Sensitivity test

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Simulation period: August 1st – 30th (first five days for spin up)

Model: COSMO-org

Observation: Corrected reflectance (Visible Infrared Radiometer Suite (VIIRS)); top of the atmosphere radiation (CM SAF)

Cloud field on August 15th, 2016 at 12:00 UTC

satellite

09

10°S

20°S

20°W

10°W

rlam_heat default: 0.5249 maximum: 2 minimum: 0.1



Corse simulation

Observed cloud field by the VIIRS satellite (corrected reflectance) (left panel) Simulated cloud field visualised using the liquid water path (TQC) with different rlam_heat values (right panel)





Bias of outgoing longwave radiative flux (OLW) at the top of the atmosphere over the fine domain (model-observation(CM SAF))



33.33 55.56 77.78 100.00

rlam heat

default: 0.5249 maximum: 2

minimum: 0.1

Bias of reflected shortwave radiative flux (OSW) at the top of the atmosphere over the fine domain (model-observation(CM SAF))

-11.11 11.11 OSW (W/m²)

-33.33

-100.00 -77.78 -55.56



(model-observation(CM SAF))







Mean vertical profiles of temperature (T) within the fine domain



Mean vertical profiles of cloud liquid water content (QC) within the fine domain

Results:

- 1. COSMO-org seems to significantly overestimate the shortwave radiation over South Atlantic.
- 2. Model results are sensitive to the parameters (rlam_heat, rat_sea, tkhmin and perhaps more).
- 3. There are large potentials in improving the model performance with tunning.