

Interactive comment on “Regional and local variations in atmospheric aerosols using ground-based sun photometry during DRAGON in 2012” by Itaru Sano et al.

Anonymous Referee #2

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General Comment Authors analyzed the data obtained by the fields campaign DRAGON-Japan and DRAGON-Osaka, which are network of ground-based sun-photometers, and tried to discuss the long-range transboundary aerosol. The data obtained during the fields campaign DRAGON-Japan and DRAGON-Osaka are very valuable to understand the aerosol optical properties and the transportation process of aerosols in the region of East Asia. However, there are some unclear points in the manuscript. The authors need to show more data in order to draw the definitive conclusions. Although the manuscript includes some important data, however, the quality is not sufficient in the current state to be directly published.

Specific comments Page 1 Line 1 “The amount of long-range transboundary (LRT)

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aerosols over Japan is increasing due to growing anthropogenic emissions from the east Eurasian continent.” Is this true? The aerosol optical thickness is flat or slightly decreasing in Japan area after 2000. If true, please cite references in the text.

Page 2 Line 31 to 33 “In spring in East Asia, large desert dust particles are frequently observed from February to May. The Asian dust events result in a lower AE. At the same time, dust events bring a larger amount of particles with a high AOT. Such turbid conditions continue until August even after the Asian dust season has ended.” From Fig.1, I cannot find neither “...large desert dust particles are frequently observed from February to May” and “dust events bring a larger amount of particles with a high AOT”. This figure does not show the frequency of dust events. If the authors show the scatter plot of aerosol optical thickness and AE, we might see the frequency of dust events and a large amount of particles during dust event. When does Asian dust season end?

Page 3 line 1 to 2, “With respect to aerosols in summertime, we assume the following three conditions: a high oxidant (Ox) level from local and transboundary emissions, high temperature, and strong solar incident light, ...” I think that the conditions in May and June are also high oxidant level, high temperature, and strong solar incident light.

Page 3 line 6 to 7 “It is possible that spring is the best season to investigate the contribution from China of long-range transboundary (LRT) aerosols over Japan.” Why the spring is the best season? In spring season, the aerosol characteristics are changing with the passage of synoptic disturbance. The synoptic scale disturbance periodically passed over the Japan area. In this situation, the air mass originating in both the continent and Japan area pass over the observation site in Japan. When we interpret the observational results, the contributions of air mass from the continent and Japan area to the optical thickness must be divided.

Page 4 line 4 to 5, “It is easily understood from Fig. 3 that the AOT values decrease with longitude. In other words, western Japan exhibits higher AOT than eastern Japan.” It is not easily understood western Japan exhibits higher AOT than eastern Japan. Because

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the standard deviation at each site is large. Therefore, the difference is not significant statistically. Furthermore, if the authors are interested in LRT aerosol, the LRT aerosol and locally emitted one should be distinguished.

Page 5 line 19 Why do the authors not show the data of mountain sites in Fig. 5?

Page 6 line 1 to 14 The differences of AOT from 0.01 to 0.03 are small. I do not think that it is possible to discuss the difference of local emission.

Page 6 line 14 “the measurements on the 27th represent the intrinsic local emissions of aerosols.” This conclusion is not clear. The more explanation is necessary.

Page 9 line 6 to 17. Figure 8 is minute. I hope that the authors extract the data in May 4 and 5 from Fig. 8 and draw again it. LIDER system was installed only at Osaka site. From Fig. 8, we can get information on the vertical structure of aerosol just above Osaka site and we cannot get information on the horizontal distribution of aerosol. Therefore, Fig.8 does not explain the difference among Osaka, Osaka-C and Osaka-S. From Fig. 8a, we can get information on structure of aerosol extinction coefficient, but it is not quantitative. I recommend that the authors estimate the optical thickness below and above 500m height from Lider data.

Page 10 line 3 What do the authors mean by the word “transition”? Is the word “transition” appropriate?

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