

Improving HAFS Workflow Usability, Portability, and Testing Capabilities

PI: Evan Kalina

Team Members: Ligia Bernardet and Samuel Trahan

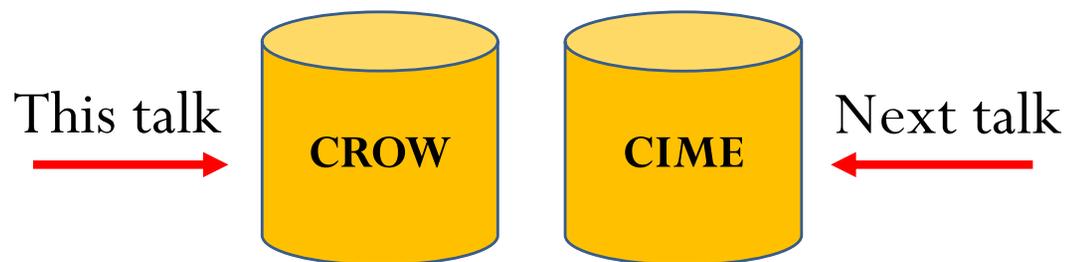
Funding: Hurricane Supplemental Program

Developmental Testbed Center
NOAA/Global Systems Division



Purpose and objectives

- Foster a community development environment for UFS workflows that is publicly accessible
- Develop a prototype flexible HAFS workflow that is easy to configure, build, run, and port
- Enable hierarchical testing (using canned datasets to run components of the coupled modeling system)
- Enable transition to operations by providing researchers with a system that is similar in capabilities to the operational workflow
- Leverage community tools to achieve these goals:



Project milestones and timeline

- Create and establish governance for UFS Workflows repository, initiate requirements collection ([Q1FY20](#))
- Community review of CROW ([Q2FY20](#))
- Demonstrate that CROW or alternative can interact with CIME ([Q3FY20](#))
- Plan/document design of the HAFS transition-to-operations workflow ([Q4FY20](#))
- Demonstrate a HAFS workflow prototype ([Q3FY21](#))
- Total FTE: 0.40 (Year 1), 0.36 (Year 2)
- Related NCAR/CGD work has separate milestones/budget

What is CROW?

- Configuration manager for Research and Operational Workflows
- Originally envisioned as an end-to-end common workflow for NCEP models
- In present form, it is a configuration manager only
 - Defines which jobs to run based on user-provided YAML configuration (i.e., create XML for rocoto/ecFlow)
 - Similar in functionality to Python's ConfigParser in HWRF



Why include CROW in HAFS?

- **Advantages**

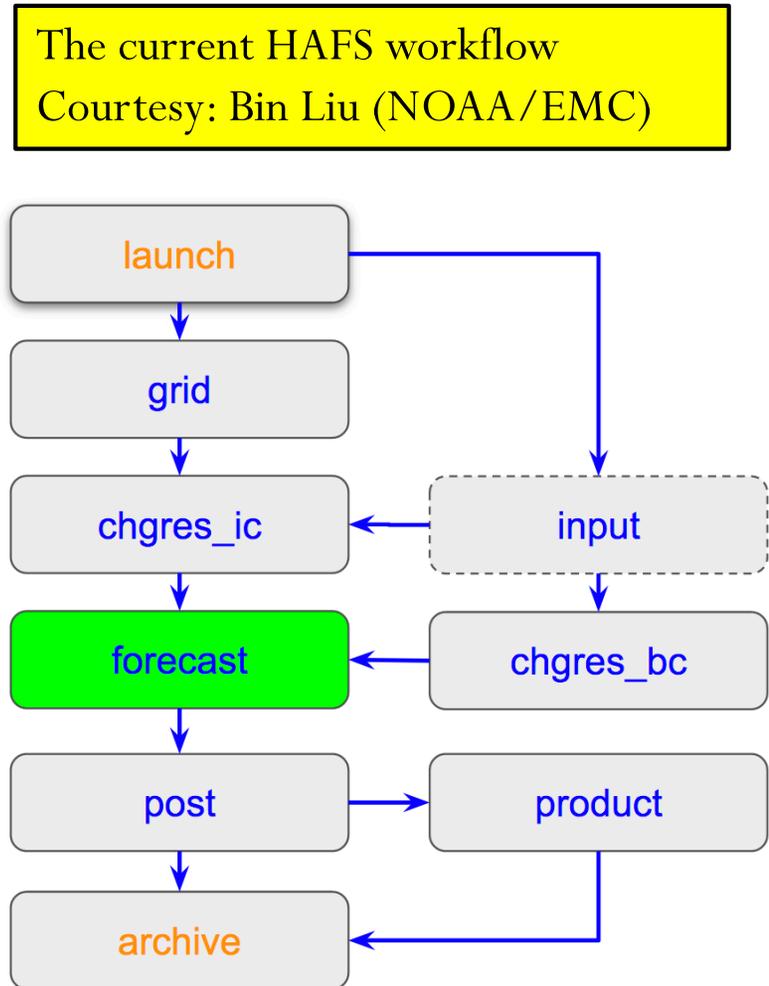
- If other UFS applications use CROW, having it in HAFS will increase uniformity/user familiarity across apps.
- Could move sanity checking of valid values from python scripts into YAML configuration files using schema.

- **Considerations**

- CROW would need to go to operations for HAFS. CROW needs to update storm-specific information for each cycle.
- If CROW is chosen, it needs to be funded, supported, and maintained for HAFS.

Connecting HAFS, CROW, and CIME

- Use CROW to build XML and write storm1.conf (GSD)
- Use CIME to build the coupled model executable and configure the forecast step (NCAR/CGD)
- Use the CMEPS coupler to couple UFS Weather Model, HYCOM, WW3 (NCAR/CGD)
- Use the HAFS workflow to execute the jobs, including the forecast job setup by CIME (GSD)



UFS workflows repository

- Pulls common source codes and tools (e.g., HYCOM, CIME, CROW, HAFS) into one place using `manage_externals`.
- https://github.com/NCAR/ufs_workflows_sandbox

The screenshot shows the GitHub repository page for `NCAR/ufs_workflows_sandbox`. The browser address bar shows the URL `https://github.com/NCAR/ufs_workflows_sandbox`. The repository description is "A repository to collaborate with HAFS folks and NCAR CGD folks, among others, regarding the infrastructure HSUP project." The repository statistics are: 5 commits, 1 branch, 0 packages, 0 releases, and 2 contributors. The current branch is `master`. There are buttons for "New pull request", "Find file", and "Clone or download". The commit history shows a recent commit by `evankalina` titled "Fix formatting of README.md" on Sep 24. Below the commit history, there is a list of files and folders:

File/Folder	Description	Last Commit
<code>manage_externals</code>	Add <code>manage_externals</code> to the repository and a starting point for the E...	last month
<code>Externals.hurricane.cfg</code>	Update the <code>Externals.hurricane.cfg</code> file to add connections to additional	last month
<code>README.md</code>	Fix formatting of <code>README.md</code>	last month

UFS workflows requirements collection

- We are using the GitHub issue tracker in the UFS Workflows repository to capture community feedback.
- A review committee will be formed to decide how/ what feedback should be elevated into requirements.
- Feedback not limited to CROW or even HAFS
 - “I want to run hourly cycling in HAFS & UFS CAM.”
 - “I want to change the size of moving nest(s) in HAFS.”
 - “I don’t want to start an app’s workflow from the beginning if I have the needed inputs to run a particular task.”
- Pertinent feedback will be summarized at the CROW review and augmented during the review.

How to contribute feedback

The screenshot shows a web browser displaying the GitHub page for the repository 'NCAR / ufs_workflows_sandbox'. The browser's address bar shows the URL 'https://github.com/NCAR/ufs_workflows_sandbox/issues'. The GitHub navigation bar includes 'Search or jump to...', 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. The repository header shows 'NCAR / ufs_workflows_sandbox' with 4 watches, 0 stars, and 0 forks. Below the header, there are tabs for 'Code', 'Issues', 'Pull requests', 'Actions', 'Projects', 'Wiki', 'Security', 'Insights', and 'Settings'. The 'Issues' tab is active, showing a search filter 'is:issue is:open', 13 labels, and 0 milestones. A green 'New issue' button is visible. The main content area displays '0 Open' and '1 Closed' issues, with a message: 'There aren't any open issues. You could search all of GitHub or try an advanced search.' A 'ProTip!' suggests using mentions like '@evankalina'. The footer contains copyright information for 2019 GitHub, Inc. and various links like 'Terms', 'Privacy', 'Security', 'Status', 'Help', 'Contact GitHub', 'Pricing', 'API', 'Training', 'Blog', and 'About'.

CROW community review logistics

- Planning for 1-day, in-person review in College Park, MD
- Timing: mid-February to mid-March 2020
- Audience
 - Designate Points of Contact (POCs) from EMC, HRD, GSD, NCAR/CGD, and DTC
 - POCs can add members from their organization to guest list
 - DTC will invite university community members
- After review, we will summarize feedback in a report.
 - Who do we share this document with? How will they make the final decision on whether CROW is used in HAFS?

Preparing for CROW community review

- PRIOR to the review, perhaps ~2 weeks before:
 - Distribute documentation to attendees
 - Allow attendees to check out the HAFS code and configure the workflow with and without CROW (instructions provided).
 - Attendees would need Jet HPC access.



- The idea is for people to already have some hands-on experience with CROW when they attend the review.

Proposed CROW review content

- Overview talks, for example:
 - Overview of CROW
 - Overview of current HAFS config system and workflow
 - Using CROW in HAFS
 - Motivation/drawbacks of including CROW in HAFS workflow
- Hands-on demo or practical
 - Run the HAFS launcher using the existing configuration system
 - Run the HAFS launcher using CROW
 - Additional exercises (change a configuration option, etc.)
- Discussion
 - Alternatives to CROW (e.g., CIME)

Summary

- A collaborative environment for HAFS and UFS workflows development has been established on GitHub.
- Anyone is welcome to help set requirements for the HAFS and other UFS app workflows using the GitHub issue tracker.
- The project team is working on developing a HAFS workflow prototype that can be configured with CROW.
- A CROW review is being planned for mid-February to mid-March to collect community feedback on whether CROW should be used in HAFS.