

## BIF file data description

The BIF (BADM Interchange Format) is an international standard developed in a collaboration between ICOS ETC, the European Database and AmeriFlux to distribute sporadic or non-continuous measurements. The BIF consists of five columns: SITE\_ID, GROUP\_ID, VARIABLE\_GROUP, VARIABLE, and DATAVALUE. A variable group is a set of variables that are reported together (e.g. a variable value, the date it was collected, and the method used to collect it). Sites may report multiple instances of the same variable group associated with different measurements collected over time, methods, locations etc. The group ID uniquely identifies the data belonging to the same instance of a reported variable group. The variable names and data value provide the details of the reported data within a variable group. For additional information about the BIF format and examples check also the Table SM8 of the Supplementary Material of the Pastorello et al. 2020 paper available at: <https://doi.org/10.1038/s41597-020-0534-3>

There is a large group of variables that are provided using the BIF format including the metadata and the ancillary measurements. In particular the following files are in BIF format:

- **SITEINFO** that contains all the general information about the station, including the team references, the location, the timezone and all the info to understand the general characteristics.
- **VARINFO**, with one BIF file for each data file, where there is a basic description of the variables provided, including their height/depth and the type of sensor. For variables calculated as average/sum across replicates this information is also reported.
- **INST**, that reports the information related to each sensor used at the station and involved in the data collection, including the information about disturbances and calibrations. In the INST\_COMMENT variable is reported also a code identifying the exact model that can be checked in the list available here: [https://docs.google.com/spreadsheets/d/1-QZ\\_i--hLO7QfEkCxzj9I8GHS9FykpgJKs8UPPtRPI](https://docs.google.com/spreadsheets/d/1-QZ_i--hLO7QfEkCxzj9I8GHS9FykpgJKs8UPPtRPI)
- **ANCILLARY** that contains all the ancillary measurements collected at the station, such species, biomass, LAI etc..

The variables present in the different files, the units and the Controlled Vocabulary when used are reported in the Variables\_description.xlsx file included in the Level2 data package.

More information and details about the BADM system can be found in the following document: Papale, D., Canfora, E., & Polidori, D. (2017). ICOS Ecosystem Instructions for Use the ICOS BADM (Version 20171013). ICOS Ecosystem Thematic Centre. <https://doi.org/10.18160/6m8s-fy7m>

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Scheme to summarize the link of metadata info. The variables reported in the same colors are the one linking the different groups. The VAR\_INFO and VAR\_AGG Groups are in the VARINFO file, the INST, INSTOM and INSTPAIR Groups are in the INST file. All is in the BIF format.

