CAM-CLUBB Integration Workflow

Software Engineering Working Group

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Overview

- Motivation and Goals
- History
- Current process
- Issues, future issues, Possible solutions?

Motivation

- CLUBB - Cloud Layers Unified by Binormals
  - A large and expensive higher order closure turbulence parameterization
  - Simulates low and large-scale convection in CAM
  - Developed (still developed) and maintained by Vince Larson's group at Univ of Wisconsin - Milwaukee.
  - Used in E3SM and stand-alone single column model from UWM also
- CAM - COMMUNITY Atmosphere Model
  - Like many of our models, code is developed here at NCAR and in other places around the world
- **How do we most efficiently collaborate while respecting autonomy and independence of external groups?**

Goals

- GOAL 1: Maintain stability and expected functionality of our model.

- GOAL 2: Include new science and functionality in the model produced by external collaborators when requested by working group scientists.

- GOAL 3: Maintain pathways for scientific or engineering updates and improvements to continue at NCAR and migrate back to external collaborators.

Questions

- What tools or processes do we have that can be leverages towards achieving these goals?

- What tools can we develop to improve our current processes?

- What are the best long-term plans and processes to ensure this proceeds smoothly regardless of NCAR personnel availability?

- Could I be replaced with a

  simple shell script?

History

- CLUBB was originally developed with GFDL and the Larson group at UWM, with the first descriptive papers published in 2002

- CLUBB replaced other shallow cloud and turbulence parameterizations with the release of CAM6
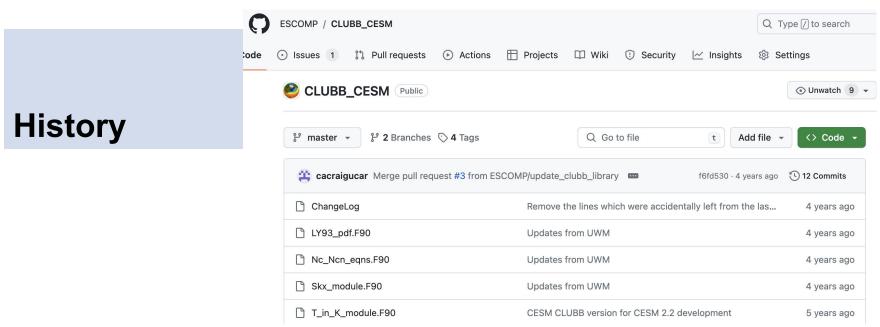
History

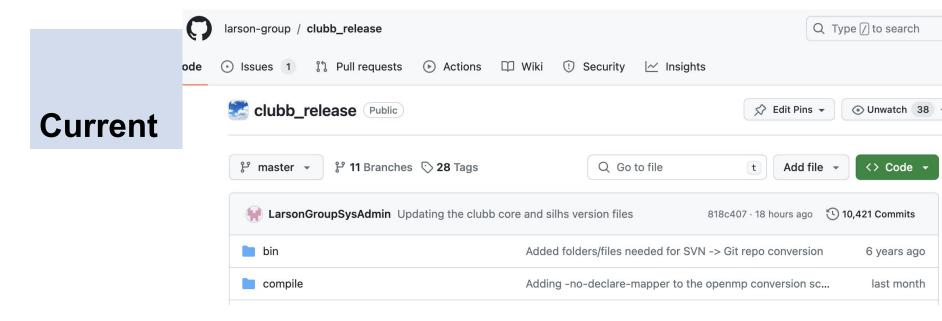Revision 91835: /clubb_core/trunk_tags

- ..
- clubb01_00/
- clubb01_01/
- clubb01_02/
- clubb01_03/
- clubb01_04/
- clubb01_05/
- clubb01_06/
- clubb01_07/
- clubb01_08/

- Originally, we took a copy of CLUBB and saved it to our own NCAR-owned (svn) repo.

- Cheryl would make changes required to run with CAM (after testing) and document with an NCAR-only changelog

- Including tuning parameters that were not available in the namelist yet

- https://svn-ccsm-models.cgd.ucar.edu/clubb_core/trunk_tags/clubb01_08/ChangeLog

History

- Eventually, we moved the CLUBB svn repo into github, but kept a similar process

- Our version of CLUBB would be modified, documented via ChangeLog, and stored in a separate repository.

- Only updated about once a year, even though CLUBB underwent constant changes at UWM.

- Other NCAR scientists could issue PRs or start issues here. https://github.com/ESCOMP/CLUBB_CESM/pull/8
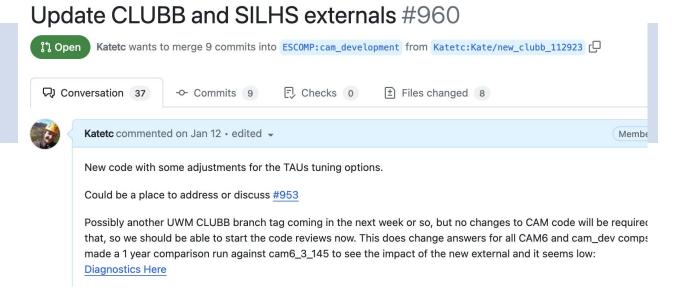
Current

- Have moved to pointing to a "Release" repo, owned and managed by UWM

- The code in this repo is updated automatically nightly after CI tests run, but tags are generated for NCAR use

- All code modifications needed for CAM/CESM were pushed back to the UWM development repo

- Issues, code modifications and PRs *to CLUBB code* go only through UWM group

Current

Update CLUBB and SILHS externals #960

Open — Katetc wants to merge 9 commits into `ESCOMP:cam_development` from `Katetc:Kate/new_clubb_112923`

Conversation 37 · — Commits 9 · Checks 0 · Files changed 8

Katetc commented on Jan 12 · edited ▾ — Member

New code with some adjustments for the TAUs tuning options.

Could be a place to address or discuss #953

Possibly another UWM CLUBB branch tag coming in the next week or so, but no changes to CAM code will be required that, so we should be able to start the code reviews now. This does change answers for all CAM6 and cam_dev comps made a 1 year comparison run against cam6_3_145 to see the impact of the new external and it seems low:
Diagnostics Here

- Bringing in a new CLUBB External now requires no CLUBB code modifications or documentation. However, the interface and namelists need updating typically.

- UWM testing is not the same as NCAR testing

- UWM development CAM is not the same as NCAR CAM

- Goal is to increase turnaround time so the repos at NCAR and UWM have less updating with each turn.

Current Issues and Questions

- Still not an *easy* process for the SE updating CLUBB

- Cannot automatically PR between CAM versions as the larson-group repo is not an official CAM fork

- NCAR scientist issues go through UWM rather than an NCAR version of CLUBB, improvement?

- Updates now 2x a year instead of 1x a year, improvement?

- Would there be a better way to automate this work? CI or Github actions?

- How do we manage collaborator code standards in general? No NCAR SE reviews for the CLUBB external, it is a *large* code base.

- CCPP may require CLUBB code changes for CAM, or more layers in the interface.

Wrap-up

- I don't know the answer yet

- Would like to find an automated tool to prepare CLUBB PRs, but I don't have the time to develop one.

- Hoping for feedback from other groups because I know this is an issue throughout CESM, and will continue to be.

Overview

- Motivation and Goals - Why am I talking about this? COMMUNITY model, but who owns what code exactly? Testing and validation? Would love feedback from other groups. Possible CI?
- History - Previous versions of CAM convection. CLUBB-Unicon bake-off. Early SVN repository copied. Github repo mirrored.
- Current process - Pointing to a larson-group mirror. Using github sparse checkout now.
- Issues, future issues, possible solutions - How do NCAR scientists make changes to CLUBB code? Merging and testing issues - who keeps uwm up to date? How can we improve this further?
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