Response to Referee #2

We thank the reviewer for the careful reading of the manuscript and helpful comments. We have revised the manuscript following the suggestion, as described below.

General comments

The authors report the forest cover change in the BTH during 2001-2013 based on the MODIS product, and they assimilate the land cover change to the WRF-Chem model to investigate the effects of afforestation on haze pollution in this region. Furthermore, they examine whether a speculative and controversial proposal of building a large ventilation corridor system in Beijing would be beneficial in improving the local air quality. The authors conclude that afforestation has minor effects on the haze pollution in BTH, and building the ventilation corridor system would not help in improving the air quality in Beijing either. The manuscript is well presented; I have some minor comments for the authors to address.

Special comments

Comment: Land cover change can modify many factors associated with air quality, such as surface roughness, surface moisture and terrestrial erosion, dry deposition of pollutants, thermal stability of PBL, etc. These factors affect air quality directly or indirectly. For example, changing the surface roughness can affect the surface wind speed and consequently affect air quality, upon which this manuscript addresses. A change in surface moisture and surface erosion affect the emissions of natural particles; a change in dry deposition can affect the in situ air quality and the air quality downwind when recirculation occurs. Since this manuscript focuses exclusively on the factor of surface roughness, the authors should clarify this confinement. Other factors could play important roles in improving the air quality, and taking all factors into account, it is likely that afforestation would improve the air quality in the BTH.

Response: We have clarified in Section 4: "*It is worth to note that, in the present study, contributions of the surface roughness change induced by afforestation to the*

haze pollution are primarily evaluated using the WRF-CHEM model, but many other factors which directly or indirectly influence air quality, are also modified by the land cover change, including surface moisture, terrestrial erosion, pollutants' dry deposition, PBL thermal stability, etc. For example, changes in surface moisture and surface erosion impact the emissions of natural particles; changes in dry deposition directly influence the air quality in situ and indirectly the air quality downwind with occurrence of recirculation. Therefore, when changes in all those factors caused by land cover change are accounted for, the role of afforestation in air quality in situ might be uncertain. In the online WRF-CHEM model, besides the surface roughness, the impacts of afforestation on the heat flux, surface moisture, surface erosion, and dry deposition of air pollutants have also been considered. Considering that afforestation in BTH is mainly distributed in the mountain region, the surface roughness increase induced by afforestation obviously decrease surface wind speeds, facilitating accumulation of air pollutants in the downwind region and further deteriorating the haze pollution."

Comment: L230-232, the correlation measures the strength of a linear relationship between two variables; a high correlation coefficient means merely a strong linear relation, but it does not necessarily mean that a variable is a strong contributor of the other one.

Response: We agree with the reviewer's comment, and have clarified in Section 3.3: "*The SFz0 change is highly correlated with the forest LCF change, with a correlation coefficient of 0.91. Generally, the SFz0 is mainly dependent upon the LCF (Equation 6), and sensitive to the forest change (Table S2). Therefore, afforestation constitutes the most important factor for the increase in the SFz0 in BTH.*"