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Evaluation of WRF and BRAMS for one way downscaling of surface air temperature in Portugal

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Periods of hot and cold days (heatwaves and cold spells) have major consequences for agroforestry production and public health. The sustainable development of society and socioeconomic sectors requires the continuous monitoring and prediction of temperature with high spatiotemporal resolution as well as warning systems of the occurrence of extreme events. To respond to this necessity and implement operational weather and climate web services to serve the interests of the agroforestry production chain and the general public, we have evaluated and compared the performance of two atmospheric mesoscale models: WRF ARW and BRAMS. Surface air temperature for consecutive periods of 3 days during the month of January and July 2016 with two different parameterizations sets in WRF and one in BRAMS, was simulated. This set of parametrizations differ between then, on the schemes for planetary boundary and surface layers, long- and short-wave radiation, and cumulus. The simulation periods were selected since various weather situations occurred during these months. Daily and hourly temperature forecasts were compared with official data observed in the weather station network of the Portuguese Meteorological Service (Instituto Português do Mar e da Atmosfera) using different statistical measures. The simulations ran in a one-way dynamical nesting domains cover Peninsula-Iberian with 27 km resolution and Portugal with 9 km resolution grid. The model was initialized and forced at the upper boundaries, by 0.25º NOAA Global Forecast System forecasts and 0.5º sea surface temperature fields, and by 0.25º ERA-Interim ECMWF reanalyzes. The results of calibration depend on the station point chosen location, namely near the coast result from some land/sea interaction mechanisms (like influences of sea/land breezes) and topography difference from grid model (1 sec resolution). Validation results show that both models present high performance and are able to support land management strategies to get the best practices to preclude loss of agricultural and forestry production.

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