ALADIN - Technical and Scientific Portuguese Activities

à frente do nosso tempo

1. Summary of main activities

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Main focus has been targeted towards high resolution models. ALARO is being integrated at 5 km resolution for Madeira archipelago and AROME at 2.5 km resolution for Madeira archipelago and for the mainland. Since last Workshop, our operational model has been upgraded to cycle 35t1. Verification is in a continuous development process, to which new parameters have been included (cloud cover and 10m wind gusts). Verification using fuzzy methods has been introduced to assess the performance of high resolution forecasts and it is in the process of validation.

2. ALADIN/Portugal

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2.1 Present status

No major changes were made in ALADIN/Portugal system during the last year. The only operational change was a version upgrade to cycle 35t1 in October 2009. Tests with AROME forecasts for two domains, Portugal mainland and Madeira archipelago, as well as ALARO forecasts for Madeira archipelago are being conducted.

2.2 Foreseen activities

Testing ALARO at 5km resolution for Portugal mainland should start soon. Besides that AROME is scheduled to assume an operational status by the end of the year and we will continue to plan the implementation of data assimilation procedures for ALADIN.

2.3 Operational version

<u>Computer characteristics</u>

IBM P5-575 with 10 nodes, each node with 8 Power 5+ dual-core processors running at 1.9 GHz and 32 GB RAM of memory. The operating system is AIX 5.3. The execution of the model is done with 4 nodes, 32 dual-core processors, 64 tasks with Open Multi-Processing and Simultaneous Multi-Threading activated.

<u>Model characteristics</u>

ALADIN/Portugal is run in a spectral hydrostatic version, with hybrid vertical co-ordinates, digital filtering initialisation, semi-implicit semi-lagrangian two-time-level advection scheme and ISBA surface parameterisation scheme. Integration domain has a size of 439x277 points, with 46 vertical levels, 9 km horizontal resolution and time step of 360 s. It is run twice a day for 48 hours forecast range, coupling every 3 hours with ARPEGE and making post-processing every hour.

3. Higher resolution models: ALARO 5 km, AROME 2.5 km

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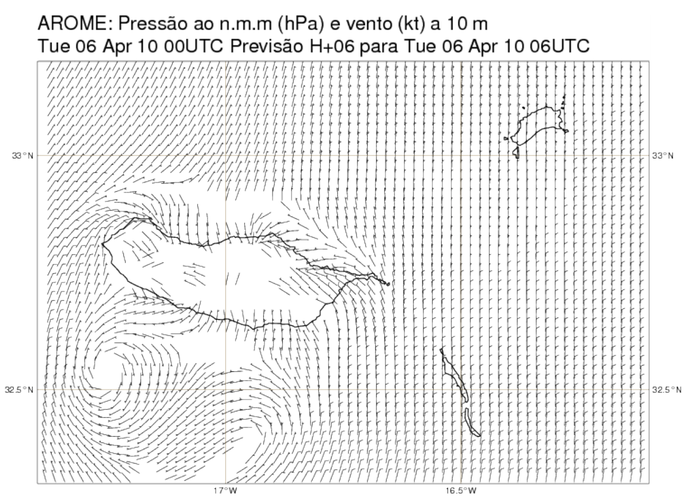
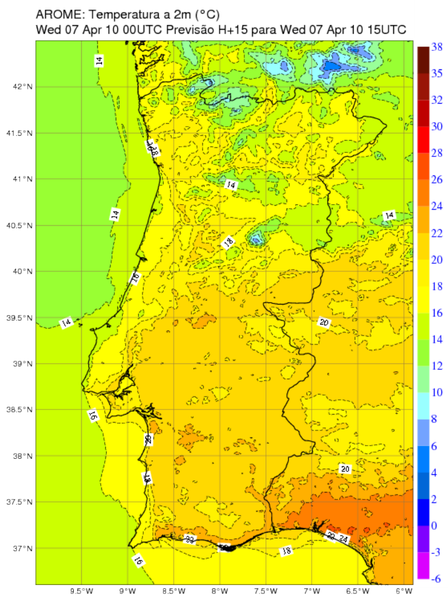
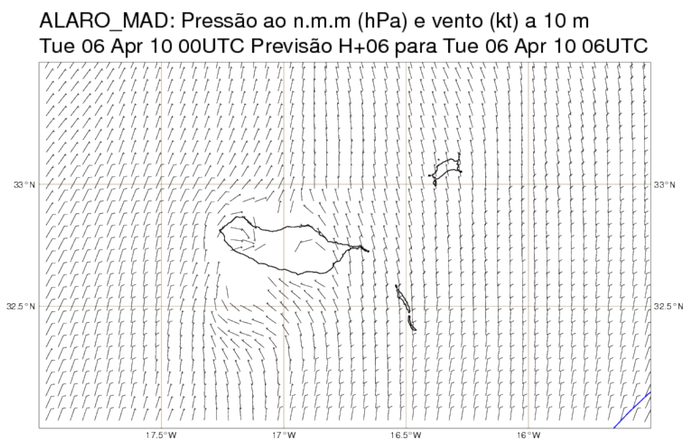
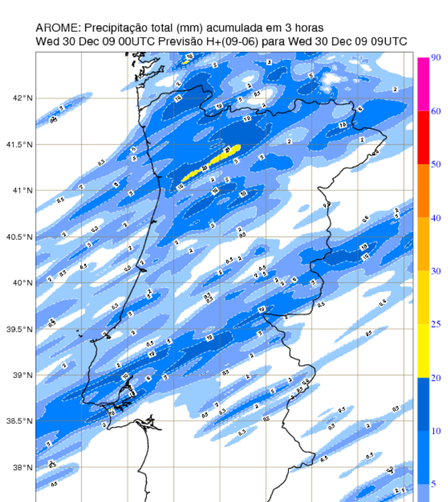
Test runs with AROME at 2.5 km resolution for two domains, one for the Portugal mainland and another for the Madeira archipelago, and with ALARO at 5 km resolution for a domain of the Madeira archipelago have started. Relevant fields to forecasters at these resolutions and the best way to present the information are under evaluation.









4. Verification: models performance in the Madeira flood event

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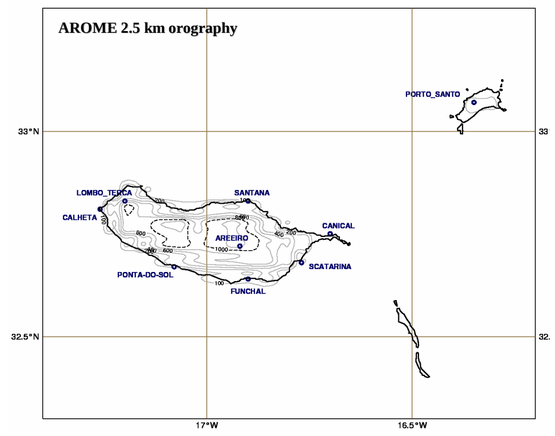
On the 20th February of 2010, the Madeira archipelago suffered the efects of a frontal surface with strong activity, resulting in heavy precipitation, mainly over the southern part of the Madeira island. This front had its origins in lower latitudes, being driven by a tropical maritime airmass with very high content of precipitable water. The orography of the island played an important role in the outcome of the event, triggering heavy precipitation that caused flash floods. This event had a catastrophic impact on the island with the loss of 42 lives and a major destruction of properties and infrastructures, including bridges and roads.

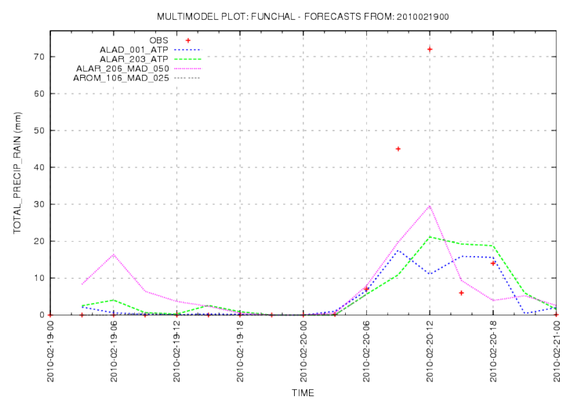


According to the observations, the areas in the west and south of the island as well as the mountain areas were the most affected. During that day, 387 mm were recorded in Areeiro and 144 mm in Funchal. The precipitation was very heavy between 09 UTC and 15 UTC, with data records showing more than 204 mm in Areeiro and 72 mm in Funchal. Hourly records for Funchal reached 51 mm/h.

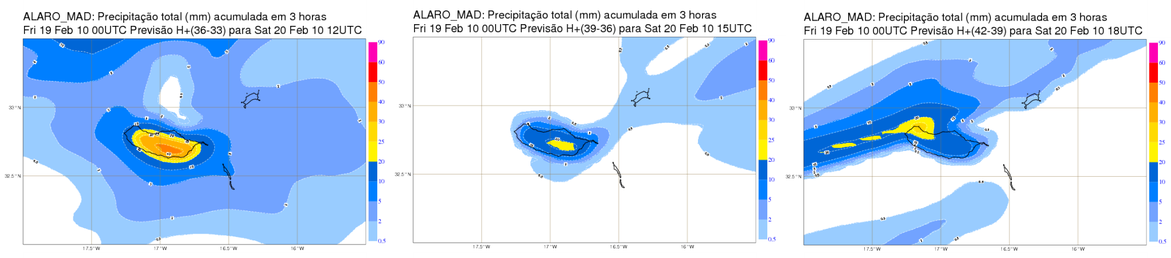
A brief subjective verification of the models performance is shown, based only on the precipitation forecasts. Operationaly, only two models were available for forecasting the event: the IFS model, which at 25 km resolution does not "*see*" the existence of the island, and ALADIN at 9 km resolution. None of them were able to forecast correctly the event.

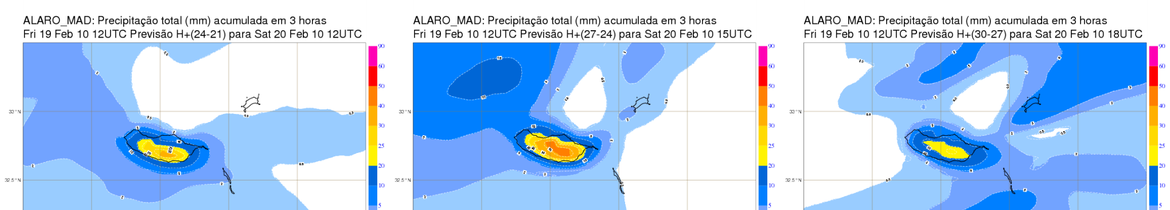
Forecasts of ALARO at 5km resolution and AROME at 2.5 km resolution were also assessed. Even though both models underestimated the observed precipitiation, their forecasts were closest to the observations, providing useful guidance to the forecast center.

Accumulated 3-hour precipitation forecasts of LAM models are shown below for two observation sites: Areeiro (1510m) and Funchal (62m). At the bottom, precipitation fields of ALARO-5km and AROME-2.5km are shown for the period 09UTC to 18UTC.

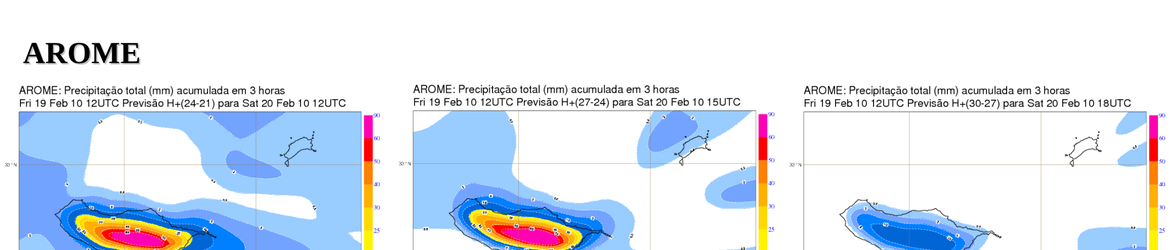


ALARO 5km





AROME



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