

Interactive comment on “Ice nucleation terminology” by G. Vali et al.

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I fully support this initiative. There are significant inconsistencies in the ice nucleation terminology used within the atmospheric sciences and we would collectively benefit from a more consistent use of language. In the following I make some suggestions and comments:

1. Condensation freezing. This term is rather poorly defined at present, but is commonly used and therefore needs to be addressed directly. This term is only mentioned in passing. I suspect that the authors feel it is a term which should not be used? At the very least I suggest that authors express their opinions on the use of this term – even if their recommendation is that the term should not be used. However, I think it does have a place in our vocabulary. By lumping the process of condensation freezing in with immersion the implication is that it is the same. Are we confident that they are the

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same? In my mind immersion freezing takes place when a particle is fully immersed in a water droplet, which implies that the water droplet has been at water saturation for some time before freezing takes place. In contrast, the term condensation freezing implies that nucleation occurs as an INP activates as a CCN. While freezing may occur at the same point in the RH-temperature phase diagram, the pathway through the RH-temperature phase diagram is distinct for immersion and condensation freezing. I am not confident that there are no differences between these pathways and it would be a shame if this definitions paper were to become out of date if someone were to show that there are differences between these pathways. There is perhaps a hint of this in the recent nx-illite intercomparison paper in which some dry suspension experiments, where nucleation occurs through a condensation pathway, produce greater ns values compared to droplet freezing experiments which proceed through the immersion pathway (Hiranuma et al. ACPD, 2014).

2. Ice nuclei or ice nucleus. One more reason for avoiding these terms and using ‘INP’ is that within the ice physics community ice nucleus refers to what we would call a critical embryo rather than the particle on which an ice embryo forms.

3. ‘ice nucleation’. In this definition it is stated that a ‘stable body of ice’ must form. I disagree with this, the nucleus and initial ice phase to nucleate may often be metastable. It is less metastable than supercooled water, but it is not the stable phase. This is discussed extensively in a recent article: Malkin et al. Physical Chemistry Chemical Physics, 2014, DOI: 10.1039/C4CP02893G.

4. INblob – are you testing we are paying attention? ;)

5. References. I think the article needs some suitable referencing. The only paper referred to is VS66, but there is no bibliography to look this up. I know which paper is referred to, but others will not. I would recommend at the very least reference to the two main sources of definitions used at present: Vali 1985 and Pruppacher and Klett (1997). It would be useful to at least acknowledge that the definitions are quite different

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and that different parts of the atmospheric community have adopted the different sets of definitions.

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