

# SCC version v5.2.0 release notes

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# 1.Introduction

This document describes the main changes implemented in the SCC version 5.2.0 (SCCv5.2.0) with respect to the previous SCC version (v5.1.8). The SCCv5.2.0 brings many important improvements in all the SCC modules. Several bugs were fixed and also new functionalities have been implemented.

The SCCv5.2.0 contains the following SCC modules:

- HiRELPP v1.1.0
- CloudScreen v1.5.0
- ELPP v7.1.0
- ELDEC v2.1.0
- ELDA v3.4.4
- ELIC v1.0.5
- ELQUICK v1.0.5
- SCCdaemon v.5.3.0
- SCCWebInterface v5.0.0

In the following sections the most important modifications for each module of SCCv5.2.0 are summarized.

Moreover, the last section of this document provides basic information about the command line tool `scc_access` allowing fully automatic submission of raw data to the SCC.

## 2. General SCC data product modifications

This section summarizes the major modifications in the file format, common to all the SCC data products. Other module-specific file format modifications are described in the corresponding module section.

### 2.1. Filename

As requested by several end users, the filename of all the SCC products has been modified with respect to the filename produced by the previous SCC versions. The main characteristics of SCC data products (station code, product type, wavelength,...) are now reported in the filename. This modification makes possible the direct identification of specific SCC data products just looking at the corresponding filenames.

New filenames are in the format:

```
<station_code>_<product_type_ID>_<wavelength>_<productID>_<starttime>_<stoptime>_<measurementID>_<SCC_module>_<SCC_version>.nc
```

where:

|                                      |   |
|--------------------------------------|---|
| <code>&lt;station_code&gt;</code>    | → 3 digits code (for example pot)                             |
| <code>&lt;product_type_ID&gt;</code> | → numeric 3 digits (for example 002)                          |
| <code>&lt;wavelength&gt;</code>      | → 4 digits reporting the wavelength in nm (for example 0532). |
| <code>&lt;productID&gt;</code>       | → numeric 7 digits (for example 0000213)                      |
| <code>&lt;starttime&gt;</code>       | → YYYYMMDDHHMM  |
| <code>&lt;stoptime&gt;</code>        | → YYYYMMDDHHMM  |
| <code>&lt;measurementID&gt;</code>   | → measurementID string  |
| <code>&lt;SCC_module&gt;</code>      | → SCC module (hirelpp,cloudscreen,elpp,eldec,elda,elic)       |
| <code>&lt;SCC_version&gt;</code>     | → SCC version (for example v5.2.0)                            |

The field `<wavelength>` is available only for ELEC and ELDA data products (for all the other SCC data products is missing).

For CloudScreen products the fields `<product_type_ID>`, `<wavelength>`, `<productID>` are missing.

### 2.2. New variables

Product type (i.e. “experimental” or “operational”) now is reported in all the SCC data products by the new variable:

```
byte scc_product_type;  
    scc_product_type:units = "1" ;  
    scc_product_type:long_name = "SCC product type" ;  
    scc_product_type:valid_range = 1b, 2b ;  
    scc_product_type:flag_values = 1b, 2b ;
```

```
scc_product_type:flag_meanings = "experimental operational" ;  
scc_product_type:_FillValue = -127b ;
```

The product type is assigned automatically to each measurement ID during the submission or re-processing phase (for more detail see section 9).

## 3.HiRELPP

HiRELPP is the High REsolution Earlinet Lidar Pre-Processor of the SCC. It produces a high resolution timeseries of lidar range corrected signal (RCS). RCS are corrected for several instrumental effects (dead time, trigger delay, electronic and atmospheric background subtraction, pre-trigger elimination, low range and high range signal gluing,...).

Main changes with respect to the previous version:

- Fixed a bug in correcting dark measurement for dead time. The number of shots now are estimated on the base of dark measurement stop and start time and the laser repetition.
- All the string global attributes in the HiRELPP products are defined even if they are blank (see [https://bugzilla.imaa.cnr.it/show\\_bug.cgi?id=54](https://bugzilla.imaa.cnr.it/show_bug.cgi?id=54))
- Added a check to ensure the polarization calibration products and the corresponding product to calibrate refer to the same station id.
- Fixed a bug in writing variable attributes of type NC\_FLOAT.
- Added the handling of the manual cloudmask if provided in the raw input file.
- Fixed problem in assigning altitude to cloud\_mask variable: cloud\_mask is now rescaled considering the values provided for the minimum and maximum product altitudes.
- Filename format was changed according to the new format described in section 2.1.
- Fixed a bug in setting lidar range profile. The minimum height in the product options was not taken into account.
- Product type (experimental or operational) now is reported in the HiRELPP products as described in section 2.2.

## 4.CloudScreen

The cloud screening module aims to detect aerosol free regions in uncalibrated lidar signals. Its purpose is to allow initial aerosol property retrieval for the calibration of the lidar signals. After detecting several issues with the previous version, the cloud masking algorithm has been rewritten and should now be more stable and robust.

For the cloud screening module to run, you should have a 1064nm channel with time resolution  $\leq 60$ s and vertical resolution  $\leq 30$ m. As before, the cloud screening module requires no user input.

The major changes for the module are:

- Major update of the cloud screening algorithm. Initial testing has shown that the new algorithm is much more robust than the previous version.
- All signal bins neighboring a cloudy bin are also marked as cloudy. This is done to exclude partially-cloudy bins at the edges from further processing.
- The cloudmask files now use better internal compression, to achieve smaller file size. This compression is transparent to the user, and does not change the way files are used.
- Filename format was changed according to the new format described in section 2.1
- Product type (experimental or operational) now is reported in the CloudScreen products as described in section 2.2

## 5.ELPP

ELPP is the standard Earlinet Lidar Pre-Processor of the SCC. It produces low resolution timeseries of lidar range corrected signal (RCS). RCS are corrected for several instrumental effects (dead time, trigger delay, electronic and atmospheric background subtraction, pre-trigger elimination, low range and high range signal gluing,...). Moreover, time integration and/or vertical interpolation/smoothing are performed according to the user settings. All the ancillary atmospheric variables needed for the optical processing are reported in the output products.

Main changes with respect to the previous version:

- ELPP supports the new database structure in which the field `_signal_type_id` is defined in the table `product_channels` and not anymore in the table `hoi_channels`.
- Added time dimension to the atmospheric molecular variables
- Added support for Cloudnet icon-iglo-24-35 and icon-iglo-36-47 models
- `Molecular_Calc=0` now is used for automatic calculation of molecular atmosphere (first check the availability of Cloudnet NWP's and, if none of these are found, use standard atmosphere). The new values for `Molecular_Calc` variable are:

**0**→automatic

**1**→correlative sounding (to be submitted as ancillary file)

**2**→use Cloudnet NWP

**4**→standard atmosphere

- Atmospheric molecular transmissivity is provided at both emission and detection wavelengths
- All the string global attributes in the ELPP products are defined even if they are blank (see [https://bugzilla.imaa.cnr.it/show\\_bug.cgi?id=54](https://bugzilla.imaa.cnr.it/show_bug.cgi?id=54))
- Added a check to ensure the polarization calibration products and the corresponding product to calibrate refer to the same station id.
- Fixed a bug in writing variable attributes of type `NC_FLOAT`
- Implemented a new check on the time representativeness of the pre-processed integrated profile. The pre-processed time slices are kept only if the effective integration time is above a certain percentage of the pre-processing integration time
- Now we keep track of the generation time for the ELPP products in the SCC database
- Filename format was changed according to the new format described in section 2.1
- Product type (experimental or operational) now is reported in the ELPP products as described in section 2.2

## 6.ELDEC

ELDEC (Earlinet Lidar DEpolarization Calibrator) is the SCC module responsible for the depolarization calibration. The calibration is done according to the quality ensured procedure defined within EARLINET.

Main changes with respect to the previous version:

- All the string global attributes in the ELDEC products are defined even if they are blank (see [https://bugzilla.imaa.cnr.it/show\\_bug.cgi?id=54](https://bugzilla.imaa.cnr.it/show_bug.cgi?id=54)).
- ELDEC was adapted to read the new molecular variables defined in the ELPP products. Old variables are still supported.
- Fixed a bug in writing variable attributes of type NC\_FLOAT.
- Filename format was changed according to the new format described in section 2.1.
- Product type (experimental or operational) now is reported in the ELDEC products as described in section 2.2.
- Added the global attribute 'scc\_product\_ID' in the ELDEC products to report the SCC product ID.
- Polarization gain factors are now written in the ELDEC output by the following new variables:

```
double polarization_gain_factor_wavelength(calibration) ;  
    polarization_gain_factor_wavelength:units = "nm" ;  
    polarization_gain_factor_wavelength:long_name = "polarization gain factor  
wavelength" ;  
    polarization_gain_factor_wavelength:_FillValue = 9.96920996838687e+36 ;
```

```
byte polarization_gain_factor_range(calibration) ;  
    polarization_gain_factor_range:units = "1" ;  
    polarization_gain_factor_range:long_name = "polarization gain factor range  
type" ;  
    polarization_gain_factor_range:valid_range = 0b, 3b ;  
    polarization_gain_factor_range:flag_masks = 1b, 2b ;  
    polarization_gain_factor_range:flag_meanings = "near_range far_range" ;  
    polarization_gain_factor_range:_FillValue = -127b ;
```

```
double polarization_gain_factor(calibration, time) ;  
    polarization_gain_factor:units = "1" ;  
    polarization_gain_factor:long_name = "polarization gain factor" ;  
    polarization_gain_factor:_FillValue = 9.96920996838687e+36 ;  
    polarization_gain_factor:ancillary_variables=  
"polarization_gain_factor_wavelength polarization_gain_factor_range" ;
```

```
double polarization_gain_factor_statistical_error(calibration, time) ;  
    polarization_gain_factor_statistical_error:units = "1" ;
```

```
polarization_gain_factor_statistical_error:long_name = "statistical error on  
polarization gain factor" ;  
polarization_gain_factor_statistical_error:_FillValue =  
9.96920996838687e+36 ;
```

- Fixed a bug affecting only the usecase 0.

## 7.ELDA

ELDA (EARLINET Lidar Data Analyzer) is the SCC module for calculating profiles of optical aerosol properties from ELPP files.

Main changes with respect to the previous version:

- Adapt import of ELPP files to new filenames and file format.
- Filename format was changed according to the new format described in section 2.1.
- Product type (experimental or operational) now is reported in the ELDA products as described in section 2.2.
- bug fix: zenith angle is now properly written in ELDA files.
- bug fix: signals with emission wavelength 510.6 nm now are analyzed properly.
- write additional output files (for expert users only) for the purpose of identification of problems with the data analysis. The new files have the additional variable `_quality_flag` and invalid data points are not removed from the profile.

## 8.ELIC

ELIC (Earlinet Lidar Calibrator) is the SCC module producing high and low resolution calibrated pre-processed SCC products out of the HiRELPP and ELPP products respectively. The optical calibration is provided by the ELDA module. ELIC products contain mainly total attenuated backscatter timeseries.

Main changes with respect to the previous version:

- Start and stop date time for attenuated backscatter calibration are now written properly in the ELIC products.
- All the string global attributes in the HiRELPP products are defined even if they are blank (see [https://bugzilla.imaa.cnr.it/show\\_bug.cgi?id=54](https://bugzilla.imaa.cnr.it/show_bug.cgi?id=54)).
- Added support to read the new molecular variables defined in the ELPP products. Old variables are still supported.
- Fixed a bug in writing variable attributes of type NC\_FLOAT.
- Manual cloudmask in the HiRELPP products is transferred to the output products.
- Filename format was changed according to the new format described in section 2.1.
- Product type (experimental or operational) now is reported in the ELIC products as described in section 2.2.

## 9.ELQUICK

ELQUICK is the SCC module generating the EARLINET quicklooks. These quicklooks are based on the high resolution ELIC products (high resolution elastic total attenuated backscatter or volume depolarization ratio) and are made available on the official EARLINET quicklook web page (<https://quicklooks.earlinet.org>).

Main changes with respect to the previous version:

- Fixed a typo in the colorbar label (st->sr).
- Fixed a bug generating quicklook (partial!) even if the current station or the lidar or the lidar version or the lidar configuration corresponding to the current measurement ID was not enabled for quicklook.

# 10.SCC Web Interface

The most relevant new features in the version 5.0.0 of the SCC Web Interface are described below.

- **Locking Lidar Configuration**

Change lidar configuration Export HOI System History

| System information    |                        |                    |                          |  |                                     |
|-----------------------|------------------------|--------------------|--------------------------|--|-------------------------------------|
| Basic system settings |                        |                    |                          |  |                                     |
| Id                    | 125                    | Configuration Name | daytime                  |  |                                     |
| Lidar version         | 75: MUSA - Version 1.0 | Station (owner)    | pot                      |  |                                     |
| PI                    | Aldo Amodeo            |                    |                          |  |                                     |
| Latitude              | 15.7                   | Longitude          | 40.62                    | Height asl   | 760.0<br><small>in meters</small>   |
| Configuration from    | 2009-05-01 00:00       | Configuration to   | 2021-02-28 00:00         | <input checked="" type="checkbox"/> Locked Configuration |                                     |
| Telescope test passed | -                      |                    |                          |  |                                     |
| Environments          |                        |                    |                          |  |                                     |
| Description           |                        |                    |                          |  |                                     |
| Entry update date     | 2021-02-09 18:58       | Exclude from hoi   | <input type="checkbox"/> | Enable quicklook   | <input checked="" type="checkbox"/> |

A lidar configuration can be locked by SCC account with locking right enabled (SCC admins, or CARS accounts). In this way all its properties and all the objects related to it (channels, products, telescope, laser, ...) can't be edited.

- **Experimental/Operational Measurements**

Measurements

19 results | 63168 total Filter

< All dates January 2021 February 2021

| <input type="checkbox"/> | Station | Id              | Measurement Start Date | Stop             | Creation date    | Updated date     | Upload                              | HRELPP                              | CloudMask                           | ELPP                                | ELDA                                | ELDEC                               | ELIC                                | ELQUICK                             | Is Being Processed       | Processing Priority | Type         |
|--------------------------|---------|-----------------|------------------------|------------------|------------------|------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|---------------------|--------------|
| <input type="checkbox"/> | pot     | 20210113pot1230 | 2021-01-13 12:30       | 2021-01-13 13:29 | 2021-01-13 13:50 | 2021-01-13 13:50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210120pot1030 | 2021-01-20 10:30       | 2021-01-20 11:29 | 2021-01-20 14:34 | 2021-01-20 14:34 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210120pot1130 | 2021-01-20 11:30       | 2021-01-20 12:29 | 2021-01-20 14:34 | 2021-01-20 14:34 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210120pot1230 | 2021-01-20 12:30       | 2021-01-20 13:29 | 2021-01-20 14:34 | 2021-01-20 14:34 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210127pot1030 | 2021-01-27 10:30       | 2021-01-27 11:29 | 2021-01-28 10:01 | 2021-01-28 10:01 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210127pot1130 | 2021-01-27 11:30       | 2021-01-27 12:29 | 2021-01-28 10:01 | 2021-01-28 10:01 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210127pot1230 | 2021-01-27 12:30       | 2021-01-27 13:29 | 2021-01-28 10:01 | 2021-01-28 10:01 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210130pot1030 | 2021-01-30 10:30       | 2021-01-30 11:29 | 2021-01-30 13:50 | 2021-01-30 13:50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210130pot1130 | 2021-01-30 11:30       | 2021-01-30 12:29 | 2021-01-30 13:50 | 2021-01-30 13:50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210130pot1230 | 2021-01-30 12:30       | 2021-01-30 13:29 | 2021-01-30 13:50 | 2021-01-30 13:50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |
| <input type="checkbox"/> | pot     | 20210203pot1030 | 2021-02-03 10:30       | 2021-02-03 11:29 | 2021-02-03 13:50 | 2021-02-03 13:50 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | -                   | Experimental |

A measurement processed/reprocessed with a locked configuration is labeled as Operational. Viceversa, it is labeled as Experimental.

- **Delayed Measurements**

Sounding file  
 Nessun file selezionato.

Overlap file  
 Nessun file selezionato.

Lidar ratio file  
 Nessun file selezionato.

Comments

Categories

- Calipso
- Cirrus
- Climatology
- Diurnal cycles
- Forest fires
- Photosmog
- Rural / Urban
- Saharan dust
- Stratosphere
- Volcanic eruption

Delay processing (hours) - Accepted values: 0 to 96 (optional)

During the submission of a measurement it is possible to set a value of delay in hours (Accepted values: 0 to 96). If greater than 0, the processing will be postponed and executed after the delay period. This can be used to assure that NWP data are available during processing.

- **Signal Type related to Product/Channel connections**

## Change Product

|                |  |
|----------------|--|
| Id             | 253  |
| Product type   | lidar ratio and extinction   |
| Usecase        | 0<br><small>the use-case number based on the documentation</small> |
| Station        | lei  |
| Locked Product | <span style="color: red;">✖</span>                                 |

---

| Product/channel connections   |             |
|---|-------------|
| Channel id  | Signal type |
| 225 <a href="#">Channel le035 (id: 225): 532 (PollyXT) - Emission Wavelength: 532.0000 nm</a> | eITfr       |
| 226 <a href="#">Channel le036 (id: 226): 607 (PollyXT) - Emission Wavelength: 532.0000 nm</a> | vrRN2       |

[Add another product/channel connection](#)

---

| System/product connections                       |  |
|--|--|
| system id  |  |
| 142 <a href="#">142: le_PollyXT, PollyXT_IHT</a> |  |

[Add another system/product connection](#)

Signal Type is related to Product/Channel connections and not to Channels. In this way, different products related to the same channel can have different signal types associated.

## 11. SCC API client: `scc_access`

The `scc_access` command line tool allows uploading, deleting, and monitoring measurements on the SCC programmatically, without logging in to the web interface. The tool has been updated to work with the new SCC version.

The tool is hosted on the official EARLINET repositories:

[https://repositories.imaa.cnr.it/public/scc\\_access/](https://repositories.imaa.cnr.it/public/scc_access/)

You can download the latest version using the ``pip`` python package manager:

```
pip install https://repositories.imaa.cnr.it/public/scc_access/archive/tip.zip
```

The latest version has implemented, among other, the following new features:

### **Force upload**

By default, the SCC will reject an uploaded file if the specified measurement id already exists on the server. You can instruct the script to delete any existing measurement before uploading using the ``--force_upload`` flag:

```
scc_access upload-file 20110101po01.nc 125 --force_upload
```

### **Delay option**

When uploading a measurement you can request that the processing is delayed by a specified number of hours. You can specify the delay (in hours) using the `--delay` option:

```
scc_access upload-file 20110101po01.nc 125 --delay 48
```

### **Output of module exit code and description**

When processing a measurement and monitoring its progress, the tool will now output the exit code of each module and corresponding description, e.g.:

```
INFO: Measurement exit status:  
WARNING: HiRElPP exit code: 24 - Found error(s) in SCC_DB for the  
submitted Measurement_ID  
INFO: CloudScreen exit code: None  
INFO: ElPP exit code: 0 - Finished without errors  
INFO: ELDA exit code: 0 - Finished without errors  
WARNING: ELIC exit code: 22 - Failed in quering MySQL database  
INFO: ELQuick exit code: None
```