

Interactive comment on “An improved criterion for new particle formation in diverse atmospheric environments” by C. Kuang et al.

C. Kuang et al.

ckuang@bnl.gov

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In response to the referee comment regarding data set availability, while there are many hundreds of measurements of new particle formation spanning over two decades, there are far fewer measurements of new particle formation with accompanying measurements of gas-phase sulfuric acid concentration. Measurements of $[H_2SO_4]$ were required to estimate the nucleation rate driving the aerosol dynamic model.

While the model development and validation required sulfuric acid concentrations, calculation of the new particle formation criterion LI^* can be determined exclusively from measurements of the aerosol size distribution for nucleation events accompanied by steady particle diameter growth. For these types of events, the aerosol Fuchs surface area and nucleation mode diameter growth rate can be obtained directly from mea-

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surements of the aerosol size distribution. For new particle formation events where growth of the nucleation mode is not clear, estimates of the nucleation mode growth rate can be obtained with measurements of $[H_2SO_4]$ where the time delay between the initial increase in $[H_2SO_4]$ and N3-6 (concentration of 3-6 nm particles) provides an estimate of the time it takes for the initial nucleated particle to grow to a detectable size. Generally, application of this theory requires measurements of the aerosol size distribution ($3 < D_p < 3000$ nm) and an estimate of the nucleation mode growth rate, obtained either from the size distribution itself or from the time delay between concentration profiles of H_2SO_4 and N3-6. The manuscript has been amended to include this clarification.

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