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How realistic is the meandering reproduced by a numerical model?

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It has been shown that meandering motions in the boundary layer influence horizontal dispersion to a large extent. They are frequently characterized by sudden shifts of wind direction and the related frequency distributions are often bi- or multi-modal. Unlike turbulence, which is dealt with through its more or less known scaling properties, it seems that no local similarity applies to meandering. Additionally, these motions are of generally unknown origin and numerical modelling at various scales also fails to reproduce them. Nevertheless, recent modelling efforts show that it is possible to reproduce the variability related to meandering under certain conditions. Namely, with reduced horizontal diffusion, or in its absence, the modelled fields are naturally more variable. It has been shown that the strength of this variability matches the measured variability at the same submeso scales. Here we inspect how realistic this variability is. The agreement of the modelled and measured submesoscale variability during a CASES-99 night is examined in details. Aside of the behaviour of the wind speed components at various levels in the atmosphere, an important test takes into account the dynamics of a plume under these conditions. To the degree that the modelled results are realistic, they may be used for understanding the basic mechanisms of meandering motions.