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# Effects Of Different Model Lower Boundary Conditions In The Simulation Of An Orographic Precipitation Extreme Event

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Topography and land-use force atmospheric flow dynamics, precipitation patterns and change atmospheric water vapour concentration. Understanding the influence of different topography and land-use datasets in modelled precipitation and wind flow is highly important. Several projects have treated raw satellite imagery, namely the Shuttle Radar and Topography Mission (SRTM), ASTER Global Digital Elevation Model (ASTER) and the Coordination of Information on the Environment Land Cover (CORINE). This updated Earth surface information can be included in numerical atmospheric models providing a more detailed lower boundary. This study evaluates the effect of lower boundary specification on an extreme precipitation event which occurred in the morning of the $20^{th}$ of February 2010 over the Madeira Island accounting for 42 deaths and over 100 injured. Five simulations where performed using the Weather Research and Forecast model with three different high resolution datasets (previously mentioned), two topographic datasets and one land-use, as well as with the two respective default WRF lower boundaries. 24 hours were simulated, starting at 00H00 UTC February $20^{th}$, 2010. Results show that the model simulates better the wind flow, for Madeira's mountainous region for all simulations, when using these lower boundary conditions. Furthermore, it was observed that in general, SRTM and ASTER datasets produce better results for this atmospheric property. Nonetheless, a small enhancement of model skill can be achieved for the leeward region when SRTM topography dataset is used. For precipitation the opposite result was observed and there is high model skill when simulating precipitation for altitudes lower than 800 m. In addition, an improvement of the precipitation model skill on the windward region was observed when using the SRTM topography dataset. Given the obtained results, one can conclude that the use of high resolution lower boundary datasets in WRF model improve the model skill for this particular orographic precipitation event.