Associated ICOS Ecosystem Station Labelling Report

Station: FI-Kvr (Kuivajarvi)

Viterbo (Italy), Antwerp (Belgium), Bordeaux (France), April 29th, 2020

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

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

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	-----

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 April 7th 2017 and completed the data and metadata submission on April 27th 2020. Here below a summary of the submitted data and metadata is reported.

Station Description

The lake site Kuivajärvi with ICOS code FI-Kvr, is situated in southern Finland in the middle of a managed mixed coniferous forest. The lake is oblong in shape with the surface area of 0.62 km^2 and the length of 2.6 km and maximum width approximately 500 m. The lake has a maximum depth of 13.2 m and the mean depth of 6.3 m.

The catchment area of the lake is 8.7 km^2 of which 0.86 km^2 is covered by water. The rest of it consists of natural and drained peatlands, and Scots pine (*Pinus sylvestris* L.) and Norway spruce (*Picea abies* (L). Karst) dominated managed forests. Total area of agricultural fields in the catchment is only 0.032 km^2. The terrain around the lake is mostly flat but has height variations of up to 40 m. The primary soil type is haplic podzol and a thin layer of soil at most 2 m deep sits above igneous and metamorphic bedrock.

The station coordinates are Lat. 61.84662 N, Long. 24.2804 E, the UTC offset is equal to + 02. The site is marked by following climate averages:

- Average annual temperature: 3.5 C°
- Average total annual precipitation: 711 mm
- Average annual incoming radiation: 100 W m^{-2}

Fig. 1 - FI-Kvr instrumentation

Team description

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

Tab. 2 - Team members of site

MEMBER_NAME	MEMBER_INSTITUTION	MEMBER_ROLE	MEMBER_MAIN_EXPERT
Anne Ojala	University of Helsinki, Department of Environmental Sciences	PI	BIOMASS
Ivan Mammarella	University of Helsinki, Department of Physics	CO-PI	MICROMET
Janne Levula	University of Helsinki, Department of Physics	MANAGER	LOGISTIC
Pasi Kolari	University of Helsinki, Department of Physics	DATA	DATAPROC
Reijo Pilkottu	University of Helsinki, Department of Physics	TEC-ANC	LOGISTIC
Heikki Laakso	University of Helsinki, Department of Physics	TEC-FLX	LOGISTIC

Metadata about the sensors

The metadata were sent between March and April 2020 and for each of the measured variables the sensor has been described with the model, the serial number and its position (height, eastward and northward distances). The Eddy station is characterized by LI-COR gas analyser and a Metek anemometer 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-7200RS	72H-0903	1.8	0	0
SA-Metek USA-1 Fast	KVJ_EDDY_metek1	1.8	0	0

On the tower there is also a set of sensors measuring the the main meteorological variables such radiations (Long and Short wave), temperature and relative humidity, precipitation, wind direction and speed. Also measurements of methane fluxes are available. All sensors and variables are reported in the following Table 4.

Tab. 4: The installed sensors and relative codes for the measured meteo variables

MODEL	SN	HEIGHT (m)	EASTWARD_DIST (m)	NORTHWARD_DIST (m)	VARIABLE_H_V_R
RHTEMP-Rotronic HC2(A)-S	20199390_1	1.5	0	-2	RH_1_1_1
RHTEMP-Rotronic HC2(A)-S	20199390_2	1.5	0	-2	TA_1_1_1
RAD_4C-K&Z CNR1	KVJ_META_CNR1	1.5	2	-2	SW_IN_1_1_1
					SW_OUT_1_1_1
					LW_IN_1_1_1
					LW_OUT_1_1_1
PREC-OTT Pluvio2	267651	1.5	350	-350	P_1_1_1
SA-Metek USA-1 Fast	KVJ_EDDY_metek 1	1.8	0	0	WD_1_1_1
					WS_1_1_1

Ancillary data

To describe the site, the climatic annual averages of temperature, precipitation and radiation (shortwave) have been sent in April 2020 (see the Station Description paragraph). Being the tower located in the lake, there are no ancillary data of biomass, LAI and canopy height. A profile of dissolved CO2 below water and a profile of water temperature are measured, from a depth of 0.2 m up to a maximum depth of 7 m. The relative continuous data have submitted sent with code PCO2 and TW (to be confirmed).

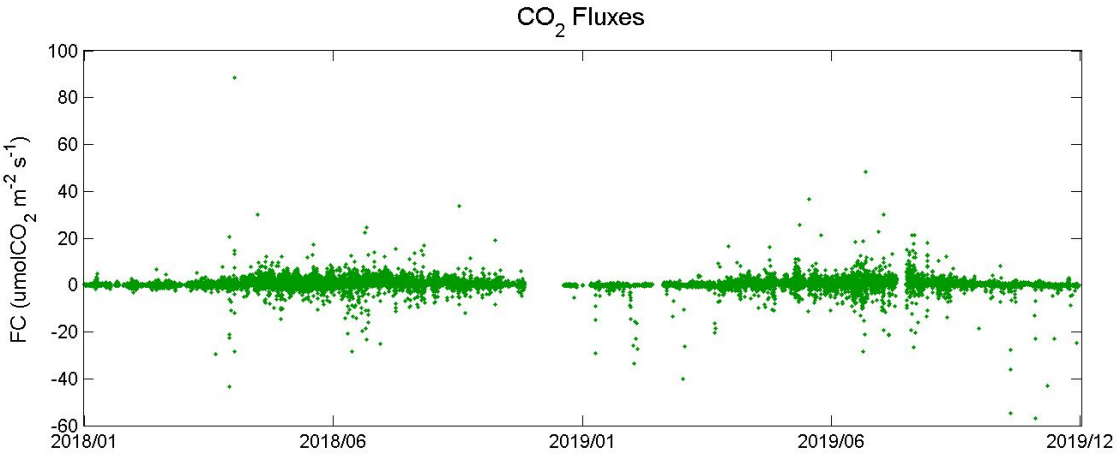
There are no recent disturbances in Lake Kuivajärvi. Silvicultural activities in the catchment area may be reflected in the water quality.

Submitted data

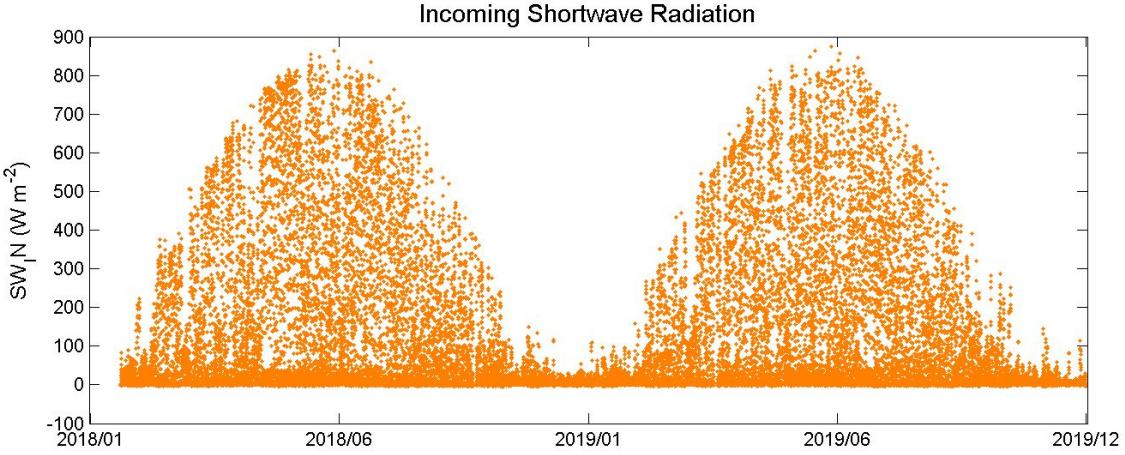
As requested in the labelling procedure, continuous data have been submitted for the period January 2018 - December 2019. The data have been uploaded in March and April 2020 and they include eddy covariance fluxes and meteorological measurements.

In the following figures plots of some of the key variables are presented for 2018-2019 as example in order to evaluate the data continuity and coverage.

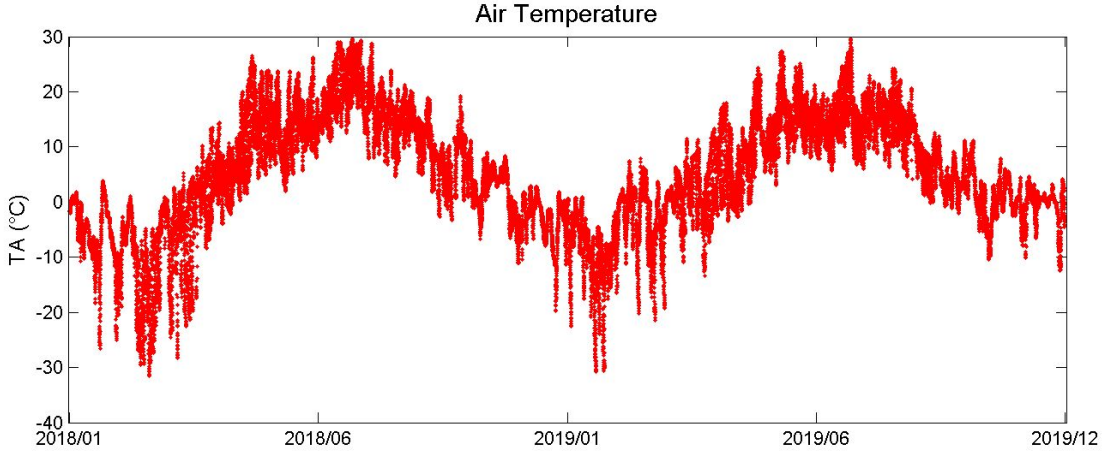
CO_2 fluxes measured with eddy covariance:



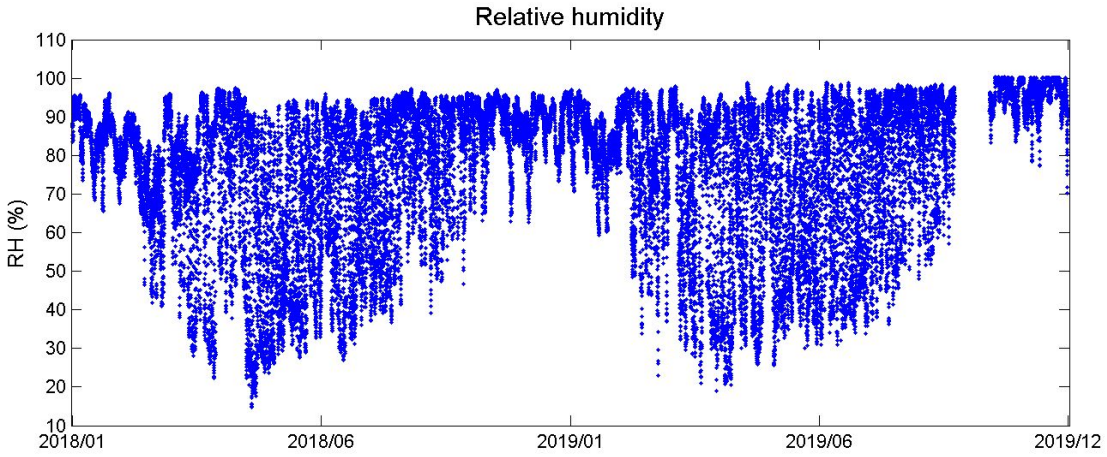
Incoming shortwave radiation:



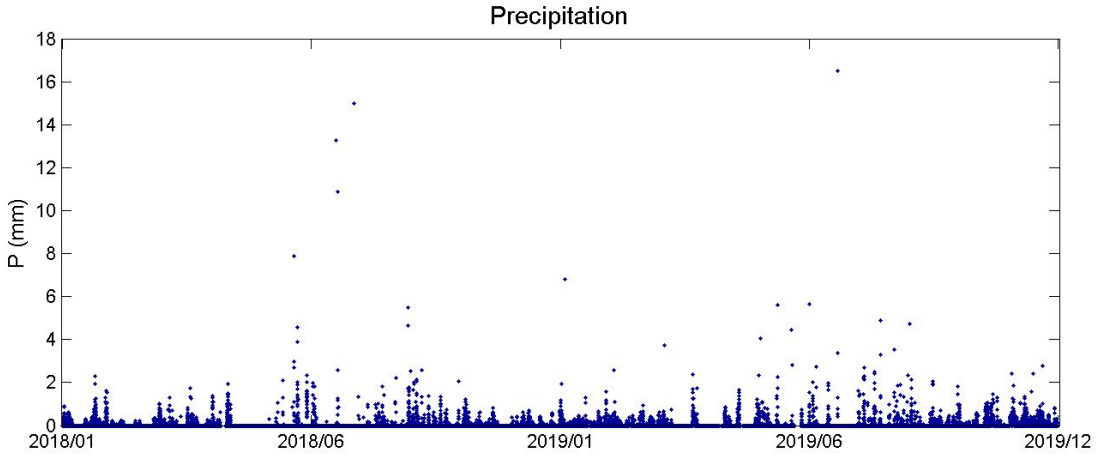
Air temperature:



Relative humidity:



Precipitation:



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 Kuivajarvi (FI-Kvr) is labelled as ICOS Associated Ecosystem station. The development of specific data and metadata for water ecosystem is ongoing in collaboration with the MSA and will be then applied also at this station in future.

April 29th 2020

Dario Papale, ETC Director