Mejorando la comprensión y predicción de brisas marinas y sus efectos en las condiciones meteorológicas de regiones semiáridas complejas: la campaña brisa en la costa de Cádiz

Improving the understanding and prediction of sea breezes and their effects on the meteorological conditions of complex semi-arid regions: the brisa field campaign on the coast of Cádiz

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RESUMEN

The BRISA project focuses on sea breezes developed in three Spanish semi-arid areas: the coast of the Gulf of Cadiz, the island of Mallorca and the eastern part of the Ebro Valley. The breezes in these regions interact with processes of different scales, such as the mesoscale thermal-low pressure systems formed over the Iberian Peninsula in summer, the secondary circulations generated in inhomogeneous surfaces characterised by wetlands and irrigated/non-irrigated agricultural patches, or the thermally driven flows favoured in complex-terrain regions. These interactions affect the formation and the characteristics of the sea breezes, with numerous impacts that affect society, highlighting their thermoregulatory role during extreme temperatures, or their importance for inland and offshore wind energy resources, among others. The methodology proposed in the BRISA project (PID2024-159841OA-I00) combines the use of long-term in situ observations and experimental field campaigns, as well as the use of numerical weather prediction models. In this work, we present the BRISA-Cádiz field campaign (July 2026), which will bring together national and international boundary-layer researchers and oceanographers to characterise the horizontal and vertical extension of the breezes. Among the planned activities are the installation of a WindCube LIDAR just at the shoreline, the launching of frequent radiosondes inland and at sea, the profiling of the atmosphere with tethered balloons, the use of drones with instrumentation to characterise the horizontal boundary-layer meteorology and turbulence contrasts between the land and the sea, or the use of marine instrumentation to monitor the sea surface conditions. The high amount of data expected to be gathered during the intensive observational periods will allow us to study how these phenomena form, evolve, and impact the meteorological conditions in coastal sites. The next step following the observational characterisation of the breezes will be the evaluation of high-resolution numerical models, to ultimately improve how these processes should be represented within them.