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Intermittent turbulence and exchange of CO2 and H2O in the Nocturnal Boundary Layer

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Intermittent turbulence, i.e., extended periods with little or no turbulent activity interrupted by brief periods with significantly increased levels of activity, is a well recognized characteristic of the stable atmospheric boundary layer. Nowadays, it is known that flux within a certain intermittent event varies considerably depending on the window used for the flux calculation. In many cases, events with very different time durations occur in the same night, and therefore, the proper determination of the surface flux would require averaging within data windows of different sizes for each event. Several studies have been proved that wavelet transform is a good method to solve this problem as can be applied at very different spectral ranges, discriminates the different scales of motion present in the perturbation, and is therefore an ideal tool for assessing the interactions between them. This methodology is generally applied to calculate momentum and heat fluxes, but only few studies have been applied it to calculate scalar fluxes as CO2 and H2O. In this study, using Cabauw tower data we study the exchange of these scalars during nocturnal intermittent episodes. Preliminary results show that fluxes that occur during specific events may be able to transfer a large portion of the scalars that accumulated during the calm period. However, the proper quantification of this transfer depends on the specific time scale of the event.