A Big Earth Data Platform for Three Poles

**Ring-width indices and annual water deficit anomaly of the southwest USA (1902-2012)**

1、Description

This dataset is collected from the Supplementary Materials part of the paper: 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.
In this paper the researchers took forests in the semi-arid area of the Colorado Plateau in the southwest USA as the research object, comprehensively applied a large amount of tree ring width data, combined with remote sensing forest coverage data, they explored the legacy effect under the influence of the interannual water deficit by designing "natural experiments" at the regional scale, and compared the similarities and differences of the effect of the interannual water status changes on the tree ring width and forest coverage. The study found that the water status in the year when the tree ring was formed can significantly affect the duration and intensity of the legacy effect, and the response of the tree ring width and forest coverage to the interannual water status is different.
This data contains ring-width indices (RWI) of 357 sample sites in 111-hydrological year (i.e., for 1902–2012) and annual water deficit anomaly (Dya) that matched to RWI.
The tree-ring database used in this research was composed of 357 standard chronologies of three major species (Pinus edulis Engelm., Pinus ponderosa Douglas ex C. Lawson and Pseudotsuga menziesii (Mirb.) Franco) in the study region, spanning from 1902 to 2012, resulting in a total of 29,969 site-years. A total of 357 tree-ring width chronologies of three major tree species were obtained from the International Tree-Ring Data Bank (https://www.ncdc.noaa.gov/data-access/paleoclimatology-data/datasets/tree-ring). To transform tree-ring width data into ring-width indices (RWI), long-term trends caused by aging and increasing trunk diameter were mostly removed by negative exponential curves using the ARSTAN program (Cook, 1985). After performing standardization, all chronologies were scaled to a standard mean (RWI = 1000) with a comparable variance to reduce the spatial heterogeneity among these tree-ring sites.
In this research, researchers used annual water deficit anomaly (Dya) to explore the impact of water deficit variability on tree radial growth and growth legacies. They matched gridded Dya to RWIs. For tree-ring chronologies within the same grid, they averaged them for each year to reduce bias caused by the rough resolution of climate data.
The data is 1 Excel workbooks, Ring-width indices and annual water deficit anomaly (1902-2012), which contains 3 worksheets as follows:
raw\_data
processed\_data
variables
The data contains the following fields:
sitename: the name of tree-ring sampled site
Year: the tree-ring formation year
RWI: ring-width indices
latitude: the latitude of tree-ring sampled site
lontitude: the lontitude of tree-ring sampled site
altitude: the altitude of tree-ring sampled site
lon Grid no.: the lontitude grid number of tree-ring sampled site
lat Grid no.: the latitude grid number of tree-ring sampled site
Dya\_3: water deficit anomaly of the 3rd year before the tree-ring formation year (i.e. "Year" column)
Dya\_2: water deficit anomaly of the 2nd year before the tree-ring formation year (i.e. "Year" column)
Dya\_1: water deficit anomaly of the 1st year before the tree-ring formation year (i.e. "Year" column)
Dya\_curr: water deficit anomaly of the tree-ring formation year (i.e. "Year" column)
Dya\_std: the standard deviation of 111-hydrological year (i.e., for 1902–2012) averaged annual water deficit of the grid

2、Keywords

Theme：Tree-ring width,Paleoclimate Reconstruction
Discipline：Palaeoenvironment
Places：The Colorado Plateau semi-arid area, The southwestern United States
Time：1902-2012

3、Data details

1.Scale：None

2.Projection：

3.Filesize：2.86MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：41.91 | - |
| west：-113.9 | - | east：-103.02 |
| - | south：31.45 | - |

5、Time frame:None--None

6、Reference method

References to data:

GAO Shan. Ring-width indices and annual water deficit anomaly of the southwest USA (1902-2012). A Big Earth Data Platform for Three Poles, doi:10.11888/Paleoenv.tpdc.2727292020

References to articles:

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

8、Data resource provider

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