时空三极环境大数据平台

**A global spatially contiguous solar-induced fluorescence (CSIF) dataset using neural networks (2000-2020)**

英文标题：A global spatially contiguous solar-induced fluorescence (CSIF) dataset using neural networks (2000-2020)

1、摘要

Satellite-retrieved solar-induced chlorophyll fluorescence (SIF) has shown great potential to monitor the photosynthetic activity of terrestrial ecosystems. However, several issues, including low spatial and temporal resolution of the gridded datasets and high uncertainty of the individual retrievals, limit the applications of SIF. In addition, inconsistency in measurement footprints also hinders the direct comparison between gross primary production (GPP) from eddy covariance (EC) flux towers and satellite-retrieved SIF. In this study, by training a neural network (NN) with surface reflectance from the MODerate-resolution Imaging Spectroradiometer (MODIS) and SIF from Orbiting Carbon Observatory-2 (OCO-2), we generated two global spatially contiguous SIF (CSIF) datasets at moderate spatiotemporal (0.05∘ 4-day) resolutions during the MODIS era, one for clear-sky conditions (2000–2017) and the other one in all-sky conditions (2000–2016). The clear-sky instantaneous CSIF (CSIFclear-inst) shows high accuracy against the clear-sky OCO-2 SIF and little bias across biome types. The all-sky daily average CSIF (CSIFall-daily) dataset exhibits strong spatial, seasonal and interannual dynamics that are consistent with daily SIF from OCO-2 and the Global Ozone Monitoring Experiment-2 (GOME-2). An increasing trend (0.39 %) of annual average CSIFall-daily is also found, confirming the greening of Earth in most regions. Since the difference between satellite-observed SIF and CSIF is mostly caused by the environmental down-regulation on SIFyield, the ratio between OCO-2 SIF and CSIFclear-inst can be an effective indicator of drought stress that is more sensitive than the normalized difference vegetation index and enhanced vegetation index. By comparing CSIFall-daily with GPP estimates from 40 EC flux towers across the globe, we find a large cross-site variation (c.v. = 0.36) of the GPP–SIF relationship with the highest regression slopes for evergreen needleleaf forest. However, the cross-biome variation is relatively limited (c.v. = 0.15). These two contiguous SIF datasets and the derived GPP–SIF relationship enable a better understanding of the spatial and temporal variations of the GPP across biomes and climate.

2、关键词

主题关键词：人地遥感,植被,太阳诱导叶绿素荧光,地表过程,碳通量,连续日光诱导叶绿素荧光,全球初级生产总值,总初级生产力,SIF,陆地表层遥感
学科关键词：陆地表层,人地关系
地点关键词：global
时间关键词：2000-2020

3、数据细节

1.比例尺：None

2.投影：

3.文件大小：60000.0MB

4.数据格式：None

4、空间范围

|  |  |  |
| --- | --- | --- |
| - | 北：90.0 | - |
| 西：-180.0 | - | 东：180.0 |
| - | 南：-90.0 | - |

5、时间范围2000-02-29 16:00:00+00:00--2020-12-30 16:00:00+00:00

6、引用方式

数据的引用:

张尧. A global spatially contiguous solar-induced fluorescence (CSIF) dataset using neural networks (2000-2020). 时空三极环境大数据平台, DOI:10.11888/Ecolo.tpdc.271751, CSTR:18406.11.Ecolo.tpdc.271751, 2021.[ZHANG Yao. . A Big Earth Data Platform for Three Poles, DOI:10.11888/Ecolo.tpdc.271751, CSTR:18406.11.Ecolo.tpdc.271751, 2021]

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7、资助项目信息

8、数据资源提供者

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