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Interactive comment on “Long-range transport of giant particles in Asian dust identified by physical, mineralogical, and meteorological analysis” by G. Y. Jeong et al.

Anonymous Referee #4

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The authors present interesting measurements that relate to the transport of very large soil dust particles through the atmosphere. There is very little literature on this topic. Thus this paper makes a valuable contribution to the field.

Much of this paper deals with particle analysis, an area that is outside my field of expertise. I do not comment on this aspect.

We can make rough calculations to ascertain if the transport of such large particles requires invoking unusual processes. In other words, is the transport physically consistent with what we know about the behavior of particles in the atmosphere, in particular,

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simple Stokes settling. The source areas are about 2000 km from the receptor site. Transport times are 35 – 45 hours. This yields a transport speed of about (very roughly) 45-60km/hr. The settling velocity of a spherical 50 μ m diameter particle of unit density is 7.6×10^{-2} m/sec or about 6.6 km per day; because of the density of soil particles the rate would be about 13 km per day. Although the authors do not discuss the altitude of the dust outbreaks, my recollection is that these dust events often reach altitudes of 10km. Thus these transport events are broadly consistent with this simple-minded approach. Other processes might occur along the way that might affect the vertical distribution, e.g., vertical mixing, and thus further facilitate the transport of such large particles.

Thus, it is conceivable that such large particles could travel such distances. In this regard, it would be helpful if the authors presented a bit more information on the altitude distribution over the source region. This could probably be estimated from rawinsonde measurements at regional meteorological stations. Perhaps a CALIPSO pass through the region might provide useful insights.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 21041, 2013.

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