forests

MDPI

Supplementary Materials

Forest Phenology Dynamics to Climate Change and Topography in a Geographic and Climate Transition Zone: The Qinling Mountains in Central China

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Text 1

The parameters of HANTS were set as follows.

- Number of frequencies: Number of frequencies (above the zero frequency) considered in curve fitting. A curve is described by means of its average value (zero frequency) and a number of sine functions with different frequencies. By this parameter, the user defines how many frequencies are used.
- Suppression Flags (Direction outliers (with respect to the current curve)): Indicates whether high or low values (outliers) should be rejected during curve fitting see also FET).
- Valid data from, to only time series data greater than or equal to the lower limit and lower than or equal to upper limit are used by the HANTS processing algorithm.
- FET (Fit Error Tolerance): During curve fitting the absolute difference in the Direction outliers direction of the remaining (that is, not rejected) data points with respect to the current curve is determined after each iteration. Iteration stops when the difference of all remaining points becomes smaller than the FET. The FET value should not be set too low, as otherwise the fit might be based on too few points, which gives unreliable results (see also Direction outliers).
- DOD (Degree of Over Determinedness): The number of valid observations must always be greater than or equal to the number of parameters that describe the curve (2 × Number of frequencies − 1). In order to get a more reliable fit, the user can decide where to use more data points than the necessary minimum. The minimum number of extra data points, which have to be used in the ultimate fit, is given by the DOD value.
- Delta (damping factor): These numbers controls the suppression of high amplitudes if there is a long data gap during winter time. A number from 0.1 to 0.5 is recommended.

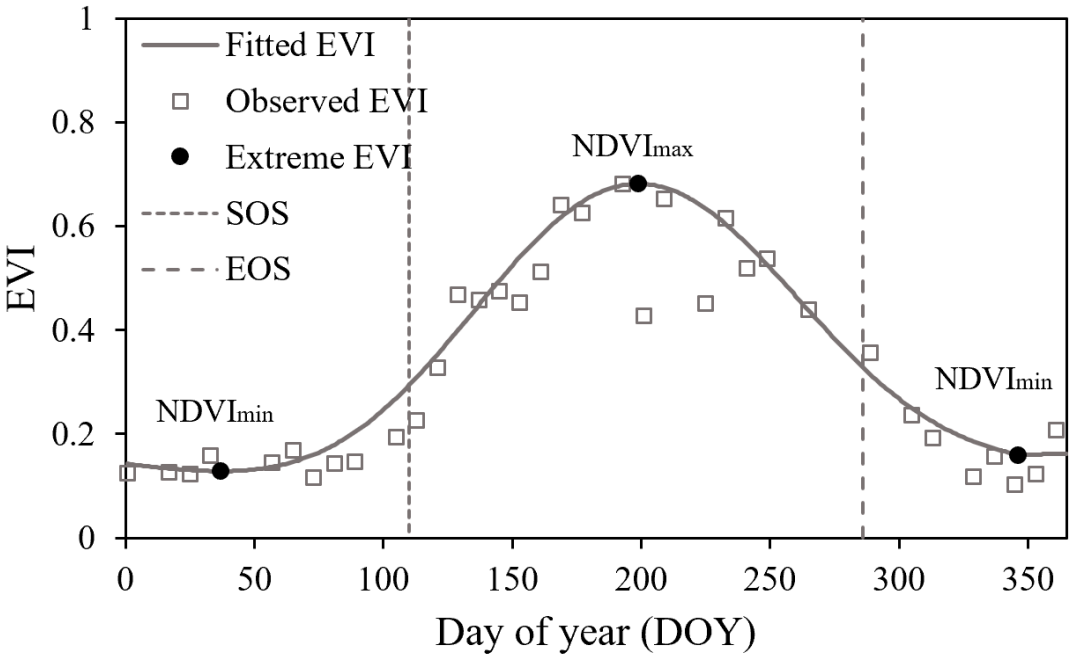


Figure S1. An example of the determination of the start (end) of the growing season using MODIS EVI with SOS (EOS) extraction method. The dates corresponding to the vertical lines are SOS and EOS values extracted by the relative threshold method, respectively.

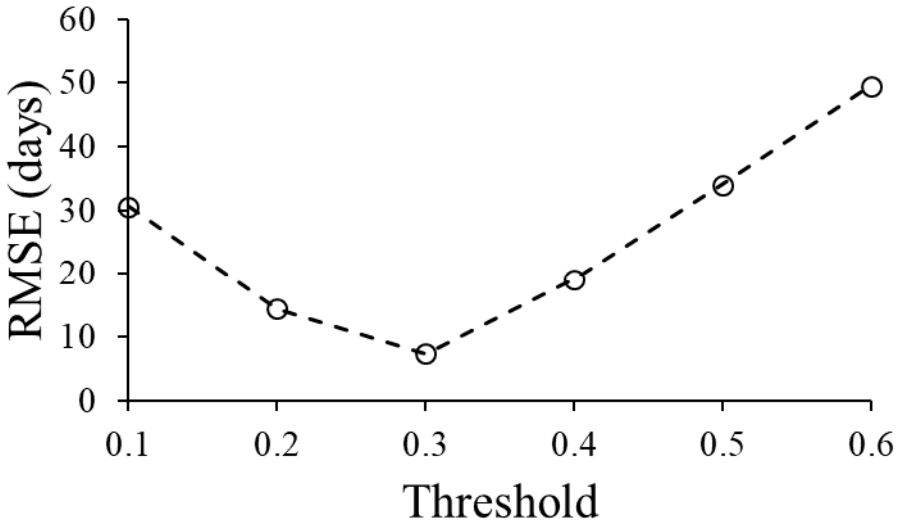
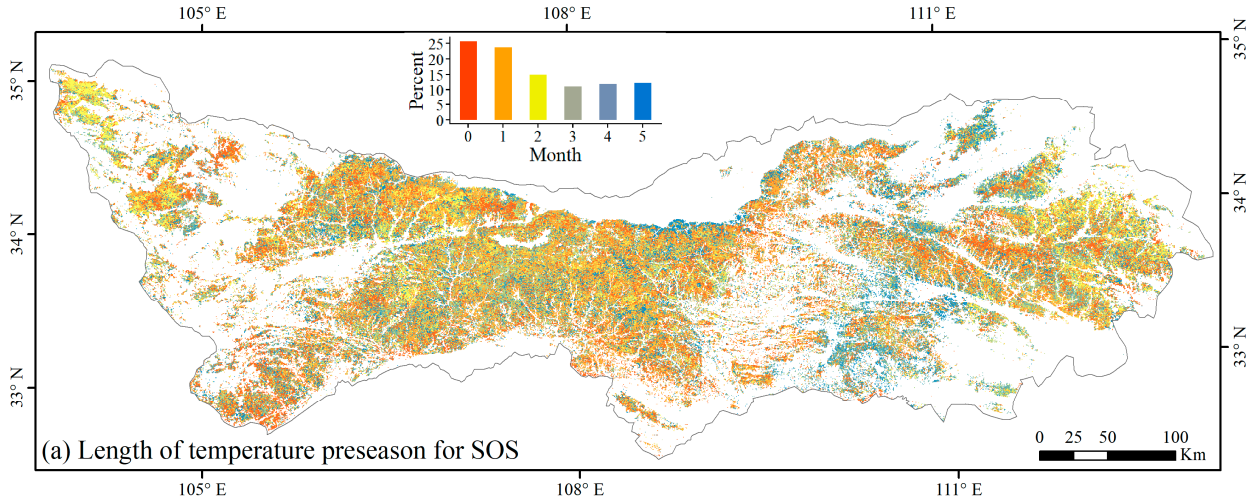
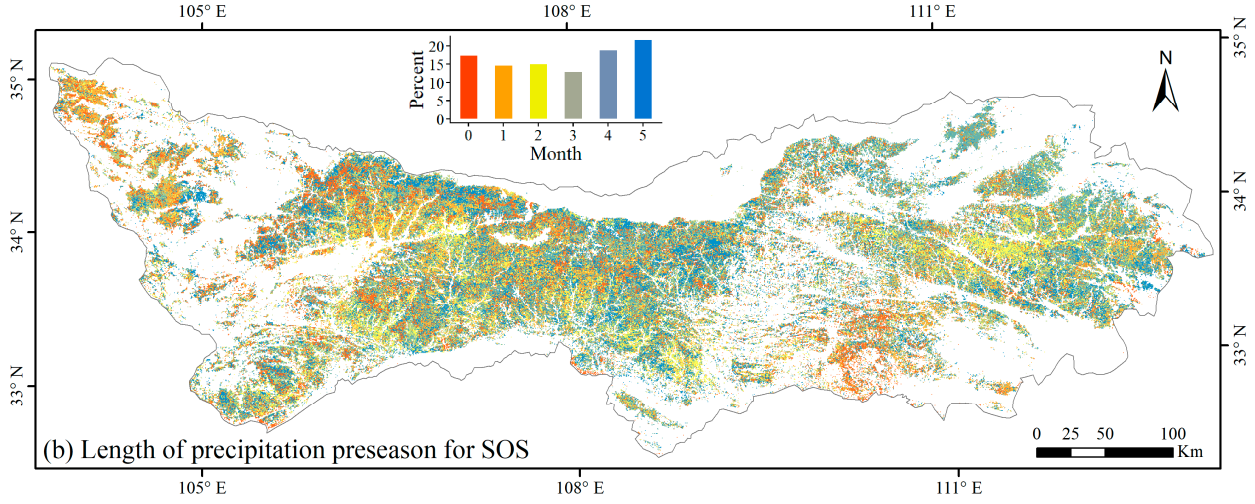
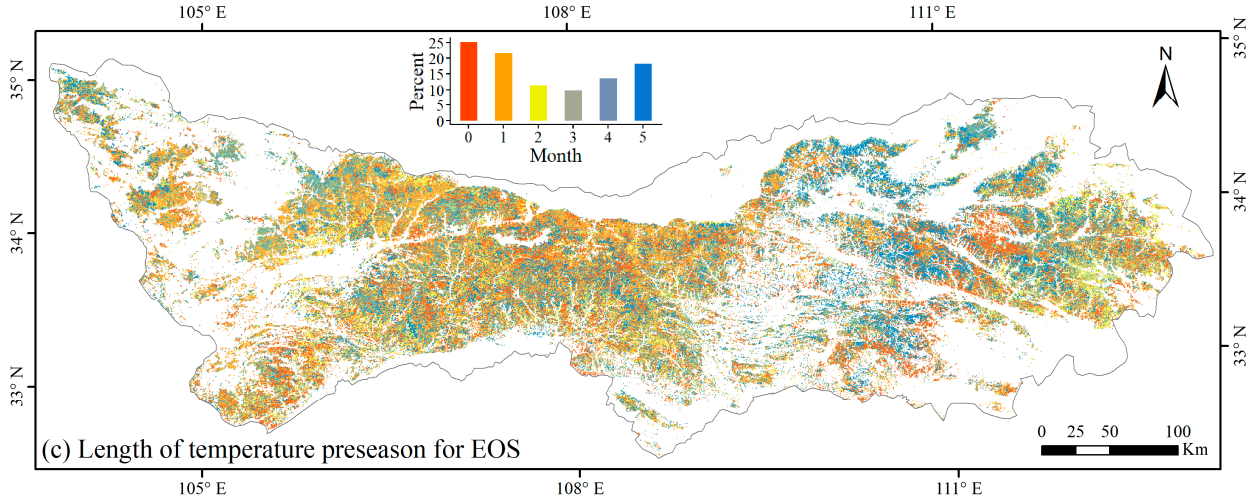


Figure S2. The threshold values were determined according to the lowest absolute error between the leaf-out and leaf senescence dates measured in situ.


105° E
108° E
111° E
35° N
34° N
33° N
Percent
Month
0 25 50 100
Km
(a) Length of temperature preseason for SOS


105° E
108° E
111° E
35° N
34° N
33° N
Percent
Month
N
0 25 50 100
Km
(b) Length of precipitation preseason for SOS


105° E
108° E
111° E
35° N
34° N
33° N
Percent
Month
N
0 25 50 100
Km
(c) Length of temperature preseason for EOS

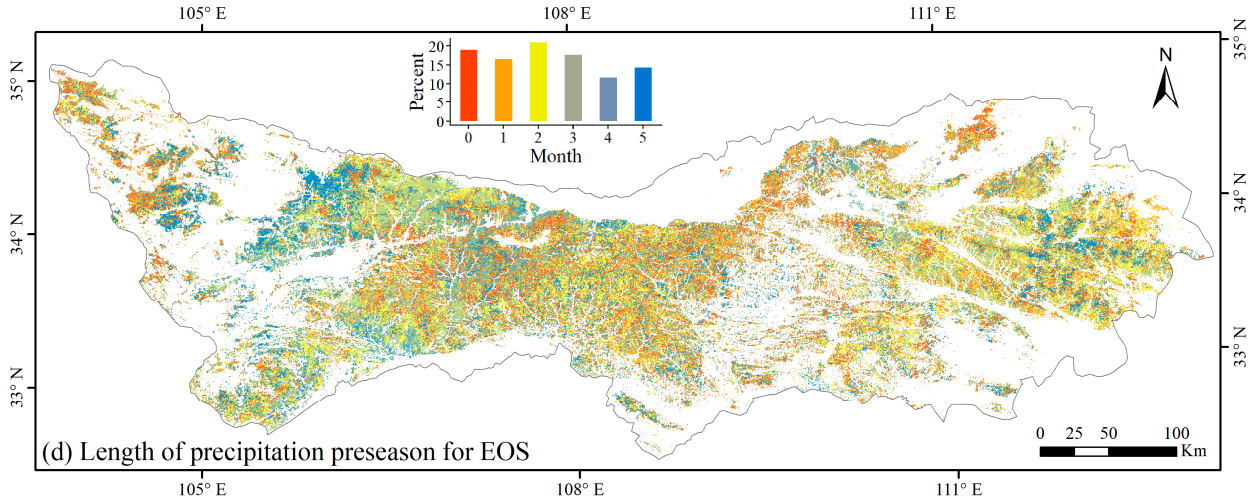
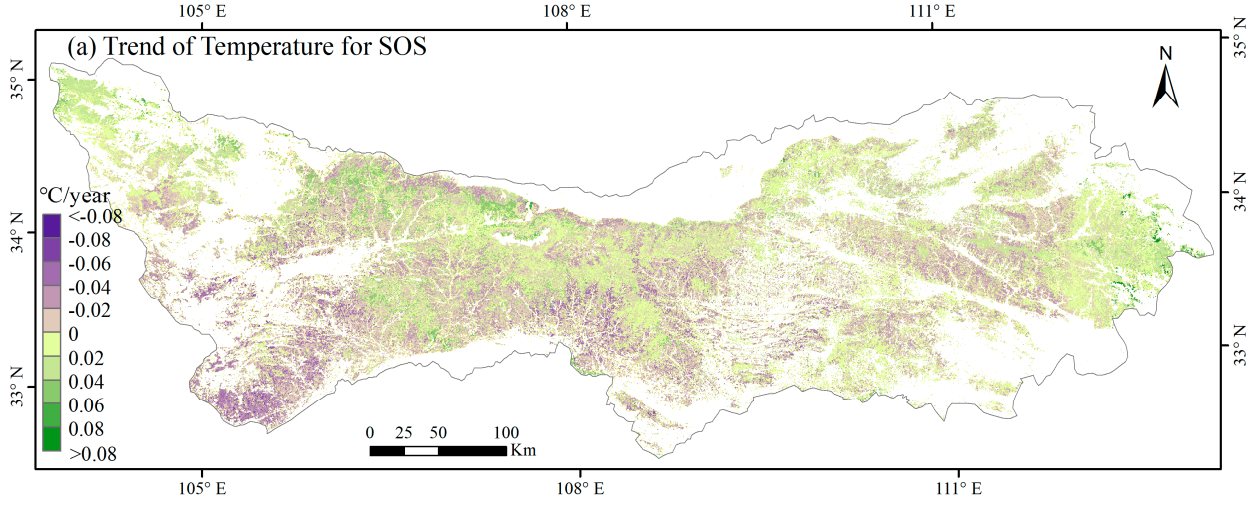
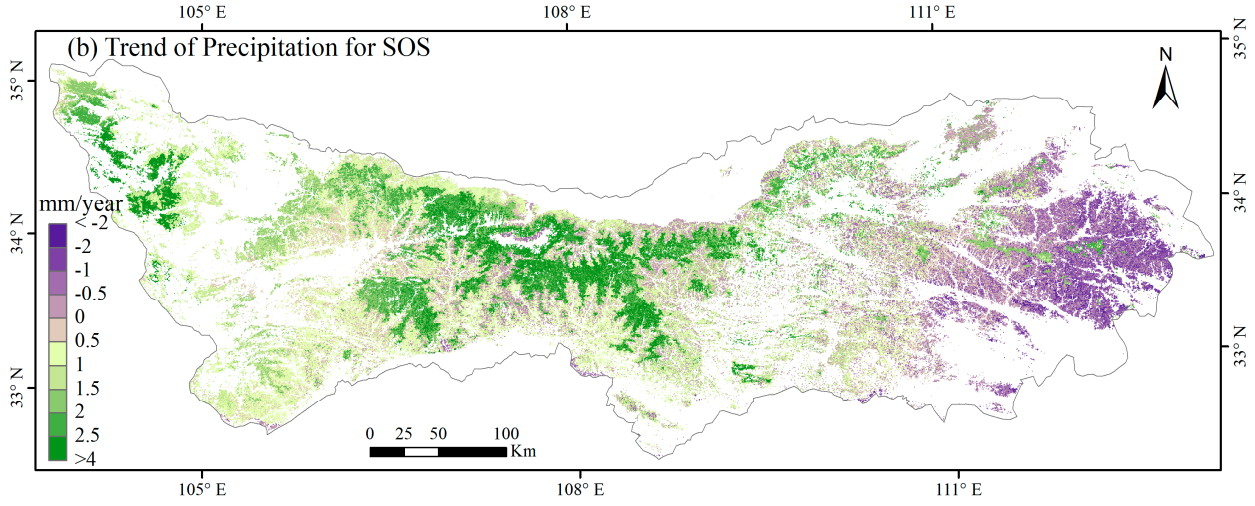


Figure S3. The length of the preseason period corresponds to temperature and precipitation. Climatic factors were summarized from the date of SOS (EOS) at one-month timesteps, then a simple correlation to the date of SOS (EOS) was calculated, and periods with maximum correlation coefficients were defined as preseasons. The labels (**a**) and (**b**) indicate the distribution of preseason length corresponding to temperature and precipitation for SOS, respectively, while the labels (**c**) and (**d**) indicate the distribution of preseason length corresponding to temperature and precipitation for EOS, respectively.





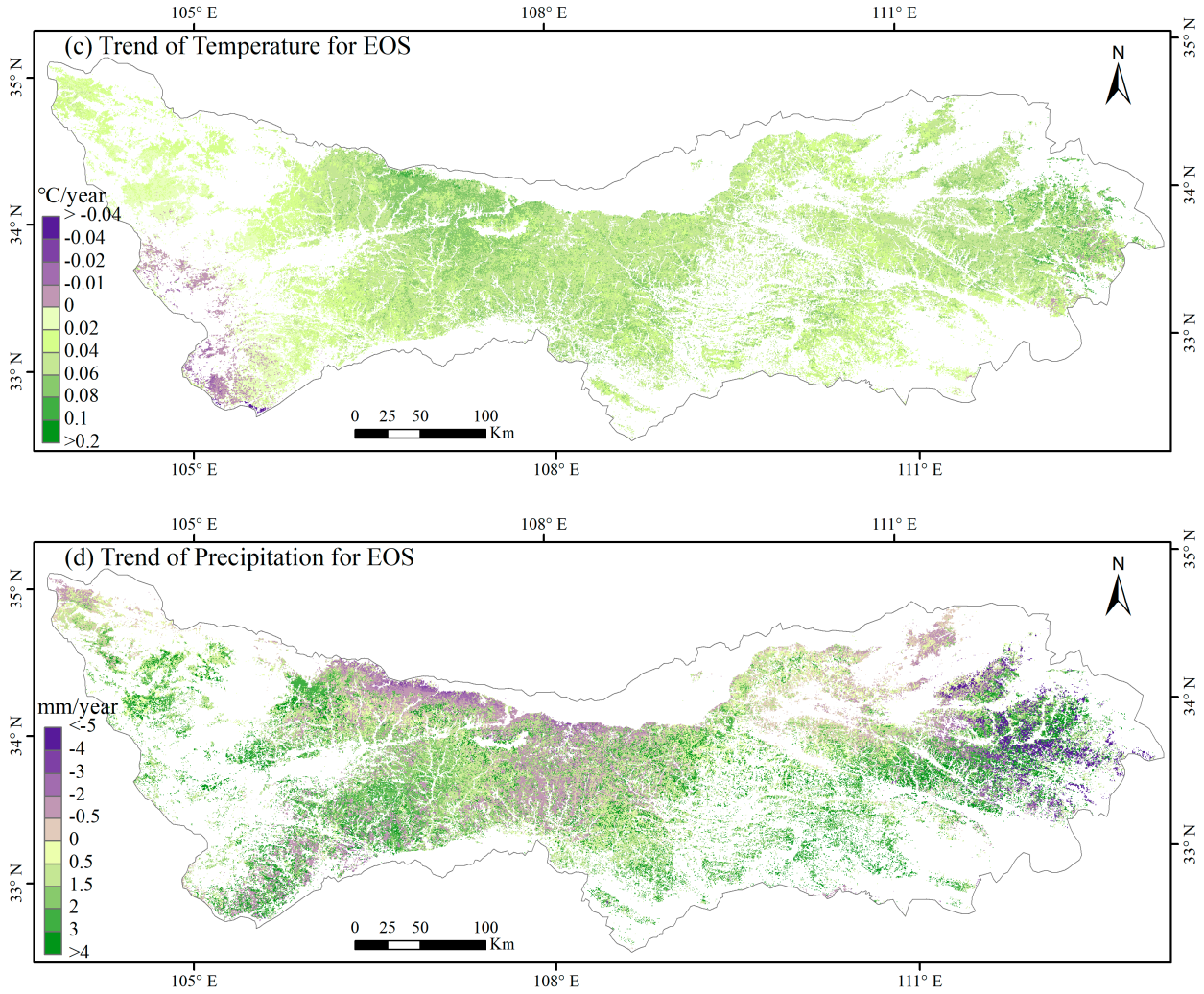


Figure S4. Change trend of the preseason temperature and precipitation for SOS and EOS. (**a**) The trend of temperature in preseason for SOS; (**b**) the trend of precipitation in preseason for SOS; (**c**) the trend of temperature in preseason for EOS; (**d**) the trend of precipitation in preseason for EOS.