

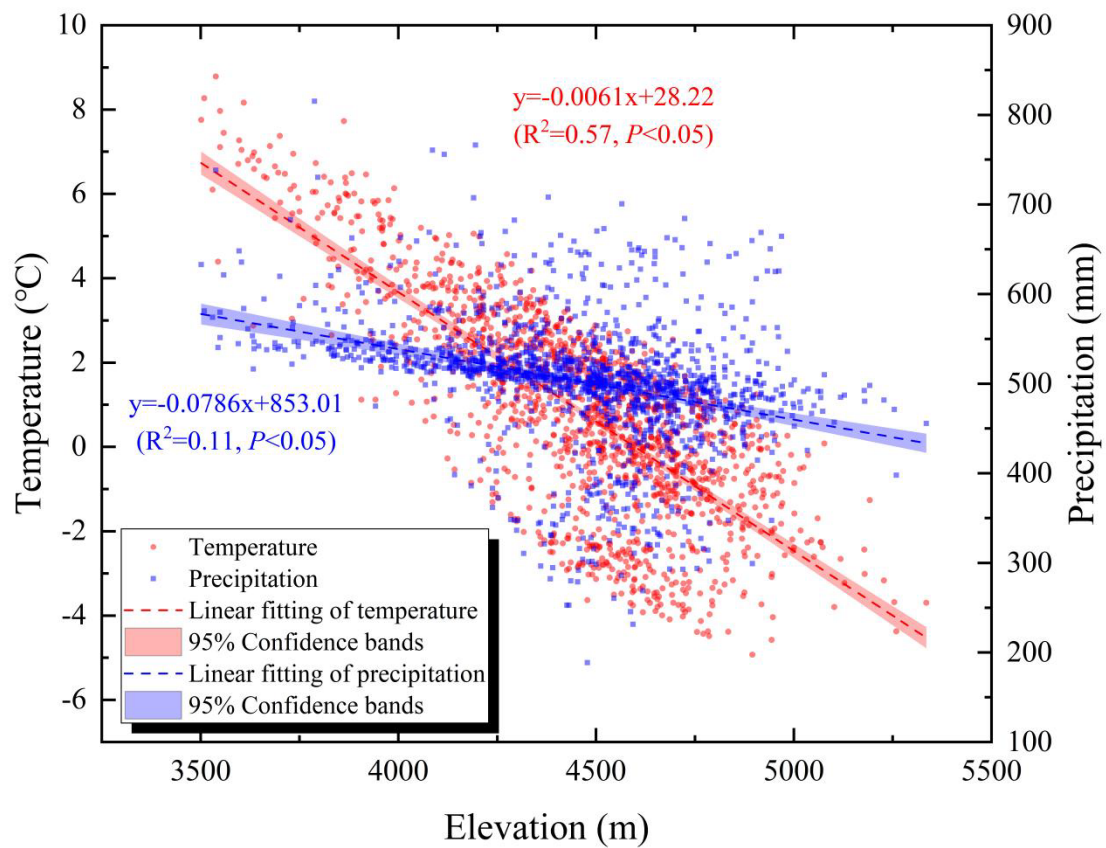
## Supplementary Material

### 1 Supplementary Data

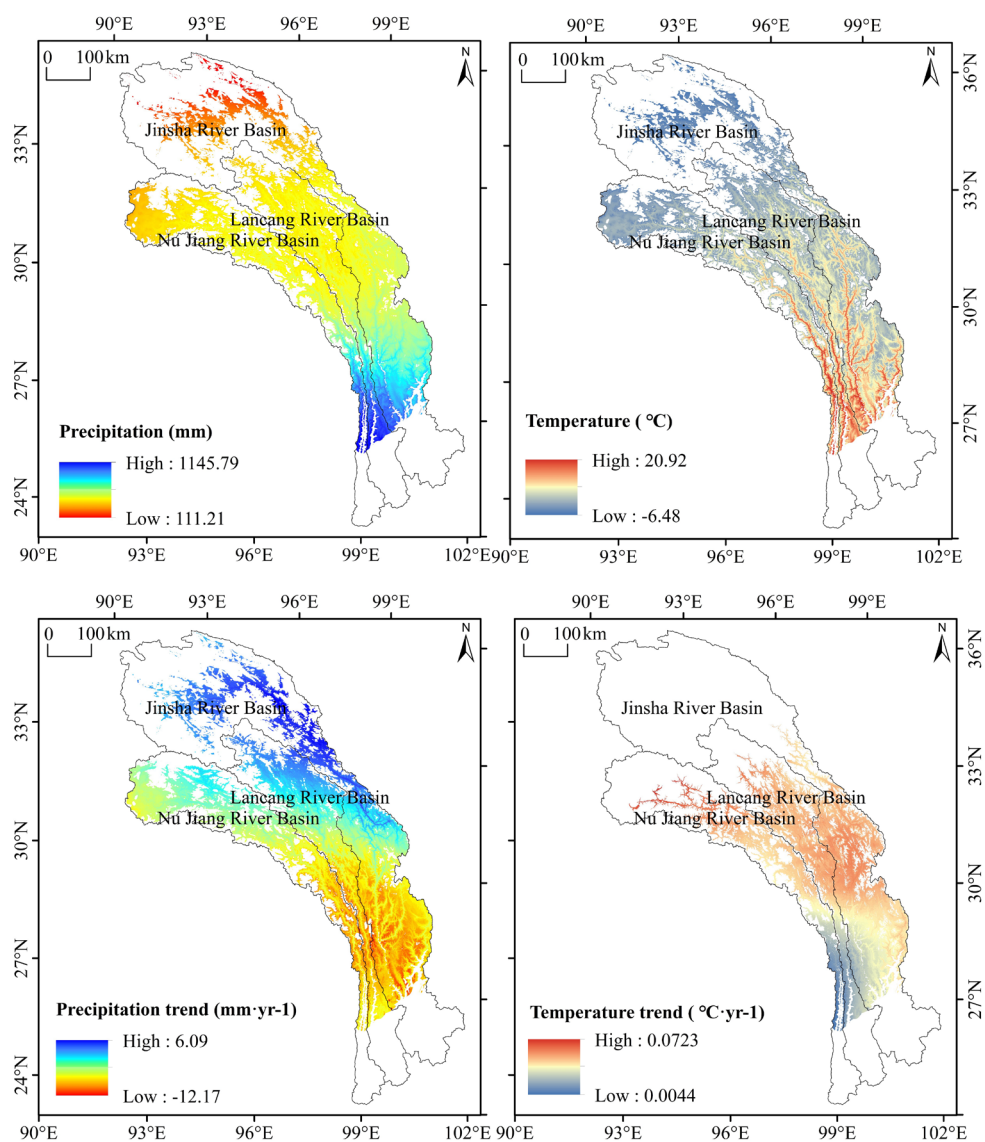
No supplementary data in this manuscript.

### 2 Supplementary Figures and Tables

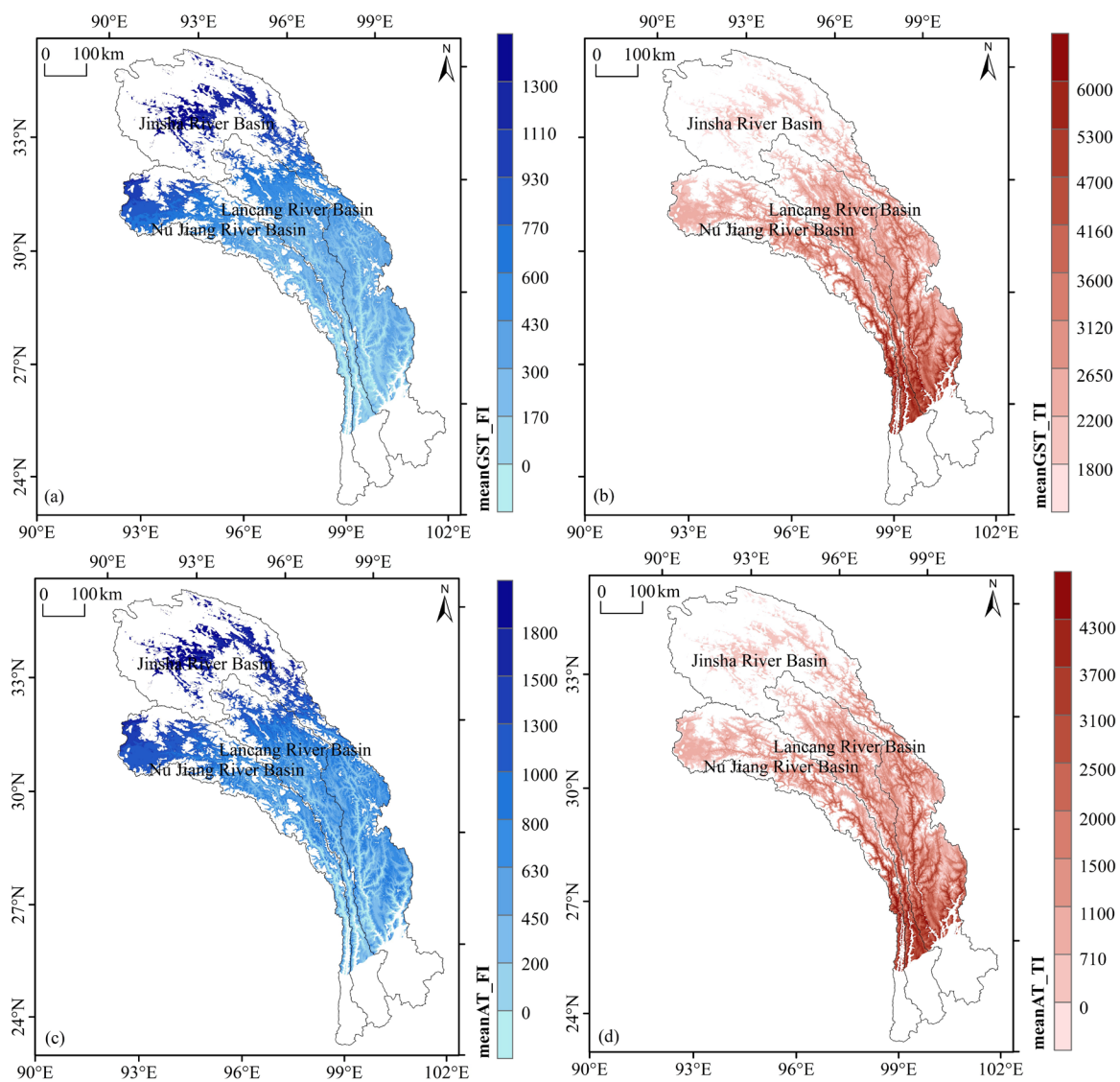
#### 2.1 Supplementary Figures



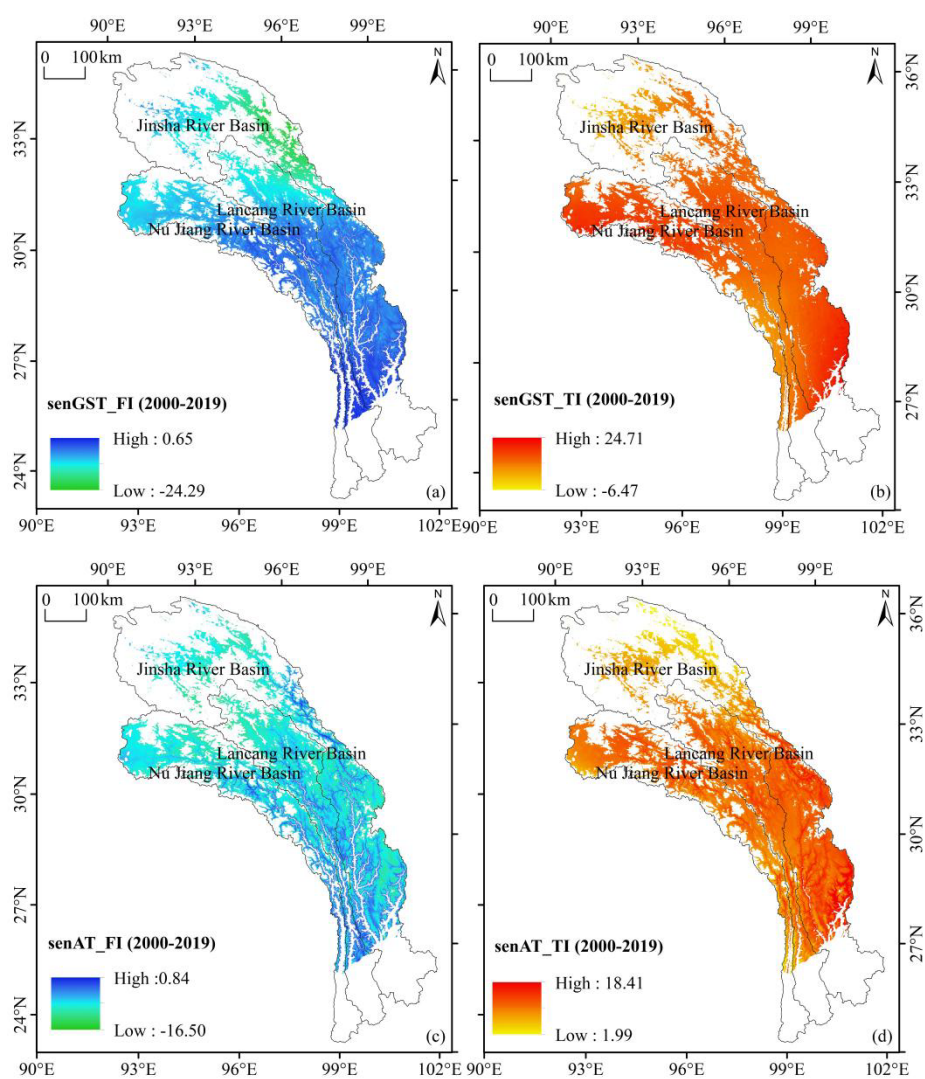
**Supplementary Figure 1.** Variation of climatic factors with altitude



**Supplementary Figure 2.** Multi-year spatial patterns and trends of climate factors (2000-2019)



**Supplementary Figure 3.** The spatial distribution of long-term averaged freezing/thawing index during 2000-2019. ((A)-(D) represent the ground surface freezing index(GFI), ground surface thawing index(GTI), air temperature freezing index(AFI), and air temperature thawing index(ATI), respectively.)



**Supplementary Figure 4.** The trends of long-term averaged freezing/thawing index in the past 20 years.