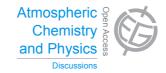
Atmos. Chem. Phys. Discuss., 14, C10434–C10436, 2014 www.atmos-chem-phys-discuss.net/14/C10434/2014/ © Author(s) 2014. This work is distributed under the Creative Commons Attribute 3.0 License.



ACPD 14, C10434–C10436, 2014

> Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Interactive comment on "Time-dependent freezing rate parcel model" by G. Vali and J. R. Snider

Anonymous Referee #1

Received and published: 23 December 2014

Review of "Time-dependent freezing rate parcel model" by Vali and Snider

There are still many uncertainties in the knowledge and understanding of ice nucleation, and how to interpret laboratory measurements and observations regarding ice nucleation. In this paper, based on laboratory measurements, the authors include a time dependent ice nucleation parameterization in a parcel model to determine the importance of this time dependence for different conditions an air parcel can encounter (i.e. cooling rates).

This paper is well written, and is of interest for advancing the knowledge of ice nucleation and should be published. I have only minor comments.

Page 29306: Line 4: Suggest rewriting "...includes a period of time when the parcel remains stationary at ..."

Line 22: "...due to lack of tools to study ice nucleation processes on molecular scale." As far as I understand, there is research beа nucleation on the molecular ing conducted to study ice scale (for http://research.chem.psu.edu/mafgroup/Research.html example see or http://econos2014.sciencesconf.org/36079/document).

Perhaps the sentence can be rephrased. ".... due to difficulties in studying ice nucleation processes on a molecular scale"

Page 29307: Line 5: Please add citations for the statement that immersion freezing is the dominant mode

Line 27: suggest rephrasing: "... as additional parameters in newer parameterizations (Li and Penner....."

Page 29308: Line 21: I suggest using capital D in Time-Dependent Freezing Rate (TDFR)

```
Page 29309: Line 10: "or" instead of "of"
```

Line 12: "Initial conditions"

Page 29310 Line 16: "indicates" instead of "indicated".

Page 29311 Line 19: I suggest that Eq 5 is described before making references to this equation in this and the next paragraph. Page 29312: Line 9: Suggest rephrasing: "...are considered when located at considerable heights"

Line 10: "above", instead of "about".

Line 18: I suggest including a reference to Knopf and Alpert 2013 (A water activity based model of heterogeneous ice nucleation kinetics for freezing of water and aqueous solution droplets, Faraday Discussions, 165, 513), who also show the effect of cooling-rate on freezing.

ACPD

14, C10434–C10436, 2014

> Interactive Comment



Printer-friendly Version

Interactive Discussion

Discussion Paper



Page 29313: Line 20: I suggest defining Ts here (as isothermal level) instead of at line 2 on page 29314.

Page 29314: Line 3:. N(s-dt): number of what? Line 5: What does 1 stand for for p1 and q1 ? Line 6: is this notation correct: -20 C > Ts < -16 C? Line 24: Should w = 1 have units of C min-1 ?

Page 29315: Line 2: not sure what is meant by: " and some other value" Line 8: Since qw is sensitive to the updraft velocity, does that mean that qw is also equally dependent on the cooling rate?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 29305, 2014.

ACPD

14, C10434–C10436, 2014

> Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

