

## ***Interactive comment on “Daily and hourly chemical impact of springtime transboundary aerosols on Japanese air quality” by T. Moreno et al.***

**Anonymous Referee #2**

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Since long-range trans-boundary transport of aerosols exerts an adverse impact on human health, it is important to quantify the contribution of source emissions on down-wind air quality based on measurements as well as numerical simulations. This study has analyzed the chemical composition of finer (PM<sub>2.5</sub>) and coarser particles (PM<sub>2.5–10</sub>) at an urban background site in southwestern Japan. It found that mineral dust and fresh sea salt are the main aerosol sources in the coarser fraction of PM<sub>2.5–10</sub>, and As-bearing sulphate dominates finer part of the measurement data (PM<sub>0.1–2.5</sub>), indicating the influence of fossil fuel combustion sources from China. In addition, this study used hourly data to show that the visits of mineral dust from Gobi desert are typically much shorter than sulphate aerosols. The topic of this manuscript is of relevance to

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this journal and the presentation quality of the paper is at an average level.

My issue with this paper is that much of the analysis is just describing the time-series of measurements and is lack of new findings which significantly advance the community's knowledge on trans-boundary transport. However, the data measured at the Kumamoto site is important. For example, they could be used to evaluate and improve regional and global models. Therefore, I suggest it being published in Atmospheric Chemistry and Physics subject to major revisions. Following are a few major comments:

(1) In the introduction, the authors should describe more on what have been done on measurements of PM and other pollutants over the East Asian region, and then clearly describe the motivation of this study and focus on the difference between this study and previous work. In addition, in section 3, the authors should try to summarize the unique features of the air quality data measured in this study in the context of previous works. Try to draw a few scientifically sound conclusions which have not been identified by previous studies and can advance the community's knowledge on trans-boundary transport.

(2) There are a few issues with this paper, which made me difficult to judge its value. First, all data and analysis are only based on one site. I wonder if it is possible to compare the results of this study to other measurements (e.g., the EANET measurements). Second, the data are measured in a city. Even without heavy industrial point sources as mentioned in this paper, the measured air quality could be contaminated by local traffic and residential sources. Therefore, it is important to show to what extent the air quality is impact by local sources. Third, the measurements were carried out for a six-week period in 2011. There should be a description on whether or not the situation of spring 2011 is more/less likely to transport dust and other aerosol pollutants from China.

(3) These measured data should be directly compared and analyzed to model predic-

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tion by the Chemical Weather Forecasting System (CFORS). In particular, I wonder how well CFORS captures these peaks for dust and sulphate aerosols.

(4) More improvements are needed in the conclusion section (i.e., section 4), particularly for policy implications. For example, the paper mentioned “The magnitude of the loss in air quality over Japan due to the 21st century spread of the mainland Asiatic pollution plume is emphasized by our Phase 3 record of 5 days when winds brought air from the oceanic rather than continental sector.” The measurements were made only in SW Japan and only lasted for a few weeks. I wonder how they could be used to infer the air quality over other more populated regions in Japan and other seasons and years.

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