Guidelines for the new EARLINET stations

EARLINET is a voluntary association of research institutions which shares scientific expertise and data. As part of the EARLINET community, each member benefits from continuous exchange / transfer of expertise, direct access to technological developments, intense scientific and technical training, support in accessing funds and, generally, a well-established reputation of high quality research. Although no funds are provided directly, collaboration within common research projects is encouraged. EARLINET has been involved over the years in several network-wide projects (EARLINET, EARLINET-ASOS, ACTRIS, ACTRIS-2) and numerous multi-lateral projects, which supported us to improve both as a distributed research infrastructure, and as an expert scientific forum.

Among the EARLINET members, lidar stations are of specific importance, through their contribution to the collection of atmospheric data, advancement of aerosol research and lidar technology. Lidars used by EARLINET are not standardized instruments moreover they are continuously upgraded to improve the quantity and the quality of the measured parameters. To cope with this diversity, a complex quality assurance program was developed and implemented.

Because of the constant dealing with significant dynamics, EARLINET can only afford to embrace active members, i.e. those who contribute systematically to the scientific and technical objectives. If you want to become an EARLINET lidar station, you have to consider an average 2-years period to accommodate to the rules described below. Although the efforts made during the integration process are significant, you will acknowledge that the number of benefits is much higher.

General rules:

1. Representation of all the EARLINET members to the <u>annual General Assembly</u> is mandatory. This is the most important EARLINET event, although participation to specific workshops and technical sessions may be of great importance especially for new members. You have to use your own funds for travel.

2. As part of the quality assurance program, all lidars operated by EARLINET stations must have <u>open access</u> to be fully characterized, starting from the components level.

3. EARLINET provides to all members full access to documentation, tools, technical developments etc., which are generally described in the "EARLINET internals" section of the website. A <u>username and a password will be provided to the PI</u> (see instructions bellow).

4. **Each station has to**:
   - <u>Perform regular lidar measurements</u> (at least 2 hours per session) on:
     - Monday, local noon
     - Monday, local sunset
     - Thursday, local sunset
   - <u>Perform intensive lidar measurements</u> during alerts (announced by email)
   - <u>Process the data and submit them to the EARLINET database</u> in max. 2 months' time after the measurement
   - <u>Participate in the quality assurance program</u> as well as in scientific and technical developments

5. Communication should be addressed to:
   - Information of <u>general interest</u> for EARLINET: to the whole EARLINET mailing list: earlinet@actris.imaa.cnr.it

- Information / questions on <u>formal issues</u>: to the EARLINET speaker: Gelsomina Pappalardo
- Information on <u>technical issues</u>: to the tutor / corresponding responsible of the specific issue:
    - access to the database, internal page, mailing list: Lucia Mona
    - quality assurance – instrument: Volker Freudenthaler
    - quality assurance – algorithm & Single Calculus Chain: Giuseppe D'Amico
    - dust forecast: Alex Papayannis
    - reporting of publications: Aldo Amodeo

Specific steps to the integration:

1. **Send a Letter of interest** to the EARLINET General Assembly (EARLINET speaker Gelsomina Pappalardo):

    a. Use the template reported on the website:
        i. <u>Provide enclosed basic info</u>: PI details, station's coordinates, description of the system and team
        ii. <u>Accept EARLINET terms</u>: voluntary association, participation to meetings (1 per year), perform measurements in accordance to EARLINET requirements and share data and expertise with the rest of the EARLINET members
    b. You will receive a letter of acceptance, in the event of a favorable vote from the EARLINET GA

<u>NOTE</u>: Each new member is provided with a tutor to help the new station in its effort to adjust to EARLINET's requirements. All specific questions and problems should be addressed first to the tutor. A training period at the tutor's lidar station is advisable.

2. **Present your station, team and scientific results** at the earliest EARLINET GA meeting
    a. A short (~ 10 min) ppt presentation should be provided at the EARLINET GA meeting following your acceptance as an EARLINET member

3. **Obtain access /use of EARLINET info, database & mailing list**:
    a. Contact Lucia Mona for username and password to access the database and internal documents (CC to EARLINET speaker, Gelsomina Pappalardo)
        i. the request can only be sent after the formal acceptance (please attach the signed letter of acceptance to prove you are eligible!)
        ii. this automatically adds the Principal Investigator (PI) to the EARLINET mailing list, therefore it gives the PI full access to all EARLINET communications
        iii. the PI can also nominate another person to be registered as user of the EARLINET database
        iv. the responsibility for data availability and quality, as well as for the update of the contact information (persons who are allowed to have access to the EARLINET's internal documents) is entirely of the PI.
    b. <u>Check </u>the documentation in the EARLINET internal website → Data archive & use:
        i. NetCDF format
        ii. mandatory measurements schedule
        iii. guidelines for data checking

       iv. name conventions

       v. categories

  c. Contact Sara Basart, to be included in the BSC vertical profiles list

  d. Contact Francesco Amato to get access to the EARLINET forum

A further "service" could be offered about satellite overpasses :
Contact Aldo Giunta to be included in the satellite overpasses service.

4. **Participate to the Quality Assurance program**

  a. <u>Algorithm</u>

       i. go to EARLINET internal page → Intercomparisons: perform all 3 training cases

       ii. go to EARLINET internal page→ Activities NA1-NA6 →NA3 Quality assurance → NA3 Algorithms: use your own algorithm on the simulated signals (elastic and Raman algorithms) and compare it to the solution

       iii. results should be presented at the next EARLINET GA

  b. <u>Handbook of Instruments</u> (HoI): technical characteristics of your system should be reported to EARLINET for the purpose of setting the Single Calculus Chain

       i. go to http://www.meteo.physik.uni-muenchen.de/~stlidar/earlinet_asos/EARLINET-ASOS-NA3-QA.html → Handbook Of Instruments – HOI → select one system from the list, download the Excel file → fill in technical data for your system in accordance to the model → send the Excel file to Volker Freudenthaler (several iterations may be necessary) and CC to Giuseppe Damico

  c. <u>Regular instrument tests</u>:

       i. go to EARLINET internal page→ Activities NA1-NA6 →NA3 Quality assurance → read and implement tests described in "D3.1_Documentation_of_tools_for_internal_lidar_check.pdf"

       ii. go to http://www.meteo.physik.uni-muenchen.de/~stlidar/earlinet_asos/EARLINET-ASOS-NA3-QA.html → check for news and other useful tools

  d. <u>Direct intercomparisons</u> with an EARLINET reference system

       i. a short campaign to compare your system with a reference lidar will be organized in approx. 1 year following your integration; schedule and details will be communicated to you in due time

5. **Register to the automatic data processing using Single Calculus Chain**

  a. <u>Contact Giuseppe D'Amico</u> for channel IDs and details to access to the SCC

       i. for this, your HoI has to be complete, correct, and stored by Giuseppe D'Amico

  b. <u>Preparation of raw data</u> to be fed into SCC:

       i. go to EARLINET internal page → Activities NA1-NA6 → NA5 → read "NetCDF_input_filev2.0.pdf"

       ii. develop your own tool to convert raw data time series in the specific SCC format

       iii. send Giuseppe D'Amico a test file

  c. **Note**: there are a few minor modifications in the SCC input file compared to the document → ask Giuseppe D'Amico the most recent format

Final comments:

EARLINET is continuously developing new tools / projects / activities → the only way to keep up with changes is to:

- participate to annual meetings
- visit the website / forum often

keep contact with your tutor / other EARLINET