

GEOS-Chem “Classic” Update

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Current focus of netCDF diagnostics

- Lizzie
 - IN PROGRESS: Cloud diagnostics and optical depth (ND21)
- Bob
 - COMPLETED: Met_THETA (Potential temperature, ND57)
 - IN PROGRESS: J-values (ND21)
 - NEXT UP:
 - SOA and PM2.5 diagnostics (ND42)
 - Sulfate prod/loss diagnostics (ND05) – might have to create a “total” collection
 - Carbon diagnostics (the remainder of ND07)

chemgrid_mod.F is now removed!

In the NcDiag branch, which will be added to v11-02e

Routine from GeosCore/chemgrid_mod.F	Is now replaced by
ITS_IN_THE_CHEMGRID(I, J, L, State_Met)	State_Met%InChemGrid(I,J,L)
ITS_IN_THE_NOCHEMGRID(I, J, L, State_Met)	.not. State_Met%InChemGrid(I,J,L)
ITS_IN_THE_STRAT(I, J, L, State_Met)	State_Met%InStratosphere(I,J,L)
ITS_IN_THE_STRATMESO(I, J, L, State_Met)	State_Met%InStratMeso(I,J,L)
ITS_IN_THE_TROP(I, J, L, State_Met)	State_Met%InTroposphere(I,J,L)
GET_CHEMGRID_LEVEL(I, J, State_Met)	State_Met%ChemGridLev(I,J) = COUNT(State_Met%InChemGrid(I,J,:))
GET_MAX_CHEMGRID_LEVEL()	MAXVAL(State_Met%ChemGridLev(I,J,:))
GET_MIN_CHEMGRID_LEVEL()	REMOVED
GET_TPAUSE_LEVEL(I, J, State_Met)	State_Met%TropLev(I,J) = COUNT(State_Met%InTroposphere(I,J,:))
GET_MIN_TPAUSE_LEVEL()	REMOVED

All bpch code has now been isolated!

In the NcDiag branch, which will be added to v11-02e

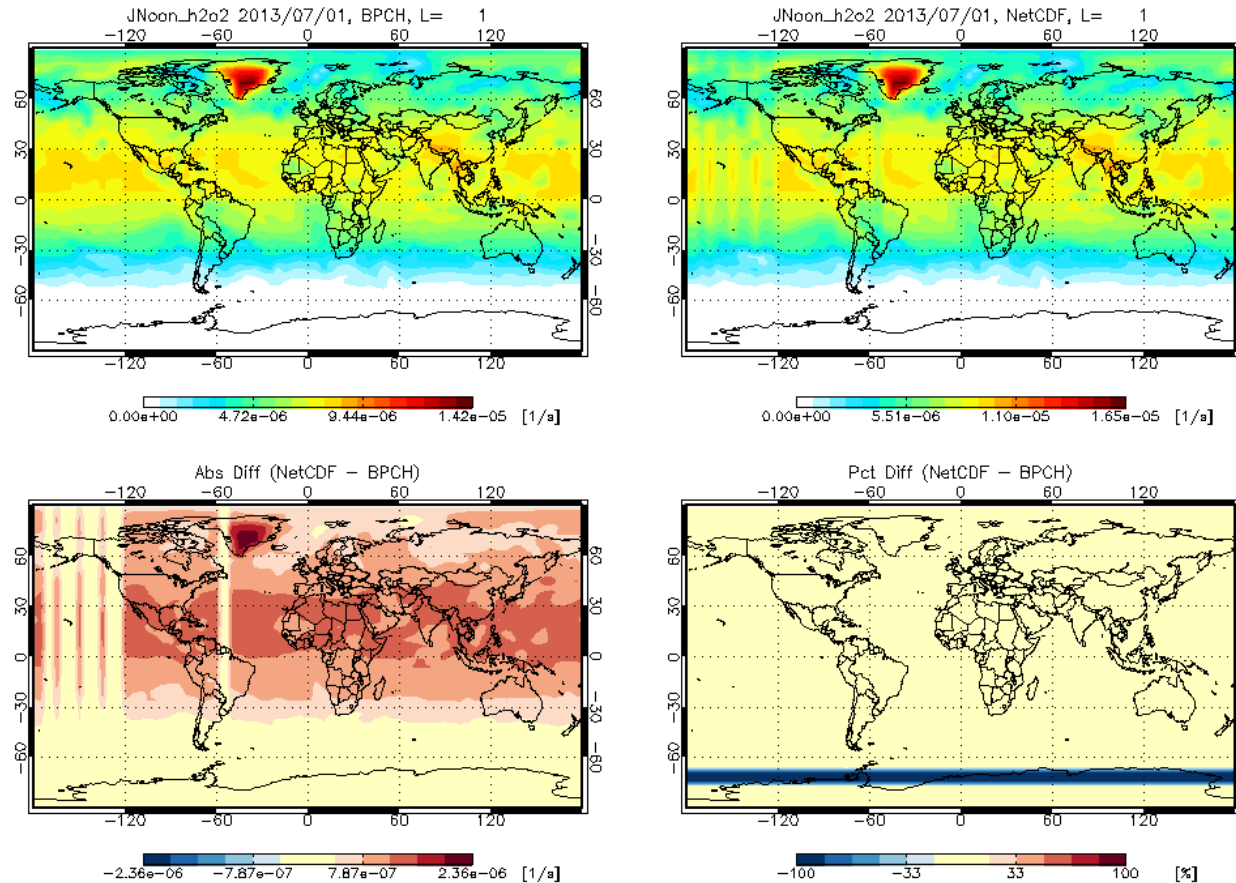
- Compiling with `BPCH_DIAG=n` will:
 - Ignore ALL code that is blocked out with `#if defined(BPCH_DIAG)`
 - Turn bpch-specific routines into stubs
 - Read the OUTPUT MENU from `input.geos`
 - Because GC needs this to know when to stop the run (at least for now...)
 - Read the DIAGNOSTIC MENU from `input.geos`,
 - But ignore all of the NDxx switches except ND70 debug print
 - Ignore the ND48, ND49, ND50, ND51, ND51b, etc. menus in `input.geos`
 - Avoid creating bpch output files
- The Unit Tester (Bleeding Edge) has been modified accordingly
 - i.e. The “validate” script won’t look for bpch files if `BPCH_DIAG=n`

GEOS-Chem compilation options

- GEOS-Chem “Classic”:
 - `BPCH_DIAG=y NC_DIAG=n`: Default that will ship with v11-02
 - `BPCH_DIAG=y NC_DIAG=y`: For comparing bpch vs. netCDF output
 - `BPCH_DIAG=n NC_DIAG=y`: For building GC “Classic” in the cloud
- GCHP (or GC embedded in BCC, GEOS-5, CESM, ECMWF, ...):
 - `BPCH_DIAG=n NC_DIAG=y`: Avoids potential conflicts with ESM code
- Eventually these Makefile options will go away once bpch is totally removed. NetCDF will be the only I/O option. Someday ...

J-value algorithm

Multiplying by $86400s / 7200s = 12$, which is the width of the window that is used for local time averaging (11:00 to 13:00 local solar time)



Quantity: J(H₂O₂), 24-hour avg

Simulation: geosfp_4x5_standard

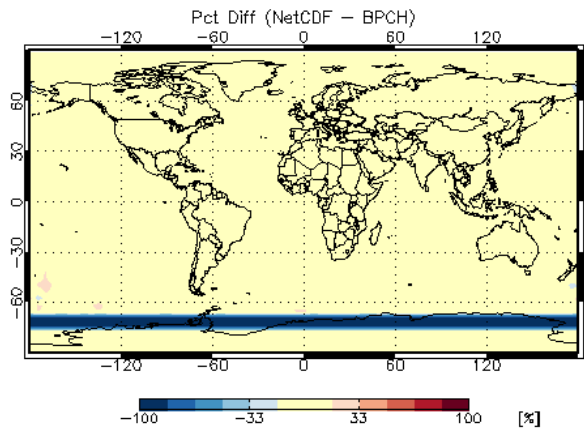
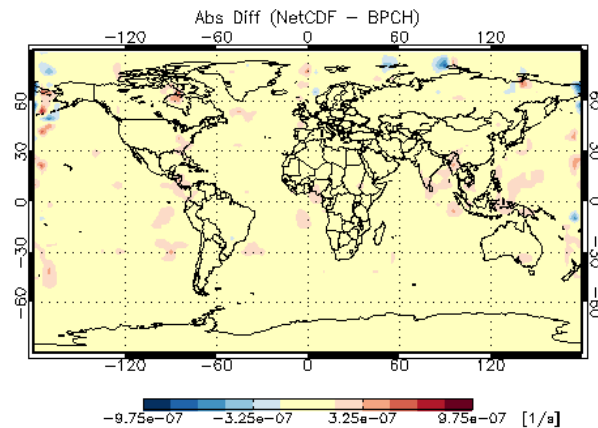
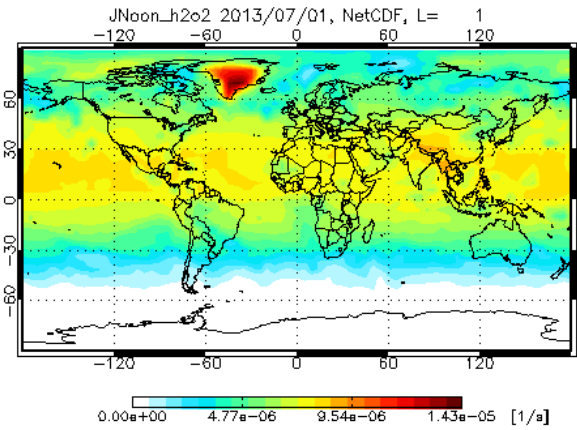
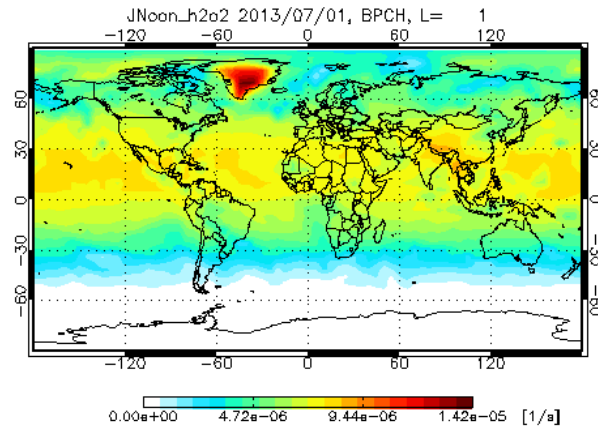
You can see striping in the difference between the netCDF and bpch.

The bpch is being divided by the number of times each box is near local noon (between 11 and 13 LT).

The netCDF multiplies each J-value by a factor of 12 to “counteract” the fact that the diagnostic is being divided at each update.

J-value algorithm

Picking the nearest box to local noon, and multiplying by 86400s / chem timestep to counteract the fact that the diagnostic is divided by the number of updates



Quantity: J(H₂O₂), 24-hour avg

Simulation: geosfp_4x5_standard

If instead we pick the nearest box to local noon (instead of averaging) then we get a much better representation of the J-values!

Miscellany

- GC “Classic” History fixes yet to be made:
 - Add better error checks for collections and species
 - DryDepVel_CO should stop with an error, because CO doesn’t dry deposit, etc.
 - Updates when reading in HISTORY.rc
 - Make sure each collection ends with a ::, and other syntax checks.
 - Use ExpID as the file template prefix with the ability to customize the path
 - Remove non-functional parts from GCC HISTORY.rc to avoid confusion
- Unit Tester fixes yet to be made:
 - Add a HISTORY.rc specific to each simulation in the Unit Tester, with all relevant netCDF diagnostics turned on
 - Don’t append .mp or .sp suffixes to files unless it’s a unit test