A Big Earth Data Platform for Three Poles

**An earlier start of the thermal growing season enhances tree growth in cold humid areas but not in dry areas**

1、Description

Climatic warming alters the onset, duration and cessation of the vegetative season. While prior studies have shown a tight link between thermal conditions and leaf phenology, less is known about the impacts of phenological changes on tree growth. Here, we assessed the relationships between the start of the thermal growing season (TSOS) and tree growth across the extratropical Northern Hemisphere using 3451 tree-ring chronologies and daily climatic data for 1948-2014. An earlier TSOS promoted growth in regions with high ratios of precipitation to temperature but limited growth in cold dry regions. Path analyses indicated that an earlier TSOS enhanced growth primarily by alleviating thermal limitations on wood formation in boreal forests and by lengthening the period of growth in temperate and Mediterranean forests. Semi-arid and dry subalpine forests, however, did not benefit from an earlier onset of growth and a longer growing season, presumably due to associated water loss and/or more frequent early spring frosts. These broadly relevant patterns of how climatic impacts on wood phenology affect tree growth at regional to hemispheric scales, enhance our understanding of how future phenological changes may affect the carbon sequestration capacity of extra-tropical forest ecosystems.

2、Keywords

Theme：Earth SurFace Processes,Forest,phenology,tree rings  
Discipline：Terrestrial Surface  
Places：extratropical Northern Hemisphere  
Time：the start of the thermal growing season

3、Data details

1.Scale：None

2.Projection：

3.Filesize：23.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：70.0 | - |
| west：-180.0 | - | east：180.0 |
| - | south：20.0 | - |

5、Time frame:1947-12-31 16:00:00+00:00--2013-12-31 16:00:00+00:00

6、Reference method

References to data:

LIANG Eryuan, GAO Shan. An earlier start of the thermal growing season enhances tree growth in cold humid areas but not in dry areas. A Big Earth Data Platform for Three Poles, doi:10.11888/Terre.tpdc.2719252021

References to articles:

Gao, S., Liang, E. Y., Liu, R.S., Babst, F., Camarero, J. J., Fu, Y.S., Piao, S.L., Rossi, S., Shen, M.G., Wang, T., Peñuelas, J. (2022). An earlier start of the thermal growing season enhances tree growth in cold humid areas but not in dry areas, Nature Ecology & Evolution, 6(4): 397–404.  
  
Gao, S., Zhou, T., Yi, C., Shi, P., Fang, W., Liu, R., Liang, E., & Julio Camarero, J. (2020). Asymmetric impacts of dryness and wetness on tree growth and forest coverage. Agricultural and Forest Meteorology, 288-289, 107980. doi:10.1016/j.agrformet.2020.107980

7、Supporting project information

Second Tibetan Plateau Scientific Expedition Program

8、Data resource provider

name: LIANG Eryuan  
unit: Institute of Tibetan Plateau Research, CAS  
email: liangey@itpcas.ac.cn  
  
name: GAO Shan  
unit:   
email: gaoshan@itpcas.ac.cn