Geophysical Research Abstracts
Vol. 20, EGU2018-3295, 2018
EGU General Assembly 2018

Plant phenological sensitivity to climate change is greater on the Tibetan Plateau than in other areas of the world

Ji Suonan (1,2,3), Aimée Classen (3,4), Nathan Sanders (3,4), Jin-Sheng He (2,5)

(1) Institute of Tibetan Plateau Research, Chinese Academy of Sciences , China (sonamkyi@itpcas.ac.cn), (2) Department of Ecology, College of Urban and Environmental Sciences, and Key Laboratory for Earth Surface Processes of the Ministry of Education, Peking University, China (sonamkyi@itpcas.ac.cn), (3) The Center for Macroecology, Evolution, and Climate, Natural History Museum of Denmark, University of Copenhagen, Denmark (sonamkyi@itpcas.ac.cn), (4) Rubenstein School of Environment & Natural Resources, University of Vermont, Burlington, United States (Aimee.Classen@uvm.edu), (5) Key Laboratory of Adaptation and Evolution of Plateau Biota, Northwest Institute of Plateau Biology, Chinese Academy of Sciences, China (jshe@pku.edu.cn)

Global warming and changes in precipitation are altering the phenology of plants that significantly impact the functioning and services of ecosystems. Although a number of studies have addressed responses of plant phenology to warming and altered precipitation individually, their interactions can alter plant phenology differently than either does independently. To explore how the interaction between global change drivers alters alpine ecosystems, we conducted a factorial experiment manipulating warming (ambient, +2 oC) and altered precipitation (decrease 50%, control, increase 50%) simultaneously in an alpine meadow on the Tibetan Plateau. Over two-years, we monitored plant phenological events, leaf-out day and first flowering day, for 11 common plant species which account for 74.4% of the total above biomass. Surprisingly, there was no interaction between warming and changes in precipitation on community plant phenology, but warming advanced leaf out and first flowering day by 7.10 and 9.79 days, respectively. Unlike the community response, plant functional groups had a variety of direct and interactive responses to the experimental climate drivers. While legumes were most influenced by temperature, temperature and precipitation interacted to alter the grasses and forbs. To explore how plant phenological sensitivity on the Tibetan Plateau compared to other meadow ecosystems, we combined our dataset with a global plant phenology dataset. Interestingly, the phenological sensitivity of leaf-out day and first flowering day on the Tibetan Plateau are 7.3% and 37.8% greater than global phenological sensitivity, respectively. This result highlights that meta-analysis of global phenological sensitivity may significantly underestimate change in some regions – even regions as large as the Tibetan Plateau. Together, our results suggest that the Tibetan Plateau may experience rapid change as temperatures warm and that these changes will likely be more rapid than in other regions of the world. Further, our study highlights that if we are to make accurate predictions of how plant phenology may change with warming, we need to understand the specific environmental cues that drive phenological responses across different areas.