

Additional NCtools testing.

There is a simple and largely automated trick to do additional NCtools testing beyond the existing unit tests run by the CI or by running “make check”. It's useful for checking the typical PR code changes, where we can expect bitwise reproducibility when on the same hardware, with the same compiler and compilation flags.

1. comment the teardown function in FRE-NCtools/t/test\_utils.bash so that files are not deleted when "make check" is run.

```
teardown(){  
  cd $BASE_TEST_DIR  
  # rm -rf $testDir  
}
```

2. For each version of NCtools to compare, compile it after step 1; and compile into distinct directories, say /build1 and /build2. When you run “make check” in each of the two build directories, over two hundred netcdf files will be produced per build directory..

3. Run a program to compare via nccmp all files under /build1 to those corresponding files under /build2. One possible program is ardiff.py of fre-commands. Another is dircompnc.py found in Miguel Zuniga's github repo gfdl\_misc:

[https://github.com/ngs333/gfdl\\_misc/tree/master/src/python](https://github.com/ngs333/gfdl_misc/tree/master/src/python)

3B dircompnc.py can be run like this:

```
python dircompnc.py /build1/t /build2/t --s
```

It produces plenty of output, and an example of the tail end of that is below, with manually added annotations are in bold and marked with **(ANN:**

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**(ANN: ...)**

-----  
Starting nccmp compare of [ocean\\_hgrid.nc](#)

-----  
Starting nccmp compare of WOA09\_ann\_theta.nc

-----  
Starting nccmp compare of WOA09\_ann\_theta\_cm2g\_extrap.nc

-----  
nccmp comparisons finished.

Dir 1 :/home/mzuniga/nct\_srchb/FRE-NCtools/build/t/Test06

Dir 2 :/home/mzuniga/nct/FRE-NCtools/build-g11/t/Test06

[# files compared, # files differing]: [7, 0]

**(ANN: it prints something like the above for every directory visited. And it visits all directories underneath t)**

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**(ANN: it prints this summary line when done :)**

[total files compared, total files differing]: [212, 12]

All comparisons finished  
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The program dircompnc.py prints up to five lines per field per differing compared file, and an example of one is:

Starting nccmp compare of C48\_mosaic\_tile1Xocean\_mosaic\_tile1.nc

DIFFER : VARIABLE : tile1\_distance : POSITION : [0,0] : VALUES : -6.07284e-11 <>  
-0.0011068