

# Associated ICOS Ecosystem Station Labelling Report

Station: DE-Kli (Klingenberg)

Viterbo (Italy), Antwerp (Belgium), Bordeaux (France), April 29<sup>th</sup> 2018

# **Description of the Labelling procedure**

Associated stations have a simplified, one step labelling procedure. After a first general evaluation of the station to ensure the compatibility with the ICOS aims and standard, proposed stations must submit data and metadata. There is a list of mandatory variables and related metadata that must be measured and submitted by an Associated station in order to get and maintain their status and it is reported in Table 1. Calculated fluxes and processed data at the final time resolution must be submitted

Variable	Specifications	Metadata		
GHG flux	At least one GHG flux + concentration (30 minutes resolution) among $CO_2$ , $CH_4$ and $N_2O$ measured with eddy covariance. In case of forest storage flux measured using a vertical profile.	Description of the system (sensors and setup), description of the processing applied to calculate the fluxes.		
Incoming radiation	At least one between SW_IN and PPFD_IN, representative of the target area	Description of the system (sensors and setup)		
Air Temperature	Representative of the target area	Description of the system (sensors and setup)		
Relative Humidity	Representative of the target area	Description of the system (sensors and setup)		
Precipitation	Representative of the target area	Description of the system (sensors and setup)		
Horizontal wind speed/direction	Representative of the target area	Description of the system (sensors and setup)		
Maximum LAI	LAI or GAI measured at its maximum in the year. Method not prescribed.	Description of the method used.		
Above Ground Biomass	Above ground biomass, for annual vegetation the biomass at the maximum in the year	Description of method used.		
Soil texture	Average soil texture at the site	Description of method used.		
Management and disturbances	Info on the disturbances occurring at the site and management practices			

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Table 1. List of	variables and	metadata	that Associated	stations must submit

In addition to the mandatory variables, the Associated stations can and are invited to submit other micrometeorological and ancillary data collected at the site that can help to better interpret and analyze the flux variables.

The station must be active, submit at least one year of data and continue to submit the data at least yearly by end of February of the year after the acquisition.

# Labelling report

The station started the labelling on March 6<sup>th</sup> 2017 and completed the data and metadata submission on January 14<sup>th</sup> 2019. Here below a summary of the submitted data and metadata is reported.

# **Station Description**

The cropland site Klingenberg (ICOS code DE-Kli) is located in the mountain foreland of the Erzgebirge. EC measurements began in 2004. The ecosystem is an intensively managed farmland (5-year crop rotation including rapeseed, winter wheat, forage maize, spring barley and winter barley). Near the cropland is an adjacent village (530 m W) and a reservoir (around 1500 m E). According to footprint investigations there are no fetch restrictions. The site represents the specified target land cover type very well. The area is flat in a radius of at least 800 m around the EC mast except the medium sloped Western direction.

The station coordinates are Lat. 50.89306 N, Long. 13.52238 E, the elevation is 478 m above level see and the UTC offset is UTC+ 01.

The site is located in the suboceanic/subcontinental climate with the following climate averages:

- Average annual temperature: 8 °C
- Average total annual precipitation: 792 mm
- Average annual incoming radiation: 130 W<sup>m-2</sup>



Fig. 1 - DE-Kli instrumentation

# **Team description**

The staff of the site has been defined and communicated in August 2017. It includes in addition to the PI, the Manager and the scientific expert. Below the summary table of the Team members is reported.

MEMBER_NAME	MEMBER_INSTITUTION	MEMBER_ROLE	MEMBER_MAIN_EXPERT
Christian Bernhofer	TU Dresden	PI	
Thomas Grünwald	TU Dresden	MANAGER	MICROMET
Uta Moderow	TU Dresden	SCI-FLX	
Uwe Eichelmann	TU Dresden	DATA	
Markus	Hehn	TEC	

Tab. 2 - Team members of site

# Metadata about the sensors

The metadata were sent in November 2018 and for each of the measured variables the sensor has been described, communicant the model, the serial number, its position (height, eastward and northward distances). The Eddy station is characterized by one analyzer LI-COR and one anemometer Gill as reported in the underlying Table 3.

Tab. 3 - The Eddy Covariance system

MODEL	SN	HEIGHT (m)	EASTWARD_DIST (m)	NORTHWARD_DIST (m)
GA_CP-LI-COR LI-7000	IRG4-0737	3.5	-0.64	-0.39
SA-Gill R3-50	H000235	3.5	-0.72	-0.3

A set of instruments are located near the tower: precipitation, radiation, air meteorology and soil climate. Table 4 summarizes the installed sensors and the measured variables.

Tab. 3 - The meteorological measurement sensors

MODEL	SN	HEIGHT (m)	EASTWARD_DIST (m)	NORTHWARD_DIST (m)	VARIABLE_H_V_R
			0	-8.10	SW_IN_1_1_1
RAD-Pyrrad-SW+LW	061147	2			SW_OUT_1_1_1
					LW_IN_1_1_1
					LW_OUT_1_1_1
RAD-PAR Quantum	Q51055	2	0.65	-7.20	PPFD_IN_1_1_1
RAD-PAR Quantum	Q51056	2	0.65	-7.20	PPFD_OUT_1_1_1
RH-Capac	B1920016	2	0	-3.15	TA_1_1_1

					RH_1_1_1
PREC-WeightGauge	385954	1	-4.30	-3.75	P_1_1_1
SOIL_H-Plate	00433	-0.02	1.10	-6.80	G_1_1_1
SOIL_H-Plate	00432	-0.02	-0.85	-7.40	G_2_1_1
TEMP-Thermis	1012UE03	-0.02	1.40	-6.60	TS_1_1_1
TEMP-Thermis	1012UE05	-0.05	1.40	-6.60	TS_1_2_1
TEMP-Thermis	1012UE07	-0.10	1.40	-6.60	TS_1_3_1
SWC-FDR	187/057	-0.10	0.30	-5.75	SWC_1_1_1
WIND-3DSA	0235 3.50	0.72	0.20	WD_1_1_1	
		5.50	-0.72	-0.30	WS_1_1_1

# **Ancillary data**

To describe the site, the climatic annual averages of temperature, precipitation and radiation (shortwave) have been sent in October 2018 (see the Station Description paragraph). The dates of periodical fertilizations, sowing, till and scarification have been reported.

The soil data were sent in December 2018 specifying in detail the chemical composition (carbon, nitrogen, potassium and CN ratios), the pH, the soil bulk density, the carbon and nitrogen stocks. Also the data of texture, the soil depth and the soil group according the Soil World Reference Base for Soil Resources have been sent. Finally are available data of profile: chemistry, stock and texture.

Further and detailed ancillary data have been provided, and in particular:

- PAI (2005-2007)
- Biomass (2005-2007)
- Canopy height (2005-2018)

The data cover different periods following the crops development. After 2007 Biomass and PAI measurements have been provided by an external partner, the staff started just recently (2018) to measure again such variables (included in the bio file) due to limited man power. These data will be provided as soon as they are available.

#### Submitted data

As requested in the labelling procedure, continuous data have been submitted for the period January 2017 - December 2018 (two years). The files have been uploaded in January 2019 and they include eddy covariance fluxes, meteo measurements and soil measurements. For 2018 the flux variables ( $CO_2$  flux, sensible heat and Latent heat flux) report also the Steady State and Integral Turbulence Characteristics tests results according to Foken et al. 2004. The uploaded meteo and soil variables are listed in Table 4. In the following figures plots of some of the key variables are presented as example in order to evaluate the data continuity and coverage.

#### <u>CO<sub>2</sub> fluxes measured with eddy covariance</u>



### Incoming shortwave radiation







## <u>Relative humidity</u>



Air pressure



Soil temperature



# Labelling summary and proposal

On the basis of the activities performed and data submitted and after the evaluation of the team capacity to be compliant with the ICOS requirements for Associated Ecosystem Stations we recommend that the station Klingenberg (DE-Kli) is labelled as ICOS Associated Ecosystem station.

Dario Papale, ETC Director

April 29<sup>th</sup> 2019

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