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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A new data set of soil mineralogy for dust-cycle modeling" *by* E. Journet et al.

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Firstly, this is a useful and interesting paper. The compilation of a new data set which extends to soils which may become significant dust sources in the future is a valuable contribution to the field.

The purpose of this comment is to make the authors aware of a new study, published last June, which should be discussed in the present manuscript. In our paper (Atkinson et al., 2013) we studied the ice nucleating ability of the various minerals in mineral dust and also used a global aerosol model to produce global distributions of airborne minerals. Hence there is significant relevance for the Journet et al. study.

Specific comments:

1) P23945, ln 11. It is stated here that the clay minerals are highly effective ice nuclei. This comment should be revised in light of our recent paper. A major finding in our study (Atkinson et al. 2013) was that the feldspar minerals are the component of mineral dust which makes it effective at nucleating ice in the immersion mode (relevant for mixed phase clouds). In another article it was shown that feldspar is more efficient that the clay minerals at nucleating ice in the deposition mode (Yakobi-Hancock et al., 2013). It was previously though that the clay minerals were effective ice nuclei (e.g. (Murray et al., 2012)), but in our article we show that clay minerals in the absence of feldspar do not nucleate ice effectively (also see (Murray et al., 2011)). We also show that clay mineral powders used in some previous work contained a small, but significant, amount of feldspar (using powder X-ray diffraction). We suggest that it was this feldspar 'contaminant' that caused those clay samples to be effective ice nuclei.

2) P23945. In this section the reasons for needing a detailed mineralogy is discussed. In light of the new Atkinson paper another important reason is that a relatively minor component of mineral dust dominates its ice nucleating ability – a detailed knowledge of dust mineralogy is therefore needed to understand the indirect glaciation effect.

3) On P23957 there is an interesting discussion of the feldspar proportion in air vs in the average clay fraction globally – feldspar is enhanced in the airborne dust. One of the things we discuss in our paper is how new sources may have a different feldspar content to the new sources. Journet et al are now in a position to expand on this discussion with this new data set. Are new sources likely to have more or less feldspar?

4) In the airborne dust plots – what altitude/pressure level is this data reported for?

5) How well do the model dust mass loadings compare to measurements in the atmosphere?

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