

Deliverable D12.1: Documentation of WP12 variables saved to the database

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The purpose of the WP12 is to standardize the vertical exchange measurements of aerosol particles in the planetary boundary layer using a combination of state-of-the-art in-situ and remote-sensing techniques. The in-situ measurements cover the eddy covariance (EC) measurements which combines a three dimensional anemometer measuring all three wind components and a particle counter. Remote sensing, on the other hand, combines a Doppler lidar giving the wind components and a Raman lidar for the particle counts.

Final data collected within the project will also be saved to the ACTRIS databases for long-term archival and access. List of saved variables together with preferable time resolution and units are given in Table 1. Saved data can be considered to cover three processing phases: raw data (level 0), processed data without final quality control (level 1) and quality controlled processed data (level 2). One of the purposes of the project is to examine the optimal measurement setup, post-processing steps and quality control of the particle flux measurements and during the project a separate SOP (Standard operation procedure) and data post-processing protocol will be created. These can still affect the list of variables and their resolution and therefore the list in Table 1 is still preliminary. The measurements and data-analysis will also be systematized with the ICOS (Integrated Carbon Observation System) ecosystem protocols.

Table 1. Preliminary list of variables to be saved to the database.

Variable	Units	Resolution	Acronym	Database
EC				
Wind speed components	m s^{-1}	10 Hz	u,v,w	EBAS
Sonic temperature	K	10 Hz	Ts	EBAS
Diagnostics	-	10 Hz	AnemometerDiag	EBAS
Particle concentration	particles cm^{-3}	1 - 10 Hz	p_EC	EBAS
Chemically resolved concentrations	$\mu\text{g m}^{-3}$	Not fixed	xx_EC	
Operational variables (e.g. instrument temperature, pressure differences, water removal, line pressure)	-	10 min	-	EBAS
Externally measured volumetric flow rate	slpm	10 min	SLPM	EBAS
Particle flux (level 1)	$\text{particles m}^{-2}\text{s}^{-1}$	30-60 min	F_p_EC_I1	
Particle flux (level 2)	$\text{particles m}^{-2}\text{s}^{-1}$	30-60 min	F_p_EC_I2	EBAS
Particle concentration	particles cm^{-3}	30-60 min	c_p_EC	EBAS
Particle standard deviation	particles cm^{-3}	30-60 min	std_p_EC	EBAS
Random error for particle flux	$\text{particles m}^{-2}\text{s}^{-1}$	30-60 min	randErr_p_EC	EBAS
Time lag for particle flux	$\text{particles m}^{-2}\text{s}^{-1}$	30-60 min	tau_p_EC	EBAS
Friction velocity	m s^{-1}	30-60 min	u_star	EBAS
Sensible heat flux	W m^{-2}	30-60 min	H	EBAS
Mean wind components	m s^{-1}	30-60 min	u_mean, v_mean, w_mean	EBAS
Mean wind speed	m s^{-1}	30-60 min	U	EBAS
Mean wind direction	°	30-60 min	WD	EBAS
Mean sonic temperature	K	30-60 min	Ts_mean	EBAS
Chemically resolved particle concentrations	$\mu\text{g m}^{-3}$	30-60 min	C_xx_EC ¹	EBAS
Chemically resolved particle standard deviation	$\mu\text{g m}^{-3}$	30-60 min	std_xx_EC ¹	EBAS
Chemically resolved particle fluxes	$\mu\text{g m}^{-2}\text{s}^{-1}$	30-60 min	F_xx_EC ¹	EBAS
Lidar				
Particle backscatter profile	$\text{km}^{-1}\text{sr}^{-1}$	60 - 90 min	beta_p_lidar	Cloudnet DB
Particle backscatter gradient	$\text{km}^{-2}\text{sr}^{-1}$		d_beta_p_lidar	Cloudnet DB
Particle type classification profile	1	60 - 90 min	type_p_lidar	Cloudnet DB
Particle concentration profile (conversion	$\mu\text{g cm}^{-3}$	60 - 90 min	c_p_lidar	Cloudnet DB

from beta and type)				
Particle concentration uncertainty	$\mu\text{g cm}^{-3}$	60 - 90 min	std_p_lidar	Cloudnet DB
Vertical wind	m s^{-1}	5 s	w_lidar	Cloudnet DB
Backscatter fluctuation profile	$\text{km}^{-1} \text{sr}^{-1}$	5 s	fluct_beta_p_lidar	Cloudnet DB
beta-w-covariance	$\text{km}^{-1} \text{sr}^{-1} \text{m s}^{-1}$	60 - 90 min	beta_w_cov	Cloudnet DB
beta-w-covariance sampling error (noise)	$\text{km}^{-1} \text{sr}^{-1} \text{m s}^{-1}$	60 - 90 min	se_beta_w_cov	Cloudnet DB
beta-w-covariance flux error (systematic)	$\text{km}^{-1} \text{sr}^{-1} \text{m s}^{-1}$	60 - 90 min	fe_beta_w_cov	Cloudnet DB
Particle flux profile (from the EC method)	$\mu\text{g m}^{-2} \text{s}^{-1}$	60 - 90 min	F_p_lidar	Cloudnet DB
TKE profile	$\text{m}^2 \text{s}^{-2}$	30 min	tke_lidar	Cloudnet DB
Particle flux profile (from gradient method)	$\mu\text{g m}^{-2} \text{s}^{-1}$	60 - 90 min	F_p_lidar	Cloudnet DB

¹xx refers to the respective compound