GLACE experiments with ACCESS

GLACE in ACCESS required several code changes, in CABLE as well as the UM (see below).

We introduced a Namelist option in the CABLE namelist file: GLACE\_STATUS

Can be “NONE”, “WRITE”, or “READ”. Needs to be run with the WRITE option first to save soil moisture files at every timestep that can be read in in a READ run. The data is written into the same directory as the other output (e.g. /short/$PROJECT/$USER/UM\_OUTDIR/$User/$Runid) into folders smcl\_YEAR that contain a .bin and .dat file for each processor. The .bin data can be read back into the model directly (GLACE-1) or intermediate steps can be performed on the data before reading it back in (GLACE-CMIP5). The GLACE\_DIR specifies the folder for the READ runs where the input data is located.

In cable\_user%GLACE\_STATUS = 'WRITE' runs every timestep we write the soil moisture (ssnow%wb) at every level (ms=6) to a file per node. Every file contains timesteps for one run/resubmission (resubmission needs to be once every year). After each year these files are moved from the run directory into yearly folders. In GLACE\_STATUS = 'READ' these kind of files can be read in again, overwriting the calculated soil moisture at every level. It is crucial to run write and read runs on the same number of processors to be able to read files back in on a per node basis. In the case of postprocessing in between, e.g. when calculating a climatology, we need to keep the strucuture of one file per node. Every file can contain different numbers of landpoints (dimx) depending on how the landpoints are distributed on the nodes.

See code repositories <https://access-svn.nci.org.au/trac/um/browser/branches/dev/rzl561/ACCESS-1.3_CABLE-2.0_repl_GLACE>

and

<https://trac.nci.org.au/trac/cable/browser/branches/Users/rzl561/CABLE-2.0.1_GLACE-typeForcing>

GLACE-CMIP5 jobs are @accesscollab: uamoa (CTL), uamon (GC1A85), uamom (GC1B85)

Code changes in CABLE

changes are in core/biogeophysics/cable\_diag.F90 and UM/cable\_implicit\_driver.F90

cable\_diag.F90 includes now cable\_diag2: writes 3D variables (proc, timestep, soil level)

cable\_read\_module was adjusted to read 3D variables

cable\_implicit\_driver calls cable\_diag2 and cable\_read depending on GLACE\_TYPE status (write or read)

for writing, files are opened if first\_atmstep\_call/start\_run are .true. at the beginning of the run (NRUN) AND at the beginning of every resubmission (CRUN) -> first\_atmstep\_call had to be passed down from UM (see below)

it is new that cable\_implicit\_driver depends on cable\_diag: needed to add dependency in Makefile!

Changes in cable\_soilsnow.F90 make sure ssnow%wb is not updated if GLACE\_TYPE == ‘READ’

Code changes in UM

endstep, timestep\_number, mype and first\_atmstep\_call need to be passed to cable\_implicit\_driver,

they all need to be added and declared in subroutines AND calls

endstep, timestep\_number and mype:

subroutine /control/top\_level/atmos\_physics2.F90 has all 3, calls subroutine control/top\_level/ni\_imp\_ctl -> pass endstep and mype to ni\_imp\_ctl (timestep\_number already there)

subroutine ni\_imp\_ctl calls atmosphere/boundary\_layer/imps\_intct.F90 -> pass endstep, timestep\_number and mype

subroutine imps\_intct calls atmosphere/boundary\_layer/imp\_solver.F90 2 times -> pass endstep, timestep\_number and mype

subroutine imp\_solver calls atmosphere/boundary\_layer/sf\_impl.F90 -> pass endstep, timestep\_number and mype

subroutine imp\_solver calls core/biogeophysics/cable\_implicit\_driver.F90 -> pass endstep, timestep\_number and mype

first\_atmstep\_call: logical

present in /control/top\_level/atm\_step.F90 which calls atmos\_physics2.F90,

pass from atm\_step to atmos\_physics2 and further same way as above

# GLACE-CMIP5

For GLACE-CMIP5 we wanted to prescribed soil moisture climatologies and transient climatologies (30-year running means). The functions we used to do this are in /short/dt6/rzl561/utils/calc\_avg\_binFiles @raijin.

The shell script calc\_avg\_start.sh calculates the average over a certain number of years (climatology) and was used for GC1A85. The shell script calc\_runmean\_start.sh starts a cascade of job scripts that calculate the average over a certain number of years and then does the same for the next year (+1), this was used to calculate the running means for experiment GC1B85.

These routines are not very fast, because the averages are calculated over every timestep for every processor.