EMS Annual Meeting Abstracts
Vol. 13, EMS2016-553, 2016
16th EMS / 11th ECAC

On the evaluation of the ability of different Reanalyses in representing Coastal Low-Level Jets

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Reanalyses provide us a description about the recent climate, since they are built by combining forecast models with observations through data assimilation. This resource is very important in the atmospheric studies, such as coastal low-level jets (CLLJs). Along the Eastern Boundary Currents Systems (EBCS), coastal jets play an important role in defining regional climate. Coastal jets are coastal parallel winds features within the first 1000 m above sea level, where the maximum of the wind speed is found. CLLJs occur in the eastern side of the semi-permanent subtropical mid-latitude high pressure systems, with one exception in the Arabian Sea. Due to the intense heating over land, a thermal low develops inland. The thermal low and the high-pressure systems over the ocean are the main synoptic forcing of the CLLJs, which results in winds parallel to the coast. In the CLLJs regions, the coastal winds over the ocean generate upwelling currents due to offshore Ekman transport. This brings deep cold water to the surface, sharpening the temperature and pressure gradient close to the coast, and leading to a local increase of the wind speed and a decrease of the sea surface temperature (SST). Coastal jets are driven by a pressure gradient produced by a sharp contrast between high temperatures over land and lower temperatures over the sea.
Recently, a global climatology of global CLLJs was developed based on the European Centre for Medium-Range Weather Forecasts (ECMWF) Interim Reanalysis (ERA-Interim). In the present study, the ability of four different reanalyzes in representing CLLJs and their main properties will be presented for the period 1979-2010. The four reanalyses used in this study are the ERA-Interim Reanalysis, the Japanese 55-year Reanalysis (JRA-55), the National Center for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) and the National Aeronautics and Space Administration (NASA) Modern Era Retrospective-Reanalysis for Research and Applications (MERRA).