

On spurious correlation in the flux-profile relationships for the stable boundary layer.

P. Baas (1), G.J. Steeneveld (2), B.J.H. van de Wiel (2) and A.A.M. Holtslag (2).

1) KNMI, PO box 231, 3720 AE De Bilt, The Netherlands, baasp@knmi.nl 2) Wageningen University, Meteorology and Air Quality Group, uivendaal 2, Wageningen, The Netherlands.

The stable boundary layer is poorly represented in current large-scale weather prediction and climate models. Turbulent flux calculations in these models are based on the traditional and widely used so-called flux-profile relationships. Flux-profile relationships relate observations of non-dimensional gradients of wind speed ϕ_m , or temperature ϕ_h to the stability parameter z/L . In this study we firstly analyze the difference between obtained scatter for ϕ_m and ϕ_h , and secondly we analyze the impact of spurious correlation on the scatter observed in flux-profile relationships. At first we obtain that implied uncertainties in the measured surface fluxes lead to enhanced scatter for ϕ_h while for ϕ_m the scatter remains hidden. This is due to the common variables in ϕ_m and z/L . At second, we find a strong impact of spurious correlation in the flux-profile relationship for ϕ_m . Derivation of ϕ_m with randomized observations provided a similar flux-profile relationship as with real observations. This underlines that one should be aware of spurious correlation when applying similarity theory.