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Vertical evolution of wind meandering in a nocturnal boundary layer during low-wind speed conditions

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In the nocturnal boundary layer episodes of horizontal wind meandering are frequent. These episodes are characterised by low-wind regimes (wind speed less than 1.5 m s^{-1}) in which submeso motions drive the wind dynamics and turbulence is weak and often intermittent. The inception of the meandering phenomenon as well as the interaction between turbulence and the submeso oscillations are still poorly understood.
In this work we study the vertical evolution of the wind meandering by analysingnight-time anemometric data.
The observations were carried on at a coastal site in Espirito Santo state, south-eastern Brazil from august to November 2016. The turbulent data, divided in hourly series, were collected in a 140-m tower designed to provide micrometeorological observations with high vertical resolution and deep coverage of the lower portion of the atmospheric boundary layer. Particularly, turbulence observations of the wind components and temperature are carried at 11 vertical levels. The tower has been deployed next to a natural gas power plant, at 3 km from the ocean. The terrain is generally flat for an area of 30 km from the tower, where moderate hills exist.
The meandering timescale at each level is evaluated through the Eulerian Autocorrelation Functions of the horizontal wind velocity components and temperature, while the interactions between the different scales of motions is studied using the multi-correlation analysis. Thus the vertical evolution of meandering and time scales structure can be studied.