

Projected changes of growing season length across Northern Eurasia in the 1.5°C and 2°C warmer world

Baiquan Zhou, Panmao Zhai

State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences, No.46

Zhong-guan-cun South Street, Haidian District, Beijing, 100081, China.

**Correspondence to:* Panmao Zhai (pmzhai@cma.gov.cn)

Northern Eurasia, undergoing dramatic climatic and environmental changes, is a key part of the global socioeconomic systems. Projections of 15 CMIP5 models under scenarios RCP 2.6, RCP4.5 and RCP8.5 including surface air temperature and growing season length (GSL) were employed to investigate the responses of ecology in Northern Eurasia to global warming. Based on the median projections of all CMIP5 models, the 1.5°C global warming crossing times of all RCPS range from 2024 to 2031 and 2°C warming limit will be reached by 2038 and 2051 for RCP8.5 and RCP4.5 respectively. By comparison of GSL changes under RCP4.5 and RCP8.5, it is noted that projections under these two scenarios look very similar for both warming levels. Larger increase of GSL is found in the west and at higher latitudes of Northern Eurasia. According to the spatial distribution of changes in GSL, at 1.5°C warming, GSL projections averaged between RCPS show 48.3% and 16.8% land area of Northern Eurasia will experience 10 days and 20 days longer GSL. Comparing 2°C global warming with 1.5°C, 20% and 16% more land area of Northern Eurasia will experience 10 and 20 days longer GSL respectively. When global mean air temperature increases from 1.5°C to 2°C, longer growing seasons in Northern Eurasia do not necessarily translate into an increase in yield, accompanying high temperature extremes will restrain the growth of crops.