

Linking ICOS data stream to PEcAn

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Process-based models play a crucial role in enhancing our understanding of the terrestrial ecosystems and make actionable predictions about their future. These models require data to drive, assess and inform them for which the data collected by the stations in the ICOS network provides an excellent source. However, bringing such data to these computer models and systematically running the analytical workflows with minimal manual input is not an easy task. The tools for retrieving the data products and the process of using them for analyses are unique depending upon the source and the model. Predictive Ecosystem Analyzer (PEcAn) is an open-source ecological informatics toolbox designed to facilitate these model-data interactions and meet the demands of modern ecosystem monitoring and modeling. In our work, we developed an automated pipeline to connect ICOS ecosystem data products (archive and Drought2018) with PEcAn's data processing workflows. More specifically, this pipeline retrieves ICOS data to i) transform it from ICOS format to PEcAn intermediate standard format to allow driving all models that are coupled to PEcAn and ii) make use of the data in the downstream automated benchmarking module where model outputs and data are aligned and evaluated using a number of performance metrics, and in the parameter data assimilation module where model parameter combinations which produce model predictions that are compatible with observations are estimated through inverse numerical methods. Leveraging this pipeline, we benchmarked the SIPNET ecosystem model, and calibrated its parameters across 52 sites in Europe by synthesizing observations from the Drought 2018 product.