

## File list and directory description

**Control\_run-defaultparams:** This directory contains the CM1 output files for the control simulation using the default parameter values. No perturbations are done here. This simulation is compared to the perturbation experiments to see how the precipitation responds to changes in the parameters.

**Control\_experiments:** this directory contains the results from the one-at-a-time sensitivity experiments using the control sounding. Within this directory, there are 60 directories, which correspond to 4 individual perturbations for each of the 15 parameters ( $4 \times 15 = 60$ ). See the 'Simulation\_Decoder' spreadsheet for details on which simulation represents which parameter perturbation. Within these 60 directories, there is a directory holding the CM1 binary files, which are output every 5 minutes. For analysis, the cm1out\_i.ctl (interpolated data) are used. The namelist.input text file is included, this is needed to run the model. The paramlist.input test file for each simulation is included, and shows the values for each parameter.

**LowFL\_experiments:** This directory is the same as Control, expect these are the CM1 output files for the environmental test where the surface potential temperature is decreased (see citation for details).

**LowU70\_experiments:** This directory is the same as Control, expect these are the CM1 output files for the environmental test where the horizontal wind speed profile is decreased by 30% (see citation for details).

**netcdf\_1param\_runs\_lowFL:** This directory contains all 60 simulations in netCDF format. The control simulation using the default parameter values for this lower freezing level (FL) environment is also included (lowFL\_control.nc), as well as the fortran files that were changed for this simulation, i.e., the base.F file which is where the environment is changed. After each change, the model must be re-compiled through 'make clean; make'. The reorder.sh bash file is also included, which renames the files so that the NCL scripts used can read each file in numerical order.

**netcdf\_1param\_runs\_lowU\_70:** Same as netcdf\_1param\_runs\_lowFL, but for the lower wind speed profile environment.

**netcdf\_1param\_runs\_morePRs:** Same as netcdf\_1param\_runs\_lowFL, but for the control environment.

**bash-script:** Contains the bash script to automatically generate the directories and run the simulation for all parameter perturbations at once.

## Variables

In the output files, there are some variables we used that are not clearly described, here is a list:

qc – cloud water mixing ratio (kg/kg)

qr – rain mixing ratio (kg/kg)

qi – cloud ice mixing ratio (kg/kg)

qs – snow mixing ratio (kg/kg)

qg – graupel mixing ratio (kg/kg)

qdiag1 – autoconversion process rate ( $s^{-1}$ )

qdiag2 – accretion process rate ( $s^{-1}$ )

qdiag3 – snow melting process rate ( $s^{-1}$ )  
qdiag4 – graupel melting process rate ( $s^{-1}$ )  
qdiag5 – rain evaporation process rate ( $s^{-1}$ )  
qdiag6 – cloud ice deposition process rate ( $s^{-1}$ )  
qdiag7 – snow deposition process rate ( $s^{-1}$ )  
qdiag8 – cloud droplet condensation/evaporation process rate ( $s^{-1}$ )  
qdiag9 – graupel deposition process rate ( $s^{-1}$ )  
qdiag10 – snow sublimation and change of Q melting snow and evaporation process rate ( $s^{-1}$ )  
qdiag11 – graupel simulation and change of Q melting of graupel and evaporation process rate ( $s^{-1}$ )  
qdiag12 – cloud ice sublimation process rate ( $s^{-1}$ )