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Responses of aeolian desertification to a range of climate scenarios in China

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1. Figures

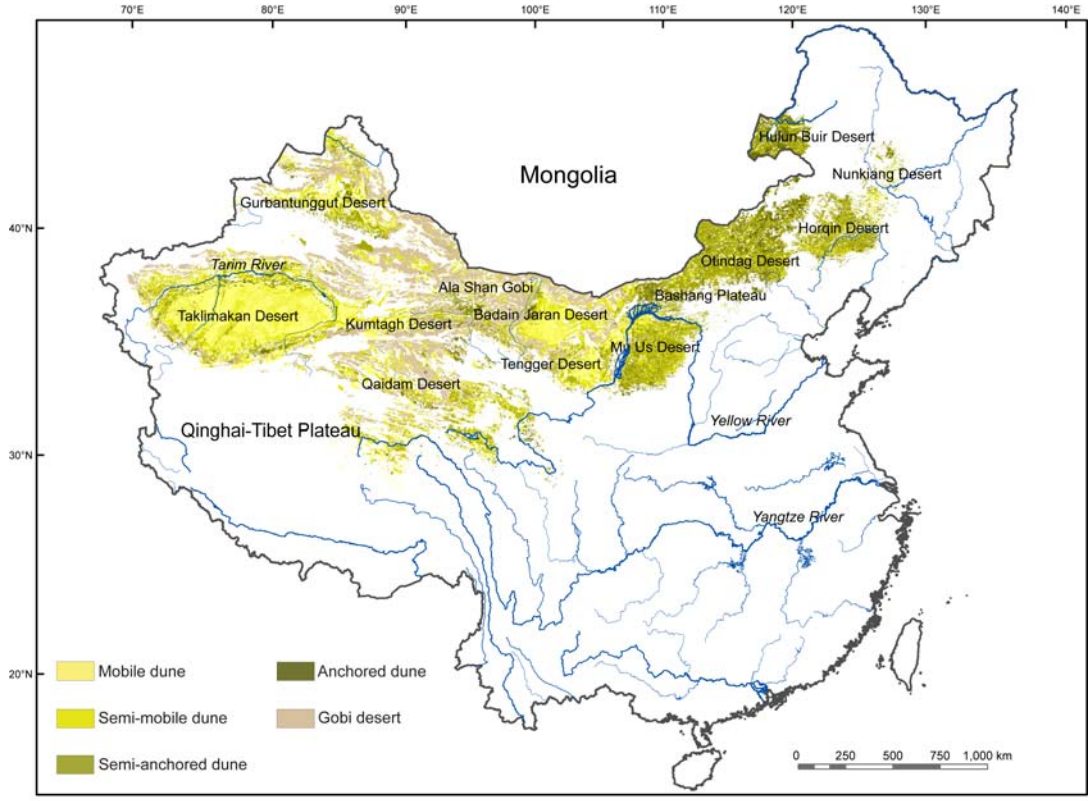

Figure S1. Distribution of the Sandy and Gobi deserts in China.

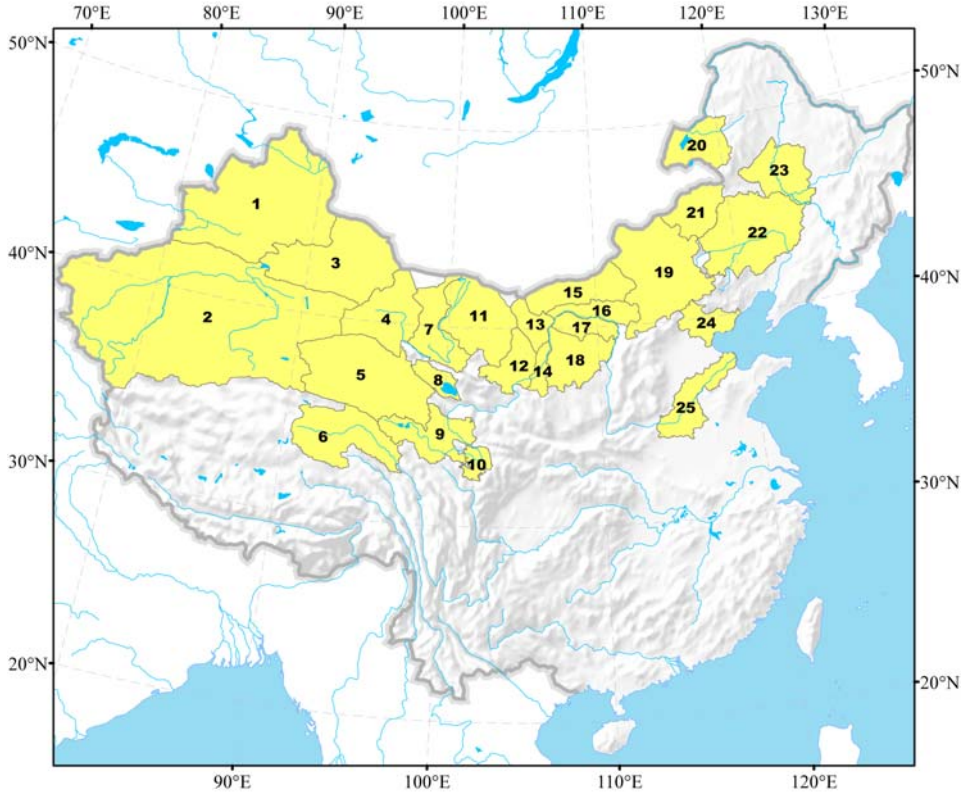

Figure S2. Areas monitored for aeolian desertification over the past decades in China.

Note: 1. Junggar Basin 2. Tarim Basin 3. Turpan-Kumul Basin 4. Kashgar Drainage area 5. Qaidam Basin 6. Yangteze River Source 7. Heihe Drainage area 8. Qinghai Lake Basin 9. Yellow River Source 10. Zoige Plateau 11. Badain Jaran Desert 12. Tengger Desert 13. Ulan Buh Desert 14. Northeast of Ningxia Province 15. Central Inner Mongolia 16. Hetao Plain 17. Hobq Desert 18. Mu Us Desert 19. Otindag Desert 20. Hulun Buir Desert 21. Xilin Gol Grassland 22. Horqin Desert 23. Nunkiang Desert 24. Luanhe-Yongding Drainage area 25. Lower Yellow River.

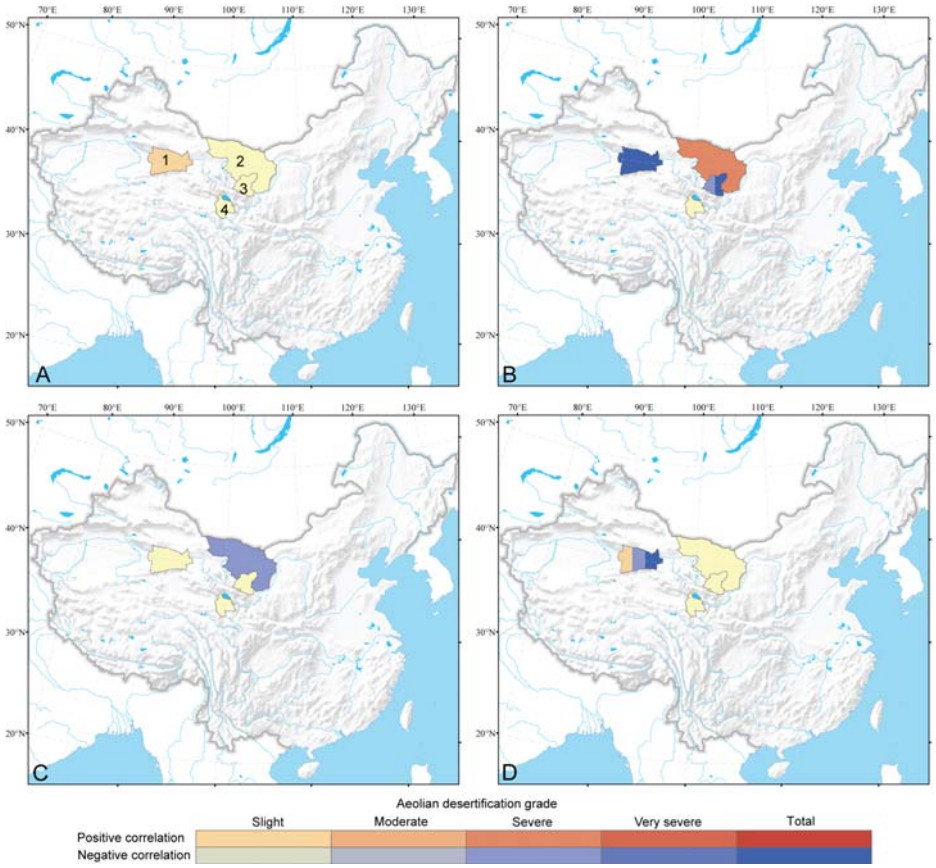

Figure S3. Relationships among the variations in the areas impacted by aeolian desertification and (a) precipitation, (b) temperature, (c) wind velocity and (d) the Palmer Drought Severity Index (PDSI) in the overlapping regions (1: Kumtagh Desert, 2: Ala Shan Plateau, 3: Shiyanghe Drainage area, 4: Gonghe Basin). Regions with negative/positive correlations significant at the 0.05 level (2-tailed) are shown in blue/red, and those that were not significant at the 0.05 level (2-tailed) are shown in yellow.

2. Tables

Table S1 Classification of aeolian desertification in China (modified after Wang et al, 2014).

Grade	Surface categories				
	Anchored or semi-anchored dune or sand sheet	**Shrub**	**Gravel**	**Eroded**	**Rain-fed farmland**
Grade 1 (Slight)	Blowouts occur on the stoss slope of dunes; the total area of mobile sands is 5% to 20%	Under shrubs little mobile sand accumulates	Gravels begin to become enriched on surface	Eroded shallow pits begin to develop	Some sands accumulate in furrows, and erosion signals appear on plowing ridges
Grade 2 (Moderate)	Stoss and slip slopes appear, the total area of mobile sands is 20% to 50%	Mobile sands appear on the stoss side of mounds, some gravels and sand appear on inter-mounds	Surface covered by coarse sands and gravels, grass cover >20%	Large blowouts and small escarpments appear on surface	Patches of mobile sands appear, loss of thickness of humus layer is beyond 50%
Grade 3 (Severe)	Total area of mobile sands >50%	Vegetation cover <20% while area of mobile sands <50%	Surface almost covered by gravels, grass cover varies between 5 and 20%	Deflation residuals appear on surface; graveled farmlands are abandoned	Humus layers are entirely lost, total area of mobile sand >20% and farmland is abandoned
Grade 4 (Very severe)	Mobile dunes or sand sheets, vegetation cover <5%	Mobile dunes or sand sheets appear with vegetation cover <5%	Surface entirely covered by gravels with vegetation cover <5%	Deflation surface	Mobile sand sheets or gravel surface with vegetation cover <5%

Table S2 Climate index periods that correspond to the periods of aeolian desertification monitoring.

Monitoring period of aeolian desertification	Corresponded stage of temperature, precipitation, wind velocity, and PDSI
Around 1975	1970-1975
1990	1976-1990
2000	1991-2000
2005	2001-2005
2010	2006-2010

Table S3A Correlation between areas of aeolian desertification and temperature.

Monitoring region	Aeolian desertification classifications				
	Slight	Moderate	Severe	Very severe	Total area
Ala Shan Plateau	-.300	.800	**1.000****	-.300	.300
Badain Jaran Desert	-.700	-.500	-.300	**.900***	-.300
Qaidam Basin	-.100	**-.900***	.700	.300	.600
Gonghe Basin	.700	.500	-.700	-.600	-.700
Heihe Drainage	.100	-.700	-.300	.200	-.600
Hulun Buir Desert	**1.000****	.600	-.600	-.400	.600
Lower Yellow River	.783	.600	.100	**-1.000****	**-1.000****
Yellow River Source	**1.000****	-.400	.100	.500	.100
Otindag Desert	**.900***	.300	.300	.600	.600
Horqin Desert	**.900***	.500	**.900***	-.100	.700
Hobq Desert	.300	**1.000****	**.900***	-.600	.700
Kumtagh Desert	.600	-.200	-.700	-.821	**-.900***
Luanhe-Yongding Drainage	.400	.600	.700	-.800	-.800
Mu Us Desert	.700	**.900***	**.900***	-.600	.600
Hetao Plain	**.900***	.300	-.200	.100	.600
Central Inner Mongolia	.600	.200	.600	-.600	.600
Northeast of Ningxia Province	**.900***	**.900***	.300	-.700	-.400
Qinghai Lake Basin	.300	-.800	**-.900***	-.200	-.600
Zoige Plateau	.400	.500	-.600	-.100	.100
Shiyanghe Drainage	.300	-.800	**-1.000****	-.300	**-1.000****
Kachgar Drainage	**.900***	**-.900***	-.700	-.600	.000
Nunkiang Desert	.600	.600	.100	-.100	.500
Tengger Desert	.300	.700	-.700	-.600	**-.900***
Turpan-Kumul Basin	**1.000****	.600	-.500	-.600	.600
Ulan Buh Desert	-.600	-.300	.600	.100	.800
Xilin Gol Grassland	**.900***	.300	.400	-.100	.600
Tarim Basin	**.900***	-.800	**-.900***	-.700	-.700
Yangteze River Source	-.100	.200	.800	.500	.500
Junggar Basin	**1.000****	**1.000****	-.600	-.700	.100

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table S3B Correlation between areas of aeolian desertification and precipitation.

Monitoring region	Aeolian desertification classifications				
	Slight	Moderate	Severe	Very severe	Total area
Ala Shan Plateau	-.700	.800	.700	.300	.700
Badain Jaran Desert	-.600	-.100	-.100	.700	-.100
Qaidam Basin	.100	-.600	.300	-.300	.100
Gonghe Basin	.700	.300	-.700	-.600	-.700
Heihe Drainage	.700	**-.900***	-.600	-.600	-.700
Hulun Buir Desert	-.600	-.200	.700	.700	-.200
Lower Yellow River	.671	.500	-.400	-.200	-.200
Yellow River Source	.200	-.400	**-.900***	-.700	**-.900***
Otindag Desert	-.700	.100	.500	.200	.200
Horqin Desert	-.700	-.300	-.300	.800	-.100
Hobq Desert	-.200	.300	.600	-.100	.000
Kumtagh Desert	**.900***	.300	-.700	-.359	-.600
Luanhe-Yongding Drainage	-.700	-.700	-.400	.600	.600
Mu Us Desert	.100	.700	.700	-.300	.300
Hetao Plain	.000	.700	.300	.600	.500
Central Inner Mongolia	-.400	.200	.600	-.100	.600
Northeast of Ningxia Province	.100	.100	-.800	.700	**.900***
Qinghai Lake Basin	.100	-.600	-.300	**-.900***	-.700
Zoige Plateau	.000	-.600	.500	.200	.200
Shiyanghe Drainage	.200	-.300	-.800	-.200	-.800
Kachgar Drainage	**.900***	-.600	-.700	**-.900***	-.200
Nunkiang Desert	-.700	.200	.700	.500	.200
Tengger Desert	-.600	.000	.000	.200	-.200
Turpan-Kumul Basin	**.900***	.800	-.600	-.300	.700
Ulan Buh Desert	-.600	.300	.400	.000	.300
Xilin Gol Grassland	-.700	.500	.200	.700	.200
Tarim Basin	.700	**-.900***	**-1.000****	**-.900***	**-.900***
Yangteze River Source	.500	.700	.300	-.200	-.200
Junggar Basin	**.900***	**.900***	-.500	**-.900***	-.200

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table S3C Correlation between areas of aeolian desertification and wind velocity.

Monitoring region	Aeolian desertification classifications				
	Slight	Moderate	Severe	Very severe	Total area
Ala Shan Plateau	.300	-.800	**-1.000****	.300	-.300
Badain Jaran Desert	**.900***	-.100	-.500	-.700	-.500
Qaidam Basin	.200	.800	**-.900***	-.500	-.700
Gonghe Basin	-.500	-.700	.500	.600	.500
Heihe Drainage	.700	-.100	-.500	-.600	-.200
Hulun Buir Desert	**-1.000****	-.600	.600	.400	-.600
Lower Yellow River	-.447	-.600	-.400	.700	.700
Yellow River Source	-.800	-.100	-.500	-.700	-.500
Otindag Desert	-.800	-.100	-.500	-.700	-.700
Horqin Desert	**-1.000****	-.700	-.700	.300	-.600
Hobq Desert	-.300	**-1.000****	**-.900***	.600	-.700
Kumtagh Desert	.200	.600	.100	.616	.500
Luanhe-Yongding Drainage	-.300	-.300	-.600	.500	.500
Mu Us Desert	-.600	**-1.000****	**-1.000****	.700	-.300
Hetao Plain	**-.900***	-.300	.200	-.100	-.600
Central Inner Mongolia	-.600	-.200	-.600	.600	-.600
Northeast of Ningxia Province	-.300	-.300	-.600	.400	.300
Qinghai Lake Basin	-.300	.700	**.900***	-.200	.600
Zoige Plateau	.000	**-.900***	.000	-.700	-.700
Shiyanghe Drainage	.500	.600	.600	-.500	.600
Kachgar Drainage	-.300	.500	.100	-.200	-.400
Nunkiang Desert	-.700	-.700	.000	.300	-.300
Tengger Desert	-.300	-.700	.700	.600	**.900***
Turpan-Kumul Basin	.300	-.100	.300	**-.900***	-.500
Ulan Buh Desert	.600	.300	-.600	-.100	-.800
Xilin Gol Grassland	-.600	-.800	**-.900***	-.600	**-.900***
Tarim Basin	-.300	.600	.500	.100	.100
Yangteze River Source	.500	.200	-.700	-.700	-.700
Junggar Basin	**-1.000****	**-1.000****	.600	.700	-.100

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table S3D Correlation between areas of aeolian desertification and PDSI.

Monitoring region	Aeolian desertification classifications				
	Slight	Moderate	Severe	Very severe	Total area
Ala Shan Plateau	-.700	.200	.200	.700	.700
Badain Jaran Desert	-.700	.200	.300	.600	.300
Qaidam Basin	-.500	**-1.000****	.500	.100	.300
Gonghe Basin	.600	.400	-.600	-.700	-.600
Heihe Drainage	-.200	-.600	-.100	.500	-.500
Hulun Buir Desert	**-1.000****	-.600	.600	.400	-.600
Lower Yellow River	-.447	-.200	.000	**.900***	**.900***
Yellow River Source	.300	-.100	-.400	-.300	-.400
Otindag Desert	-.700	-.500	-.100	-.300	-.300
Horqin Desert	-.800	-.700	-.700	.200	-.400
Hobq Desert	-.600	.100	.300	.300	.100
Kumtagh Desert	**.900***	.500	**-1.000****	-.359	**-.900***
Luanhe-Yongding Drainage	-.100	-.500	**-1.000****	.700	.700
Mu Us Desert	-.600	-.200	-.200	.300	-.300
Hetao Plain	**-.900***	-.300	.200	-.100	-.600
Central Inner Mongolia	-.700	-.100	-.300	.500	-.300
Northeast of Ningxia Province	-.500	-.800	.100	.500	.200
Qinghai Lake Basin	-.500	-.200	-.500	-.300	**-.900***
Zoige Plateau	.400	.500	-.600	-.100	.100
Shiyanghe Drainage	.300	-.300	-.700	-.300	-.700
Kachgar Drainage	.500	-.800	**-.900***	-.800	-.600
Nunkiang Desert	-.600	.500	.600	.600	.400
Tengger Desert	.300	.800	-.800	-.500	-.400
Turpan-Kumul Basin	-.300	.100	-.300	**.900***	.500
Ulan Buh Desert	**-1.000****	-.100	-.200	.700	.400
Xilin Gol Grassland	**-.900***	-.300	-.400	.100	-.600
Tarim Basin	.800	-.600	-.800	-.600	-.600
Yangteze River Source	.300	.400	.400	-.100	-.100
Junggar Basin	.700	.700	**-.900***	-.300	.500

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).