

# ***Interactive comment on “Does afforestation deteriorate haze pollution in Beijing–Tianjin–Hebei (BTH), China?” by Xin Long et al.***

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WRF-Chem modeling was, to some extent, performed using an “improved” roughness length (line 162, eq. 3 which should be eq. 6) which presumably took into consideration of surface heterogeneities within a model grid cell. The influences of surface heterogeneities on surface momentum and heat transfer have been extensively studied in the 1990s partly aiming to more precisely simulate surface stress induced sub-grid inhomogeneous terrain in a climate model. Dynamically, the area average of the roughness length in a heterogeneous terrain would produce the correct spatial average value of the surface stress. A heuristic argument was presented to show that this effective value of  $z_0$ , or “effective roughness length”, could be obtained by averaging drag coefficients based on a ‘blending’ height approach. In other words, the correct formulation

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of an effective roughness length, defined as the area average of the roughness length in heterogeneous terrain, relies upon the appropriate determination of a height scale (blending height). At this height a meteorological quantity is approximately in equilibrium with local surface conditions and independent of horizontal position.

Authors of this paper appeared not aware of the progresses in this aspect. However, they should at least comment on previous studies and compare their model with “effective roughness length” approach, and add some discussions to defend their roughness model which might be subject to uncertainties.

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