GOSIF: A Global, 0.05-Degree Product of Solar-Induced Chlorophyll Fluorescence Derived from OCO-2, MODIS, and Reanalysis Data

Description:
Solar-induced chlorophyll fluorescence (SIF) brings major advancements in measuring the terrestrial photosynthesis. Several recent studies have evaluated the potential of SIF retrievals from the Orbiting Carbon Observatory-2 (OCO-2) in estimating gross primary productivity (GPP). However, the spatially and temporally sparse nature of OCO-2 data makes it challenging to use these data for many applications from ecosystem scale to the globe. We developed a new global, OCO-2-based SIF data set (GOSIF) with high spatial and temporal resolutions (i.e., 0.05°, 8-day) using discrete OCO-2 SIF soundings, remote sensing data from the Moderate Resolution Imaging Spectroradiometer (MODIS), and meteorological reanalysis data. Our SIF estimates are highly correlated with GPP from 91 FLUXNET sites ($R^2 = 0.73$, $p < 0.001$). Compared with the coarse-resolution SIF data that are directly aggregated from OCO-2 soundings, GOSIF has finer spatial resolution, globally continuous coverage, and a much longer record. GOSIF is useful for assessing terrestrial photosynthesis and ecosystem function and benchmarking terrestrial biosphere and Earth system models. The methodology, validation, and spatial and temporal patterns of this product are described in our paper (Li and Xiao, 2019).

Fair Data Use Policy:
We make this data product available to the research community as we believe that the dissemination of this data set will lead to advancement in science. If you plan to use our data in a manuscript or presentation, we request that you inform us at an early stage of your work. You should ensure that your research does not significantly overlap with what we are currently working on with this product. In addition, if this data set is essential to your work, or if an important result or finding depends on the GOSIF data, co-authorship may be appropriate. You must inform us of your analysis and publication plans well in advance of submission of a paper, give us an opportunity to read and intellectually contribute to the manuscript, and, if appropriate, offer co-authorship.

Contact: Drs. Jingfeng Xiao (j.xiao@unh.edu) and/or Xing Li (zxwlxty@163.com).

Metadata:
- Spatial resolution: 0.05 degree
- Temporal resolution: 8 day (and monthly, annual)
- File format: GeoTIFF
- Scale factor: 0.0001
- Spatial extent: globe
- Temporal extent: 2000 -2022
- Map projection: Geographic
- Units: W m$^{-2}$ μm$^{-1}$ sr$^{-1}$
- Fill values: 32767 (water bodies) and 32766 (lands under snow/ice throughout the year)

Citation:

<to be continued>
Download:
Global Ecology Group Data Repository: http://globalecology.unh.edu/data/GOSIF.html. Please visit our webpage for any update to this product.

Changes from the original version:

Update on 5/14/2023: We made a mistake in generating the data for 2022 that were released in early April 2023; this mistake has been corrected and the data files have been updated. If you previously downloaded the 2022 data, please replace them with the new files.

The new version (V2) has been updated from the original version in the following ways: (1) the dataset has been extended to 2022; (2) GOSIF has been slightly improved using five subcommittee models rather than three subcommittee models; (3) a new data type (signed short rather than double) and a scale factor were used to reduce data volume.

V2 was first released on December 1, 2019 and was last updated on April 2, 2023.

Citation:

Relevant Publications:

GOSIF GPP product:


SIF-GPP relationships:


Applications:


Review: