

## ***Interactive comment on “Measurements of cloud condensation nuclei activity and droplet activation kinetics of wet processed regional dust samples and minerals” by P. Kumar et al.***

### **Anonymous Referee #2**

Received and published: 16 June 2011

#### General Comments:

Kumar et al. describe the CCN properties of soil and mineral samples that have been generated by atomization of a dust-water suspension. The authors investigate the artifacts associated with this traditional method of laboratory dust aerosol generation. From this work, the authors developed a “Unified Dust Activation Framework” based on Frenkel-Halsey-Hill adsorption activation theory and Kohler theory, following comparisons of the laboratory data to each theory. Given the importance of desert dust storms and cloud activation, this topic is very important, particularly for inclusion of accurate CCN properties of dust into models, as well as with respect to the study of cloud

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processing. This is an excellent contribution to ACP. Minor revisions are suggested below.

#### Specific Comments:

Page 12562, Lines 8-9: The generation method should be noted here. Also, please clarify that these are soil samples that were atomized, rather than resuspended dust collected on a filter, for example.

Introduction: The introduction is well written and concise, while providing the background necessary for the manuscript.

Section 2.2: It should be mentioned that an SMPS was utilized for the size distribution measurements, as shown in Fig. 1.

Section 4: For interpretation of the soil sample data, it would be useful to state the most prevalent minerals in the soils (should be available in the literature); this should allow for comparisons between the minerals and soils and greater interpretation of the CCN properties.

Section 5: Addition of a glossary table is suggested to clearly define (in one place) all of the terms utilized in the equations, as searching for the term definitions can become cumbersome.

Page 12585, Last Paragraph: It is not clear how equation 15 was applied to result in the data points shown in Fig. 9. These are exciting results that show how this new framework can be applied to other samples; therefore, please clarify this process. How were different chemistry solutes considered?

#### Technical Comments:

Page 12575, Line 26: Fix typo.

Page 12577, Lines 1-2: Fix grammar.

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Page 12578, Line 17: Fix typo.

Page 12581, Lines 11-12: “dry dust lake beds” should be “dry lakebeds”.

Page 12581, Line 27: “or the Kelvin” should be “or Kelvin”.

Page 12586, Lines 18-20: Rearrange sentence for clarity.

Page 12591, Lines 27-30: Sullivan et al. has since been published in final form in ACP; please fix.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 12561, 2011.

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