I have reviewed the paper "TEM analysis of the internal structures and mineralogy of Asian dust particles and the implications for optical modeling" by the authors G. Y. Jeong and T. Nousiainen. This paper describes the use of focused ion beam (FIB) – TEM to image cross sections of large (generally > 10 micron) mineral dust particles collected in Korea in field campaigns that have been described in previous papers. They find that particles are quite heterogeneous in composition, but can be grouped in three categories. Many particles have shells composed of clay minerals, and many particles contain iron oxide (mostly goethite). Because of its diversity of composition and shape, mineral dust is difficult to account for in remote sensing. Understanding composition and internal structure of particles can help us to determine which optical models need to be used for retrievals of mineral dust. As a result of its relevance to atmospheric science, *Atmospheric Chemistry and Physics* is an appropriate journal for this manuscript. It is also worth noting that the writing in the paper is exceptionally clear. I have several questions about the science in the paper that should be addressed prior to publication.

Major Comments

Most of the particles presented in this manuscript are very large (this is necessary to use FIB). However, long-range transported dust has a smaller diameter (Zender et al., JGR, 2003, 108, 4416 ; Durant et al., Prog. Phys. Geo., 2009, 33, 88). According to number distribution, most of the long-range transported dust is less than 1 micron in diameter. In this manuscript, many inclusions/coatings/pores are hundreds of nanometers to 1 micron across (with the exception, perhaps, of some of the goethite inclusions). As a result, I would expect that individual particles the submicron fraction are much more homogeneous in structure. Consequently, I would expect that this manuscript is applicable to the optical properties of dust near the source region, but not long-range transported dust, and thus has a lower degree of applicability to retrievals. These points should be addressed in the manuscript.

Clarity of figures: The imaging in this paper is beautiful, but I am concerned about the clarity of image interpretation. In particular: 1) not all of the images have scale bars, 2) the words indicating composition will be too small once the figures are the final size (could letters and a legend be used, e. g. Q = quartz, G = goethite, etc.?), 3) the lattice fringes are hardly visible and should be shown at higher magnification (a zoomed in image).

Other studies have performed FIB-SEM imaging of aerosol particles, and should be discussed in the introduction (e. g. mineral dust: Conny, Environ Sci Technol, 2013, 47, 8575; organic aerosol: Adler et al., PNAS, 2013, 110, 20414).

Minor Comments

Section 2: Some brief description of the field collections would be useful (were these samples obtained during dust storms?).

pg 6625 lines 24-26: This sentence is awkwardly worded.

pg 6627 lines 25-26: Why are the pores unlikely to be formed from dehydration? Are they too large?

Fig. 6 description in 3.1.2: What are the lines in the quartz component of the particle due to?

Section 3.1.3: How is halloysite differentiated from the other minerals?

Section 3.1.6: Mention how goethite is identified earlier in the manuscript. For some particles, you also used SAED (selected area electron diffraction), which should be mentioned as well.

Pg 6634 lines 5-7: It would be clearer to say "as the example we discuss below in sect. 3.3.2 shows," etc.

Pg 6635 lines 26-28: This sentence needs to be more specific. What exactly has not been attempted?

Pg 6638 line 6: Change "optical property" to "optical properties"

Fig 2: Does (e) show a lattice fringe or just (f)?