Associated ICOS Ecosystem Station Labelling Report

Station: IT-Tor (Torgnon)

Viterbo (Italy), Antwerp (Belgium), Bordeaux (France), October 25th 2017

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 November 16th 2016 and completed the data and metadata submission on October 2nd 2017. Here below a summary of the submitted data and metadata is reported.

Station Description

The station (code IT-Tor) is located in Torgnon, small village in the Valle d'Aosta in the western Alps, on a grassland 2160 m a.s.l.. Its coordinates are Lat. 45.84444 N, Long. 7.578055 E, the UTC offset is UTC+1.

The site is characterized by a typically alpine climate with the following climate averages:

Average annual temperature: 3.27 C°

Average total annual precipitation: 945 mm

Average annual incoming radiation: 165 W m-2

Fig. 1 - IT-Tor instrumentation

Team description

The staff of the site has been defined and communicated in January. It includes in addition to the PI, the CO-PI and the scientific 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
Edoardo Cremonese	ARPA Valle d'Aosta	PI	DATAPROC
Marta Galvagno	ARPA Valle d'Aosta	CO-PI	MICROMET
Umberto Morra di Cella	ARPA Valle d'Aosta	SCI	MICROMET

Metadata about the sensors

The metadata were sent in October 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 Campbell as reported in the underlying Table 3:

Tab. 3 - The Eddy Covariance system

EC_MODEL	EC_SN	EC_HEIGHT	EC_EASTWARD_DIST	EC_NORTHWARD_DIST
GA_OP-LI-COR LI-7500A	75H-1994	2.55	0	0
SA-Campbell CSAT-3	1990	2.55	0	0

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

MODEL	SN	HEIGHT	EASTWARD_DIST	NORTHWARD_DIST	VARIABLE_H_V_R
RAD-Pyrrad-SW+LW	90054	2.8	5.9	-1.1	SW_IN_1_1_1
					LW_IN_1_1_1
					SW_OUT_1_1_1
					LW_OUT_1_1_1
RAD-PAR Quantum	Q46074	2.2	-0.22	-0.58	PPFD_IN_1_1_1
RAD-PAR Quantum	Q46075	1.2	-0.72	-1.25	PPFD_OUT_1_1_1
RAD-PAR Quantum	Q39969	0	0	-2.3	PPFD_BC_IN_1_1_1
RAD-PAR Quantum	Q39970	0	-2.36.00	0.41	PPFD_BC_IN_2_1_1
RAD-PAR Quantum	Q39972	0	-1.9	1.1	PPFD_BC_IN_3_1_1
TEMP-ElectResis	4520026	1.8	5.8	2.6	TA_1_1_1
					RH_1_1_1
PRES-AnerBar	3997796	1.1	6	2.2	PA_1_1_1
PREC-WeightGauge	279161	1.95	10.5	4.4	P_1_1_1
SNOW-Other	2633	2.4	4.2	2.6	D_SNOW_1_1_1
TEMP-Other	2412	2.1	6	2.7	T_CANOPY_1_1_1
TEMP-Thermis	ARPAVDA_ITTOR_TSO_1	-0.02	3.1	1.75	TS_1_1_1
TEMP-Thermis	ARPAVDA_ITTOR_TSO_2	-0.1	3.1	1.75	TS_1_2_1
TEMP-Thermis	ARPAVDA_ITTOR_TSO_3	-0.35	3.1	1.75	TS_1_3_1

SWC-FDR	ARPAVDA_ITTOR_SWC_1	-0.05	2.9	1.75	SWC_1_1_1
SWC-FDR	ARPAVDA_ITTOR_SWC_2	-0.3	2.9	1.75	SWC_1_2_1
SOIL_H-Plate	HF_HFP01SC_2994	-0.05	3	1.75	G_1_1_1
SOIL_H-Plate	HF_HFP01SC_2995	-0.3	3	1.75	G_1_2_1

Ancillary data

To describe the site, the climatic annual averages of temperature, precipitation and radiation (shortwave) have been sent on January (see the Site Description paragraph). No disturbances or management is reported except a general woody encroachment.

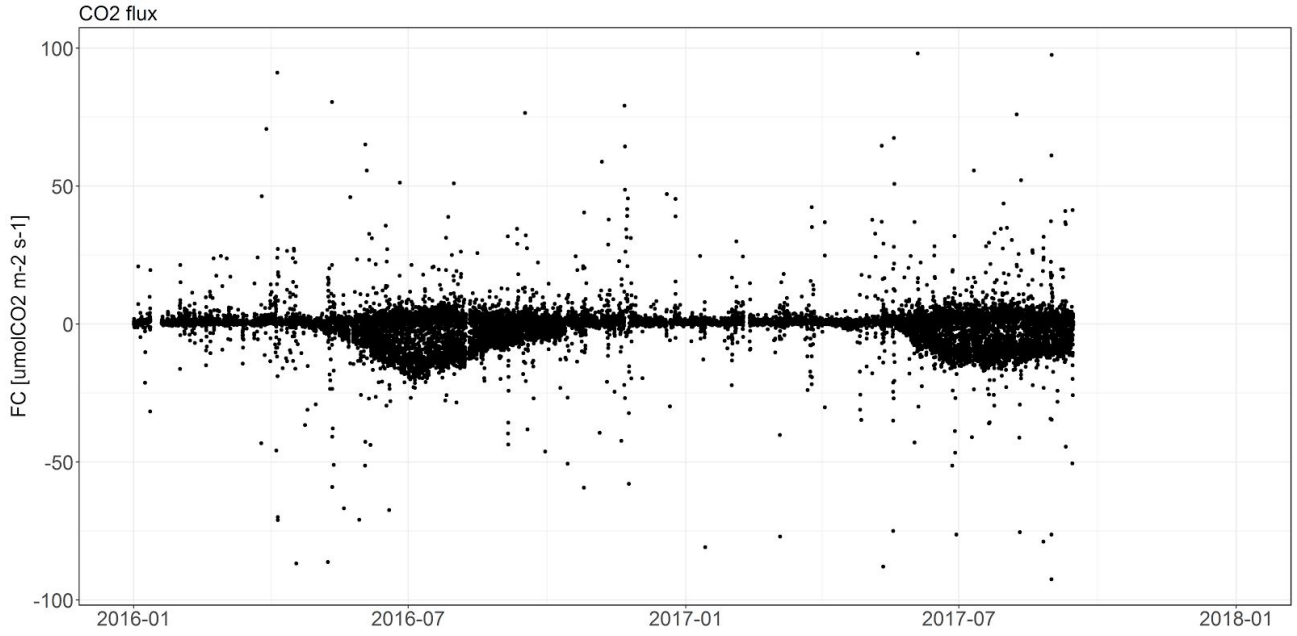
The soil data were sent on September specifying in detail the chemical composition (carbon, nitrogen, ammonium, nitrate, potassium, phosphorus and ratios), the pH, the data of texture, the soil group according the Soil World Reference Base for Soil Resources.

Submitted data

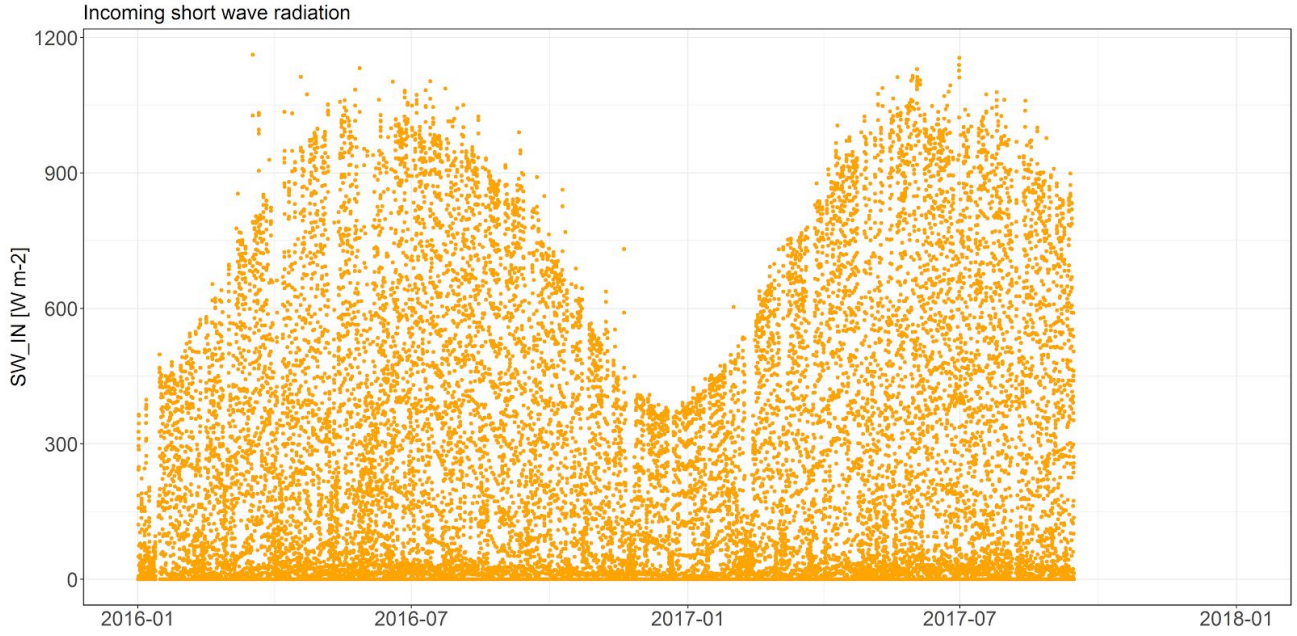
As requested in the labelling procedure, continuous data have been submitted for the period January 2016 to July 2017. The files, one for each year, have been uploaded in September and they include eddy covariance fluxes, meteo measurements and soil measurements. The flux variables (CO2 flux, sensible 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.

In addition to the measurements, the configuration file of EddyPro software that has been used for data processing has been submitted. This will allow to reconstruct exactly the processing applied (reproducibility) and to simplify in future the use of the site raw data.

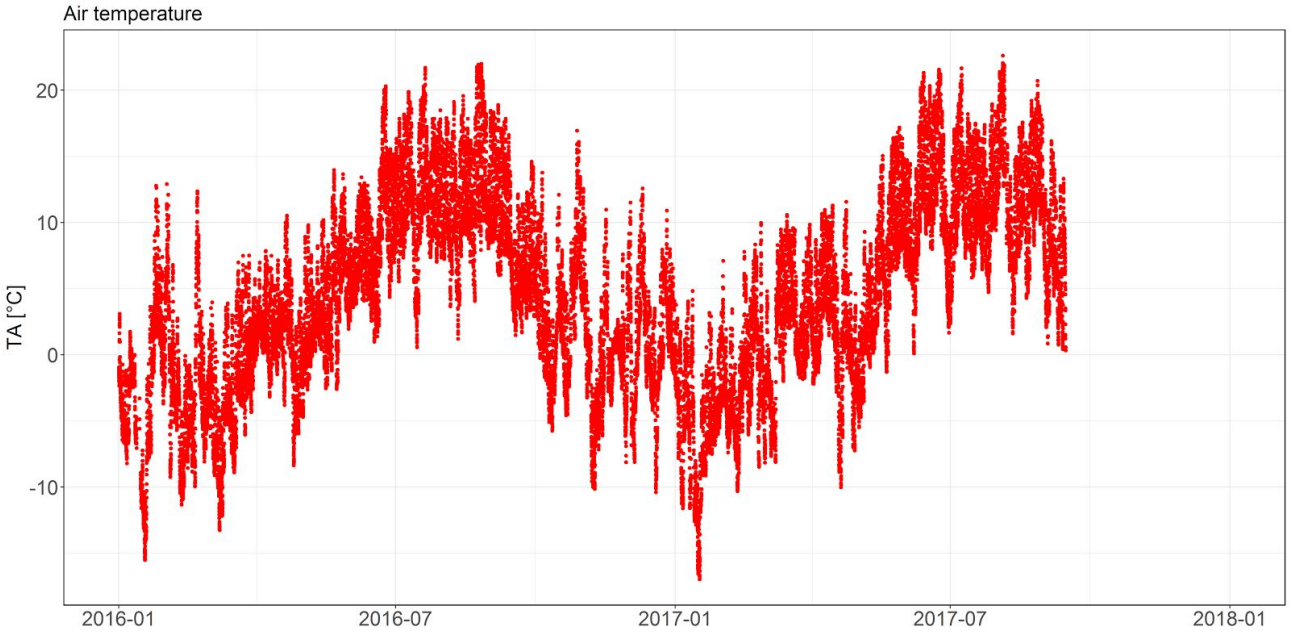
CO_2 fluxes measured with eddy covariance



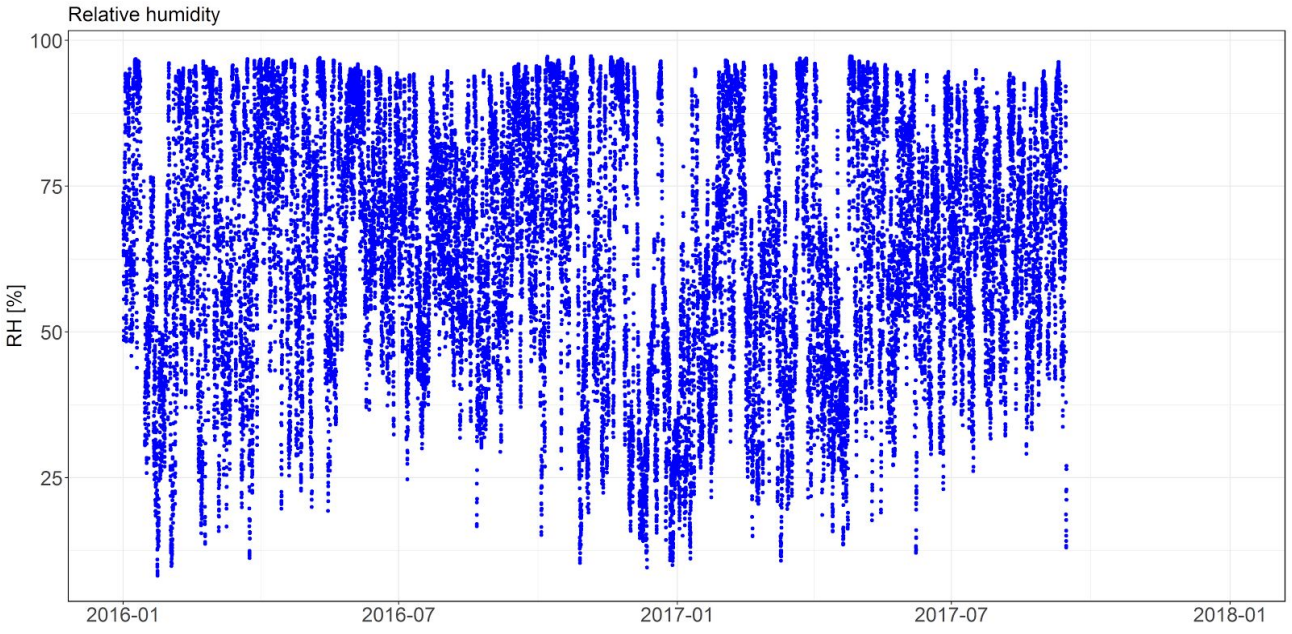
Incoming shortwave radiation



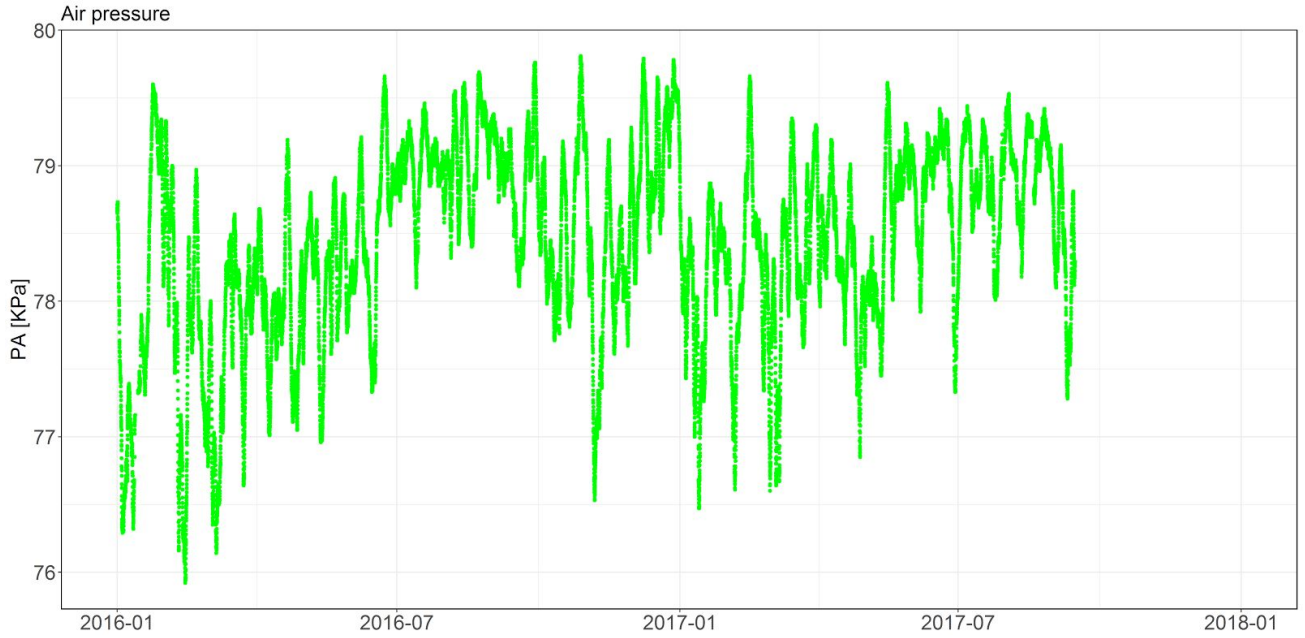
Air temperature



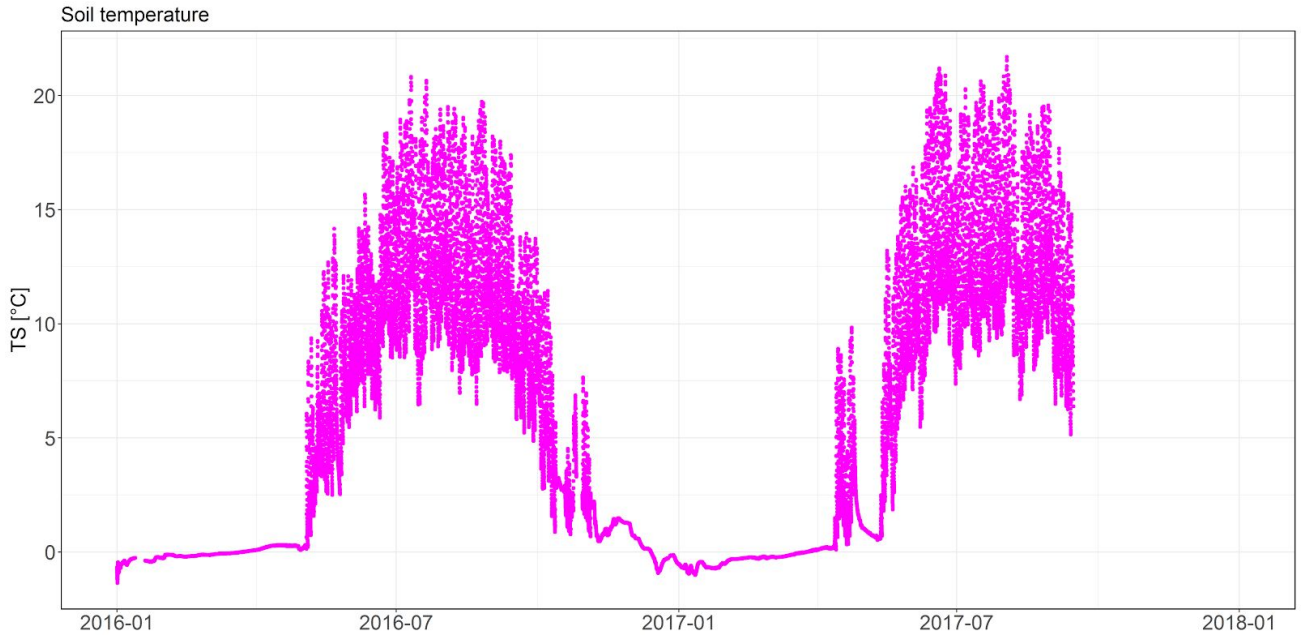
Relative humidity



Air pressure



Soil temperature



Next steps

Some ancillary data, as Above Ground Biomass, LAI and GAI, were measured during the growing season just ended and and they will sent to ETC in the next period, as well as the last six months of high frequency data (Jul-Dec 2017) that will b.

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 Torgnon (IT-Tor) is labelled as ICOS Associated Ecosystem station.

Dario Papale, ETC Director

October 25th 2017