KATE THAYER-CALDER
NCAR/CGD/PPC | LIWG SE LIAISON

Using the CESM Test Framework for CISM Development

JUNE 09, 2025

This material is based upon work supported by the National Center for Atmospheric Research, which is a major facility sponsored by the National Science Foundation under Cooperative Agreement No. 1852977.

TOPICS COVERED

- How can CESM tests HELP YOU?
- How to run tests with CISM in CESM?
- What tests are available in CESM?
- Plans… stay tuned!

How can CESM tests HELP YOU?

- Running tests are a good idea while you develop model code.
- You can run a test before and after your code changes to see if you:
  - Have code errors that prevent building
  - Have code changes that change answers
  - Have code errors with unexpected side effects

How to run tests with CISM in CESM?

- Check out CISM-Wrapper

```
katec/lndice> git clone https://github.com/ESCOMP/CISM-wrapper.git CISM-wrapper-testing
Cloning into 'CISM-wrapper-testing'...
remote: Enumerating objects: 7061, done.
remote: Counting objects: 100% (971/971), done.
remote: Compressing objects: 100% (221/221), done.
remote: Total 7061 (delta 840), reused 762 (delta 750), pack-reused 6090 (from 3)
Receiving objects: 100% (7061/7061), 7.98 MiB | 12.74 MiB/s, done.
Resolving deltas: 100% (4214/4214), done.
```

- Run git-fleximod

```
katec/lndice> cd CISM-wrapper-testing/
Directory: /glade/work/katec/lndice/CISM-wrapper-testing
lndice/CISM-wrapper-testing> ./bin/git-fleximod update
        source_cism up to date.
               cime up to date.
Recursively checking out submodules of cime
         ccs_config up to date.
              cmeps up to date.
              cdeps up to date.
Recursively checking out submodules of cdeps
              share up to date
```

How to run tests with CISM in CESM?

- Check out your CISM Code

```
lndice/CISM-wrapper-testing> cd source_cism/
Directory: /glade/work/katec/lndice/CISM-wrapper-testing/source_cism
CISM-wrapper-testing/source_cism> git remote add myfork https://github.com/Katetc/CISM-wrapper.git
CISM-wrapper-testing/source_cism> git fetch myfork
remote: Enumerating objects: 6073, done.
remote: Counting objects: 100% (1152/1152), done.
remote: Compressing objects: 100% (152/152), done.
remote: Total 6073 (delta 1051), reused 1009 (delta 1000), pack-reused 4921 (from 3)
Receiving objects: 100% (6073/6073), 7.52 MiB | 19.30 MiB/s, done.
Resolving deltas: 100% (3744/3744), completed with 55 local objects.
From https://github.com/Katetc/CISM-wrapper
 * [new branch]        katetc/calvingmip-pr       -> myfork/katetc/calvingmip-pr
 * [new branch]        katetc/cism-wrapper-2-1-97 -> myfork/katetc/cism-wrapper-2-1-97
 * [new branch]        katetc/cism-wrapper-2-1-98 -> myfork/katetc/cism-wrapper-2-1-98
 * [new branch]        katetc/cism-wrapper-2-2-03 -> myfork/katetc/cism-wrapper-2-2-03
 * [new branch]        katetc/cism-wrapper-2-2-04 -> myfork/katetc/cism-wrapper-2-2-04
 * [new branch]        master                     -> myfork/master
 * [new branch]        new-cism-main-1124         -> myfork/new-cism-main-1124
 * [new branch]        stand_alone_tests          -> myfork/stand_alone_tests
CISM-wrapper-testing/source_cism> git checkout katetc/calvingmip-pr
Previous HEAD position was 38c0e48d Merge pull request #70 from ESCOMP/lipscomb/calvingmip_update
branch 'katetc/calvingmip-pr' set up to track 'myfork/katetc/calvingmip-pr'.
Switched to a new branch 'katetc/calvingmip-pr'
CISM-wrapper-testing/source_cism>
```

How to run tests with CISM in CESM?

- Run a test!

```
CISM-wrapper-testing/source_cism> cd ..
Directory: /glade/work/katec/lndice/CISM-wrapper-testing
lndice/CISM-wrapper-testing> cd cime/scripts/
Directory: /glade/work/katec/lndice/CISM-wrapper-testing/cime/scripts
cime/scripts> se
[katec@izumi scripts]$ ./create_test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag
Testnames: ['SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel']
No project info available
create_test will do up to 1 tasks simultaneously
create_test will use up to 60 cores simultaneously
Creating test directory /scratch/cluster/katec/SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel.20250608_184712
RUNNING TESTS:
  SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel
Starting CREATE_NEWCASE for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel with 1 procs
Finished CREATE_NEWCASE for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel in 1.567714 seconds (PASS)
Starting XML for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel with 1 procs
Finished XML for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel in 0.484914 seconds (PASS)
Starting SETUP for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel with 1 procs
Finished SETUP for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel in 2.352922 seconds (PASS)
Starting SHAREDLIB_BUILD for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel with 1 procs
Finished SHAREDLIB_BUILD for test SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel in 337.470833 seconds (PASS)
```

For ideas, look in the file: cism-wrapper/cime_config/testdefs/testlist_cism.xml

- (Or several tests)

```
qcmd -- ./create_test --xml-category aux_glc --xml-machine derecho --retry 2 --xml-compiler\
 intel --test-root /glade/derecho/scratch/katec/aux_glc_${testid} --output-root /glade/dere\
cho/scratch/katec/aux_glc_${testid} --project P93300301 --test-id aux_glc_${testid} --gener\
ate /glade/derecho/scratch/katec/aux_glc_${testid}/baselines
```

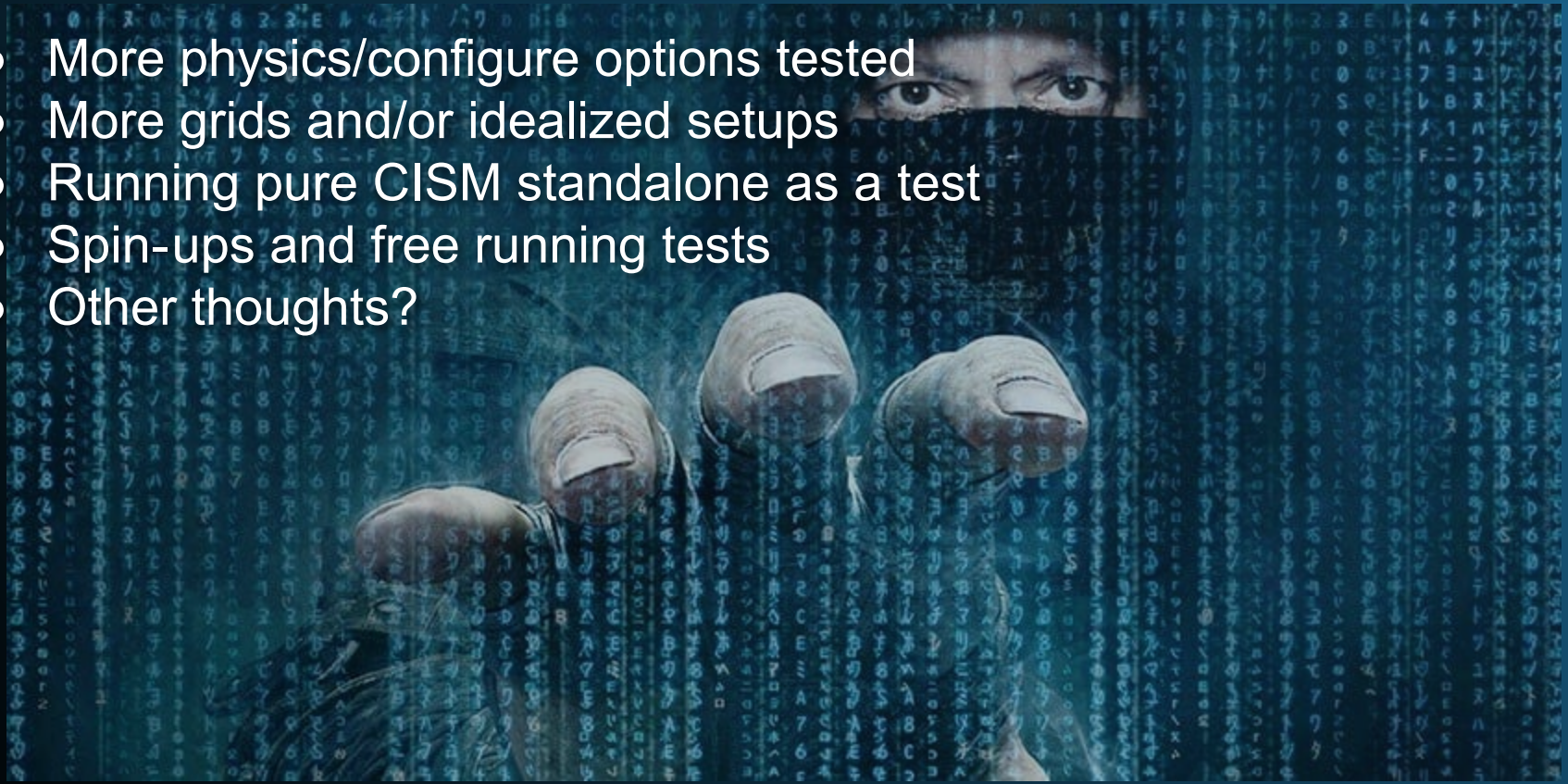
- Look at the Results

```
[katec@izumi katec]$ ./cs.status.20250608_184712_huhlj1
20250608_184712_huhlj1: 1 test
  SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel (Overall: FAIL) details:
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel CREATE_NEWCASE
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel XML
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel SETUP
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel SHAREDLIB_BUILD time=336
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel MODEL_BUILD time=685
    PASS SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel SUBMIT
    FAIL SMS_Ly1_D.f10_f10_ais8gris4_mg37.T1850Gag.izumi_intel RUN time=69
```

What Tests Are Available in CESM?

- Right now: Greenland 4km, Antarctica 8km, with CLM (I case) and without (T case)
- Debug on and off, other config options available
- SMS = Smoke Test (just run for certain number of years)
- ERS = Exact Restart
- PFS = Performance Test
- REP = Simple reproducibility
- And many others…
  https://esmci.github.io/cime/versions/master/html/users_guide/testing.html

Plans….



- More physics/configure options tested
- More grids and/or idealized setups
- Running pure CISM standalone as a test
- Spin-ups and free running tests
- Other thoughts?