



## **The 20 February 2010 Madeira flash flood**

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On February 20, 2010, Madeira Island was struck by a violent rain storm, which led to a major flash flood leading to more than 50 casualties and an estimated property loss above 1G€. The storm was not well forecasted by the Institute of Meteorology, based on the global ECMWF forecast. However, the operational forecasts made by our group at the University of Lisbon, with MM5 and WRF at 2 km resolution, consistently indicated heavy precipitation for that day, starting on the 72h from 18 February at 00 UTC, and including all intermediate forecasts, issued every 12h, until the day of the event. At the same time, many important details of the forecasts, concerning in particular the timing of precipitation in low level stations, have discrepancies with observations.

In the present study we analyze not only the quality of the high resolution forecasts of the rain storm, with the two models at different resolutions, but also review the MM5 model performance in all forecasts from 2006 to 2010, where other important orographic precipitation events have occurred, but no flash flood was triggered. The analysis emphasizes the relative importance of the state of the terrain, due to accumulated precipitation in days and weeks before a major rain storm, in the occurrence of flash floods.