**RCEMIP-ACI MODEL DOCUMENTATION FORM**

Please fill out the below with the relevant information for the model simulations you are submitting to RCEMIP-ACI. If you are submitting multiple sets of simulations from multiple versions or configurations of a model, please fill out a documentation form for each.

**Your information**
Your Name: Gabrielle Leung, Sue van den Heever

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**Model information**
Model Name/Version: RAMS version 6.3.04 (<https://github.com/grleung/rams/releases/tag/rcemipaci>)

 Model Name Abbreviation (used when uploaded to JASMIN): RAMS

Citation for model:

* Cotton, W.R., R.A. Pielke, Sr., R.L. Walko, G.E. Liston, C.J. Tremback, H. Jiang, R.L. McAnelly, J.Y. Harrington, M.E. Nicholls, G.G. Carrio, J.P. McFadden, 2003: RAMS 2001: Current status and future directions. Meteor. Atmos. Physics, 82, 5-29.
* Saleeby, S.M., and S.C. van den Heever, 2013: Developments in the CSU-RAMS Aerosol Model: Emissions, Nucleation, Regeneration, Deposition, and Radiation. J. Appl. Meteor. Climatol., 52, 2601-2622

Time step: 1s

**Grid information** (modify if needed)
RCE\_small, number of grid points: 100x100x74

RCE\_small, horizontal grid spacing: 1 km

 RCE\_large, number of grid points: 2000x134x74

 RCE\_large, horizontal grid spacing: 3km

Number of vertical levels: 74 (model top at 33 km) Vertical levels: RCEMIP grid as specified in Wing et al 2018.

Sponge layer: Rayleigh damping of above 25km

**Physics packages**
Radiation scheme: RTE-RRTMGP (longwave and shortwave)

Temporal resolution of radiation calculations: 60s

Microphysics scheme: RAMS bin-emulating two-moment microphysics

The model includes the Twomey effect of liquid (i.e., the microphysics is online coupled to the radiation and transfer the droplets size): yes

The model includes the Twomey effect of liquid (i.e., the microphysics is online coupled to the radiation and transfer the ice particles size): yes

Sub-grid scale turbulence scheme: deformation-K eddy turbulent diffusion scheme [Smagorinsky (1963), with stability modifications from Lilly (1962) and Hill (1974)]

Other comments:

* RAMS microphysics computes saturation with respect to liquid for liquid-phase processes and with respect to ice for ice-phase processes. In the 1D output, we specify “hur*i*\_avg” for saturation with respect to ice and “hur*l*\_avg” for saturation with respect to liquid water. The cloud fraction is defined according to the definition in Wing et al. (2018), using saturation with respect to liquid below 0ºC and with respect to ice above 0ºC.
* RAMS uses an Arakawa-C type staggered grid. Grids for u, v, and w are staggered by half a grid spacing relative to the thermodynamic grid. “zt” is the altitude for the scalar grid, and “zm” is the altitude for the momentum/w grid.