

## ***Interactive comment on “Characteristics and source apportionment of atmospheric aerosols at the summit of Mount Tai during summertime” by H. Xu et al.***

**Anonymous Referee #2**

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The manuscript describes a study to chemically characterize PM samples taken in Mount Tai during the summer of 2006 and to determine the possible source of them. The title of the paper suggests that some technique of source apportionment was applied; nevertheless, only results of concentrations and back trajectory analysis is presented. With only those elements this “apportionment” appears as an excessive claim. On the other hand, there are some inconsistencies with the sampling description, the presented results and the discussion. The paper remains unclear in both the central points: the experimental section and the discussion of the results. The authors should expand the description of the experimental methods used, including a discussion on their errors and uncertainties. This paper should be enhanced a lot.

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Some issues are missing equipment calibration, expected uncertainty associated to each one measurement, detection limits, and results of reference materials analysis. The description of the experimental methods used is incomplete and without references. Which was the efficiency of the extraction of metals? Co, Se, Sb, Mo and Tia are missing from the list in the Analysis section. Has this method used before? Similarly, very little is said about the IC analysis and quality control.

It is confusing the number of samples collected: if the authors sampled 30 days (days and nights) and only 2 samples were not taken they should have 470 and not 288. On the other hand in Table 1, it is not clear what do they mean with TSP. The total mass is PM<sub>10</sub> or PM<sub>2.5</sub>? Is the sum of all the stages, day plus night? This is recurrent in all the paper, you never know which size are the authors talking about.

If only four samples were collected in the other sites, it is necessary to know the standard deviation or the range of the measurements to know the variation on the concentrations and to demonstrate that these 4 samples are representative of all the period.

Figure 2: The size variability is not discussed related with day to night basis. A more deeply discussion is needed to understand and support the conclusions. The comparison among the sites is not sound, comparing PST vs PM<sub>10</sub> or PM<sub>2.5</sub>!, as well as in different seasons. The authors should explain if there are seasonal patterns in source activity in particles, ions and metals.

Page 16367. Concentrations of the crustal elements and metallic elements are referred to total mass? This is confused again. One or two tables showing concentrations of ions and metals with their basic statistic at different sizes and sampling periods should be included to understand the variations in concentrations, time and sizes. In figure 2 the typical size distributions of ions and elements are the averages at each size? What do you mean with typical?

The explanation of figure 3 is poor. The authors describes that concentrations of ions are lower at night, but that is not true in the first days of sampling. They do not explain

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also why since days 14 there is not variation of  $K^+$  concentration (days and nights).

Page 16369. "Secondary ions and  $K^+$  had large variations. (not true for  $K$ ), while others had little variations". Which others if there are only 4 species which had larger variations. Later, "For most metallic elements, the differences between . . . taking during the day and night was obvious". Where they are obvious if they do not show any figure or table about this! There are many inconsistencies like this in the discussion of the figure.

There is not PM source apportionment at all. At least a material balance should be performed to establish this.

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