

Single Column Model exercise

In the following exercise the radiative properties of atmospheric gases in the Earth's Atmosphere will be explored with the single column (SCM) version of the IFS model. This simplistic exercise will assume no cloud interfering with the radiation.

1. Clear sky conditions for a standard Tropical atmosphere (25N) - reference

- Make sure to have MetView window opened in your screen.
- Go to the directory Radiation/clear (double click on desired folder).
- Inspect your input profile data *scm_in.clear.nc*.
- Inspect your model icon *ScmRun_clear*. Make sure you are using correct namelist file, input file and the name for output file is defined. (Do not use spaces in the filename.)
- Run the SCM by right click on *ScmRun_clear* and selecting execute. Make sure the execution finished successfully: Icon label gets green and the output file is created.
- To visualize results as the 2D height-time profiles use the plotting tool *plot_clear.mv*: right click -> execute -> drag in the Input data box the SCM output file icon & check the output PS file name -> Apply.
- Check the results: The SW shows heating over the whole profile, strong in the stratosphere above 15 km, whereas three major features are observed in the LW heating rate profile:
 - negative heating (cooling) dominates in the troposphere
 - small heating is observed in the lower-mid stratosphere around 100 hPa
 - cooling dominates again in the upper stratosphere and mesosphere above 50 hPa.

2. Contribution of different atmospheric gases to the radiative transfer

To explore the way different gaseous species contribute to the profiles set the parameter *igas* in the *NAERAD* section of the *namelist_clear*. The possible values of the parameter are:

<i>igas</i> =0	all gases are active
<i>igas</i> =1	only H ₂ O active
<i>igas</i> =2	only CO ₂ active
<i>igas</i> =3	only O ₃ active
<i>igas</i> =4	only CH ₄ active

Run the model for the desired *igas* value and save the output with a unique name (e.g. *out_h2o.nc*). Produce the plots for each experiment using the plotting tool *plot_clear.mv*. You can also compare each output with the control profiles using the comparison tool *clear_compare*. Remember to set the name of the plot file in the last box of the user interface (e.g. *h2o_vs_cntl*).

3. Inspect the previous for other initial profiles

The same as above can be checked with the other three profiles named *scm_in.X1.nc*, *scm_in.X2.nc* and *scm_in.X3.nc* belonging respectively to sub-arctic winter (62N, end February), mid-latitude winter (46N, February) and mid-latitude summer (46N, June).