Response to Referee #1

We thank the reviewers for the careful reading of the manuscript and helpful comments. According to the suggestions of the reviewer, the reviewers' comments have been carefully addressed, and the paper is carefully revised. We believe that the revised paper has been significantly improved after addressing the comments of the reviewers.

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This manuscript provides a case study of changed landuse fraction on the dust storm over Northern China. Its method is straightforward and easy to understand. My main concern is whether the single case study of 5 days is sufficient for the climatological pattern shift of dust storm as the paper title states. The authors may consider study more cases for more years. For instance, this single case shows that the dust storms strength became weaker after changing its landuse. How about the frequency of the dust storm occurrence for one or more year? It would be better to add more convincing cases.

We agreed the reviewer that the single case cannot provide a general conclusion, but it provides some important insights of ERPs' effects.

1) We described the limitation of previous studies, which could implicated the insights and importance of our work **in Line 108**: "The previous studies didn't quantify the roles of ERPs on dust concentrations, such as the detailed land cover change induced by ERPs, the effect of regional dust transport to downwind regions, especially in the NCP region, etc."

2) We emphasized the theme of our work with "a case study" **in Title**: "**Effect of ecological restoration programs on dust concentrations in North China Plain: a case study**".

3) We also reiterated the limitation of our work in the summary and conclusions **in Line 524**: "It should be reiterated that, considering the limitation of case

study, the main focus of this study do not intent to give a general conclusion, but rather to provide some insights of the effect of ERPs on the land cover change and resultant decreasing of dust concentration over downwind areas, where heavy haze often occurred due to anthropogenic air pollutants."

4) In order to address the reviewer's concern, we added a new case simulation in different year from 22 to 26 May 2014. We have conducted another simulation from 22 to 26 May 2014 to investigate the influence of ERPs to the dust concentrations in NCP. This simulation shows that the EPRs help to reduce the dust particle concentrations from -5% to -15% in BTH, NCP, and DSR, respectively (see Fig. S7). This result is similar to the case in 2016. Because the frequency of the dust storm occurrences is different in different years, this new simulation shows some evidences that the ecological restoration programs in China plays important roles to reduce the dust concentrations in eastern China. More detailed discussion can be seen in the Supplementary **Section SI-1**: **Effect of ERPs on dust concentrations in NCP during another dust events from 22 to 26 May 2014.**

"The model simulations from 2 to 7 March 2016 show that the EPRs help to reduce the dust concentrations in NCP, especially in BTH, involving [PMC] reduction ranges from -5% to -15%. In order to further confirm the important role of ERPs transport, another dust events from 22 to 26 May 2014 in NCP is simulated using the WRF-DUST model.

Figure S6 shows the daily average calculated and measured [PMC] distributions. On 22 to 23 May 2014, the dust storm was started and strengthened in DSR region, both the observed and simulated [PMC] reached as high level in the upwind DSR region, while with low value (lower than 40 μg m^{-3}) in the downwind NCP region (Fig. S6a, S6b). On 24 May, the dust storm started to be transported from upwind DSR to downwind NCP with northwest to southeast direction due to the strong northwest prevailing winds (Fig S6c). On 25 May, the dust storm reached to the NCP region, and caused a remarkable [PMC] increase, rising to 100–250 μg m^{-3}. On 26 May, the dust storm passed through and the wind speed slowed down, the [PMC]

significantly decreased in NCP region (Fig. S6e). The correlation coefficients between measured and simulated [PMC] are 0.66–0.87 during the episode (Fig. S6). Despite some model biases, the WRF-DUST model well captures the evolutions of dust storm during 22 to 26 May 2014.

Figure S7 presents the hourly near-surface [PMC] change during the dust events from 22 to 26 May 2014, including the temporal variations in concentrations and percentage averaged at monitoring sites in the regions of DSR, NCP and BTH. During the episode when the dust storm was transported from DSR to NCP, the [PMC] reduction induced by ERPs performs with the maximum reduction of [PMC] ranging -5% to -15% in NCP. The results suggest that ERPs decrease the dust concentrations in NCP, which is consistent with the previous dust events during 2 to 7 March 2016 (Tab. S2).”