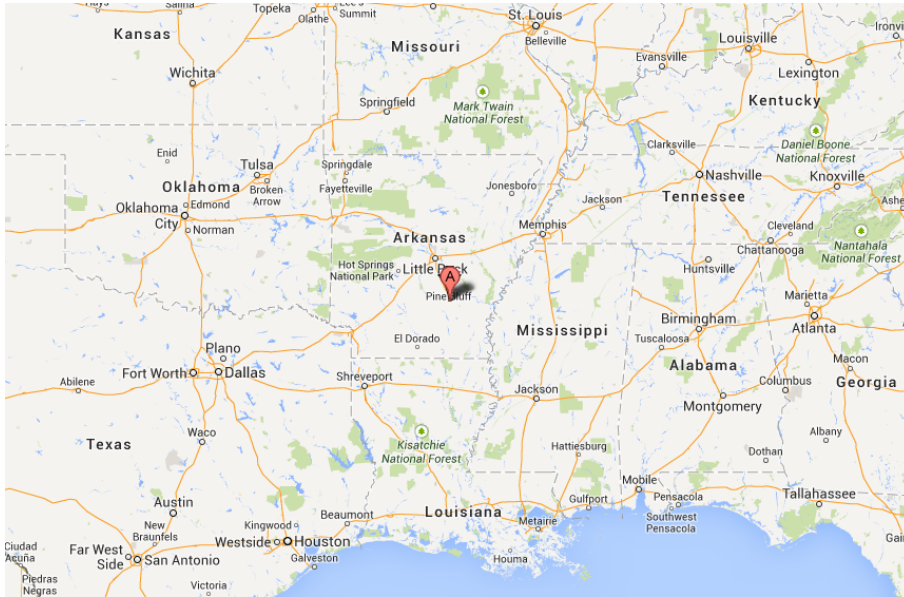


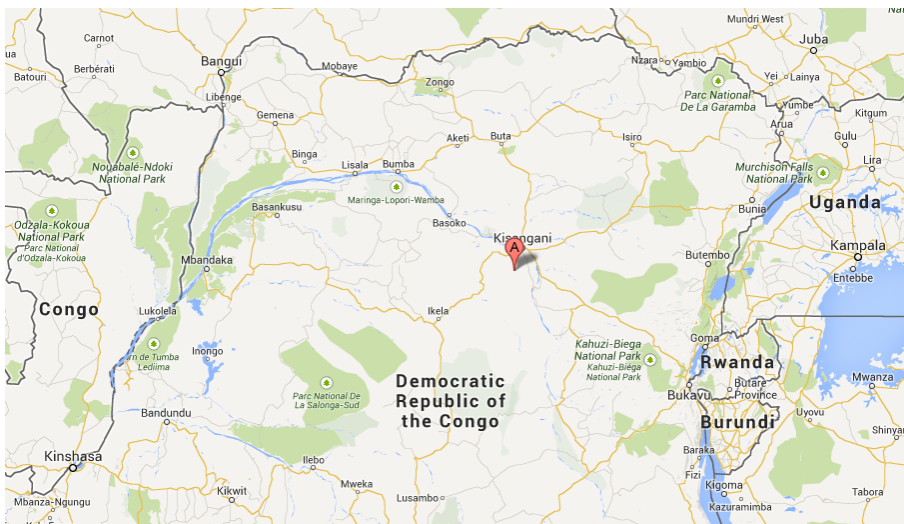
Single Column Model exercise

Two profiles from the operational IFS T1279L137 27/04/2014 00 UTC forecast were extracted for the first 30 hours (with frequency 1 hour) for the following locations with intensive convection:

North America (34N,92W)



Central Africa (0,25E)



Those two profiles will be used as a large scale forcing for the IFS single column model (SCM) sensitivity study to further explore convection parameterization.

Instruction to run SCM under Metview

- Make sure to have MetView window opened in your screen.
- Go to the **SCM_Stockholm** directory where the two cases are stored under directories **NAmerica** or **CAfrica**.
- Go to the appropriate directory (double click on desired folder).
- Inspect your input profile **scm_in.XX.nc** (double click)
- Inspect your model icon **ScmRun** (right click -> Edit). Make sure the correct namelist file and correct output data path is set.
- Run the SCM: **ScmRun** (right click -> Execute). During execution the icon label gets orange. Green label indicates the execution is successfully completed. (In the other case the label gets red.)
- The results appear as another netCDF file (*.nc) with the name specified in **ScmRun** icon. Note that any existing file with the same name as the SCM output file is automatically overwritten by the most recent SCM execution. Make sure you don't mess up your results.
- The output file can be inspected in the way described for the input file (double click). The visualisation could be better done with the **Scm Visualiser** icon allowing Time Value Curves, Time Height Matrix visualisation or set of Profiles for output variables. It also allows to plot differences when comparing two different SCM results.
- A convenient macro **plot_ref.mv** was prepared to visualise set of useful fields. Right click -> execute. Move the SCM output file (pull and drag) into the input data box. Make sure the output file has the intended name. Then confirm the setting by Apply and wait the macro is processed. The postscript file can be viewed by right click -> visualise.

SCM exercises

There are several sensitivity tests to be studied with the SCM. All settings are to be controlled through the namelist file only. Please make sure, the outputs are given unique names in order to be easily identified from other experiments. (Use duplicate option to make a copy. Once a file is being modified don't forget to rename it.)

For each location following test could be performed:

1. Impact of the improved diurnal cycle of convection

Namelist block NAMCUMF, parameter RCAPDCYCL

RCAPDCYCL = 2 (default) activates the diurnal cycle using sub-cloud CAPE,

RCAPDCYCL = 1 diurnal cycle using surface sensible heat flux,

RCAPDCYCL = 0 reverts the code to a setting before the diurnal cycle for convection was implemented.

Look at the timing of convective and precipitation events.

2. Optimization factor for the time scale adjustment:

Namelist block NAMCUMF, parameter RTAUA

RTAUA=1. default value (set it to 0.33 and 3.)

The ratio between the actual cloud base mass flux and the unit (initial) cloud base mass flux:

$$\frac{M_{base}}{M_{base}^*} = \frac{PCAPE - PCAPE_{bl}}{\tau} \dots$$

Look at the amplitude of precipitation.

3. Sensitivity to entrainment rate:

Namelist block NAMCUMF, parameter ENTRORG

ENTRORG= 1.75E-3 default setting

ENTRORG= 5.8E-4 reduced by factor 3 (mostly shallow convection regime)

ENTRORG= 5.25E-3 multiplied by factor 3 (mostly deep convection regime)

Look at the cloud top height, precipitation and eventually changes in temperature and moisture fields with respect to the reference. Note also this is having less impact with the diurnal cycle activated.