

# Quantitative characterization of climate change and its impact on aeolian desertification: A case study in northwest Shanxi of China

Zhanjin Xue<sup>1</sup>

<sup>1</sup>Shanxi Univ

April 28, 2020

## Abstract

Aeolian desertification, one of the most serious eco-environmental issues, has strongly hampered the sustainable socio-economic development in semi-arid regions. However, research on climatic change and its influence on aeolian desertification in such region remains problematic. To combat desertification, it is necessary to identify the causes of aeolian desertification. In the present study, based on the geostatistical approach, the meteorological data were used to characterize the climate variation and its impact on aeolian desertification in the period of 1970-2015. Results demonstrated that the climate tended to become warmer and drier. The linear trend rates of mean temperature for the whole year (WY), winter half year (WHY), and summer half year (SHY) were 0.24 (10 a)<sup>-1</sup>, 0.25 (10 a)<sup>-1</sup>, and 0.18 (10 a)<sup>-1</sup>, respectively. The linear trend rates of mean precipitation in WY, WHY, and SHY were -8.29 mm (10 a)<sup>-1</sup>, 2.69 mm (10 a)<sup>-1</sup>, and -8.27 mm (10 a)<sup>-1</sup>, respectively. The temperature rise in WY, WHY, and SHY resulted in an increasing topsoil evaporation and could trigger aeolian desertification. However, the decrease of precipitation in SHY weakened soil water erosion process, and the increase of precipitation at a rate of 0.26 mm a<sup>-1</sup> in WHY improved soil-moisture content. Thus, the analyzed results show that there are relative high sensitivities for climate change, especially in WHY, to ADL expansion or reversal in semi-arid regions.

## Hosted file

Quantitative characterization of climate change and its impact on ADL.docx available at <https://authorea.com/users/313211/articles/443779-quantitative-characterization-of-climate-change-and-its-impact-on-aeolian-desertification-a-case-study-in-northwest-shanxi-of-china>

1 Figure captions:

2 **Fig. 1.** Sketch map of the study area based on elevation.

3 **Fig. 2.** Inter-year variations of mean temperature in northwest Shanxi from 1970 to 2015.

4 **Fig. 3.** Trend test of mean temperature in northwest Shanxi during 1970-2015.

5 **Fig. 4.** Inter-year variations of annual mean precipitation in northwest Shanxi from 1970 to

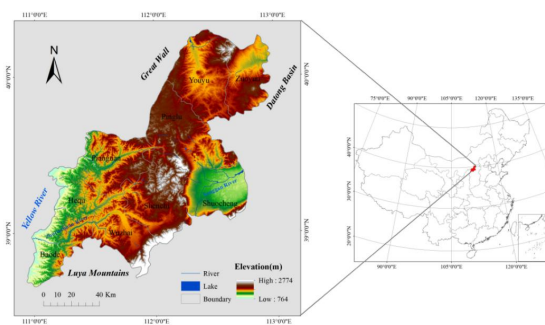
6 2015.

7 **Fig. 5.** Trend test of annual mean precipitation in northwest Shanxi during 1970-2015.

8 **Fig. 6.** Fluctuations in ADL relative to the climate in 1970-2015. All data are normalized.

9

10



11

12 **Fig. 1.** Sketch map of the study area based on elevation.

13

14

15

16

17

## Hosted file

Figures.pdf available at <https://authorea.com/users/313211/articles/443779-quantitative-characterization-of-climate-change-and-its-impact-on-aeolian-desertification-a-case-study-in-northwest-shanxi-of-china>