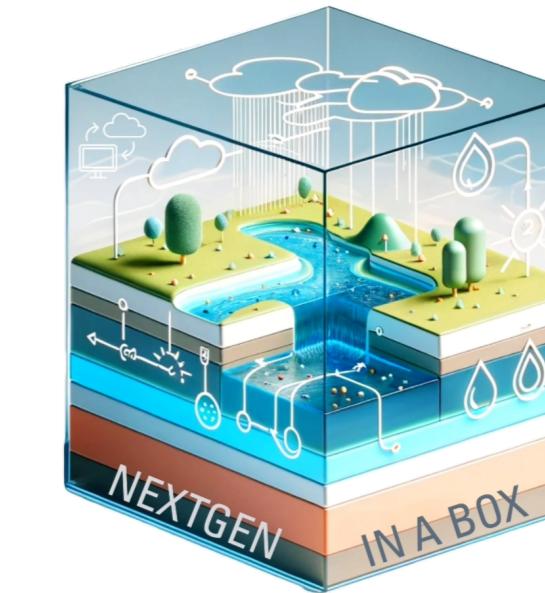


Advancing Hydrological Modeling: CIROH's NextGen In A Box (NGIAB) and Enhanced Tools for Community-Driven Research

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The Challenge: A High Barrier to Community Modeling

The Next Generation Water Resources Modeling Framework (NextGen) is a powerful, model-agnostic system essential for future versions of the NOAA National Water Model (NWM). However, its potential for community contribution is often blocked.

- Complexity: complex, time-consuming, and error-prone installation.
- Time Sink: Manual setup takes days to weeks; a major barrier for researchers and new users.

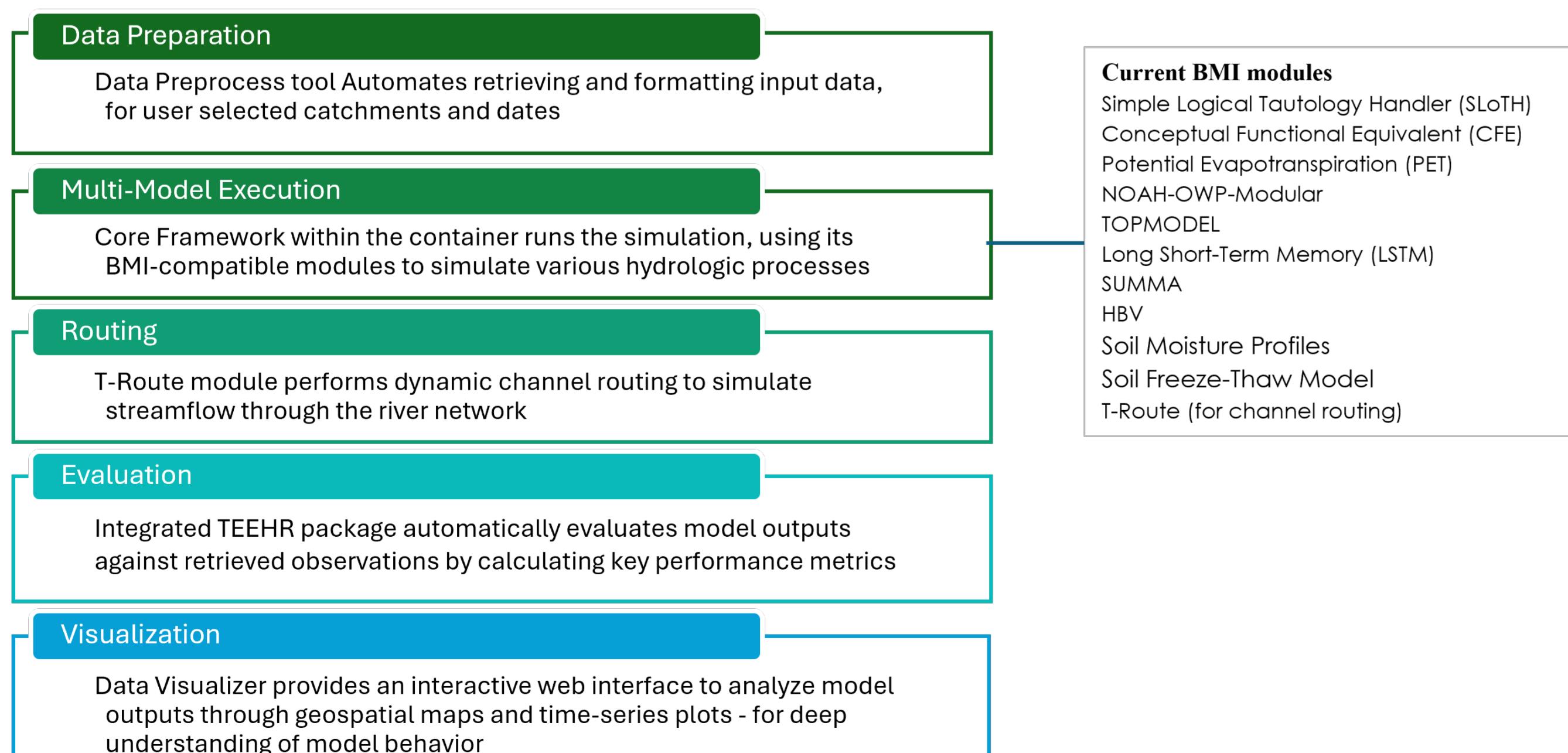
A need to make the NextGen framework highly accessible to the entire hydrology community.

Our Solution: A "Single-Click" Container

NextGen In A Box (NGIAB) is an open-source, "single-click" containerization solution.

- All-in-One: It encapsulates the entire NextGen framework, its dependencies, and a full suite of modeling tools into a single, pre-configured, self-contained application.
- Portable: Uses Docker and Singularity to ensure consistent, reproducible deployment on local machines, cloud platforms, and HPC clusters.
- Accessible: Reduces setup time from days to minutes. At a recent CIROH workshop, 95% of participants successfully ran the framework within 30 minutes.

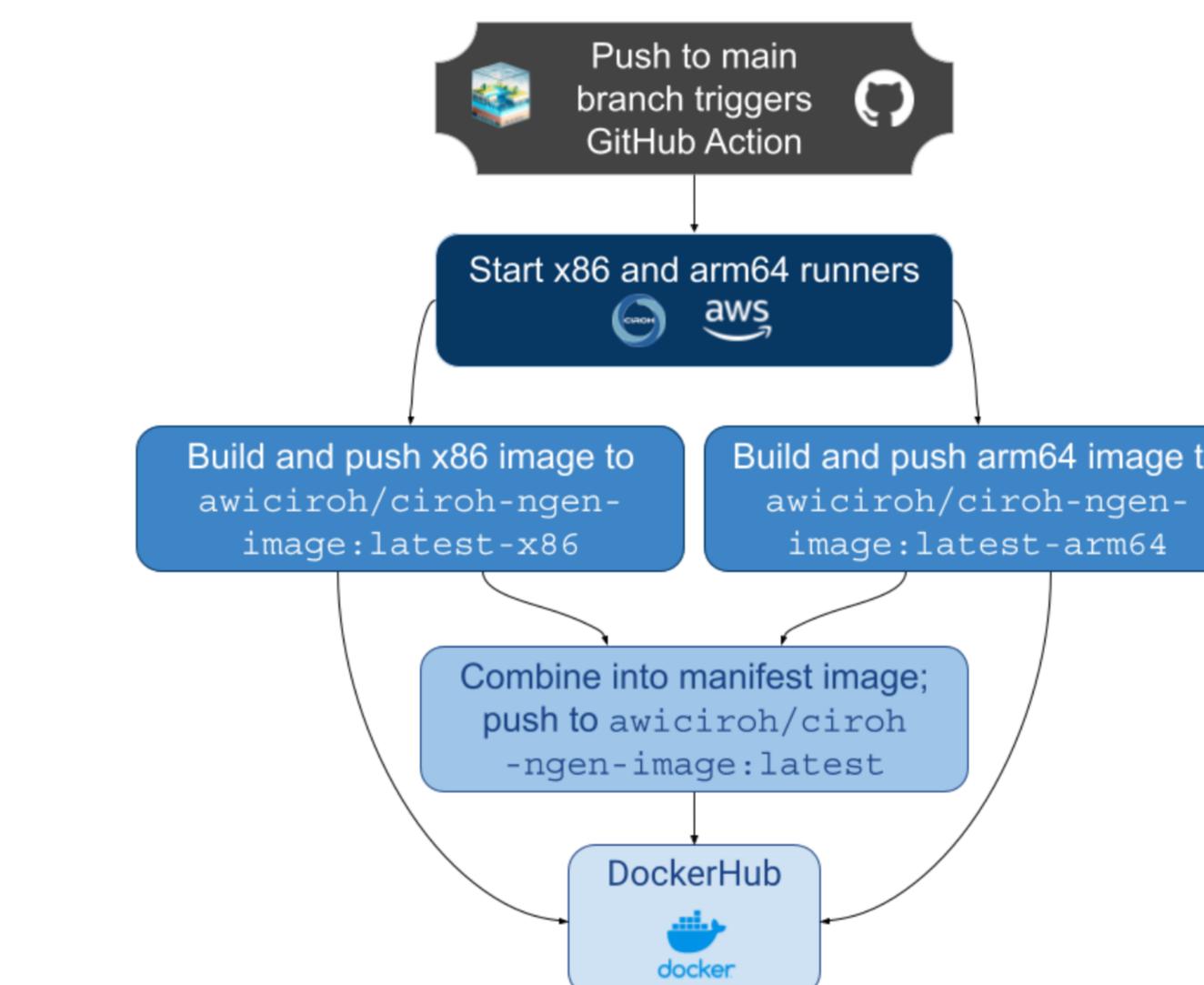
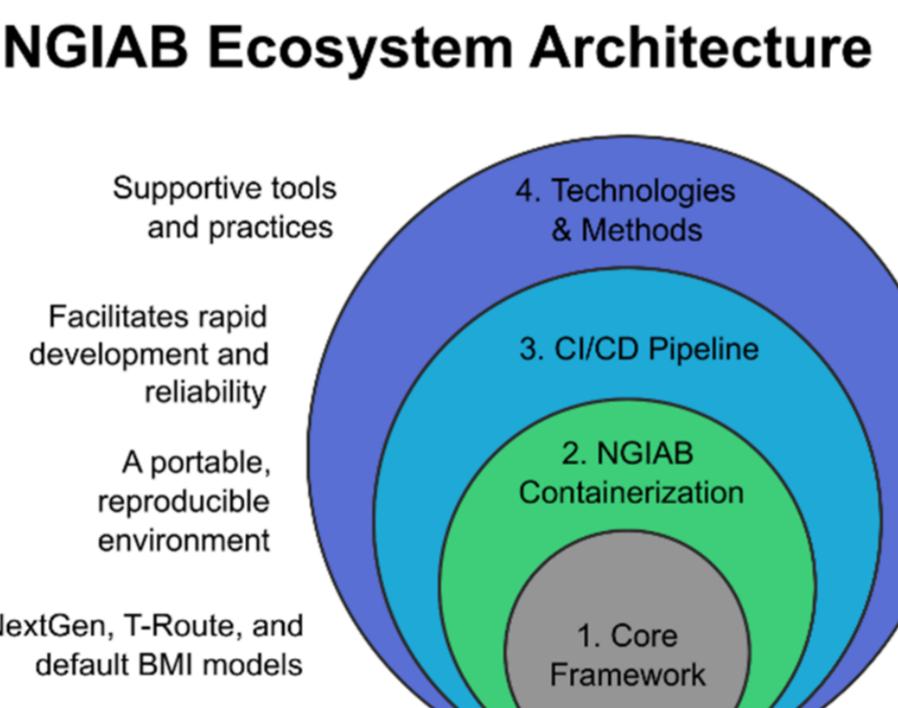
An End-to-End Modeling Ecosystem



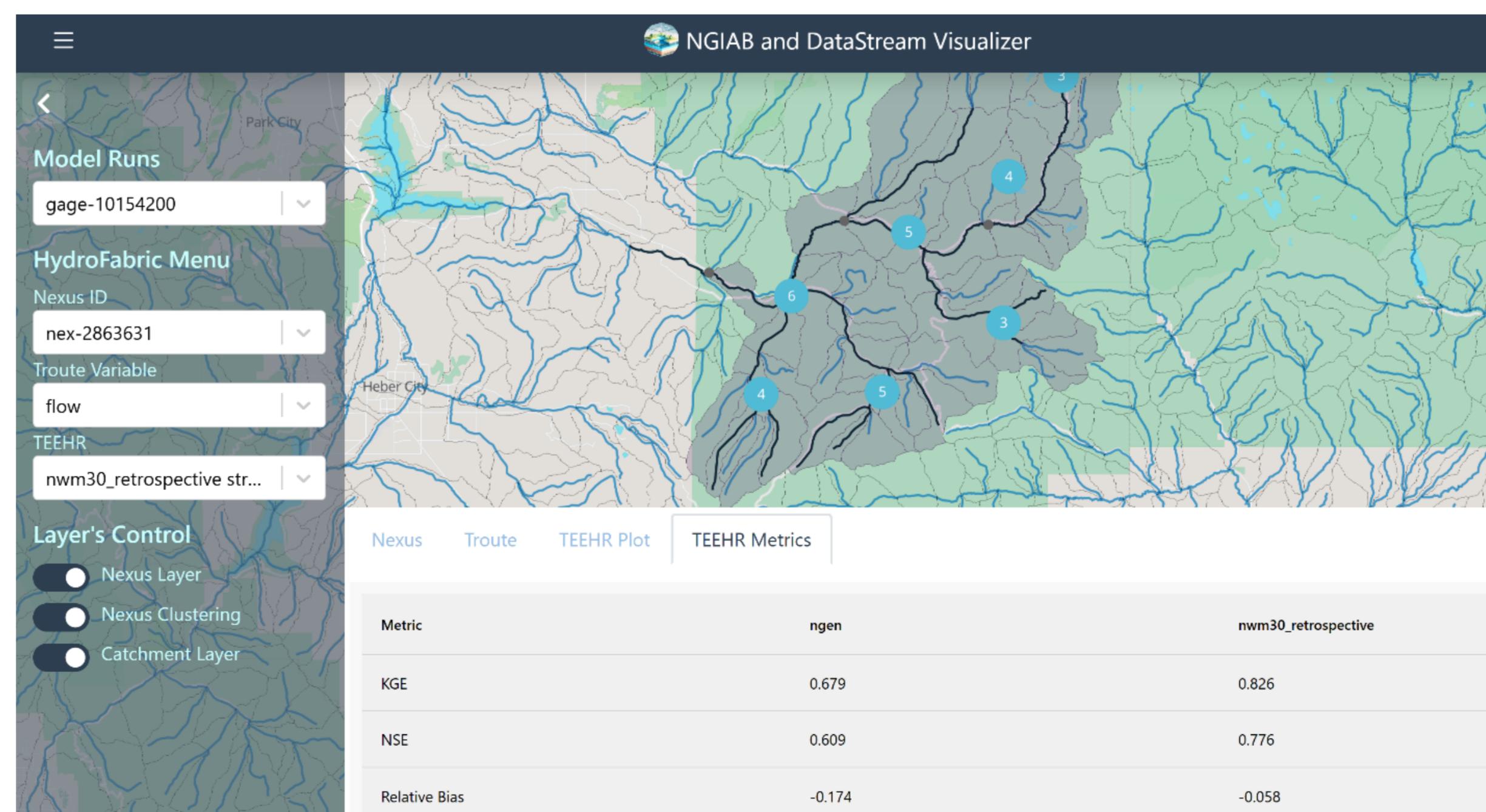
Under the Hood: A Robust Scalable Architecture

NGIAB is built on a stable, high-performance foundation designed for scientific computing and scaling.

- Core Architecture: Built within a Rocky Linux 9.1 container, including the full toolchain (C++, Fortran, NetCDF, HDF5).
- Parallel Ready: Pre-compiled to support both serial (single-threaded) and parallel (MPI-based) runs.
- Automated Reliable: A mature CI/CD pipeline using GitHub Actions automatically builds, tests (for ARM64, AMD64), and publishes stable images to DockerHub.

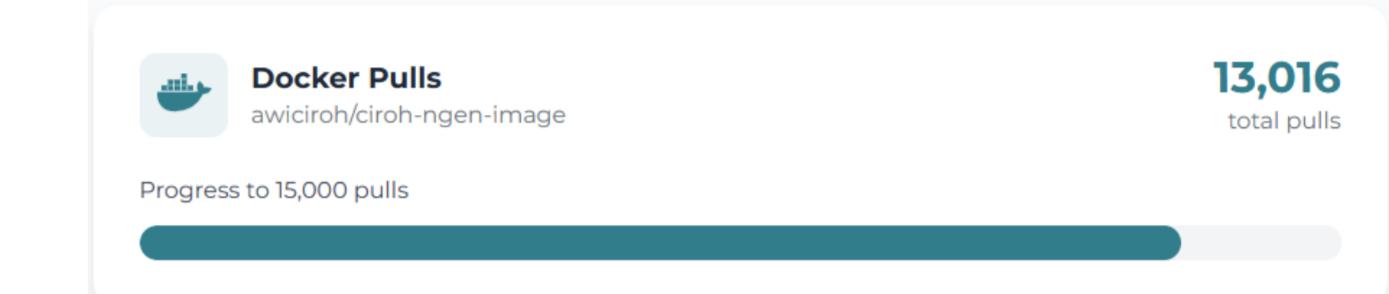


- Scaling: The DataStreamCLI tool automates NGIAB workflows at scale and is the backbone of the CIROH NRDS (NextGen Research DataStream), a community-centric continental model. H31G-03, H33J-07, H41Q-1425

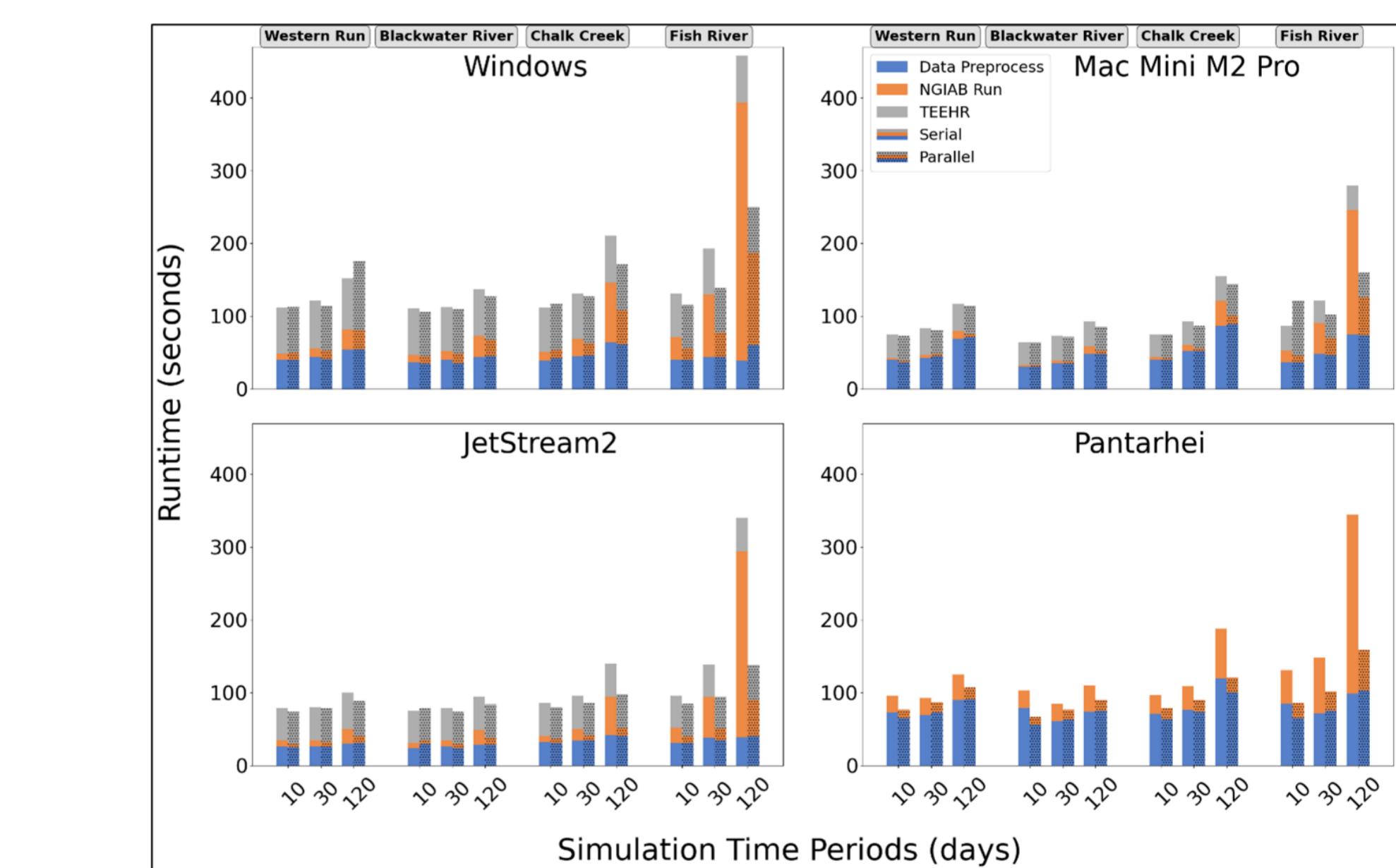


Community Adoption Performance

NGIAB has already demonstrated significant community uptake and reliable performance.



- Performance: Parallel runs offer a significant speedup for large basins.
- Community Engagement: We actively engage with the community via the CUAHSI Summer Institute, CIROH Developers Conference.



Get Started!

We are actively fostering a user community with extensive documentation and support.

- NGIAB 101 Training Module: A "getting started" guide that walks new users through the entire workflow.
- CIROH DocuHub: A centralized documentation hub for all tools in the NGIAB ecosystem. H41Q-1426



DOCUHUB | NGIAB tools | NGIAB Paper

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