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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A simple model for the time evolution of the condensation sink in the atmosphere for intermediate Knudsen numbers" *by* Ekaterina Ezhova et al.

Anonymous Referee #2

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The manuscript entitled "A simple model for the time evolution of the condensation sink in the atmosphere for intermediate Knudsen numbers" by Ekaterina Ezhova and colleagues describes the effects of an approximated Fuchs-Sutugin (FS) coefficient on the mass flux in the regime of Knudsen numbers down to ~0.5. The new FS approximation is then used to analyze the impact on a purely calculated condensation sink. The comparison to ambient data from the Hyytiälä measurement site shows agreement within 5.5 % as long as larger particles do not play a big role. The manuscript is well written and clearly fits into the scopes of Atmospheric Chemistry and Physics. The new findings look convincing and novel enough to justify publication in ACP. I have a few minor comments though that should be considered before final publication.

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Discussion paper

On page 3 just before equ. 3 it is stated that the ". . .FS coefficient . . . connects the mass flux towards a molecule in the kinetic regime. . .". I believe it should be the "massflux towards a particle".

On page 6, lines 20/21, the authors mention that equ. (15) and (16) can be used in quasi-steady conditions together with distribution parameters changing slowly in time. To get some idea it would be helpful here if corresponding time scales would be mentioned. There is some indication given in a later section but should also be discussed here.

Some clarification is needed in the discussion of Figure 6 on page 7, lines 26-31. Fig. 6 displays CS for several days but then it is referred to "note that Kn $\sim$ 5.2 on March 27th an Kn $\sim$2.5 on June 1st" (line 30). I don't see how this connects to Fig. 6, at least it is not visible to me.

Figure 3: Please expand figure caption, some more explanation is needed here. Also, no reference is made to the color code (condensation sink ratio).

Figure 8: Again, more elaborate figure caption would be desirable. What are the lines representing? BTW: the inset is hard to read.

Figure 9: line types dashed and dotted are hard to distinguish.

Editorial comments: Page 2, lines 18/19: ". . .affects little the particle growth" (delete "to")

Page 7, line 27: ". . . showing that the mass. . ." (delete one "the")

Page 9, line 6: ". . . time scales. . ."

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