Geophysical Research Abstracts
Vol. 15, EGU2013-13276, 2013
EGU General Assembly 2013

A Costal Low Level Jet Feature off the West Cost of the Iberian Peninsula

Pedro M.M. Soares (1), Alvaro Semedo (2,3), Rita Cardoso (1), Maria J. Chinita (1), and Raza Ranjha (4)

(1) Instituto Dom Luiz, University of Lisbon, Lisbon, Portugal (pmsoares@fc.ul.pt), (2) CINAV-Escola Naval, Lisbon, Portugal, (3) Department of Earth Sciences, Uppsala University, Sweden, (4) Department of Meteorology, Stockholm University, Sweden

A coastal jet is a low-tropospheric wind feature driven by the pressure gradient produced by a sharp contrast between high temperatures over land and lower temperatures over the sea. Although being a mesoscale feature coastal low level jets (CLLJ) have a larger scale synoptic pattern forcing behind them: a high pressure system and a thermal low in land. For this reason CLLJ potential regions coincide with cold western boundary currents in the mid-latitudes. In these areas, the contrast between the cold ocean and the warm land in the summer is intensified by the impact of the coastal winds on the ocean generating upwelling currents and sharpening the temperature gradient close to the coast, giving rise to strong baroclinic structures at the coast. Due to the persistent and strong low-level baroclinic structure between the cool ocean and the heated continent, the pressure gradient maximum is at the coast, decreasing both landward and seaward off the coastal boundary. Through thermal wind considerations, with an increasing equator-ward flow with decreasing altitude until balanced by surface friction, a low level wind maximum is generated.
CLLJ are characterized by a wind speed maximum (the jet core) at some hundreds of meters (of the order of 500 m), capped by the marine atmospheric boundary layer (MABL) top. The inversion of the vertical temperature profile, which constrains the jet core inside the MABL, is generated by a cooled surface air temperature due to the effect of cool sea surface temperature and by warmer air temperature aloft due to subsiding air in the west flank of the high pressure system aloft.
During the summertime the Iberian Peninsula is under the effect of the Azores High and of a thermal low pressure system inland, giving rise to a seasonal wind called the Nortada (northerly wind), a CLLJ. Recently, a global climatology of CLLJ using the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA-Interim reanalysis (Dee et al. 2011) was proposed. In spite of the coarse resolution of the reanalysis data (1ºx1º) this was the only product that offered a global coherent data set that allowed a global climatology of CLLJ. Regional dedicated studies from downscaled modeled data should therefore be pursuit in each of the CLLJs regions for a more thorough and complete view of each of the jets climatology.
CLLJ play an important role in the regional climate along the coastal areas along the cold western boundary currents, and a more thorough knowledge of their dynamics and climate should be pursuit. This study presents a climatology of the CLLJ off the west coast of the Iberian Peninsula, based on high resolution (9 km) dynamically downscalled data produced using the WRF mesoscale model, forced by 20 years of ERA-Interim reanalysis (1989-2008).