The BASE:ALFA project

[Budget of the Atmosphere-Soil Exchange:A Long-term Fluxes Analysis]

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aim

The aim of the BASE-ALFA project is to:

- acquire a complete set of surface and atmospheric measurements during two intensive observing periods (1 summer month + 1 winter month) at San Pietro Capofiume in the middle of the Po Valley;
- verify the capability of state-of-the-art methods to correctly simulate PBL height from observed parameters when compared to LIDAR observations assumed as benchmark;
- verify the capability of diagnostic and prognostic models to correctly simulate the PBL heights.

measurements

- **sonic anemometer and fast hygrometer** (turbulent fluxes, surface layer stability)
- **radiometer** (surface radiative balance)
- **ground heat sensor**
- **LIDAR/ceilometer** (aerosol profiles, PBL height determination)
- **TDR** (soil moisture)
- and **synop station, radiosonde, meteorological radar, air quality station**

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WP-1

WP-1 Acquisition of the BASE-ALFA dataset:

Acquisition of long term measurements of all parameters which influence the exchange of energy and moisture between the ground and the atmosphere.

The emphasis is on two atmospheric regimes which generates
- **convective boundary layer**, characterized by condition of local instability and strong updraught. This condition is typical of mid-latitude convection formation during summer.

-**stratified boundary laye**r,characterized by condition of strong stability a and low level temperature inversion typical of fog formation.

WP-1. Responsible: F. Di Giuseppe and G. Bonafe, ARPA-SIMC

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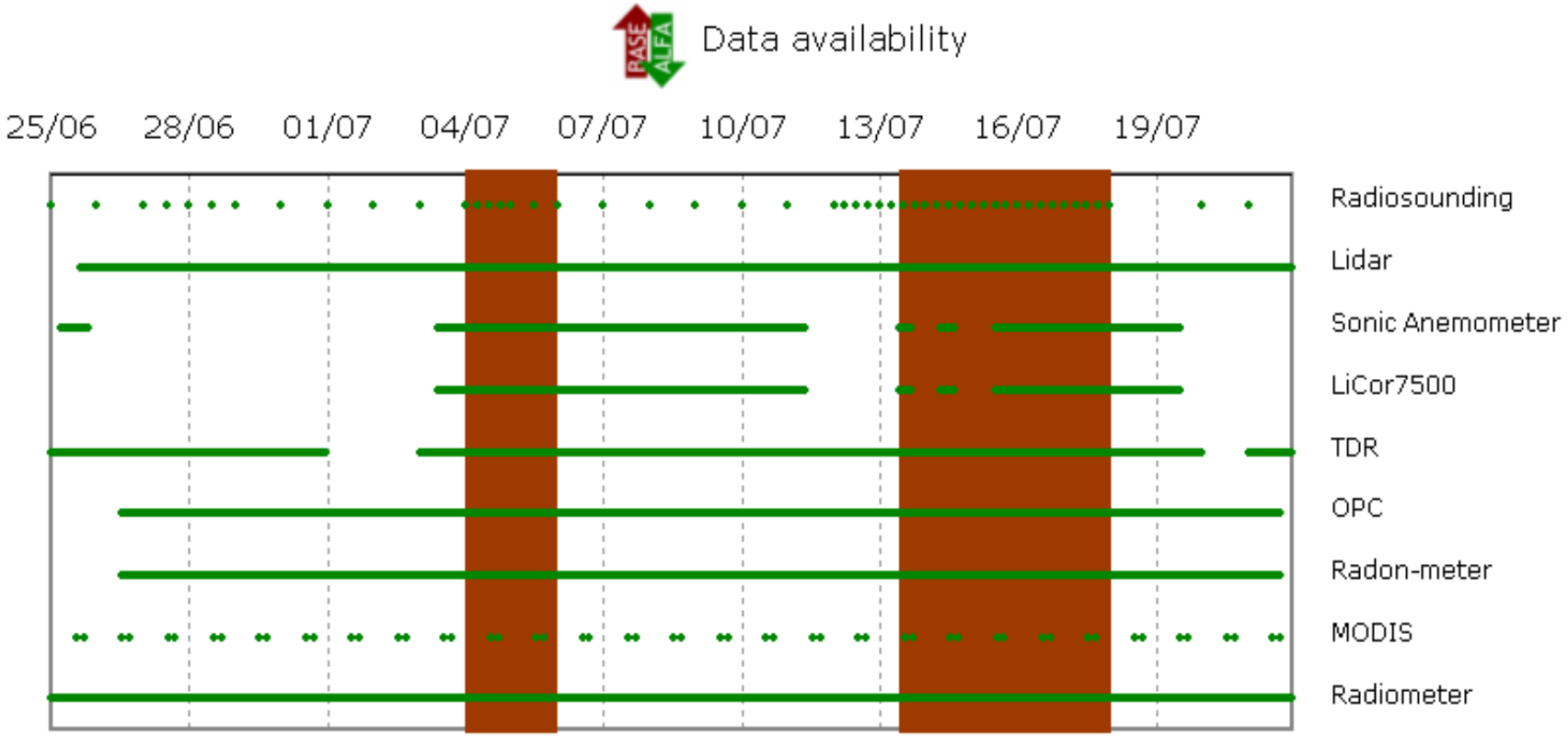
WP-1

Summer campaign



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WP-2

WP-2 PBL-Modeling.

The capability of high resolution limited area models to correctly simulate atmospheric condition mostly driven by local processes and forced by weak synoptic regimes will be investigated as function of the model resolution and initialization.

The COSMO model will be run at 1 km resolution and with increased vertical resolution and PBL driven phenomena predictability will be investigated

WP-2. Responsible: F. Di Giuseppe ARPA-SIMC

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WP-3

Mixing height calculation.

A series of way of estimating PBL heights will be investigated and compared to PBL height as calculated from LIDAR measurements.

mixing height calculation

The LIDAR/ceilometer measures aerosol reflectivity. This indirectly allows to detect the growth of the mixed layer in the morning leading to a reliable estimate of the PBL height.

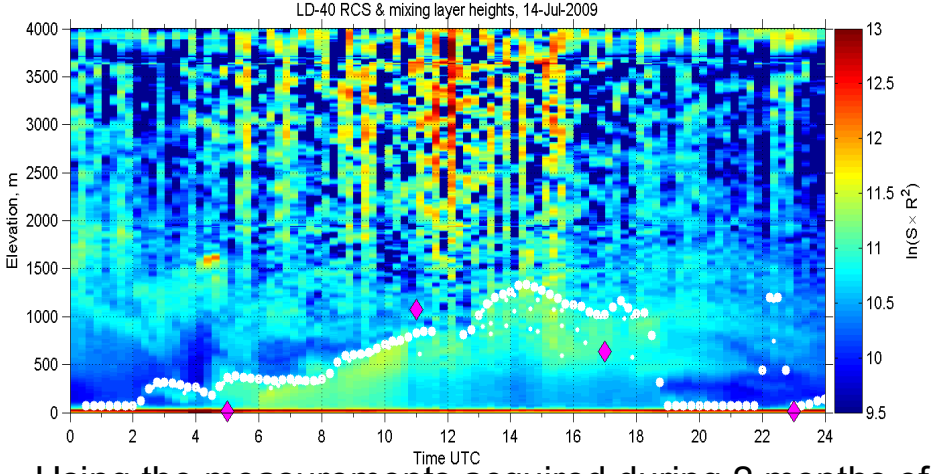

Figure: Holzworth method (purple diamonds), based on radiosounding, compared with LIDAR-calculated mixing height (white bullets)

Using the measurements acquired during 2 months of campaigns and the outputs of COSMO simulations, a series of way of estimating PBL heights will be investigated and compared to PBL height as calculated from LIDAR measurements.The following methods will be studied: Holzworth, Gryning & Batcharova, Zilitinkevich, methods based on the Richardson number or on the TKE.

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WP-4

WP-4 Air quality assessment.

A chemical transport model will be used to simulate the concentration of selected gases and aerosols. The forecast impact of using different PBL height estimations will be evaluated.

Responsible: Giovanni Bonafè,ARPA-SIMC Bologna, Italy

WP-5

WP-5 Mixing height as input for the retrieval of PM10 concentration.

Responsible: Marcello Petitta, EURAC, Bolzano, Italy