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# Impact of the extratropical storm Delta over the Canary Islands on 28-30 November 2005: severe windstorm event

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On 28-29 November an extratropical storm affected Canary Islands causing significant damage related to high sustained wind and intense gusts over some islands of the archipelago. Delta was the twenty-sixth tropical or subtropical storm of the 2005 Atlantic hurricane season. It represents an unusual meteorological phenomena for that region, and its impacts where underestimated by the different meteorological forecasts (ECMWF and HIRLAM) during the previous days of the arrival of the low near Canary Islands.

The aim of this study is to describe the local effects of the flow that were observed over Canary Islands during the travel of the Delta storm near the region using high-resolution mesoscale meteorological simulations. The role of the complex topography of the Canary Islands will be discussed with an experimental simulation without the topography of the islands. The Advanced Research Weather Research & Forecasting Model (WRF-ARW) is applied at 9, 3 and 1 km horizontal resolution using ECMWF analysis.

The high-resolution simulation will outline the main features that contribute to the high wind speeds observed in the archipelago. La Palma, which is a very steep island, and Tenerife, the largest island (1929 $km^2$) with the highest peak (3718 m a.s.l.) of Spain (Teide volcano), were the most affected. Variations in vertical static stability, vertical windshear and the intense synoptic winds of the southwestern part of Delta

were the main characteristics that contributed to the development and amplification of intense gravity waves while the large-scale flow interacts with the complex topography of the islands. Furthermore, intense downslope windstorms developed in different zones of Tenerife and La Palma reaching winds speeds above 30-40 m/s at ground surface levels. The model results show the development of intense trapped lee waves leedward La Palma, and an amplification of a gravity wave leeward Tenerife with an hydraulic jump behavior. Finally, the experimental simulation without topography will demonstrate that the intense synoptic winds associated with the Delta storm are not able to induce extreme winds over the Canaries if the complex topography of the islands is not well resolved. Furthermore, if the horizontal resolution is decreased, the mountain wave activity loses, even though the mountain-top winds present no major differences. Thus, the horizontal resolution of the mesoscale models needs to be at least around 3 km to develop the details of the vertical waves. Simulations performed with the WRF-ARW model without the Canary Islands topography or with a low horizontal resolution provide a significant wind speed underestimation, similar to that obtained with the hydrostatic operational ECMWF and Hirlam models.