

ClimBEco- Workshop 3

Introduction

This exercise package is focusing on how to use remote sensing (RS) observations from satellites for upscaling eddy covariance measurements, based on the light use efficiency (LUE) model $GPP = PAR * fAPAR * LUE$. PAR is the photosynthetically active radiation, fAPAR is the fractional absorbed PAR by vegetation, LUE is the efficiency of vegetation to convert the light energy into biomaterials. The aim of the exercise is to provide an insight into how remote sensing can be used to upscale GPP and to stimulate a discussion on strengths and weaknesses of this approach.

Data

You will work with the following data:

- MODIS EVI2 observations from the Nadir Bidirectional Reflectance Distribution Function (BRDF)-Adjusted Reflectance (NBAR) dataset (MCD43A4 Version 6) during 2017-2018.
- 18 ICOS eddy-covariance (EC) sites with measurements during 2015-2018, including GPP and PAR.
- MODIS land cover types data (a static map from IGBP 2017).
- ECMWF ERA5 surface shortwave incoming radiation (SSIR).

Content

The exercise includes the following parts:

- Calculate the LUE coefficients with EC and remote sensing data for different vegetation types.
- Create a LUE raster from the land cover classification map by assigning the calculated LUE values to certain land cover types.
- Upscale GPP from the remote sensing observations (e.g., EVI2), PAR estimations from ECMWF, and the created LUE raster.
- Investigate the upscaled GPP data.
- Tasks

Think about the questions at the end of the notebook.

Notebooks

- exercise3.ipynb