



Regional Climate Modelling of the Western Iberian Low-Level Wind Jet

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The Iberian coastal low-level jet (CLLJ) is one of the less studied boundary layer wind jet features in the Eastern Boundary Currents Systems (EBCS). These regions are amongst the most productive ocean ecosystems, where the atmosphere-land-ocean feedbacks, which include marine boundary layer clouds, coastal jets, upwelling and inland soil temperature and moisture, play an important role in defining the regional climate along the sub-tropical mid-latitude western coastal areas. Recently, the present climate western Iberian CLLJ properties were extensively described using a high resolution regional climate hindcast simulation. A summer maximum frequency of occurrence above 30% was found, with mean maximum wind speeds around 15 ms⁻¹, between 300 and 400m heights (at the jet core). Since the 1990s the climate change impact on the EBCS is being studied, nevertheless some lack of consensus still persists regarding the evolution of upwelling and other components of the climate system in these areas. However, recently some authors have shown that changes are to be expected concerning the timing, intensity and spatial homogeneity of coastal upwelling and of CLLJs, in response to future warming, especially at higher latitudes, namely in Iberia and the Canary Islands.

In this study, the first climate change assessment study regarding the Western Iberian CLLJ, using a high resolution (9km) regional climate simulation, is presented. The properties of this CLLJ are studied and compared using two 30 years simulations: one historical simulation for the 1971-2000 period, and another simulation for future climate, in agreement with the RCP8.5 scenario, for the 2071-2100 period. Robust and consistent changes are found: 1) the hourly frequency of occurrence of the CLLJ is expected to increase in summer along the western Iberian coast, from mean maximum values of around 35% to approximately 50%; 2) the relative increase of the CLLJ frequency of occurrence is higher in the north off western Iberia; 3) the occurrence of the CLLJ covers larger areas both latitudinal and longitudinal; 4) the CLLJ season is enlarged extending to May and September; and, 5) there are shifts for higher occurrences of higher wind speeds and for the jet core to occur at higher heights. Publication supported by project FCT UID/GEO/50019/2013 - Instituto Dom Luiz - University of Lisbon