Does afforestation deteriorate haze pollution in Beijing-Tianjin-Hebei (BTH), China?

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19 Table S1 Land use categories in the MCD12Q1 IGBP layer and WRF-CHEM MODIS land

use.

	Category number		
Land Cover Category	WRF-CHEM MODIS	MOD12Q1	
Evergreen Needleleaf forest	1	1	
Evergreen Broadleaf forest	2	2	
Deciduous Needleleaf forest	3	3	
Deciduous Broadleaf forest	4	4	
Mixed forest	5	5	
Closed shrublands	6	6	
Open shrublands	7	7	
Woody savannas	8	8	
Savannas	9	9	
Grasslands	10	10	
Permanent wetlands	11	11	
Croplands	12	12	
Urban and built-up	13	13	
Cropland/Natural vegetation mosaic	14	14	
Snow and ice	15	15	
Barren or sparsely vegetated	16	16	
Water	17	0	
Wooded Tundra	18	×	
Mixed Tundra	19	×	
Barren Tundra	20	×	
Unclassified	×	254	
Fill Value	×	255	

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Table S2 Threshold of the area fractional coverage of green vegetation, minimal and maximal SFz0 used in the coupled unified Noah land-surface model.

Category No.	Land Cover Category	GT	SFz0 _{min}	SFz0 _{max}
1	Evergreen Needleleaf forest	0.70	50	50
2	Evergreen Broadleaf forest	0.95	50	50
3	Deciduous Needleleaf forest	0.70	50	50
4	Deciduous Broadleaf forest	0.80	50	50
5	Mixed forest	0.80	20	50
6	Closed shrublands	0.70	1	5
7	Open shrublands	0.70	1	6
8	Woody savannas	0.70	1	5
9	Savannas	0.50	15	15
10	Grasslands	0.80	10	12
11	Permanent wetlands	0.60	30	30
12	Croplands	0.80	5	15
13	Urban and built-up	0.10	50	50
14	Cropland/Natural vegetation	0.80	5	14
	mosaic			
15	Snow and ice	0.00	0.1	0.1
16	Barren or sparsely vegetated	0.01	1	1
17	Water	0.00	0.01	0.01
18	Wooded Tundra	0.60	30	30
19	Mixed Tundra	0.60	15	15
20	Barren Tundra	0.30	5	10

33 34		Supplementary Figure Captions
35 36 37 38	Figure S1	Pattern comparisons of simulated (color counters) vs. observed (colored circles) near-surface $PM_{2.5}$ mass concentrations averaged during each episode. The black arrows indicate simulated surface winds.
39 40 41 42	Figure S2	Horizontal distribution of near-surface $PM_{2.5}$ mass concentration changes caused by the afforestation during each episode. The wind field changes are shown in black arrows.
43 44 45 46 47	Figure S3	Horizontal distributions of aerosol species mass concentrations and changes due to the afforestation for (a1, a2) organic aerosol (OA), (b1, b2) sulfate (SO ₄), (c1, c2) nitrate (NO ₃), (d1, d2) ammonium (NH ₄), and (e1, e2) elemental carbon (EC) during the episodes.
48 49 50	Figure S4	Horizontal distributions of (a) the average near surface BSOA mass concentration and (b) its change due to the afforestation during the episodes.
51 52 53 54 55	Figure S5	Horizontal distributions of (a) planetary boundary layer height (PBLH), (c) upward sensible heat flux (HFX) and (e) water vapor mixing ratio (QVAPOR), as well as (b, d, f) corresponding changes caused by the afforestation during the episodes, respectively.
56 57 58 59 60 61 62 63	Figure S6	Chinese vegetation regionalization. The BTH and ROI are highlighted with black lines. The data set is provided by Data Center for Resources and Environmental Sciences, Chinese Academy of Sciences (RESDC) (http://www.resdc.cn).



Figure S1 Pattern comparisons of simulated (color counters) vs. observed (colored circles)
near-surface PM_{2.5} mass concentrations averaged during each episode. The black arrows
indicate simulated surface winds.





Figure S3 Horizontal distributions of aerosol species mass concentrations and changes due to the afforestation for (a1, a2) organic aerosol (OA), (b1, b2) sulfate (SO₄), (c1, c2) nitrate

- 83 (NO₃), (d1, d2) ammonium (NH₄), and (e1, e2) elemental carbon (EC) during the episodes.
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- 87 Figure S3 Continued





95 Figure S4 Horizontal distributions of (a) the average near surface BSOA mass concentration

- 96 and (b) its change due to the afforestation during the episodes.



Figure S5 Horizontal distributions of (a) planetary boundary layer height (PBLH), (c) upward sensible heat flux (HFX) and (e) water vapor mixing ratio (QVAPOR), as well as (b, d, f) corresponding changes caused by the afforestation during the episodes, respectively.



110 Figure S6 Chinese vegetation regionalization. The BTH and ROI are highlighted with black

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