Responses to comments from Reviewer 1

(page and line numbers refer to the original manuscript)

P7768, Line1 : “2-moment” was changed to “quasi two-moment” everywhere it referred to the LIMA scheme.

P7768, Line5 : Manuscript corrected according to the reviewer's suggestion.

P7769 : We think that the reference to the review of Tao et al. is sufficient

P7770 Line 9 : Manuscript corrected according to the reviewer's suggestion.

P7771 : References to Thompson and Eidhammer 2014 and Thompson et al. 2008 were added, as well as a brief description of their scheme, following suggestion of reviewers 1 and 3.

P7772 Line 2 : The confusing sentence was changed to : “The nucleation of aerosol particles is dependent on water vapour amounts brought by vertical updrafts. The resolution of the vertical motion is therefore an essential point in the computation of nucleation processes Morrison et al. (2008).”

P7775 (numbered 7776 in the review) Line 14 : The manuscript was corrected to better explain that the scavenging changes the overall aerosol population size distribution by affecting differently each aerosol mode, but the modification of the size distribution within each aerosol mode is neglected because each mode has a fixed PSD.

P7777 : Since the S and t variables are used to define the integration limits, an apostrophe is used to differentiate the integration variable from the supersaturation or time (integration over all values of S' between 0 and S for example).

P7778 : All equations are now numbered.

P7779 Line 8 : Sentence removed according to the reviewer's suggestion.

P7784 Line 10 : “CCN” changed to “deliquescent aerosol” in this sentence.

P7787 Line 19 : “as plotted in black (...)” was removed from the sentence.

P7787 Line 20 : “hours” was added in the sentence.

P7787 Line 22 : “CCN” is necessary here : the aerosol population is composed of 4 modes, 3 for the CCN population and 1 for the IFN population.

P7788 Line 13&20 : Manuscript corrected according to the reviewer's suggestion.

P7789 Line 13-15 : Manuscript changed so that the different nucleating abilities of black carbon and organics is clearly presented as an illustration of the Phillips parameterization.

P7789 Line 23 : The manuscript was corrected to better stress that the small impact of changes in the IFN population on precipitating ice is specific to this case, and different results may be obtained for other cloud conditions.

P7790 Line 8 : In the paper aerosols are considered as CCN (hydrophilic particles) or IFN (hydrophobic particles). Of course it is understood that CCN can be activated to produce droplets while IFN are nucleating agents to form pristine ice crystals. Within each CCN mode, aerosols will be activated at a supersaturation which depends on their size, therefore we cannot affect a single activation supersaturation to each hydrophilic aerosol mode. We prefer to keep the terminology CCN and IFN, which reflects the activating/nucleating ability of the aerosol particles, and is commonly used in modeling (see for instance Kogan 2013, Lim and Hong 2010, Thompson and Eidhammer 2014).