Milestone MS2.6: Lidar quicklook database implemented

Giuseppe D'Amico (CNR-IMAA), Francesco Amato (CNR-IMAA)

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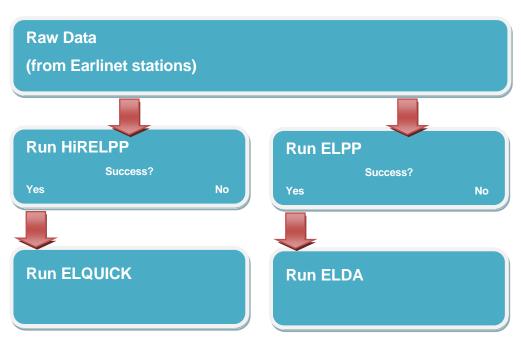
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Background

All the procedures related to the MS2.6 and needed for setting up a lidar quicklook database have been implemented in the framework of the Single Calculus Chain (SCC).

The SCC is an automatic and flexible tool to analyze raw lidar data using EARLINET quality assured retrieval algorithms. The SCC is currently installed on a centralized server where raw data measured by all EARLINET systems can be submitted and automatically analyzed. The products of the SCC are all quality certified according to the EARLINET quality assurance program. Currently the SCC can provide different levels of output: low resolution pre-processed signals (range-corrected lidar signals corrected for all instrumental effects) and aerosol optical products (aerosol backscatter and extinction coefficient profiles). These products are generated the following calculus modules:

- ELPP (EARLINET Lidar Pre-Processor) which accepts as input the raw lidar data and produces the preprocessed signals
- ELDA (EARLINET Lidar Data Analyzer) which takes as inputs the outputs of the ELPP module and generates optical products like particle extinction and backscatter coefficient.

The actions of the two modules are automatically synchronized and coordinated by another module called SCC daemon.

Lidar quicklook database implementation

The generation of lidar quicklook database has been included as new SCC functionality. In particular, two new SCC modules have been developed and installed on the SCC server:

- HiRELPP – High Resolution EARLINET Lidar Pre-Processor
- ELQUICK – EARLINET Lidar Quicklooks generator

HiRELPP module pre-processes the raw lidar data (measured by EARLINET lidar systems) generating high resolution (both in time and space) time-series of total attenuated backscatter and/or volume linear depolarization vertical profiles.

ELQUICK produces lidar quicklook images (png format) out of the HiRELPP products. The module is highly configurable as it is possible to select the quicklook time window (for example 4, 6, 12, 24h), the color palettes to use for the quicklook images, the altitude range.

These two new modules are currently in testing phase and, as already mentioned, they have been included in the automatic framework of the SCC. The SCC daemon has been modified to handle in a highly flexible and configurable way the starting and the coordination of the HiRELPP and/or ELQUICK modules (along with the other already existing SCC modules) when a new measurement is submitted to the SCC. In Fig. 1 it is shown the new SCC workflow. When a new measurement dataset is submitted to the SCC, the SCC daemon runs the HiRELPP and the ELPP modules on it automatically. The status of the both processes is monitored and logged by the daemon: if HiRELPP module returns no errors, the ELQUICK module is run on the same dataset. At the same time if ELPP module returns no errors, the ELDA module is run on the same measurement. This procedure makes possible the fully automatic generation of quicklook images and aerosol optical products out of the raw lidar data submitted by each EARLINET lidar station.

Fig. 1: Layout of the new SCC workflow

Once generated the quicklook images need to be made available to internal and external users by means of a web interface (see deliverable D14 "Implementation of the lidar quicklook database"). To allow an efficient and reliable provision of the quicklook products, the corresponding images need to be logged into a well-structured database.

The SCC database is an already existing MySQL database in which all the EARLINET lidar systems are registered in terms of experimental parameters such as available lidar channels and in terms of products to calculate in automatic way. New database tables have been designed and added to the SCC database in order to:
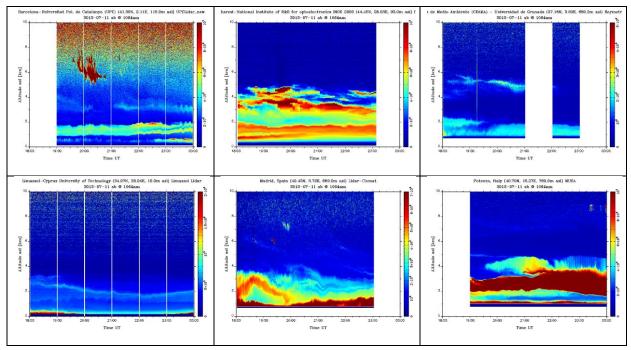
- keep track of all the operations made by the SCC to generate each HiRELPP product
- keep track of all the operations made by the SCC to generated each ELQUICK image
- configure which quicklook type should be generated for each lidar configuration
- check the status HiREPP and ELQUICK modules on each raw measurement

In particular, HiRELPP and ELQUICK modules are designed to insert new entries in the corresponding database tables each time a new product is generated. This ensures the full traceability of each HiRELPP and ELQUICK product and the possibility to efficiently filter the quicklook images in terms of lidar station, quicklook type and time.

Finally, as example, several quicklook products generated by using the HiRELPP and ELQUICK modules are shown in table 1.

Table 1: Example of quicklook images generated for different lidar systems (Barcelona, Bucharest, Granada, Madrid, Limassol, Madrid, Potenza) corresponding to the total attenuated backscatter at the same wavelength (1064nm) and the same time window (from 2012-07-11 18:00 to 2012-07-12 00:00).

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