ACTRIS aerosol vertical profile data and observations: potentiality and first examples of integrated studies with models

Lucia Mona[1], A. Benedetti[2], G. D'Amico[1], C. Lund Myhre[3] , M. Schulz[4], U. Wandinger[5], P . Laj[6], and G. Pappalardo[1], and many others

[1]CNR-IMAAPotenza, Italy [2] ECMWF, Reading, UK
[3]NILU , Oslo, Norway [4]MetNo, Oslo, Norway
[5]TROPOS, Leipzig, Germany [6]CNRS, Grenoble, France,

ACTRIS

Aerosol Cloud Trace gases Research InfraStructure

ACTRIS presented as one of the new six ESFRI Roadmap projects at the launch event!

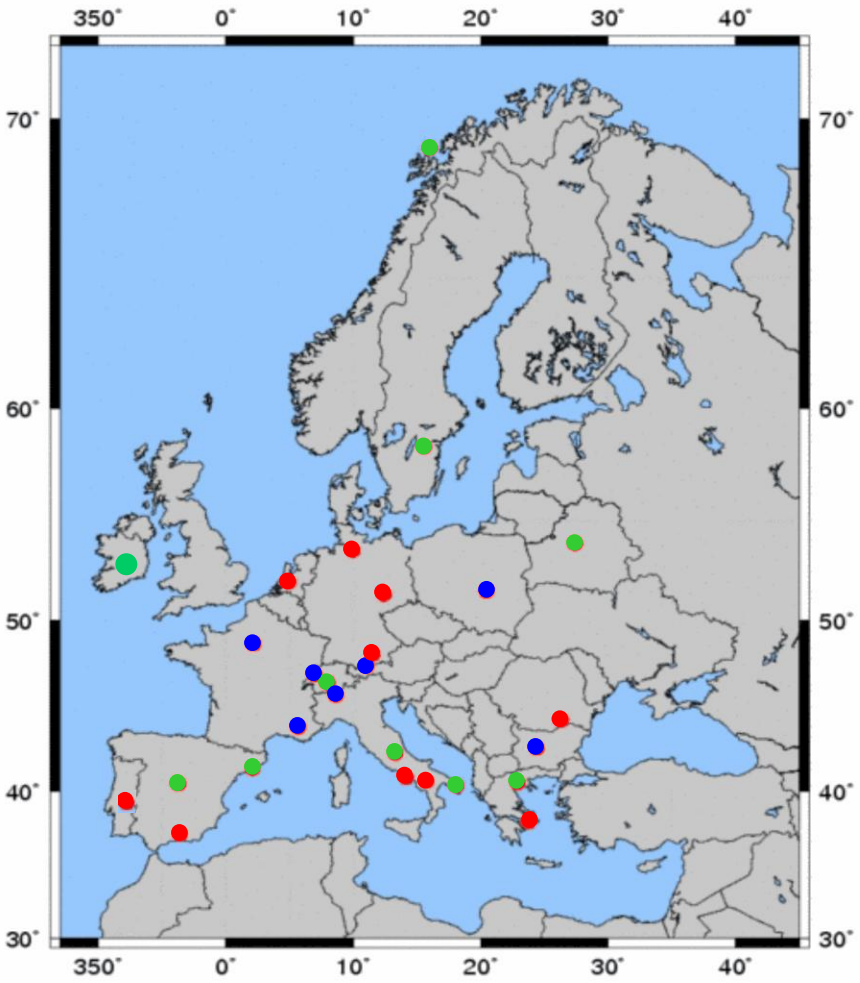
ACTRiS

Aerosols, Clouds, and Trace gases Research Infrastructure
- providing atmospheric data and research facilities for various user groups

ACTRIS includes Observing Stations, Exploratory Platforms, Calibration Centres, Data Centre & Head Office

EARLINET

European Aerosol Research LIdar NETwork



www.earlinet.org

- since 2000
- 27 lidar stations
  - •10 multiwavelength Raman lidar stations
  - •10 Raman lidar stations
  - • 7 single backscatter lidar stations
- comprehensive, quantitative, and statistically significant data base
- Continental and long-term scale

Pappalardo et al., AMT 2014

EARLINET

Different set-up and procedures

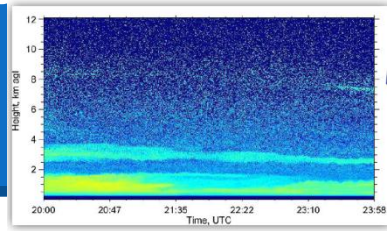
EARLINET

- ✓ Quality assurance
- ✓ Optimization of the instruments
- ✓ Optimization of the data processing
- ✓ Centralized measurements scheduling

Harmonized network and standardized measurements

EARLINET products

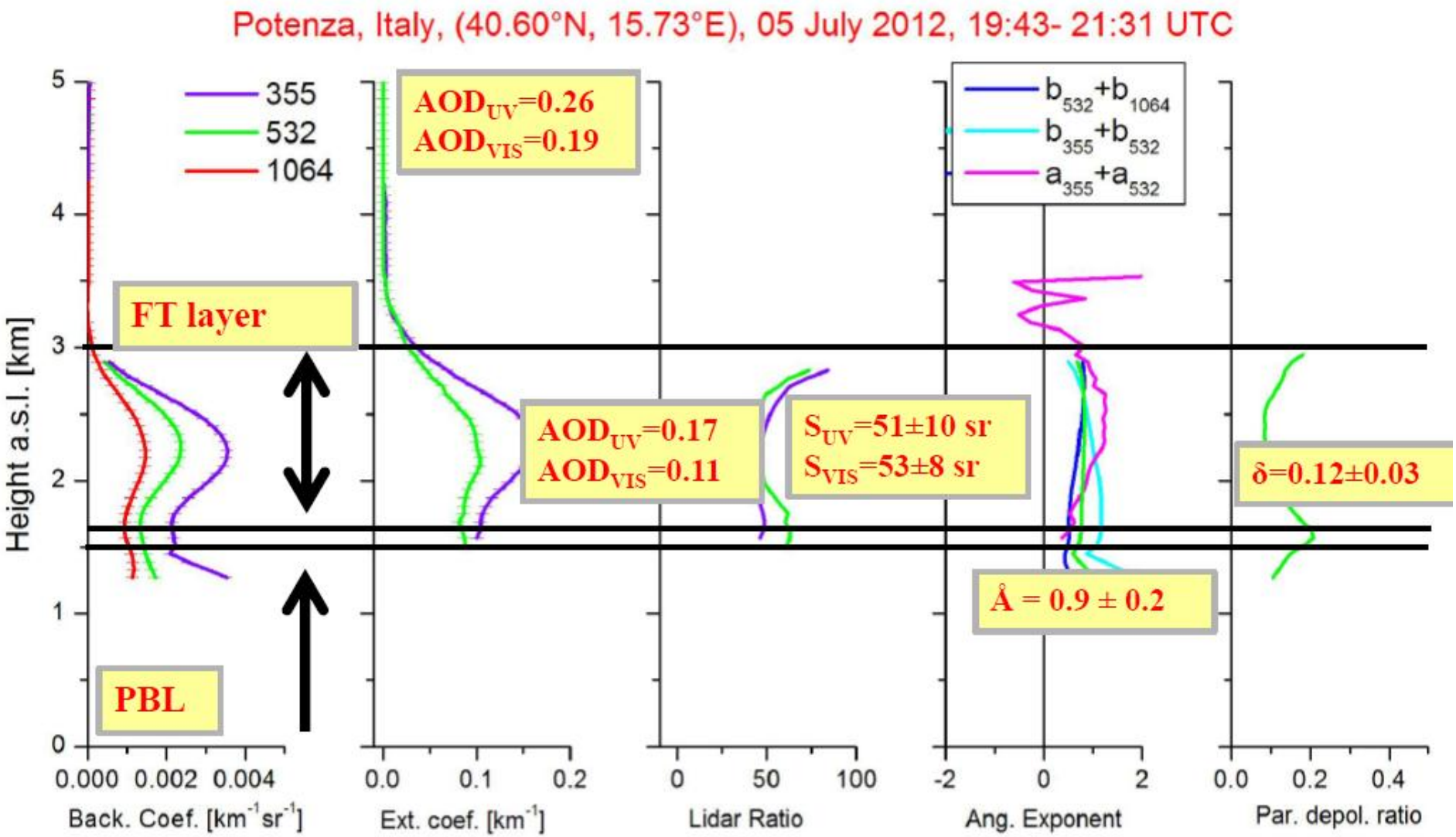
Quicklooks **available at http://www.meteo.physik.uni-muenchen.de/~stlidar/quicklooks/European-quicklooks.html**



e & b files **available at earlinet.org (and through ACTRIS data portal) and organized into categories**

Secondary products **as Eyja relational database available on request at earlinet.org**

EARLINET products



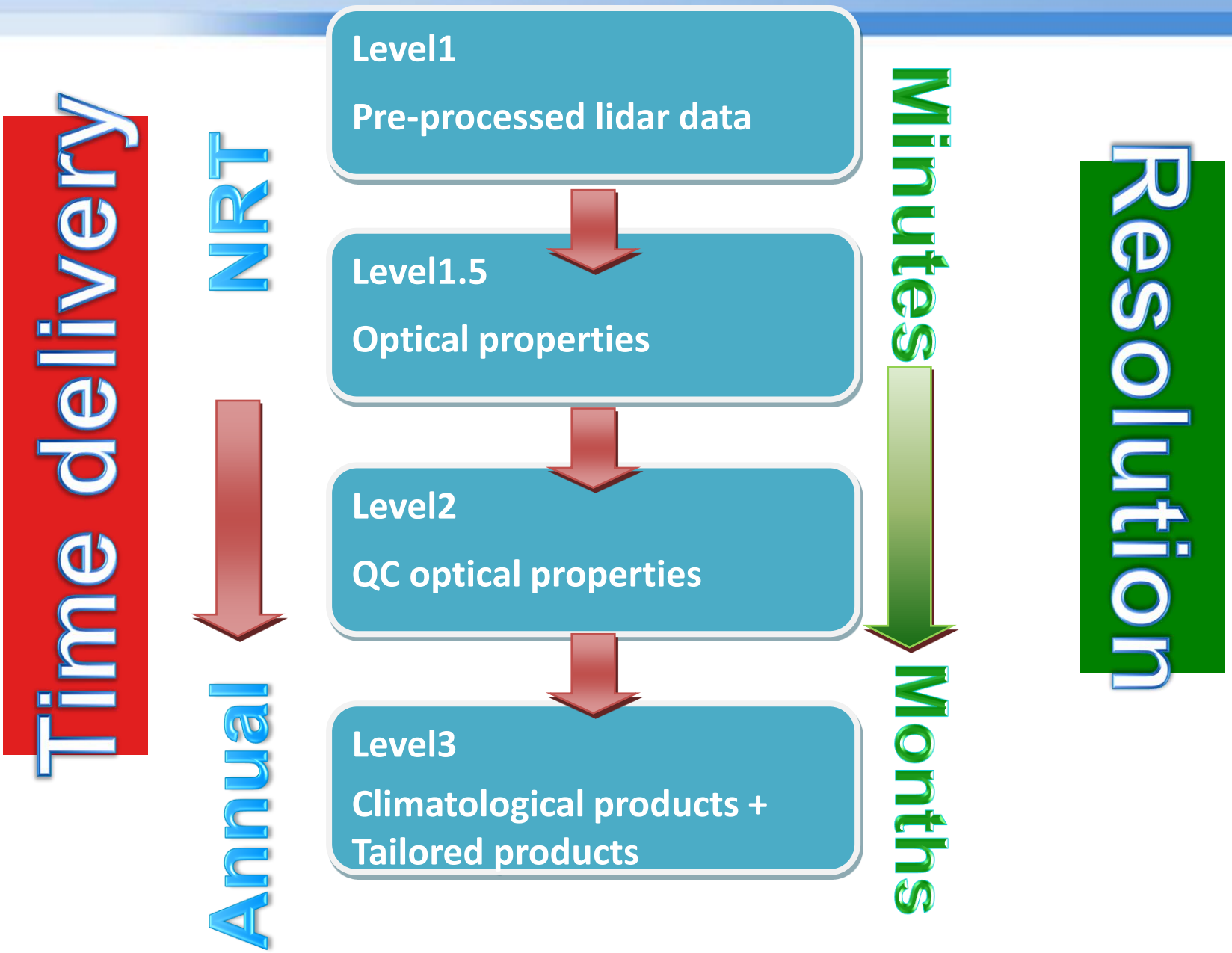
New EARLINET database design

Level structure going from low level and fast delivered data towards more advanced and correspondingly later released data.

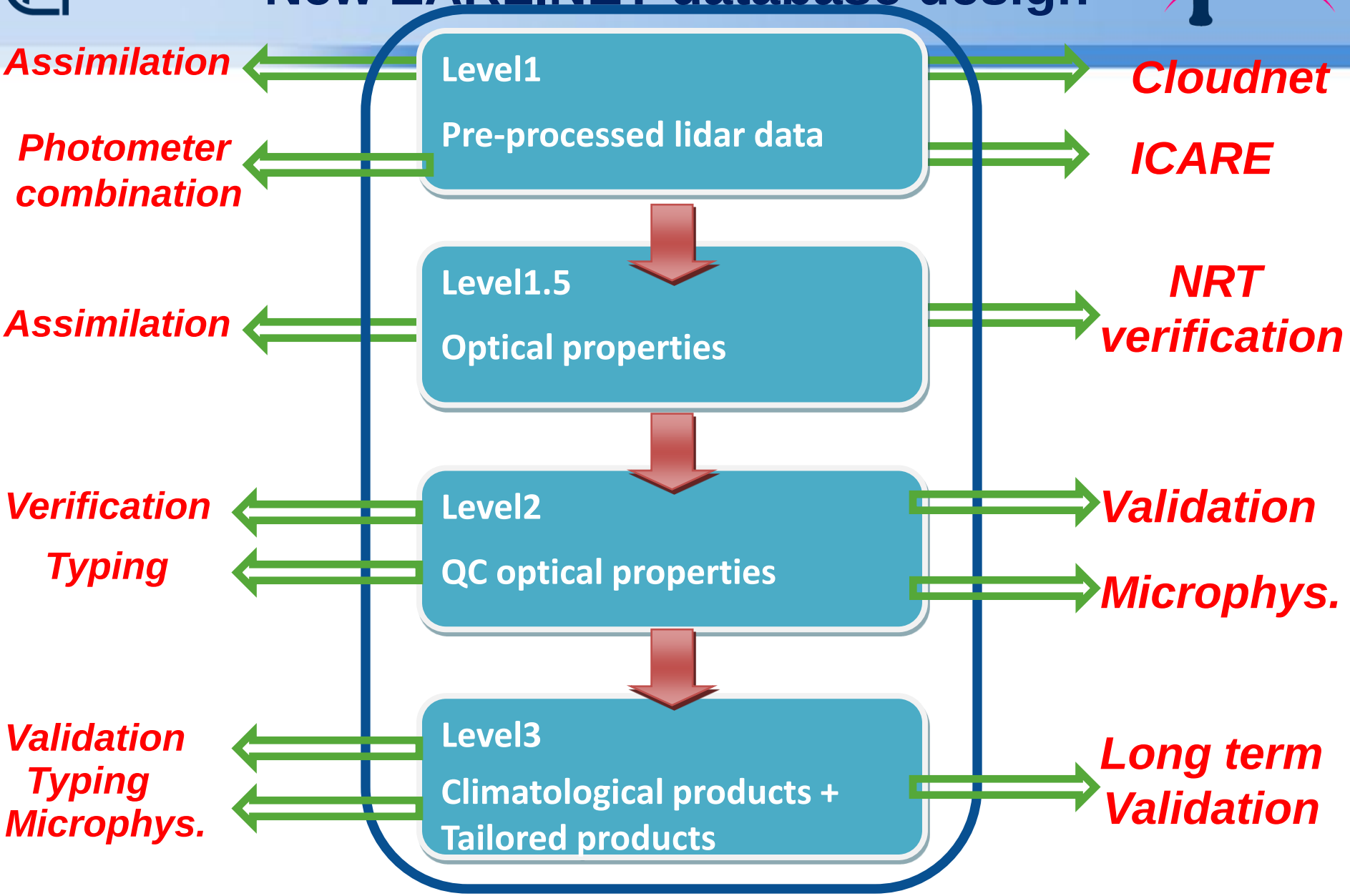
As for CALIPSO, data are organized in levels corresponding to different steps in the data analysis procedure.

As for the AERONET database, the number of quality check procedures increases with the level of the data.

New EARLINET database design



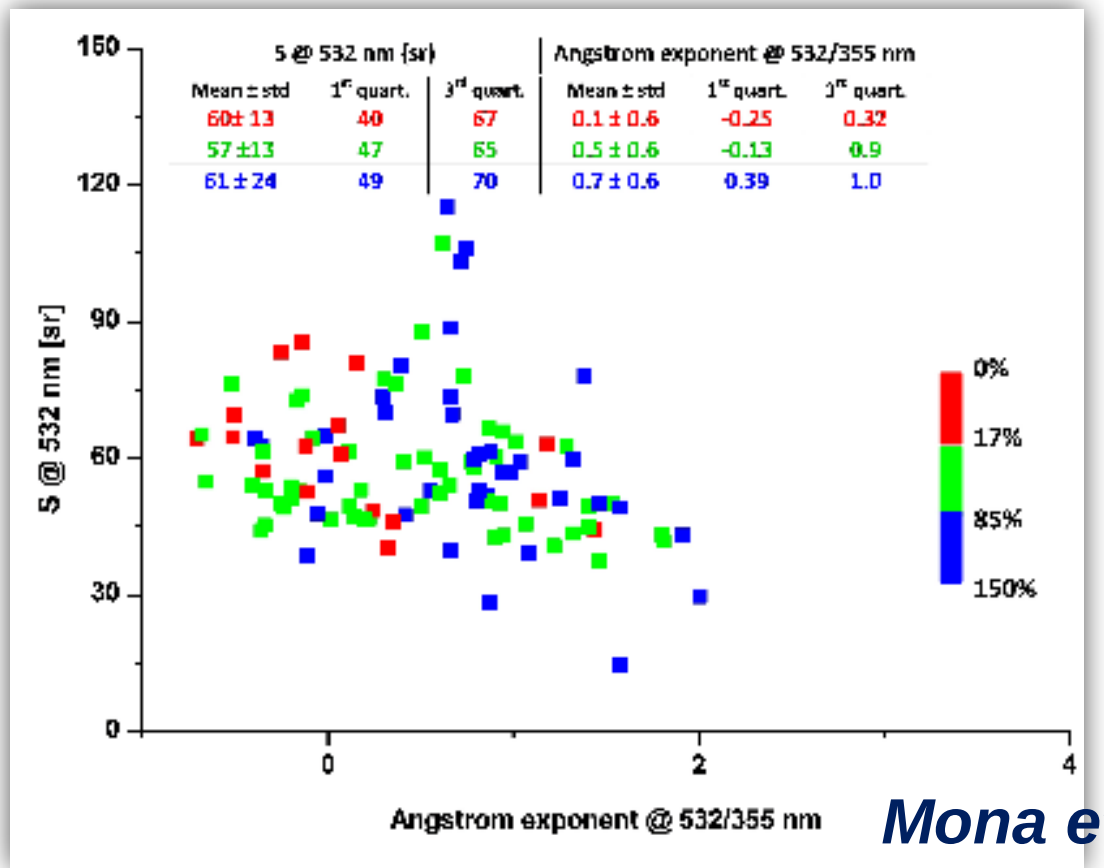
New EARLINET database design



Model evaluation
EARLINET vs BSCDREAM-8b

12 year one site extinction profile comparison

- Center of mass of the layer well described by the model
- Profile shape well reconstructed for AOD > 0.1
- Lost of agreement for mixing/modification processes

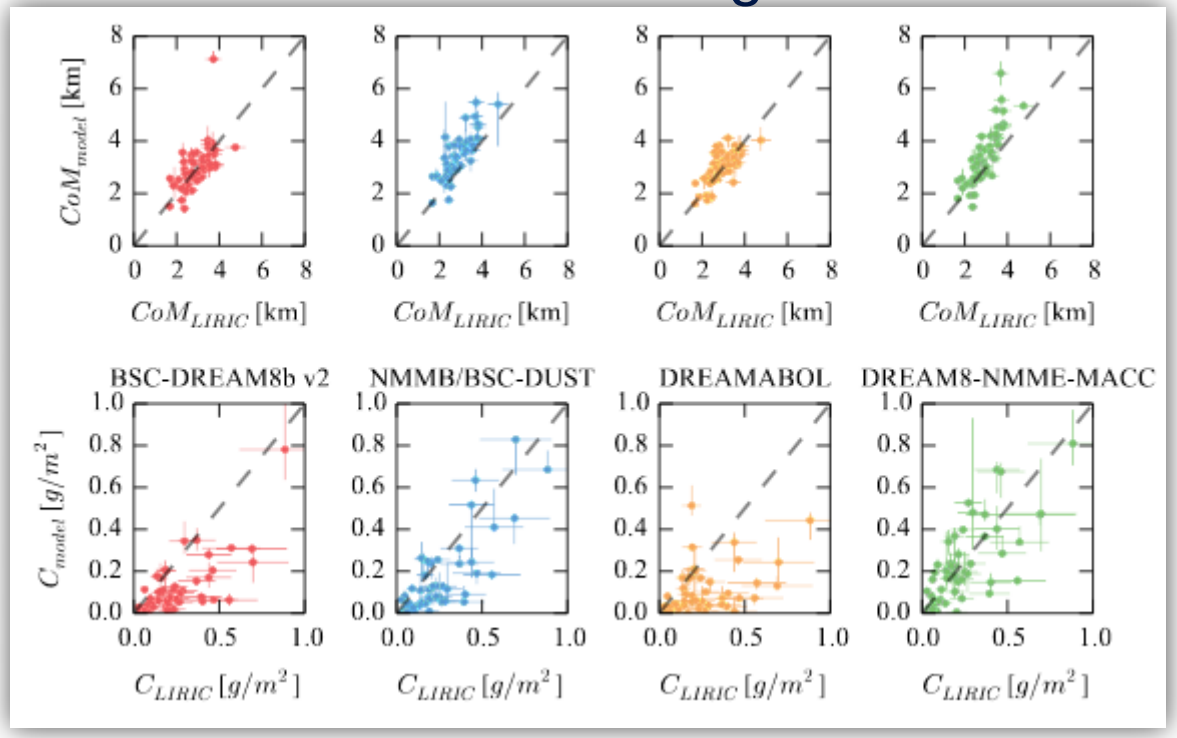


Mona et al., ACP, 2014

Model evaluation
Multimodel comparison

Cases based 6 sites Concentration comparison

- Center of mass of the layer well described by the model
- Profile shape typically well reconstructed
- Underestimation of the models in concentration number
- Different behaviour for extreme ranges in concentration (small/very high)



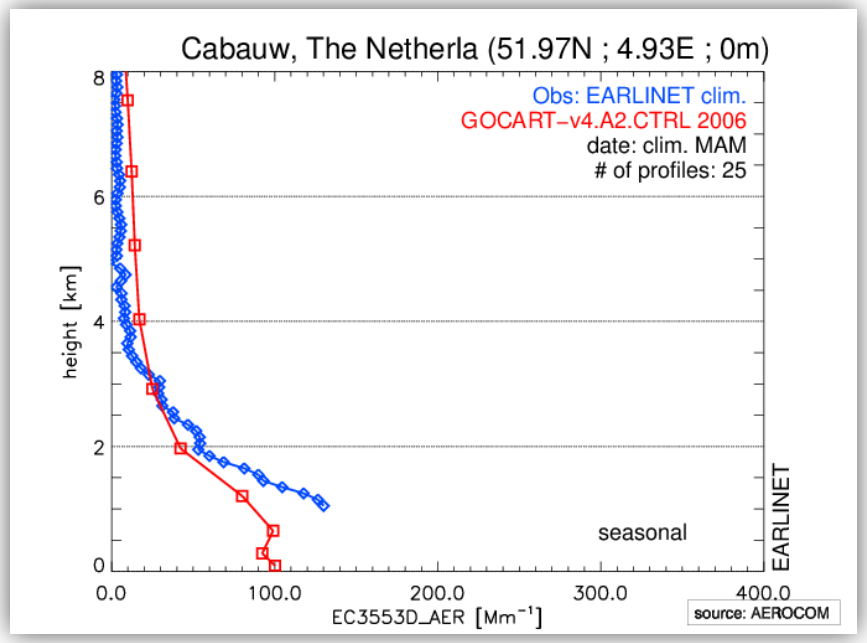
Binietoglou et al., AMT, 2015

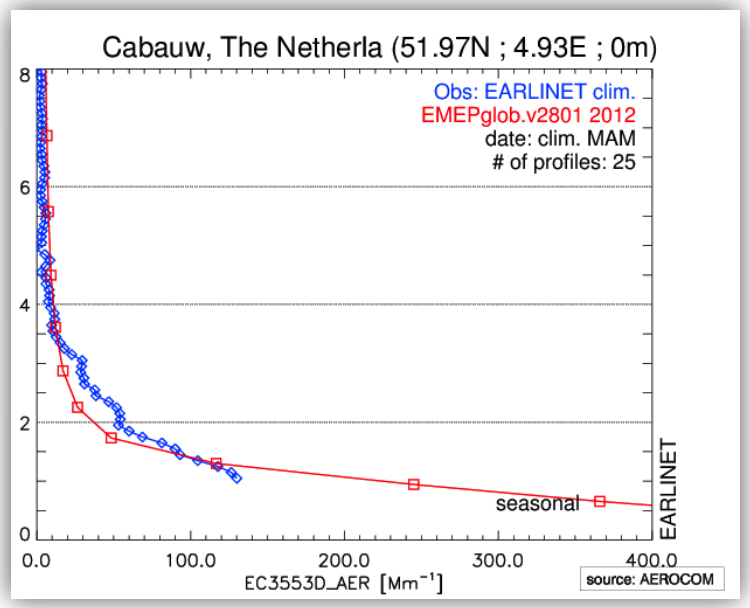
Model evaluation
Long term multi year data

First activities started already during ACTRIS-1 between EARLINET and AEROCOM.

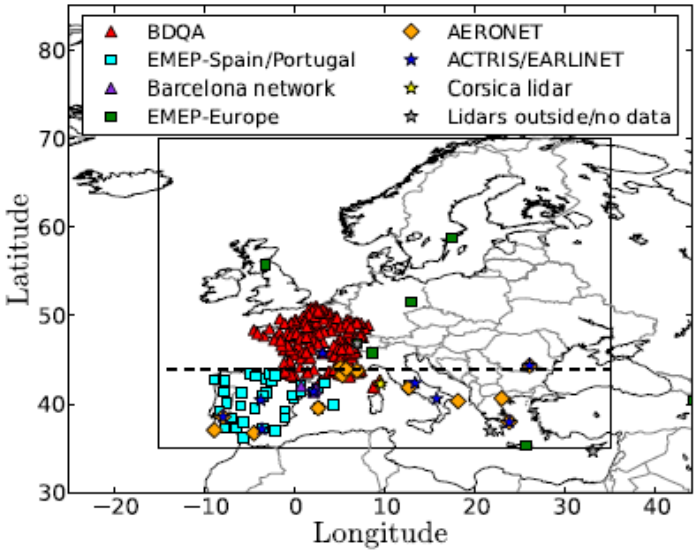
This helped the set-up of EARLINET climatological products

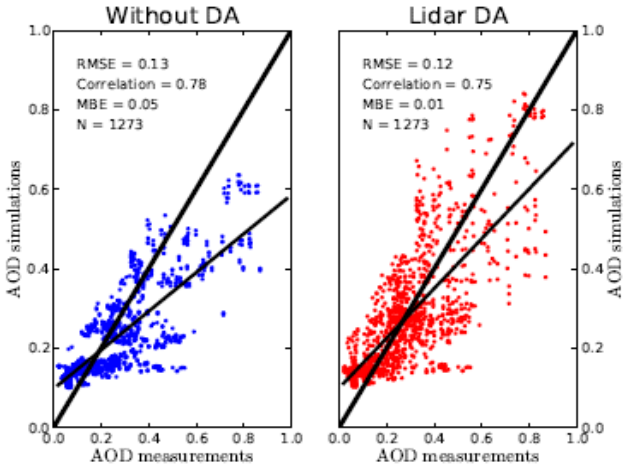
A visual models vs observation comparison is available



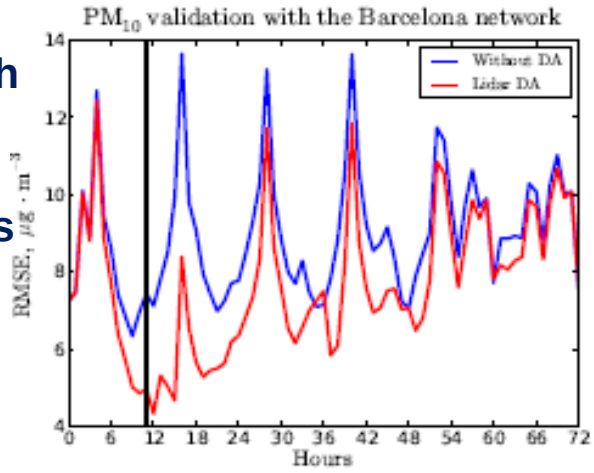


Assimilation EARLINET into POLAIR3D model

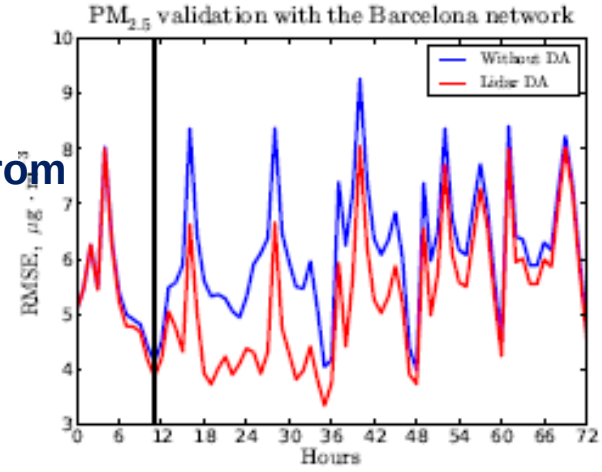




- **Reduction in RMSE with respect to independent PM observations is observed to up to 36 hours**

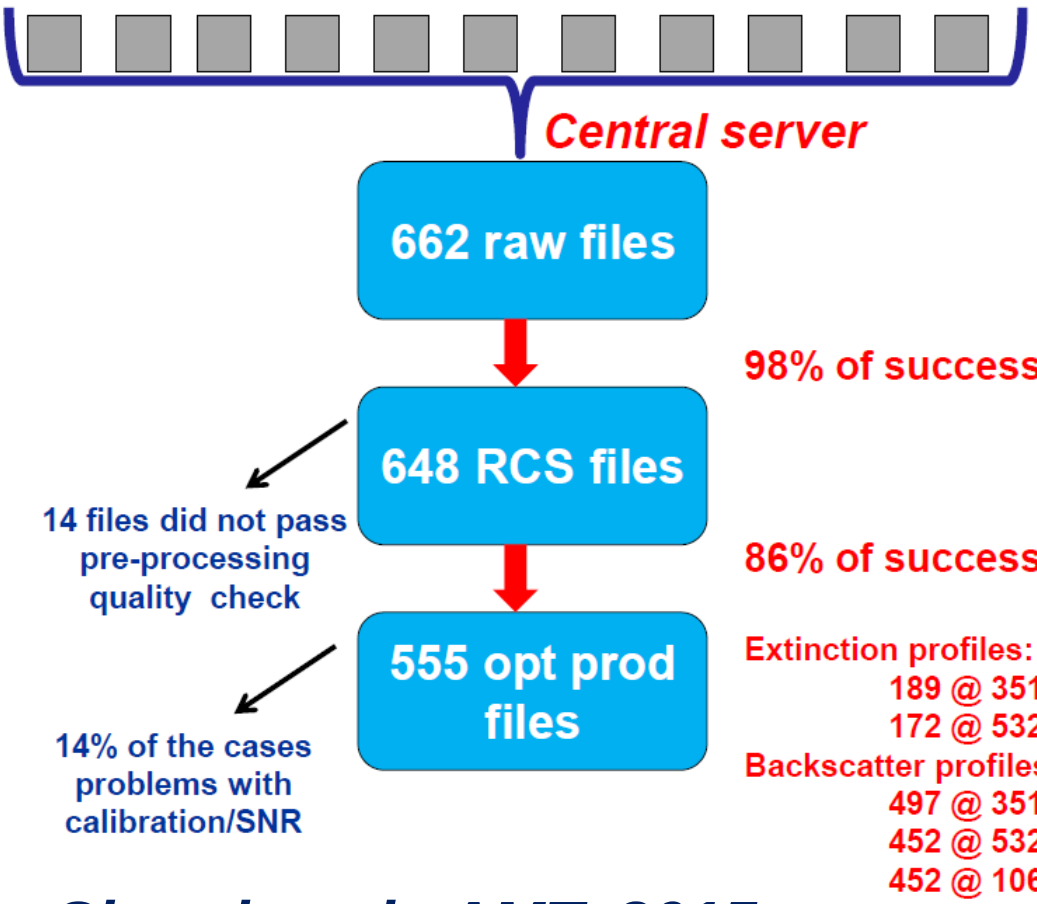


- **Comparisons with independent AOD data from AERONET show less impact of lidar DA**



Wang et al 2014, ACP, doi:10.5194/acp-14-12031-2014

EARLINET NRT data provision
ACTRIS Summer 2012 campaign



Sicard et al., AMT, 2015
D'Amico et al., AMT, 2015

Pre-processed data generated in a full automatic way and in real time

This exercise in summer 2012 helped to better tuning the SCC

Now SCC ready for be applied to the EARLINET data and deliver NRT extinction and backscatter profiles

Conclusions

- Climatological observations since 2000
- Desert dust cases available and categorized on the database
- NRT capability proved and in implementation phase for operativity
- QC chain established
- New products and additional datasets available:
  - volcanic layers
  - desert dust component
  - concentration profiles (through algorithms)

EARLINET database in a new developing phase, please check the EARLINET web page for news

contact: lucia.mona@imaa.cnr.it

Acknowledgments

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Thanks for your attention