

Nonlinear response of community stability to ambient climate determines response direction of community stability to warming and grazing

Peipei Liu¹, Wangwang Lv², Jianping Sun², Caiyun Luo³, Zhenhua Zhang⁴, Xiaoxue Zhu⁴, Xinwu Lin⁵, Jichuang Duan², Guangping Xu², Xiao-Feng Chang⁶, Yigang Hu², Qiaoyan Lin², Burenbayin Xu², Xiaowei Guo², Lili Jiang², Tsechoe Dorji⁷, Yanfen Wang⁸, Shilong Piao⁹, Jinzhi Wang², Haishan Niu², Liyong Shen², Yang Zhou², Bowen Li⁷, Qi Wang⁷, Suren Zhang², Lu Xia², Yingnian Li², Guangmin Cao¹⁰, Josep Penuelas¹¹, Xinquan Zhao², and Shiping Wang¹²

¹Chinese Academy of Sciences

²Affiliation not available

³Northwest Institute of Plateau Biology Chinese Academy of Sciences

⁴Chinese Academy of Sciences, Northwest Institute of Plateau Biology

⁵Institute of Soil Science, Chinese Academy of Sciences

⁶Institute of Water and Soil Conservation of Chinese Academy of Sciences and Ministry of Water Resource

⁷Institute of Tibetan Plateau Research Chinese Academy of Sciences

⁸University of the Chinese Academy of Sciences

⁹Peking university

¹⁰Key Laboratory of Adaptation and Evolution of Plateau Biota, Northwest Institute of Plateau Biology, Chinese Academy of Sciences

¹¹CSIC-CREAF

¹²Institute of Tibetan Plateau Research, Chinese Academy of Sciences

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Abstract

The impacts of human-driven environmental changes on the stability of natural grasslands have been assessed by comparing differences between manipulative warming and grazing plots and reference plots. However, little is known about whether or how ambient climate regulates the effects of manipulative treatments. A 36-year observational dataset shows that there is a nonlinear response of community stability to ambient climate. Manipulative warming and grazing decrease community stability with experiment duration through an increase in legume coverage and/or decrease in species asynchrony, due to exceeding the threshold of background annual mean air temperature with decreasing background annual mean air temperature through time during the 10-year experiment period. Moreover, the temperature sensitivity of community stability is more sensitive under the ambient treatment than under the manipulative treatments. Therefore, our study emphasizes the importance of the context dependency of the response of community stability to human-driven environmental changes.

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