8.4.4   Format Structure

Value saved in NetCDF format can be dimensions, variables and attributes.
table 12 to 14 describe the various terms.

Dimensions

Dimension	Description
time	The number of backscatter profiles inside the NetCDF file
range	The number of bins measured and stored in backscatter profiles in NetCDF format with 15m resolution.
range_hr	The number of bins stored in NetCDF backscatter profiles with 5 m resolution.
layer	The number of cloud layer transmitted in telegrams and stored in NetCDF files.

Table 12: Dimensions in NetCDF

Variables

Variable	Description
float latitude units = "degrees_north" long_name = "latitude of location"	latitude of the measurement location, decimal value -90° to +90° Example: Jena = 50.93333 corresponding to: 50°56'0'' N
float longitude units = "degrees_east" long_name = "longitude of location"	The longitude of the measurement installation, decimal Example: Jena = 11.58333 corresponding to: 11°35'0'' E
float time (time) units = "seconds since YYYY-MM-DD 00:00:00 00:00" long_name = "time UTC" axis = "t"	End time of measurement Allows for accuracy of 0.007 seconds
float range units = "m" long_name = "distance from lidar" axis = "range"	The distance from the CHM 15k in meter, independently of altitude of the instrument location.
float range_hr units = "m" long_name = "high resolution distance from lidar" axis = "range_hr"	The distance from the CHM 15k in meter, independently of altitude of the instrument location.
float altitude units = "m" long_name = "altitude of ceilometer above mean sea level"	The altitude of the measurement location above sea level.

Table 13: Variables in NetCDF

float azimuth units = "degree_clockwise" long_name = "laser direction of site"	The azimuth angle of the pointing direction of the laser on site.
float zenith units = "degree" long_name = "laser direction of site"	The zenith angle of the pointing direction of the laser on site. Used if an tilting adapter plate is used for 5 or 15 degrees.
float wavelength units = "nm" long_name = "laser wavelength"	The laser wavelength in nm here: 1064
int laser_pulses (time) long_name = "number of laser pulses per record (lp)" units = "unitless"	The number of laser pulses averaged in one measurement.
float range_gate long_name = "length of range gate, bin-width" units = "m"	The spatial resolution of measurement.
int average_time(time) long_name = "average time per record" units = "ms"	The time over which averaging is performed.
float beta_raw(time, range) units = "unitless" long_name = "normalized range corrected signal ((signal_raw/ lp)-b)/(c* o(r)*p_cal)*r²"	Lidar backscatter raw data with ≈15 m resolution, normalized and range corrected. lp: laser pulses, b: baseline, c: scaling, o(r): overlap function, p_cal: calibration signal
float beta_raw_hr(time, range_hr) units = "unitless" long_name = "normalized range corrected signal ((signal_raw/ lp)-b)/(c* o(r)*p_cal)*r²"	Lidar backscatter with ≈5 m resolution, raw data normalized and range corrected.
int error_ext (time) long_name = "31 Bit ServiceCode" units = "unitless"	Standard status bit sequence Service codes described n chapter 8.5
short state_optics (time) long_name = "transmission of optics" units = "percent"	Optics quality index in percent
short temp_int (time) long_name = "internal temperature in K*10" units = "K" scale_factor = 10	Inner casing temperature [Kelvin x 10]
short temp_ext (time) long_name = "external temperature in K*10" units = "K" scale_factor = 10	Outer casing temperature [Kelvin x 10]
short temp_det (time) long_name = "detector temperature in K*10" units = "K" scale_factor = 10	Detector temperature [Kelvin x 10]

Table 13: Variables in NetCDF

short temp_lom (time) long_name = "laser optic module temperature in K*10" units = "K" scale_factor = 10	Laser optic module temperature [Kelvin x 10].
int life_time (time) long_name = "laser life time" units = "h"	Laser operating time in hours.
short state_laser (time) long_name = "laser quality index" units = "percent"	Laser quality index in percent.
short state_detector (time) long_name = "quality of detector signal" units = "percent"	Detector quality signal in percent.
float base (time) long_name = "baseline raw signal in photons per shot (b)" units = "counts / shot"	Baseline height of the raw signal mainly influenced by daylight. Transmitted in photons per shot.
float stddev (time) long_name = "standard deviation raw signal in photons per shot " units = "counts / shot"	Standard Deviation of the raw signal, in photons/ shot
short p_calc (time) long_name = "calibration pulse in photons per shot" units = "counts / shot" scale_factor="100000"	Calibration pulse used to normalize individual units over time.
float scaling units = "unitless" long_name = "scaling factor (c)"	Scaling factor used to normalize individual units against reference system. (called TBcalibration in RS485).
short nn1 … nn3	used by manufacturer
short PBL (time, layer) long_name = "aerosol layer in PBL" units = "m" axis="range"	Aerosol layer calculated within the planetary boundary layer.
schar PBS (time, layer) long_name = "quality score for aerosol layer in PBL" units="unitless"	Quality score for aerosol layers.
schar SCI (time) long_name = "sky condition index"	sky condition index
schar BCC (time) long_name = "base cloud cover" unit="eighths"	base cloud cover
schar TCC (time) long_name = "total cloud cover" unit="eighths"	total cloud cover
short CBH (time, layer) long_name = "cloud base height" unit="m" axis="range"	cloud base height

Table 13: Variables in NetCDF

short CBE (time, layer) long_name = "cloud base uncertainty" unit="m"	cloud base uncertainty
short CDP(time, layer) long_name = "cloud penetration depth" unit="m" axis="range"	cloud penetration depth
short CDE (time, layer) long_name = "cloud penetration depth uncertainty" unit="m"	cloud penetration depth uncertainty
short MXD (time) long_name = "maximum detection range" unit="m"	maximum detection range
short VOR (time) long_name = "vertical optical range (VOR)" unit="m"	vertical optical range
short VOE long_name = "VOR uncertainty" unit="m"	vertical optical range uncertainty
short CHO long_name="cloud height offset" unit="m"	cloud height offset (available if, altitude(m) is set and usealtitude=1)

Table 13: Variables in NetCDF

Global Attributes

Attribute	Description
short day	The day of a month, on which the data was recorded
short month	The month, in which the data was recorded, for example, January = 1
short year	The year, in which the data was recorded
text location	Location/ site of measurement
text title	Heading for graphical representation, e.g. "Lindenberg 1064 nm Cloud Height Meter, CHM 15k"
text devicename	Serial number, device name of the instrument
text source	see devicename (left for historical reasons)
text institution	Institution or company
text software_version	Linux kernal, FPGA software, Firmware
text comment	Descriptive comment
text SerLOM	Serial number of LOM

Table 14: Global attributes in NetCDF