



## **Optimizing the estimation of the height of the stable boundary layer using surface turbulence measurements and soundings**

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The Po Valley, Northern Italy, is an highly populated flatland basin surrounded by the Alps to the North and to the West and Apennines to the South-East. It is characterized by frequent occurrence of low winds and strong temperature inversions near the ground, all factors that lead to high pollution episodes during stable conditions. Thus it is mandatory for modelling purposes an accurate evaluation of the boundary layer height, with special attention to the height reached by pollutants emitted near the ground.

A complete set of surface and atmospheric measurements have been collected during an observational program carried out at San Pietro Capofiume +meteo station, in the middle of the Po Valley, that spans winter, spring and summer conditions. The long term dataset has been collected in the contest of the project BASE:ALFA with the main aim of creating a data pool of micro-meteorological/soil data to test and validate numerical weather prediction PBL schemes.

In this work we compared the estimates of the stable boundary layer height made on the basis of the surface flux values (which are the dominant ingredients of the Zilitinkevich and Esau (2005) formulation) with the estimates derived from the examination of the vertical profiles of mean temperature and wind velocity. This comparison is made using both observed and modelled fluxes and profiles.

The main result is that the observed boundary layer height is by far less affected by surface fluxes than the modelled ones. (This is consistent with the derivation of the theoretical formulas, based mainly from numerical simulations.) This result implies that other factors must be investigated to obtain a general formulation.

A second results, not less relevant for the practical application, is the evaluation of new coefficients in the Zilitinkevich and Esau (2005) formulation to optimize the stable boundary layer estimate, with special attention to the Po Valley climatology.