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Data analysis and parameterisation for the stable boundary layer

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Turbulence in the stable boundary layer presents many aspects not well understood; on the other hand the boundary layer parameterisation is of overwhelming importance to model atmospheric dynamics and composition.

A set of observations of wind mean velocity and fluctuations obtained in the suburban site of Torvergata, near Rome, Italy, is used to test literature similarity functions for moderate to large stability conditions. In particular, the u_*-less hypotesis for large stability conditions (Grachev et al., Boundary-Layer Meteorol., 124, 2007) is discussed.

The similarity functions for mean values are used to obtain the surface layer vertical fluxes of momentum and heat in the numerical models. The applicability of the discussed functions and the limitations related to the height of the stable boundary layer (which can be not very much greater than the lowest model level height) are discussed.