EPIC/UFS Community Support for Earth System Modeling

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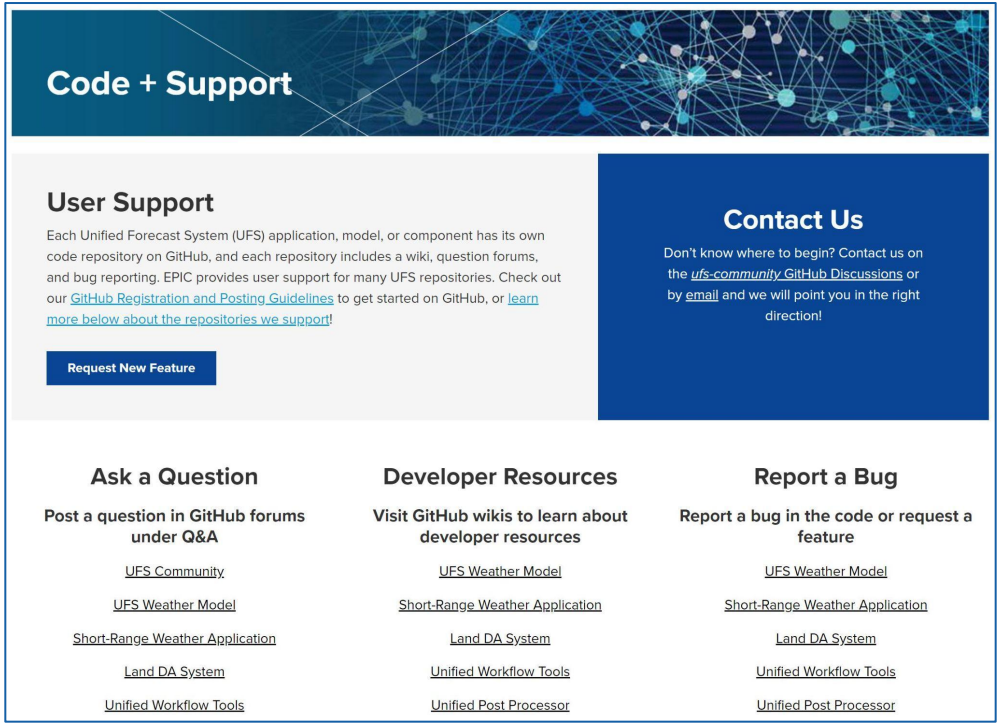
Overview

- **Overview of EPIC's community support & data management work**
  - Website Resources
  - Documentation (User Guides and wikis)
  - GitHub Discussions
  - Data Buckets & Other Data Management Tools
  - Testing Resources
  - Releases
- Q&A (time-permitting)

EPIC Community Portal (epic.noaa.gov)

- Several Relevant Pages:
  - Get Support
  - Get Code
  - Technical FAQs
  - Tutorials

- Get Support includes links to:
  - GitHub Discussions Q&A
  - GitHub wikis
  - GitHub Issues
  - Feature requests
  - EPIC Email

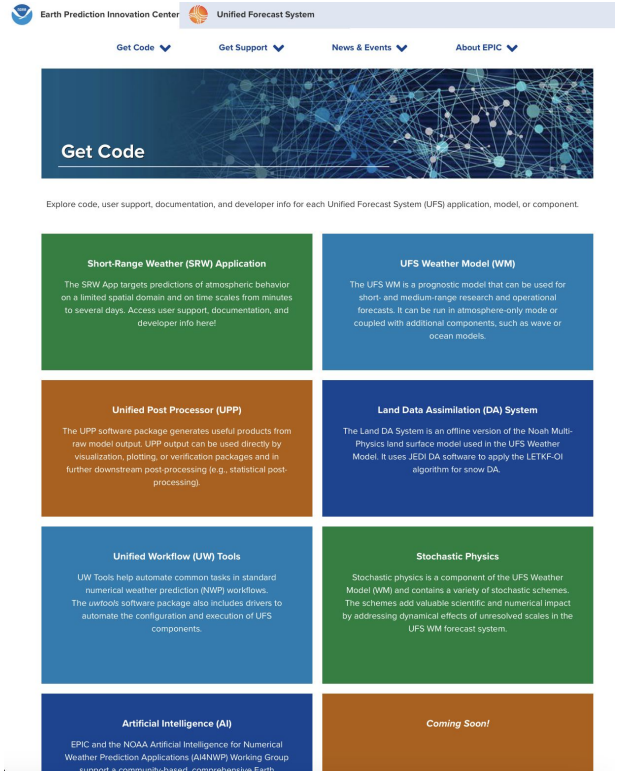


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EPIC Community Portal (epic.noaa.gov) cont'd

The Get Code page links to EPIC's supported repositories:

- The Short-Range Weather Application
- The UFS Weather Model (WM)
- The Land Data (DA) Assimilation System
- The Unified Post Processor
- Unified Workflow Tools
- Stochastic Physics
- AI (preliminary)

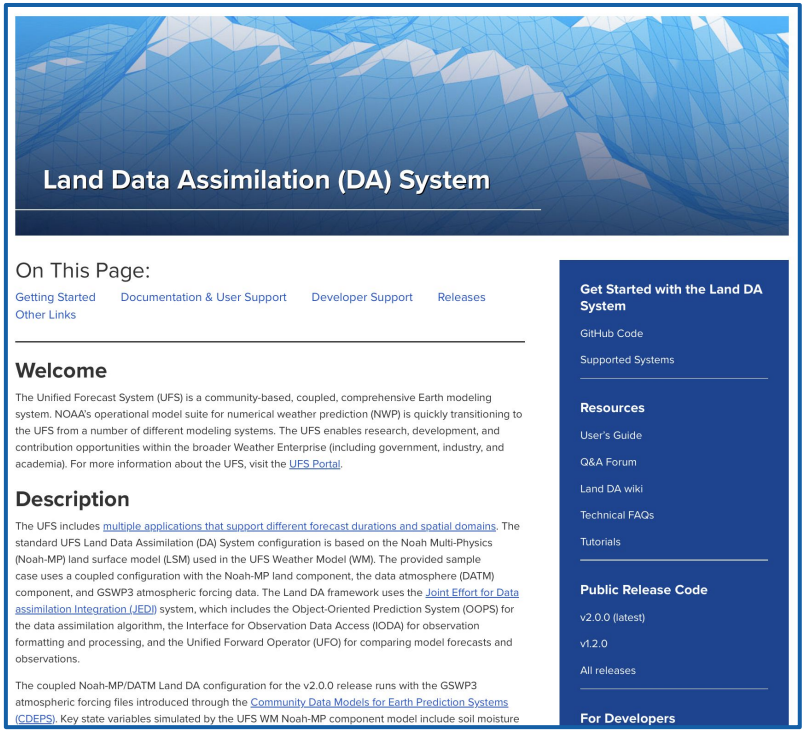


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EPIC Community Portal (epic.noaa.gov) cont'd

Each Get Code page has:

- A sidebar for easy navigation to external resources
- A top bar to jump to information of interest on the page.



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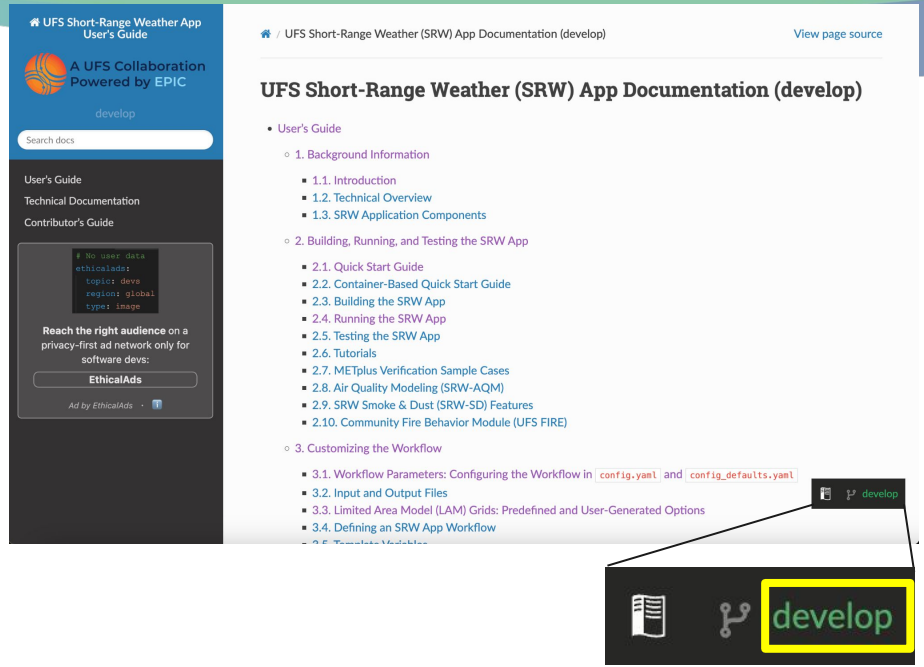
Documentation

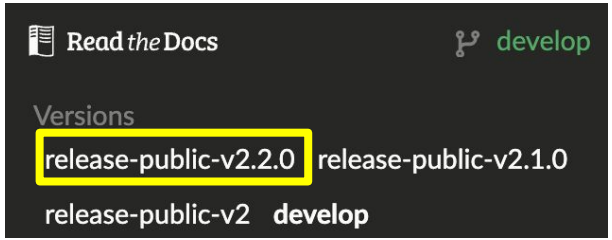
Each supported repository contains a User's Guide:

- The Short-Range Weather Application
- The UFS Weather Model
- The Land Data Assimilation System
- The Unified Post Processor
  - User's Guide
  - Technical Documentation
- Unified Workflow Tools (GSL-managed)

Switch versions using the caret at the bottom left.

- NOTE: Switch versions from documentation homepage to avoid 404 not found errors.





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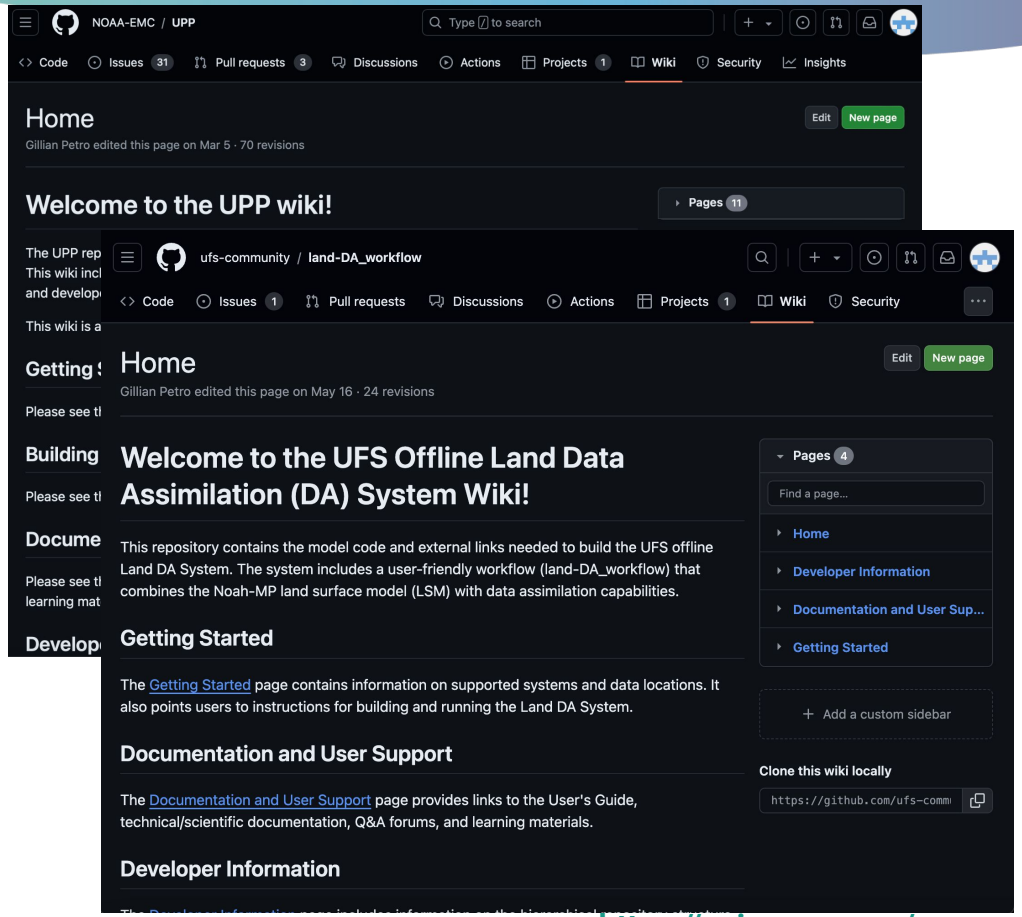
Wiki

Each supported repository contains a GitHub wiki:

- The Short-Range Weather Application
- The UFS Weather Model
- The Land Data Assimilation System
- The Unified Post Processor
- Unified Workflow Tools

Wikis generally contain sections for:

- Getting Started
- Documentation & User Support
- Developers



GitHub Discussions

Post **Questions** on GitHub Discussions:

- General/Miscellaneous Questions
- The Short-Range Weather Application
- The UFS Weather Model
- The Land Data Assimilation System
- The Unified Post Processor
- Unified Workflow Tools

Submit **feature/enhancement requests**:

- Post in the ufs-community Enhancement category.
- Post in the "Enhancement" category for the relevant repository.
- Email us! support.epic@noaa.gov

Data Buckets

EPIC currently manages data for the SRW App, the Land DA System, and the UFS WM regression tests (RTs).

Application releases include data for sample cases:

- SRW App Data Bucket
- Land DA Data Bucket

The WM provides regression test data for the last 60 days of develop branch code:

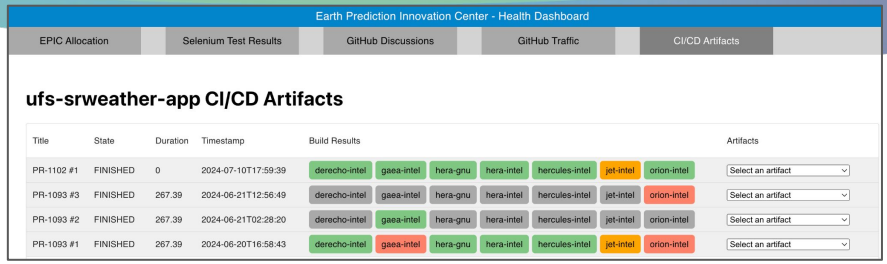
- Weather Model Regression Test Data Bucket

Data Buckets

EPIC collaborates with the AI4NWP group on AI initiatives and uses related data, available on the cloud here:

- Microsoft Azure: CONUS404
- Google Cloud (GCP): GEFS v13 Replay
- Google Cloud (GCP): ERA5

Data Management Tools



EPIC Health Dashboard

Tools to maintain data buckets up-to-date:

- ***UFS Data Tracking, Migration, & Maintenance Bot***
  - Robotic Process Automation tool for data migration & management of UFS WM RT data
- ***Multi-thread data uploader applications for WM, SRW, Land DA***
  - Partitions large files into chunks to assist in improving upload performance to cloud storage

[EPIC Health Dashboard]

- Main tab: Status of nightly builds for spack-stack, UFS WM, SRW App, Land DA
- CI/CD Artifacts Tab → View log files from Jenkins pipeline tests.

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Data Management Tools (cont'd)

- UFS Data Mapping tool to support data ingestion
  - Maps each set of UFS data files into its associated categories: UFS application-to-physics suite build, UFS component, regression test, file format, test type, applicable compiler, file size, hierarchy, source location, etc.
- UFS Data Analytics tool
  - Continual use for analyzing data as development advances for the UFS WM
- UFS WM RT Log Extraction application
  - Extracts, parses & summarizes test performance metrics featured within each RDHPCS UFS WM RT log files into visual plots.
  - Successfully transferred log information into visual plots

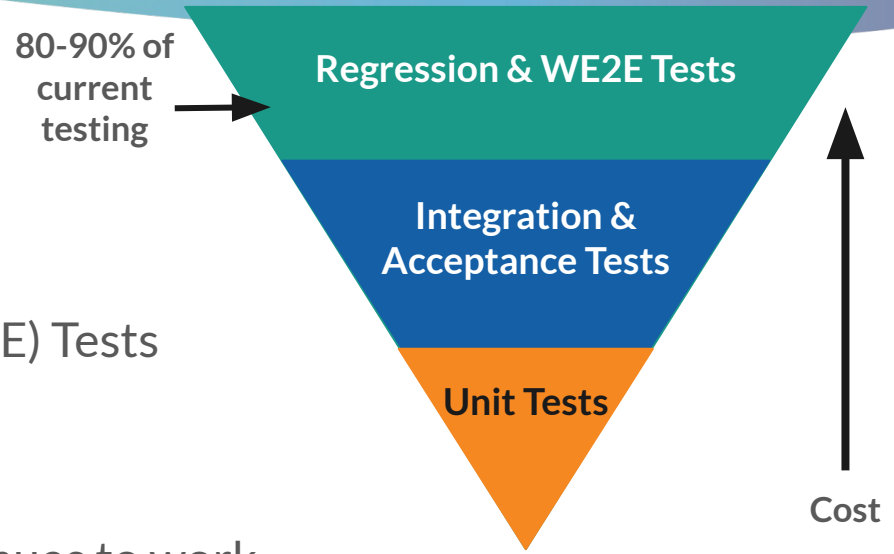
Data Management – Future Plans

Continue collaborating with EPIC and external teams to meet data needs:

- **SRW:**
  - Add AQM data to SRW App data bucket
  - Collaborate w/stakeholders to determine which SRW smoke & dust (SD) and Fire data would be beneficial to add
- **Global:**
  - Create a new data bucket
  - Add data currently staged on the cloud to this bucket
- **Coastal:** Continue to collaborate w/Coastal team to meet data needs

Work on placing ICs and model outputs in data buckets for different model resolutions.

Testing Resources



Current Testing Frameworks:

- Weather Model Regressions Tests
- SRW App Workflow End-to-End (WE2E) Tests
- Land DA System CTest functionality

Pros:

- Ensures that major functionality continues to work
- Provides sample test cases for users

Cons:

- Imbalance: Little to no component-level testing or integration testing
- Current testing is expensive

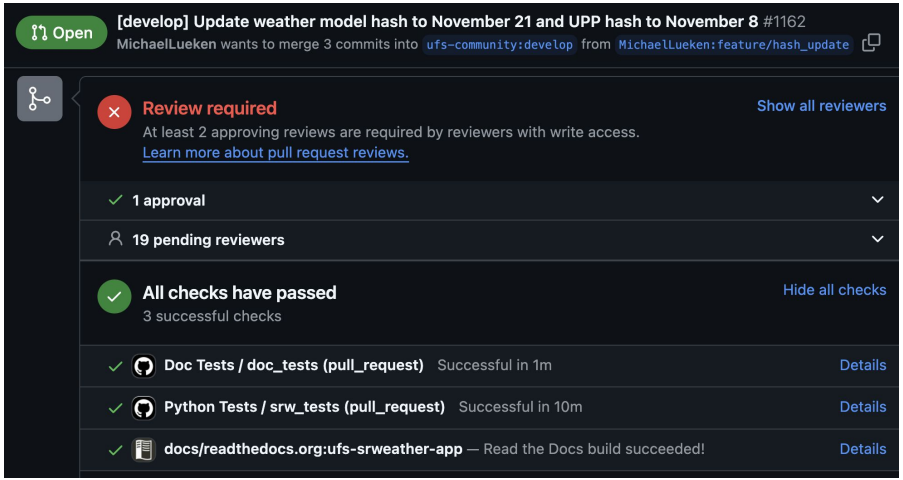
Documentation Testing

SRW App

- Documentation builds for each PR
- Automated GitHub Actions testing to ensure technical documentation is up-to-date

UPP

- WARN_AS_ERROR = YES in UPP technical documentation (Doxygen)



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Releases

Most Recent Public Releases:

- Land DA v2.0.0 (Oct. 2024)
- SRW App v2.2.0 (Oct. 2023) (v3.0.0 planned for spring 2025)
- uwtools v2.5.1 (Dec. 2024)

Capability Announcements:

- UFS WM Hierarchical System Development (HSD) cases (Nov. 2024)
  - Idealized test cases for academic audience: baroclinic wave case, July 2020 CAPE case
- SRW App Smoke & Dust features (Dec. 2024)

Planned:

- SRW App v3.0.0
- Global Workflow Prototype

Challenges

- Testing Resources
  - HPC allocation
  - Testing infrastructure → Inverted pyramid
- External SME access
- Repository ownership / knowledge transfer
- Coding standards