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Comparison between the sea-breeze circulation day and normal day Reynolds stress anisotropy in the lower atmospheric region

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This study shows the comparison between the sea-breeze circulation (SBC) day and normal day turbulent characteristics and the Reynolds stress anisotropy in the lower atmospheric region. The Reynolds stress tensor is responsible for the dissipation and transport of mean kinetic energy. The variability of the turbulent kinetic energy due to the Reynolds stress anisotropy modulates the air quality. A 20 Hz Ultrasonic anemometer was deployed in the coastal area of northern France to measure the temporal wind variability for the duration of one year five months.

The SBC was detected by a change in wind direction from the West to the East during the day time. We found that the axial component of the turbulent kinetic energy is higher than the other two through an axisymmetric expansion, and energy ellipsoid has a cigar shape due to SBC. During this time the dominance of small scale zonal turbulent motions was observed. Also, the probability of a higher degree of wind anisotropy due to SBC generates large mean kinetic energy within the lower troposphere. Moreover, the production of larger negative turbulent kinetic energy due to SBC was evident.

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