

## ***Interactive comment on “Air quality and acid deposition impacts of local emissions and transboundary air pollution in Japan and South Korea” by Steve Hung Lam Yim et al.***

### **Anonymous Referee #3**

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General comments: Lots of previous studies have indicated that The transboundary air pollution (TAP) constitutes one of the major contributor to the aerosol loading in Korea and Japan. However, it remains elusive to separate out the contribution from local emission and TAP. This study examined the spatiotemporal variations of TAP and sectoral contributions from China emissions and identified the contributions of TAP to acid depositions. The TAP's impact on acid deposition was found to be larger than TAP's impact on PM<sub>2.5</sub> concentration. These findings have implications for the decision-making policy for emission control in the upwind regions. Overall, this manuscript is well written, and the analysis methods are scientifically sound. Apparently, this study could be a significant addition to the community of transboundary transport of air pollution,

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provided the following concerns have been fully considered. Therefore, I recommend its acceptance for publications in ACP pending minor revision.

Specific comments: 1. L44: Too many citation followed by “impacts on people’s health, the environment, and economic costs. . .”. I strongly suggested to cite these references separately. In addition, air pollution also exert influence on clouds and precipitation (Li et al., 2011, doi: 10.1038/ngeo1313; Koren et al., 2012, doi: 10.1038/ngeo1364; Guo et al., 2016, doi: 10.1002/2015JD023257) 2. L60-61: Grammar error in “much of it transboundary in nature. ” 3. L110: Grammar error in “describe in the next section (2) details 4. In Fig.1, black cross representing the major cities is the same as the color of country boundary. This should be avoid. 5. L148: “, see Table 1”-> “(see Table 1)” 6. The titles of X-axis and Y-axis in in Fig.2 are suggested to indicate the PM<sub>2.5</sub>. 7. L254: “accounted for in” -> “accounted for by” 8. L288: “Shown in Table 5”->“As shown in Table 5” 9. Table 6 caption: “kg” is a typo? Is it supposed to be “tonne” or “Tg”? 10. L387: grammar error in “..enhance increase soil N availability”. 11. The fonts in Fig.4 are too small to be read easily. 12. Section 4: This study revealed a significant contribution (more than 50%) of TAP from Asia on surface PM<sub>2.5</sub> in Japan and South Korea using one-year model simulation alone. Given that a large amount of previous observational studies have been involved in the TAP, especially trans-Pacific transport of aerosols, at the very least, the authors are suggested to discuss more on the previous results from long-term observations, e.g., what is the difference of magnitude of the ratio of TAP to total pollution, what is the role that multi-scale circulation plays in the TAP, among others. As such, the readers can get a full picture on this topic. 13. The journal name is missed in the reference of Gu et al., 2016b.

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