Supplementary Information

Title: Developing a novel hybrid model for the estimation of surface 8-h ozone (O₃) across the

remote Tibetan Plateau during 2005-2018

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Number of pages: 13

Number of texts: 1

Number of figures: 10

Number of tables: 1

Text S1

We employed three statistical indicators of the coefficient of determination (R^2) , the rootmean-square error (RMSE), and the mean prediction error (MPE) to evaluate the model performance. These indicators are calculated as follows:

$$R^{2} = \frac{\sum_{i=1}^{n} (pre - pre)(obs - obs)}{\sqrt{\sum_{i=1}^{n} (pre - pre)^{2}} \sqrt{\sum_{i=1}^{n} (obs - obs)}}$$
(1)

$$RMSE = \sqrt{\frac{\sum_{i=1}^{n} (pre - obs)^{2}}{n}}$$
 (2)

$$MPE = \frac{\sum_{i=1}^{n} |pre - obs|}{n}$$
 (3)

where *pre* represents the predictive value, *obs* is the observation value, and *n* is the total number of data records.

80°0'0"E 100°0'0"E 40°0'0"N--40°0'0"N Halbei Haixi Hainan Nining Haidong Yushu Ngari Gannan Nagqu Qamdo Ganzi Aba 30°0'0"N-Lhasa -30°0'0"N Sannan Nyingchi Shigatse 0 550 1,100 Miles 80°0'0"E 100°0'0"E

 $\textbf{Fig. S1} \ \text{The names and geographical locations of prefecture-level cities in Tibetan Plateau}$

70°0'0"E 90°0'0"E 80°0'0"E 100°0'0"E N 40°0'0"N--40°0'0"N 30°0'0"N -30°0'0"N O₃ column amount < 270 270-275 275-280 280-290 20°0'0"N 170 340 680 Miles > 290 80°0'0"E 90°0'0"E 100°0'0"E

Fig. S2 The annually mean O₃ column amount (Unit: DU) in Tibetan Plateau during 2005-2018.

Fig. S3 The mean VOC and NO_x emissions (Unit: Mg) in Tibetan Plateau during 2005-2018.

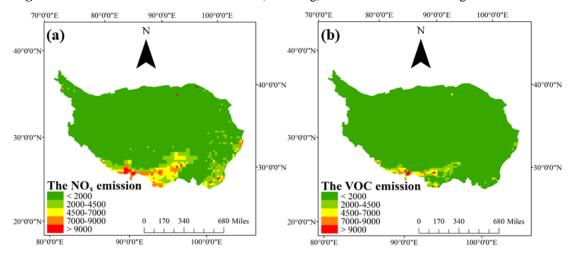


Fig. S4 The annually mean values for key meteorological factors during 2005-2018.

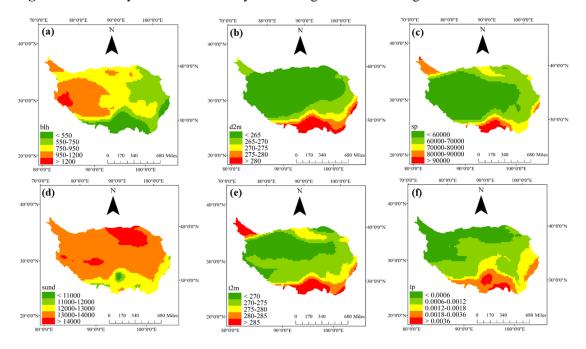


Fig. S5 The mean values for blh in four seasons during 2005-2018.

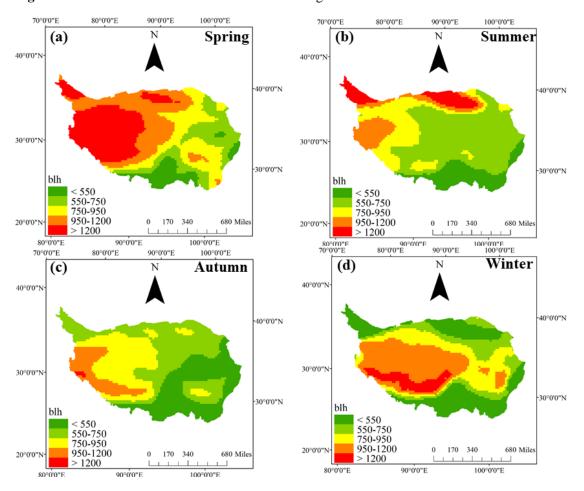
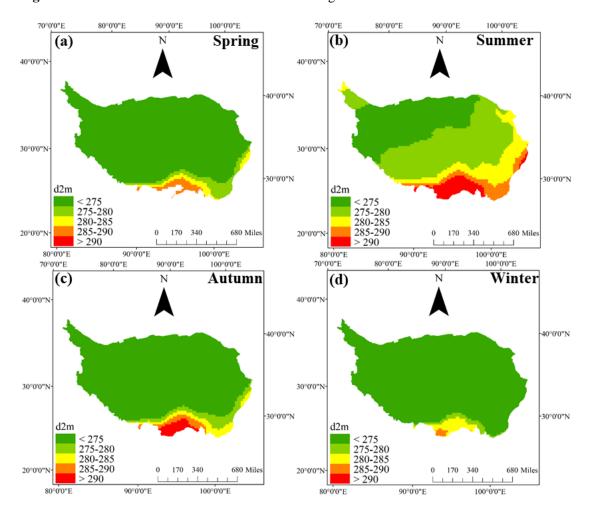


Fig. S6 The mean values for d2m in four seasons during 2005-2018.



70°0'0"E 80°0′0″E 90°0'0"E 100°0'0"E 100°0'0"E 80°0'0"E 90°0'0"E Spring (b) (a) Summer 40°0'0"N 40°0'0"N-40°0'0"N -40°0'0"N 30°0'0"N 30°0'0"N-30°0'0"N -30°0'0"N sp < 60000 60000-65000 65000-70000 70000-80000 < 60000 60000-65000 65000-70000 70000-80000 170 340 20°0'0"N-0 170 340 680 Miles 20°0'0"N-680 Miles > 80000 > 80000 90°0'0"E 80°0'0"E 90°0'0"E 80°0'0"E 80°0'0"E 70°0'0"E 100°0'0"E 100°0'0"E (c) Winter Autumn (d) 40°0'0"N 40°0'0"N -40°0'0"N -40°0'0"N 30°0'0"N 30°0'0"N -30°0'0"N 30°0′0″N sp < 60000 < 60000 60000-65000 65000-70000 70000-80000 60000-65000 65000-70000 70000-80000 0 170 340

20°0'0"N

80°0'0"E

0 170 340

680 Miles

680 Miles

100°0'0"E

20°0'0"N

Fig. S7 The mean values for sp in four seasons during 2005-2018.

Fig. S8 The mean values for sund in four seasons during 2005-2018.

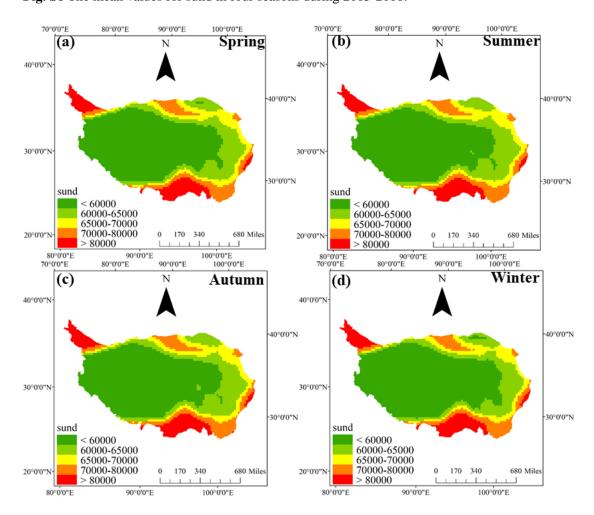
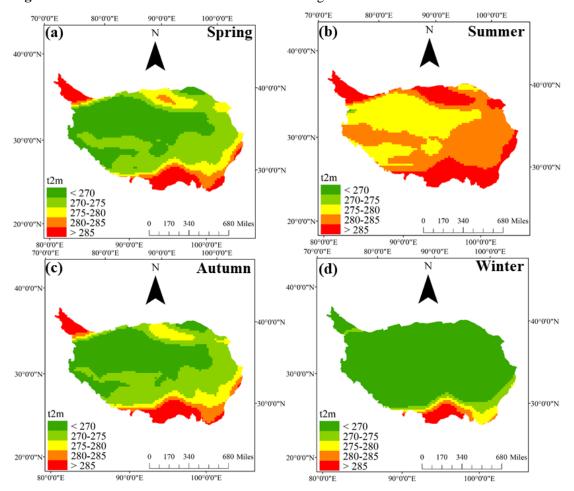
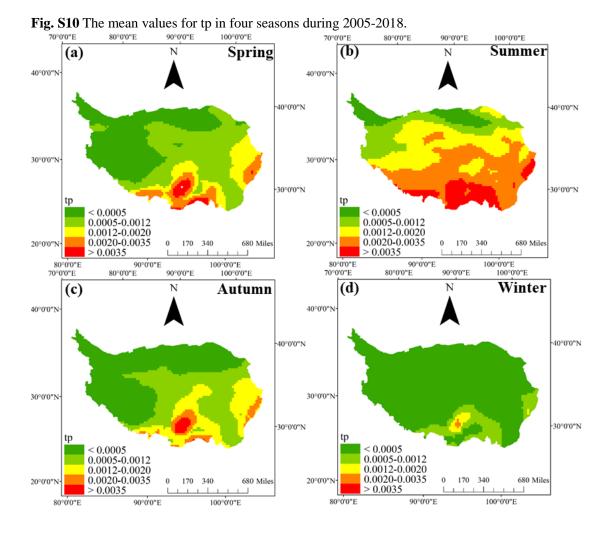


Fig. S9 The mean values for t2m in four seasons during 2005-2018.





 $\textbf{Tab. S1} \ \text{The NO}_x \ \text{and VOC emissions (Unit: Mg) in four seasons over Tibetan Plateau}$

	Spring	Summer	Autumn	Winter
NO _x	92.74±5.52	90.69±5.21	91.64±5.34	95.24±5.65
VOC	207.21±6.44	206.15±6.46	207.16±6.46	219.99±6.55