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Implications of using stability functions in modeling the nocturnal stable boundary layer

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During the night, under stable conditions numerical schemes have serious difficulties on estimate the turbulent fluxes. The main reason for that are the unpredictable changes in the atmospheric flow behavior.
Generally, when the turbulent closure is base on K-theory, both turbulent diffusivity and turbulence intensity are parameterized as function of the flow stability, by using generic functions of the Richardson number. Although, in the average, these models can reproduce some flow patterns, once the turbulence is suppressed by the stable stratification, it does not rise again. Therefore, they are unable to reproduce the observed large variability of regimes in the stable atmospheric boundary layer, which characterizes the global intermittency.
This problem occurs even when a short-tailed or a long-tailed formulation is used. Generally, these functions are obtained by fitting observational data, of the relation between stability and turbulence. By doing that, the complex relation between the two main variables in the atmospheric flow is replaced by an average expression, which automatically reduces the degrees of freedom of the system. Probably, this is the main cause of the inability of such schemes in reproduce changes in the atmospheric flow behavior, under stable conditions. In this work, we analyze deeply this hypothesis and the implications of using stability functions to prescribe the turbulence intensity in a scheme similar to that propose by Blackadar.