

SWG on "Instrument synergy to study Mixing Height in Stable conditions"

Rome, 16-17 April 2012

Local Organizers:

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The problem:determination of the atmospheric Mixing Height in stable conditions

Under stable conditions the Planetary Boundary Layer is hard to define. Therefore, the determination of the associated Mixing Height is a very hard task (Seibert et al., 2000). A variety of instruments may be employed to this purpose, each having their advantages and drawbacks (e.g.: lidar, sodar, rass, wind profiler, radiometer). If, on the one hand, the simultaneous use of more instruments may help overcoming their individual limitations, on the other hand managing co-located and similar measurements requires good techniques of data fusion and statistical inference to synergize at the best the various pieces of information.

Objectives of the meeting

During the SWG the properties of a variety of instruments will be discussed, with the aim to understand under which conditions each instrument performs better, allowing the most reliable determination of the mixing height. After that, the objective of the SWG will be to discuss how to harmonize data from the different instruments, exploiting the relative advantages and minimizing the drawbacks. To this aim, an overview of the mathematical and statistical methods of data fusion, meta analysis and fuzzy inference will be given.

Expected outcome

We expect to produce some guidelines about how to perform the best fusion of such data, in order to synergize the possible ensembles of data and then achieve the most reliable estimation of the mixing height under a wide range of conditions.

Draft of the meeting program:

Monday, April 16th, 2012

Morning

10:00 Welcome and presentation of the participants

10:30 Presentations and discussion of the problem of the MH determination under stable conditions.

Speakers (30 min):

F. Angelini: "Overview of the Stable Boundary Layer"

S. Argentini- I. Pietroni: "Estimate of the stable mixing layer height by Sodar"

G. Curci: "Simulation of stable PBL in WRF/Chem and impact on pollutant concentration"

12:00-12:30 Discussion:

- What is the importance of a correct estimate of the PBL height in stable conditions?

- Which variables are important in these cases? Is it different from convective regimes?
- What error on pollutant dispersion simulations we can expect from their measurement?
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12:30 Lunch

Afternoon

14:00 Presentations and discussion about the differences between the atmospheric profilers under stable conditions: reliability of each instrument and comparison of different measurements.

Speakers (30 min):

M. Haeffelin - S. Pal: "Application of higher-order statistics to facilitate the near-real time determination of the instantaneous atmospheric boundary layer depth using routine lidar and ceilometers measurements"

F. Madonna: "'A working group for the study of boundary layer in the frame of EARLINET /ACTRIS scientific activities: "

L. Ferrero: "Determination of Mixing height by balloon-borne Optical Particle Counter"

N. Cimini – J. C. Dupont: "Mixing height retrievals in stable boundary layer by multichannel microwave observations"

15:30 Discussion:

- Costs-benefits of each instrument, in general and under stable conditions
- Which variables allow the best synergy without conflicts?
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17:00 End

Tuesday, April 17th, 2012

Morning,

9:30 Presentations concerning the methods to implement the synergy among simultaneous measurements. Speakers (30 min):

F. Angelini: Fuzzy logic and Bayesian algorithms

S. Ceccherini: "Data fusion of vertical profiles of an atmospheric constituent retrieved from remote sensing measurements"

U. Cortesi: "Data fusion of millimeter waves and infrared limb sounding measurements for the PREMIER mission" (15 min)

To be defined: Meta-analysis and/or pattern recognition techniques

11:12:30 Discussion:

- How to manage conflicting MLH estimates and/or variables?
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Lunch 12:30

Afternoon,

14:00-General discussion of the methods to implement the synergy among simultaneous measurements

Conclusions and definition of future work

16:00 End

Registered participants:

Name	Affiliation	contact	Eligibility for reimbursement
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