kauwe · Green · Brenner · Frame · Nearing · Clark · Best · Anthoni · Arduini · Boussetta · Caldararu · Cho · Cuntz · Fairbairn · Ferguson · Kim · Kim · Knauer · Lawrence · Luo · Malyshev · Nitta · Ogee · Oleson · Ottlé · Peylin · de Rosnay · Rumbold · Su · Vuichard · Walker · Wang-Faivre · Wang · Zeng



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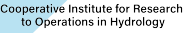
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A screenshot of the CIROH DocuHub website. The top navigation bar includes 'DocuHub', 'Products', 'Services', 'Community Impact', and 'Learn'. On the right, there are links for 'Blog' and 'News'. A left sidebar contains a list of categories: 'Policies and Best Practices', 'Data and Code Sharing', and 'NextGen Framework', with the last one highlighted. The main content area shows the title 'Technical guidance for the inclusion of models/modules in the NextGen Water Resources Modeling Framework' and a list of authors: Fred Ogden, Nels Frazier, Keith Jennings, Jonathan Frame, Wouter Knoben, Tadd Bindas, Yalan Song, Irene Garousi-Nejad, Jeffrey Carver, Andy Wood, Anthony Castronova, Arpita Patel, Shahabul Alam, Sifan A. Koriche, Junwei Guo, Cyril Thébault, Raymond J. Spiteri, Ahmad J. Khattak, James Halgren, Patrick J. Clemins, Mukesh Kumar, and Martyn Clark.



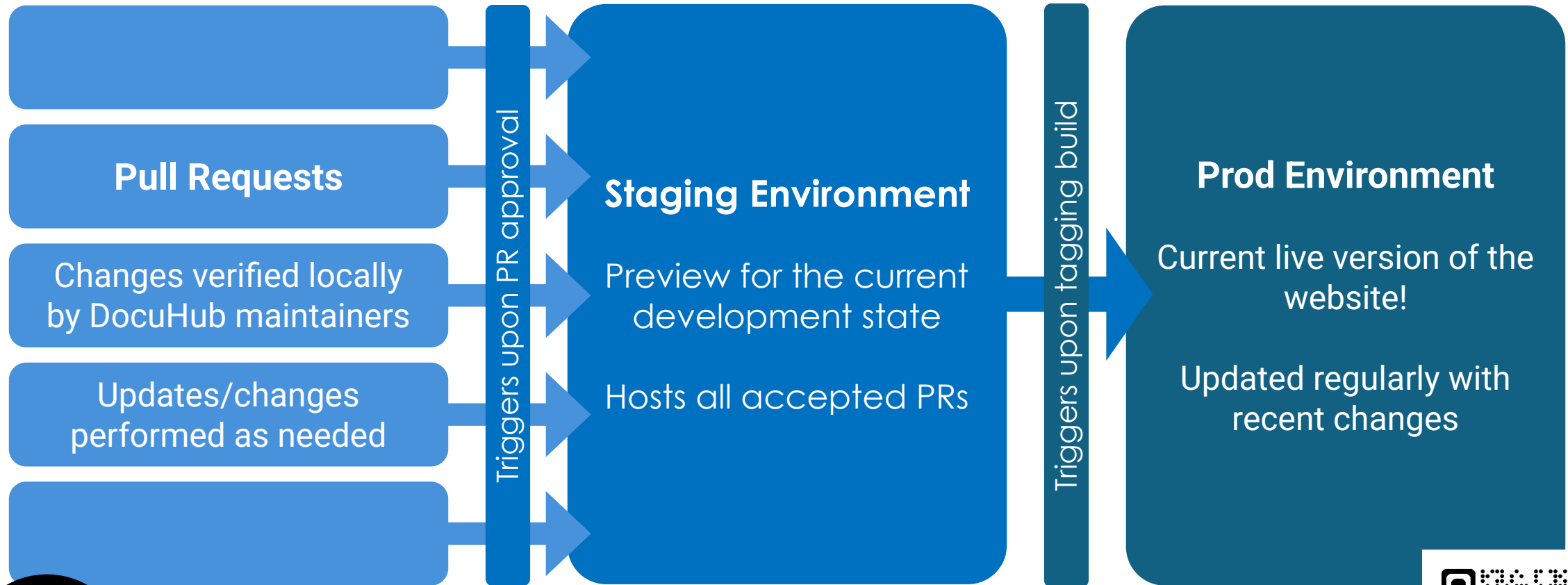


# DocuHub Demo

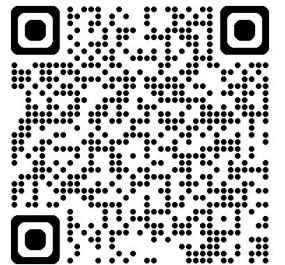
[docs.ciroh.org](https://docs.ciroh.org)



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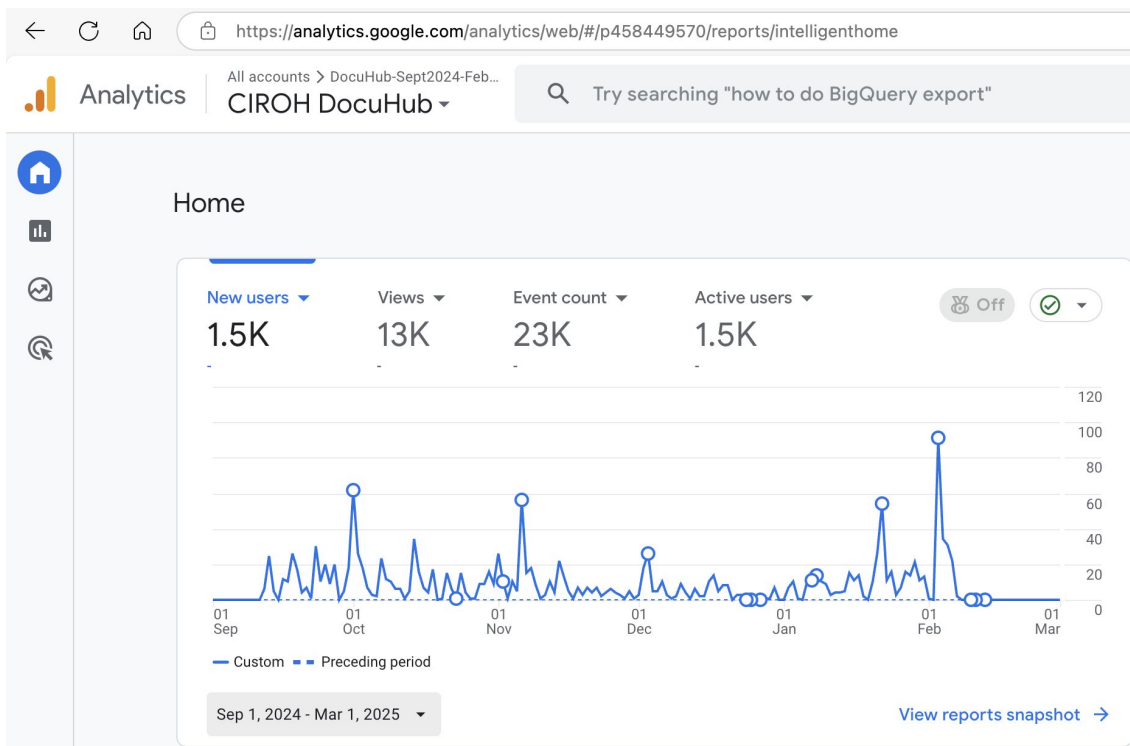
## GitHub Actions



# DocuHub Usage Metrics

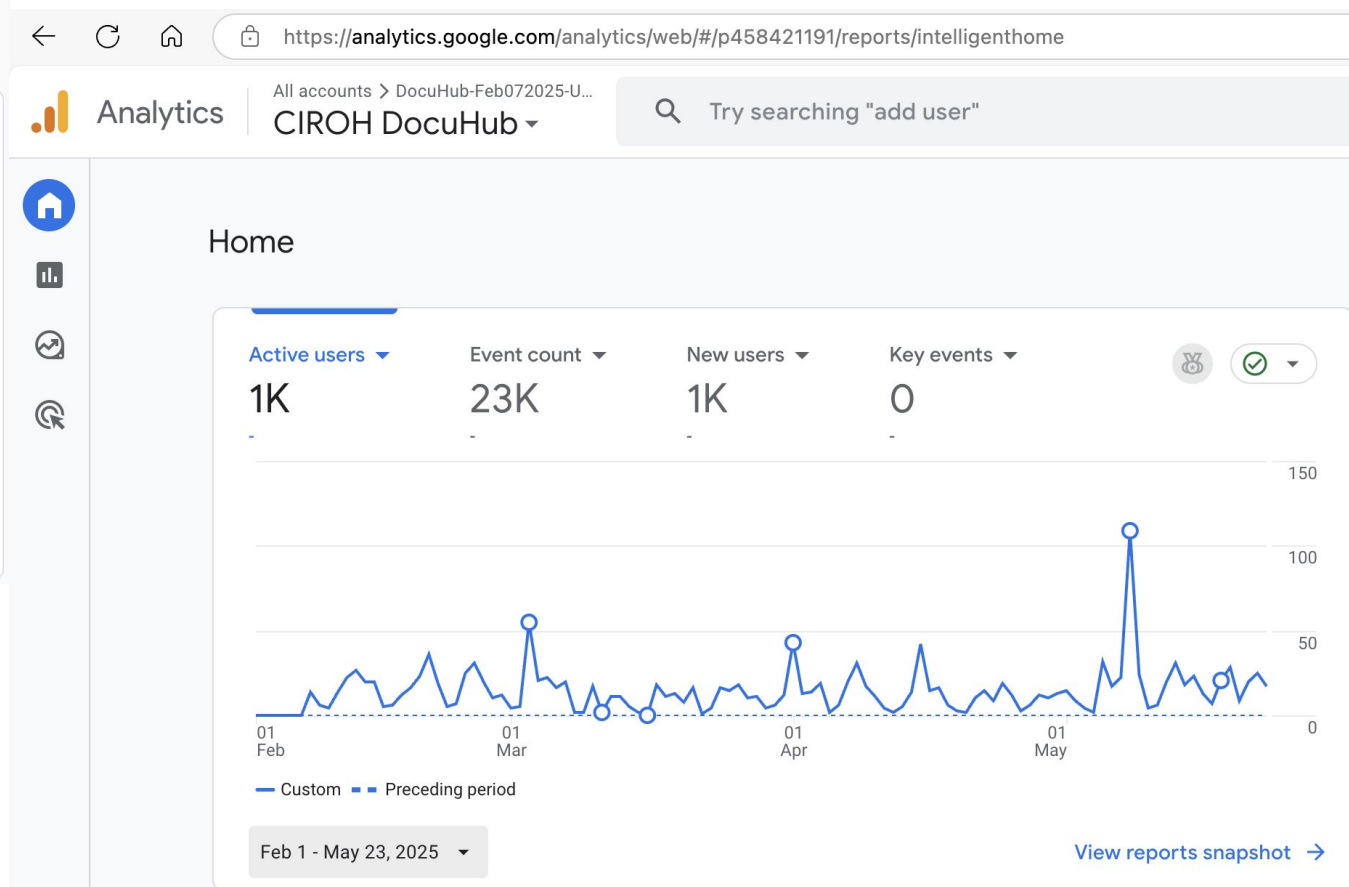


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