

Clim. Past Discuss., author comment AC6  
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## Reply on CC1

Michael Kempf

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Author comment on "Monitoring landcover change and desertification processes in northern China and Mongolia using historical written sources and modern vegetation indices" by Michael Kempf, Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-5-AC6>, 2021

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### Author correction to the article

Michael Kempf (2021)

#### **Monitoring landcover change and desertification processes in northern China and Mongolia using historical written sources and vegetation indices**

Current climate change and precipitation and temperature anomalies in Northern China and Mongolia were plotted and compared to vegetation indices (MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG V006; last accessed 07th of April 2021; <https://lpdaac.usgs.gov/products/mod13c2v006/>) (CRU, Harris and Jones, 2019, Harris).

The datasets were reprojected to WGS84 (EPSG4326) using the warp (reproject) tool in QGIS. A point dataset with 1000 random points was created within a 20 km buffer around the reconstructed route from 1688. Using the point sampling tool plugin in QGIS, each monthly environmental variable was added to each point and the mean values were calculated. Using the R package *ggpubr* developed by Alboukadel Kassambara and this R code

```
#read data
```

```
data <- read.csv("mydata.csv", header = TRUE)
```

```
##Perform Pearson's correlation
```

```
ggscatter(data, x = "mydata1", y = "mydata2", add = "reg.line", conf.int = TRUE,
```

```
col="black", cor.coef = TRUE,
```

```
cor.method = "pearson",
```

```
xlab = "mydata1", ylab = "mydata2")
```

a Pearson correlation test was performed. Result show that there is a strong correlation between total vegetation growth behavior and precipitation and Tmax respectively. The correlation test, however, has been performed including the mean values of the random point samples, which covered the entire route and not, like in the preprint version of this article, just a small section in Northern China's Inner Mongolia during the early growing season (March - May).

If the paper is further considered for publication, the new evidence and the results will be included and discussed in the revised version of the paper.

Please find the diagrams of precipitation, Tmax, and NDVI variability as well as the correlation plots attached to this correction manuscript (Fig. 1-5).

Fig. 1: Total NDVI mean values for the period Feb. 2000 – Dec. 2018 based on 1000 random points distributed in a 20 km buffer section along the reconstructed route from 1688. The values range from 227 (Feb. 2000) to 0 (Dec. 2018) and show a significant increase in physical plant condition. Uncalibrated NDVI data based on MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG V006; last accessed 07th of April 2021; <https://lpdaac.usgs.gov/products/mod13c2v006/>.

Fig. 2: Total precipitation mean values for the period Feb. 2000 – Dec. 2018 based on 1000 random points distributed in a 20 km buffer section along the reconstructed route from 1688. The values range from 227 (Feb. 2000) to 0 (Dec. 2018) and are based on (CRU, Harris and Jones, 2019). Total precipitation increases from 2000 to 2018.

Fig. 3: Total Tmax mean values for the period Feb. 2000 – Dec. 2018 based on 1000 random points distributed in a 20 km buffer section along the reconstructed route from 1688. The values range from 227 (Feb. 2000) to 0 (Dec. 2018) and are based on (CRU, Harris and Jones, 2019). There is an increase in Tmax from 2000 to 2018.

Fig. 4: Pearson's correlation test to estimate the relationship between precipitation and vegetation response. Vegetation response is significantly correlated to an increase in precipitation.

Fig. 4: Pearson's correlation test to estimate the relationship between Tmax and vegetation response. Vegetation response is significantly correlated to an increase in Tmax.

#### Reference list

University Of East Anglia Climatic Research Unit (CRU), Harris, I.C. and Jones, P.D. (2019) *CRU TS4.03: Climatic Research Unit (CRU) Time-Series (TS) version 4.03 of high-resolution gridded data of month-by-month variation in climate (Jan. 1901- Dec. 2018)*.

Please also note the supplement to this comment:

<https://cp.copernicus.org/preprints/cp-2021-5/cp-2021-5-AC6-supplement.pdf>