



## Deliverable 10.11: Provision of QC tools for ground-based aerosol and trace gas in situ data and aerosol profiles

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## Contents

1	Introduction.....	4
2	QC procedures and implementation.....	4
2.1	Provision of QC tools for the aerosol profiling .....	4
2.1.1	Future developments .....	6
2.2	Provision of QC tools for the near surface data.....	6

## 1 Introduction

Quality Control (QC) procedure on datafile is a useful and needed tool which serves two main groups of users: **Data Originator** and **External users**.

**Data Originators** take advantage from QC procedures because this avoids the presence of no-useful and in some cases error-contaminated data in the dataset they are responsible for. In the era of Horizon 2020, during which OpenData is the keyword, QC procedures are a first tool for Data Originator for limiting and assuring an established quality of the data, a tool to be accomplished by quality assurance procedures at instrumental and retrieval level in the general framework of complete traceability.

On the other hand, data are one of the most important outputs of a Research Infrastructure and they are potentially used by **External Users**: experts in the field but also by administrative bodies and finally common citizens. The QC procedures could drastically reduce the time needed for screening the data and will assure the quality of data to the final users.

As Research Infrastructure, the set up of automatic QC procedure is a stringent request to be met for ACTRIS.

## 2 QC procedures and implementation

### 2.1 Provision of QC tools for the aerosol profiling

A set of quality control procedures for aerosol profiles in terms of aerosol extensive and intensive properties has been designed in WP2 at CNR in collaboration with all WP2 partners. The design of these procedures capitalized from the previous experience of extensive manual quality check activity performed during ACTRIS on EARLINET database. As first result of this activity was a *Guideline for data checking before submission* prepared and made available to the Data originators already in 2015 .

On the base of the discussion on the quality control procedures at WP2 level, CNR data management group implemented quality control procedures. Some of the procedures work on fly during the data submission phase for assuring the best possible quality of data already for Level 1.5 (and NRT) data, while others run routinely for the release of Level 2 data.

Since 23 February 2017, an on-fly QC procedure works directly in the file submission phase. The detailed description of on-fly quality check procedures is described in *EARLINETQC on fly v1 0 20170609.pdf* (at <https://www.earlinet.org/index.php?id=125>). In general, the on-fly QC procedure checks the conformity of the file content respect to the EARLINET file structure and is embedded in the developed technical quality control procedures.

Data which are not compliant to the EARLINET standards are rejected already in the submission phase. An automatic feedback is provided to the Data Originator reporting all the problems incurred for each rejected file, fostering the prompt resubmission of the data.

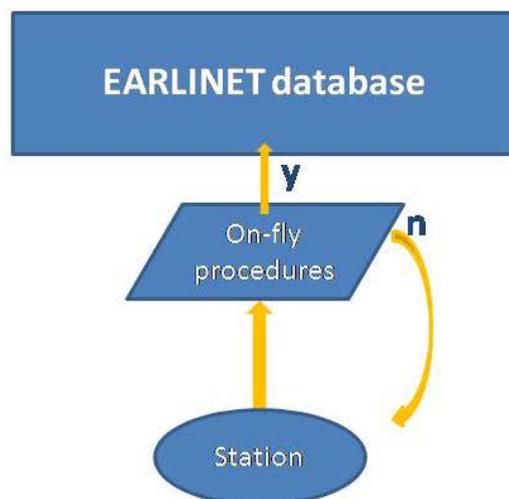


Figure 2-1: on-fly QC work flow

Because of the on-fly QC, since 23 February 2017, all the data reported at the EARLINET/ACTRIS database are automatically compliant to these standards.

Off-line quality checks (*EARLINETQCoff line v1 0 20170609.pdf*) are run systematically on the data (every 3 months) and include generally scientific content QCs related to the content of the EARLINET files in terms of validity of the EARLINET measured parameters. Feedbacks are provided to the Data Originators. Information about the files compliant to the physical QC procedures (control on extensive and intensive aerosol properties) are reported in log files on the EARLINET web page. All the data which are compliant to both all technical (formal) and physical QCs are labeled as QC2.0 data, while data passing only the on-fly QCs are labeled as QC1.0 data.

Old data still stored on the database but not compliant to the on-fly quality checks are labeled as QC0.0 level data.

Since 23 February 2017, therefore the data group QC0.0 is not be feed anymore thanks to the on-fly QCs, while both the QC1.0 and QC2.0 can increase in number. A reduction of additional QC1.0 is expected thanks to the feedbacks provided to the data originators.

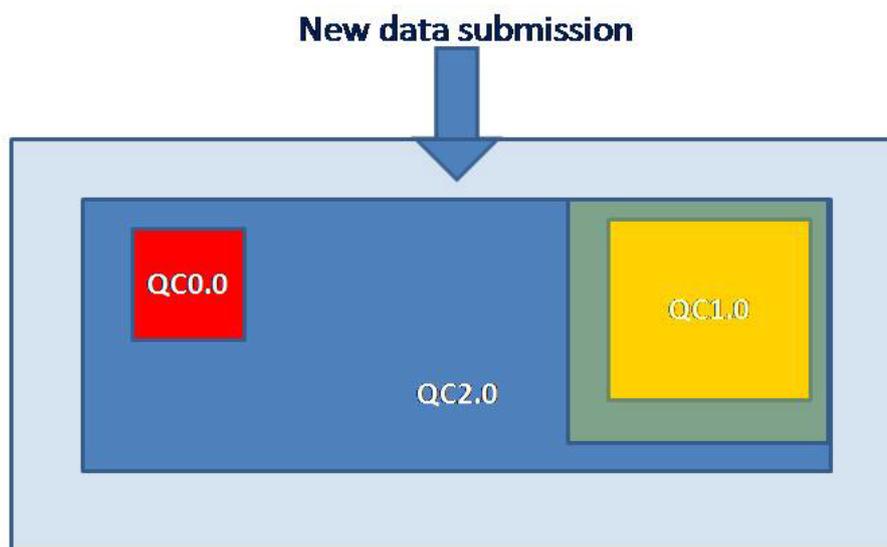


Figure 2-2: schematic view of the EARLINET database. The 3 data groups related to different compliance criteria are reported in different colors. Shaded areas indicate the potential growth in number of corresponding data groups.

### 2.1.1 Future developments

When data versioning and new level products will be implemented, a new version of the EARLINET database interface will be released and will make data explorable through QC results. This could be implemented in different ways at the moment under investigation (through flag reported into the file or info into the relational database overlaying the EARLINET database) but however with information available to external users.

Additional checks more related to the physical aspects and to comparison vs climatological info and /or other ACTRIS information could be implemented. Further QCs could be implemented making use of the output of Lidar Calibration center and of the instrumental quality check procedures.

## 2.2 Provision of QC tools for the near surface data

Built on development and experiences from earlier phases of the project, and feedback from the user communities, various tools for QA/QC of in situ data is implemented for near surface trace gases and aerosols and made accessible to users at <http://ebas-submit.nilu.no/software-tools>

Instructions, tools and programs for data collections, including Data Acquisition & Near-Real-Time Submission Software, Closure tests for aerosol data and Tools for ratios tests between specific trace gases are available, together with its documentation.

The pages are dynamic, and will be further developed in connection with the future needs of the user communities.