

EGU2020-3992

<https://doi.org/10.5194/egusphere-egu2020-3992>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Diverse effects of climate at different times on grassland phenology in mid-latitude of the Northern Hemisphere

Shilong Ren<sup>1</sup>, Yating Li<sup>2</sup>, and Matthias Peichl<sup>3</sup>

<sup>1</sup>Shandong University, Environmental Research Institute, China (slren@sdu.edu.cn)

<sup>2</sup>Department of Environmental Sciences, University of Basel

<sup>3</sup>Department of Forest Ecology and Management, Swedish University of Agricultural Sciences

Studying grassland phenology and its relationships to climate would deepen our understanding of vegetation-air interactions under global climate change. To date, however, our knowledge of the responses of grassland phenology to climatic factors is still limited at the continental scale. In this study, we retrieved the start (SOS) and end (EOS) of the growing season for mid-latitude (30°N~55°N) grasslands of the Northern Hemisphere during 1981-2014, and investigated their relations with previous temperature, rainfall, and snowfall (only for SOS) through trends analysis and time window analysis. Results illustrated a predominant significant advancing/delaying trend of SOS/EOS in 23.2%/20.5% of the study region. They jointly resulted in a primarily significant prolongation trend of growing season length in 22.7% of the study region. Next, a dominated negative correlation between air temperature/rainfall and SOS was found in 62.4%/57.6% of areas. Snowfall showed converse effects (positive/negative) among different grasslands. The time window opening date for air temperature to start to affect SOS was identified as the day 1-90 before the multi-year average SOS in 76.1% of areas, while the time window opening date for the effect of rainfall/snowfall on SOS was relatively evenly distributed between the 1st and 180th day before the multi-year average SOS. EOS was found to be significantly negatively/positively correlated with air temperature/precipitation in 74.8%/83.7% of areas. The time window opening date for the effect of air temperature on EOS was identified as the 90-180th day before the multi-year average EOS in 66.9% of areas, while the time window opening date for the effect of precipitation on EOS was mainly concentrated on the 60-120th day before the multi-year average EOS in 51.5% of areas. Overall, this study highlights the distinctly different time windows for the thermal-moisture effects on grassland vegetation phenology and this should be considered when establishing process-based phenological models.