# EARLI lidar

EARLI was the first MPI-M Raman lidar deployed at BCO (April 2010). Designed originally for EARLINET (European Aerosol Research LIdar NETwork, that is why the name EARLI) and built up in spring of 2009 the EARLI lidar prior to be installed at the BCO station took part in several lidar-intercomparison experiments conducted by EARLINET community. Demonstrating a good agreement of measured data with other lidar in the network it has been assigned a status of reference lidar system for EARLINET. Dedicated for inland but not onshore operation the lidar was getting quite hard the impact of humid and salty ocean air, slowly degrading in capabilities. In 2016 EARLI lidar has been replaced at BCO with the next-generation MPI-M Ramanlidar. Upgrade and refurbishment of the system is ongoing to make it again available for atmospheric research.
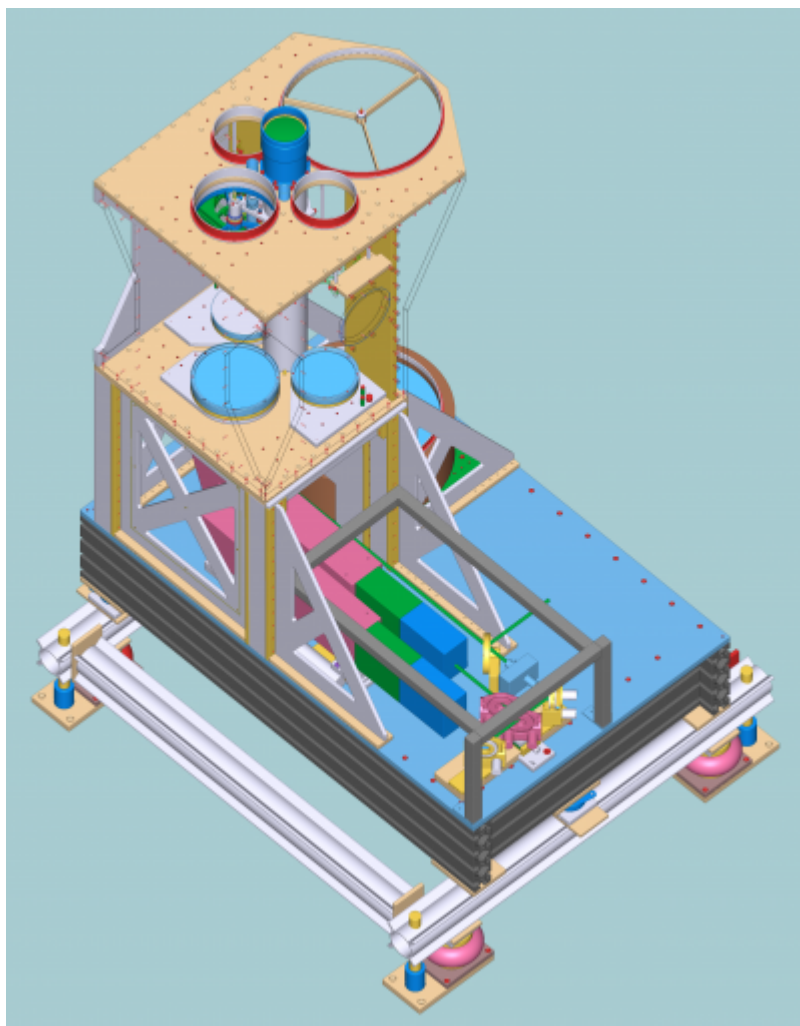
Technical characteristics

Pulse repetition rate	10 Hz		
Laser pulse energy	@ 355 nm	@ 532 nm	@ 1064 nm
	125 mJ	125 mJ	200 mJ
Laser beam diameter	80 mm		
Laser beam divergence	70 µrad		
Operating range	0 - 15 km		
Receiving telescopes:			

telescope ID	Focal length	Diameter	Field-of-view
"Far-range"	1200 mm	380 mm	250 µrad
"Near-range"	450 mm	150 mm	450 µrad
"Close-range"	100 mm	22 mm	2000 µrad
"Depolarization"	450 mm	150 mm	450 µrad

Parameters measured

Product	Wavelength of emission stimulating lidar return
Attenuated backscatter	1064, 532, 355 nm
Particle backscatter	532, 355 nm

Product	Wavelength of emission stimulating lidar return
Particle extinction	532, 355 nm
Volume linear depolarization ratio	532 nm
Particle linear depolarization ratio	532 nm
Cloud mask	532, 355 nm
Water vapor mixing ratio [1]	355 nm
Air temperature	355 nm
Relative humidity	355 nm

[1] nighttime only.

DATA ACCESS

Data recommended for scientific use could be found at:

```
/opt/pool/OBS/ACPC/RamanLidar-EARLI/4_Processed/
```

There are two sets of data released. Stored in folder "data-v1.0" is the very first version of data made open for public. Those files are kept available to provide data support for the very first studies involving BCO lidar data. Netcdf data for a particular year YY month MM and day DD could be found following the template:

```
/opt/pool/OBS/ACPC/RamanLidar-EARLI/4_Processed/data-
v1.0/20YY/YYMM/nc/dpYYMMDD[b|e|t].nc
```

Symbols "b", "e", and "t" used alternatively in the file name template are reserved to define the content of the file.

Files named with "b" letter store so-called "high"-temporal-resolution products. "High"-resolution for EARLI system means either 2 or 10 minutes averaging in time. The exact resolution could be derived from global attribute "ShotsAveraged", which is a product of averaging time in seconds and pulse repetition rate in Hertz (10Hz for EARLI). "High"-resolution data in this release are available for the period from April 2010 until March 2012.

Files with "e" letter in names designated to store particle **e**xtinction and backscatter coefficients processed with temporal resolution of one hour, i.e. "low"-resolution, see "ShotsAveraged" global attribute. Files coded with "t" in names store air **t**emperature and relative humidity profiles derived with temporal resolution of two hours. Extinction and temperature data are available for the period from April 2011 until March 2012.

Vertical resolution of the first release data is variable, increasing with height, please see the "VerticalResolution" variable.

Second release of data stored under "data-v2.0" covers the period from April 2010 until September 2014. Only "high"-temporal-resolution data were included in this release, i.e. to find are the files with "b" coded names:

```
/opt/pool/OBS/ACPC/RamanLidar-EARLI/4_Processed/data-
```

```
v2.0/20YY/YYMM/nc/dpYYMMDDb.nc
```

Compared to first release the second version data are filtered for low accuracy data in water vapor mixing ratio, and in addition we fix the vertical resolution to be constant equal to 60 meters.

To check data availability and get first impression on the data quality it is recommended to visit the lidar quicklook web page:

http://bcoweb.mpimet.mpg.de/quicklooks/lidarql/RamanLidar-EARLI/

or to go through pdf plots of processed data stored under:

```
/opt/pool/OBS/ACPC/RamanLidar-EARLI/4_Processed/data-
v[1|2].0/20YY/YYMM/pdf/dpYYMMDD.pdf
```