SNOWFALL EVENT IN SOUTH PORTUGAL

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1. Introduction

The goal of this work is to evaluate the performance of ALADIN in a snow event over Portugal, which occurred on the 29 of January 2006. In particular, we intend to compare the performance of the operational ALADIN (OPER), which uses cycle AL12_CYCORA_bis, with a new configuration, called AL28. This last configuration uses the cycle 28T3, a climatology created using the cycle 29 and a GTOPT030 database. Moreover, the integration domain used for AL28 is slightly enlarged, mainly to the West (by 3°).

Figure 1 illustrates the evolution of the depression, which caused heavy snowfall in the southern part of Continental Portugal. Figure 2 presents the MSLP and 10m wind forecasted by AL28 valid at 12UTC, which shows a shift to the southeast of the core of the depression.

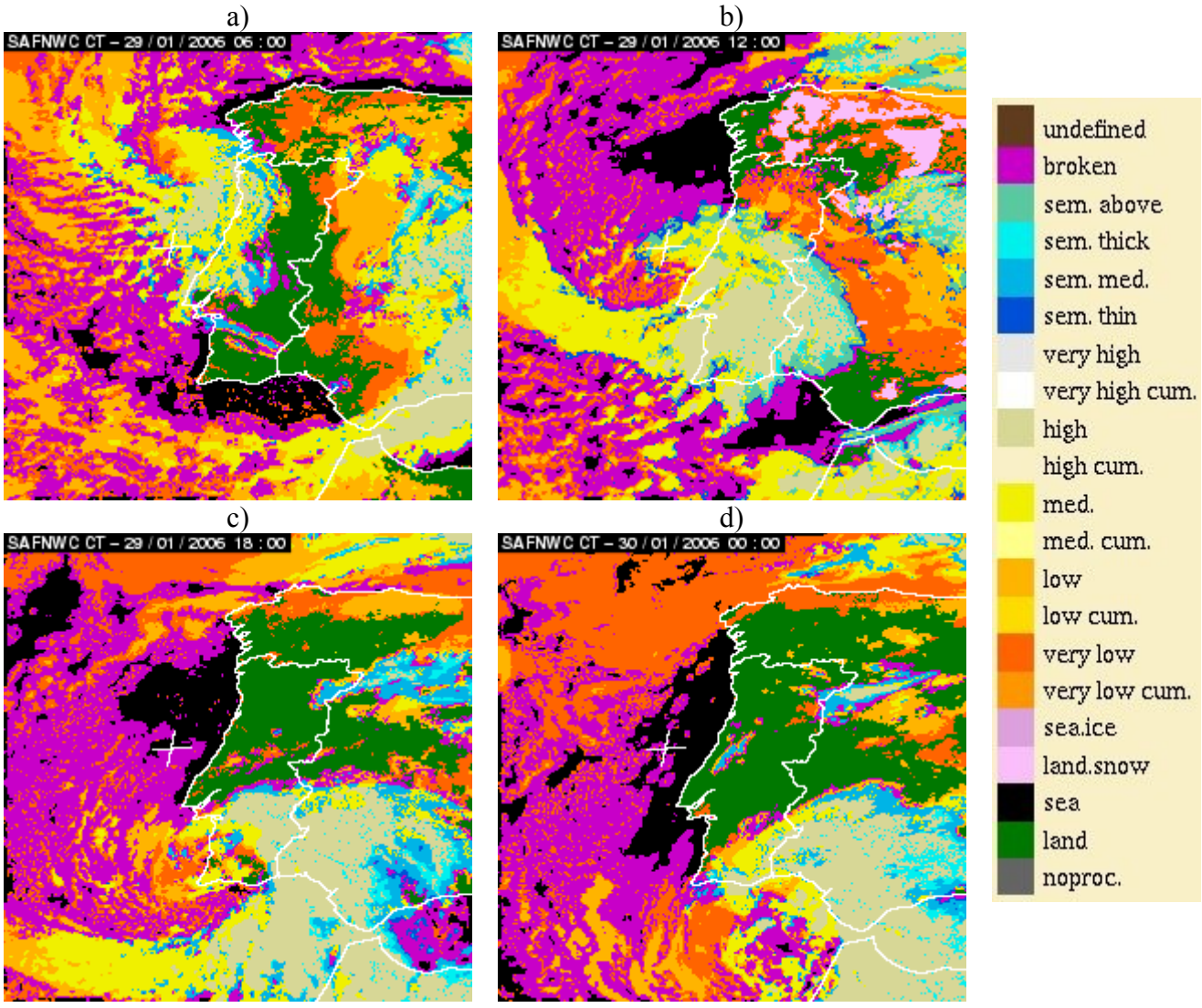

Figure 1 – Cloud type from MSG for 29 January 2006.

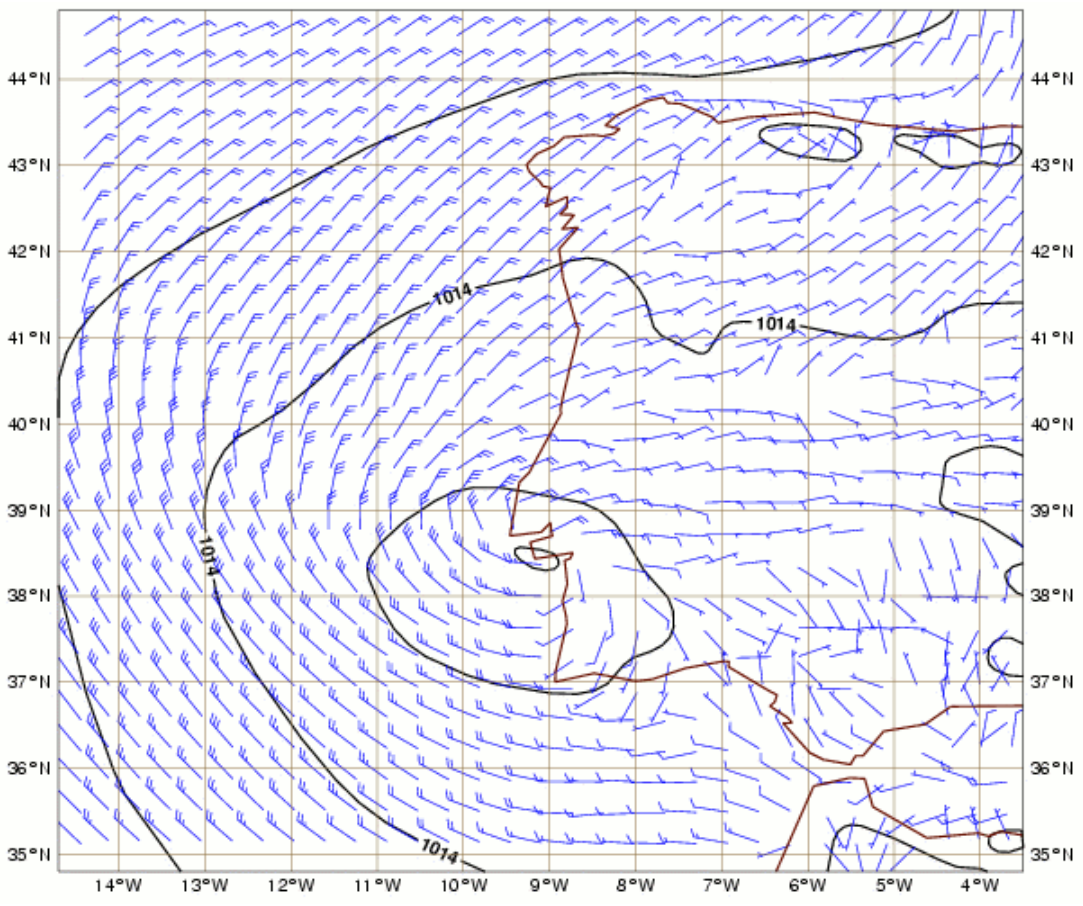

Figure 2 - Mean sea level pressure (hPa) and wind (kt) valid at 12UTC of 29/01/2006, forecasted by the AL28 from the 00UTC run.

2. Comparison between OPER and AL28 configurations

Figures 3 and 4 show the comparison between the 2m temperature observed and forecasted by the two ALADIN configurations, respectively, from the 12UTC (H+24) and 00UTC (H+12) runs. The OPER cycle from 12UTC run forecasts a local minimum in Algarve, while AL28 places it in the region of Lisbon and Alto Alentejo, which agrees better with observations. Nevertheless, it is visible that this local minimum is shifted to the south relatively to the observations, which is consistent with the forecasted position of the low.

The OPER run from 00UTC forecasts better the position of the local minimum in Alto Alentejo, than the 12UTC run, even though it presents a strong cold bias. On other hand, in this region, the AL28 configuration forecasts temperatures between 0 and 2°C, which is more in accordance with observation.

Figures 5 and 6 presents the 2m relative humidity observed and forecasted by the two ALADIN configurations, respectively, from the12UTC (H+24) and 00UTC (H+12) runs. One can see that in both runs the AL28 seems to outperform the OPER configuration, in particular, in the south and center regions.

Figures 7 and 8 compares the 24h accumulated precipitation observed and forecasted by the two ALADIN configurations, respectively, from the12UTC (H+24) and 00UTC (H+12) runs. Even though the 00UTC run is slightly better than the 12UTC run, both configurations forecast reasonably the area and amount of precipitation. Nevertheless, AL28 appears to agree better with observations, since the area of maximum precipitation is realistically shifted to the north.

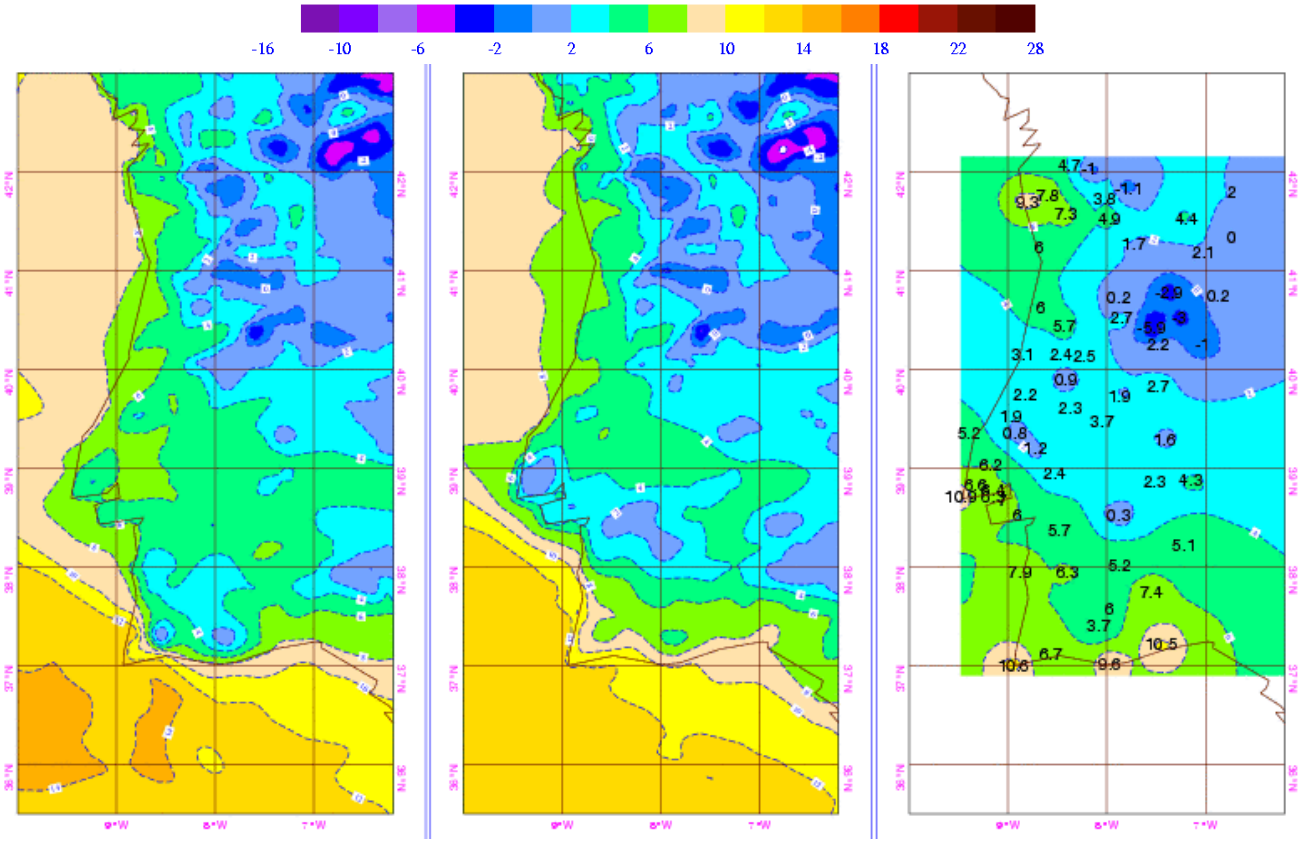

Figure 3 – Temperature at 2m (°C) valid at 12UTC of 29/01/2006, forecasted by operational ALADIN (left) and using AL28 (middle), from the 12UTC run of 28/01/2006. Observations in the right panel.

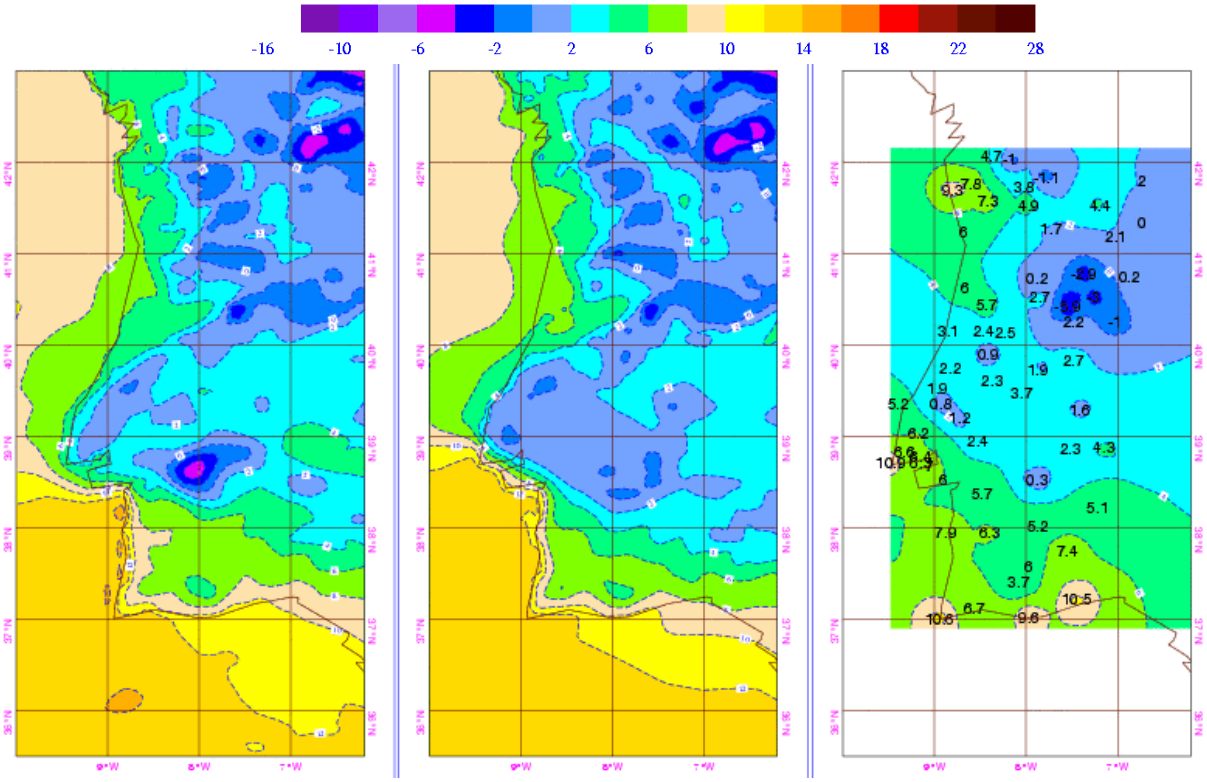

Figure 4– Temperature at 2m (°C) valid at 12UTC of 29/01/2006, forecasted by operational ALADIN (left) and using AL28 (middle), from the 00UTC run. Observations in the right panel.

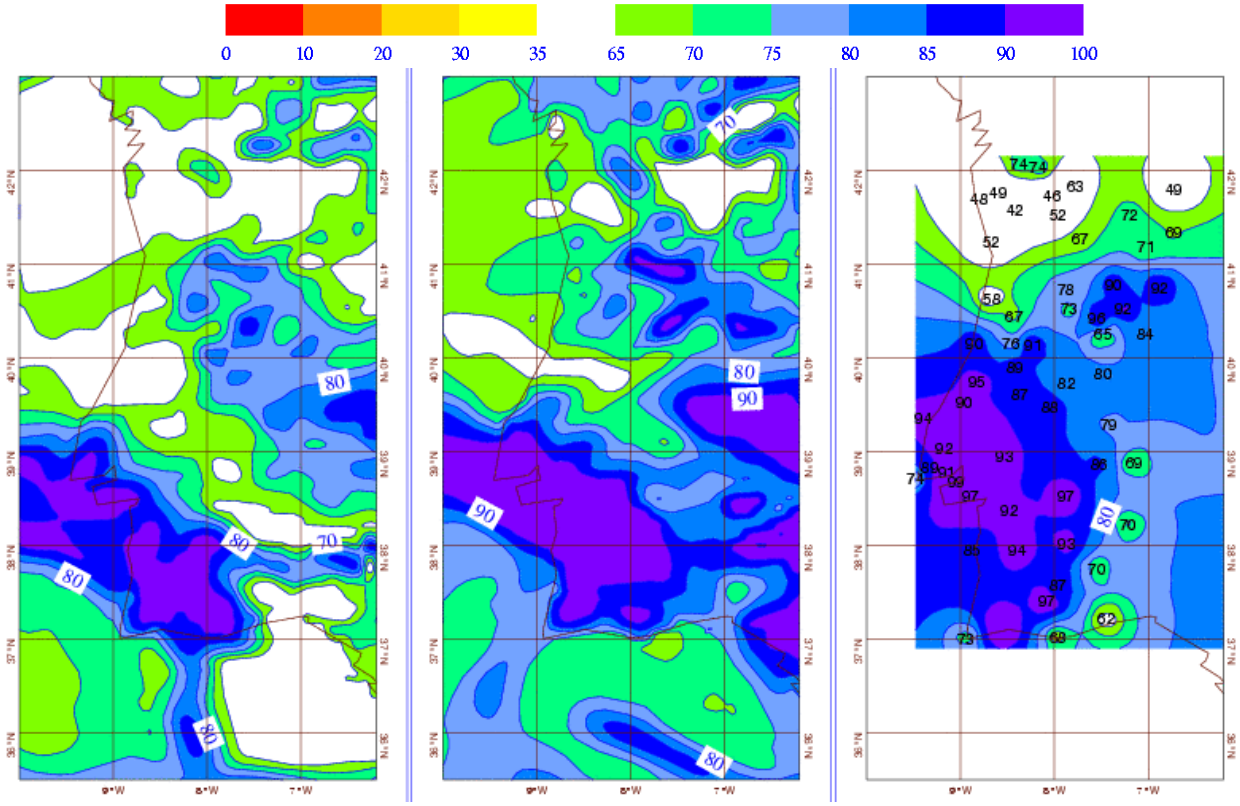

Figure 5 – Relative humidity at 2m (%) valid at 12UTC of 29/01/2006, forecasted by operational ALADIN (left) and using AL28 (middle), from the 12UTC run of 28/01/2006. Observations in the right panel.

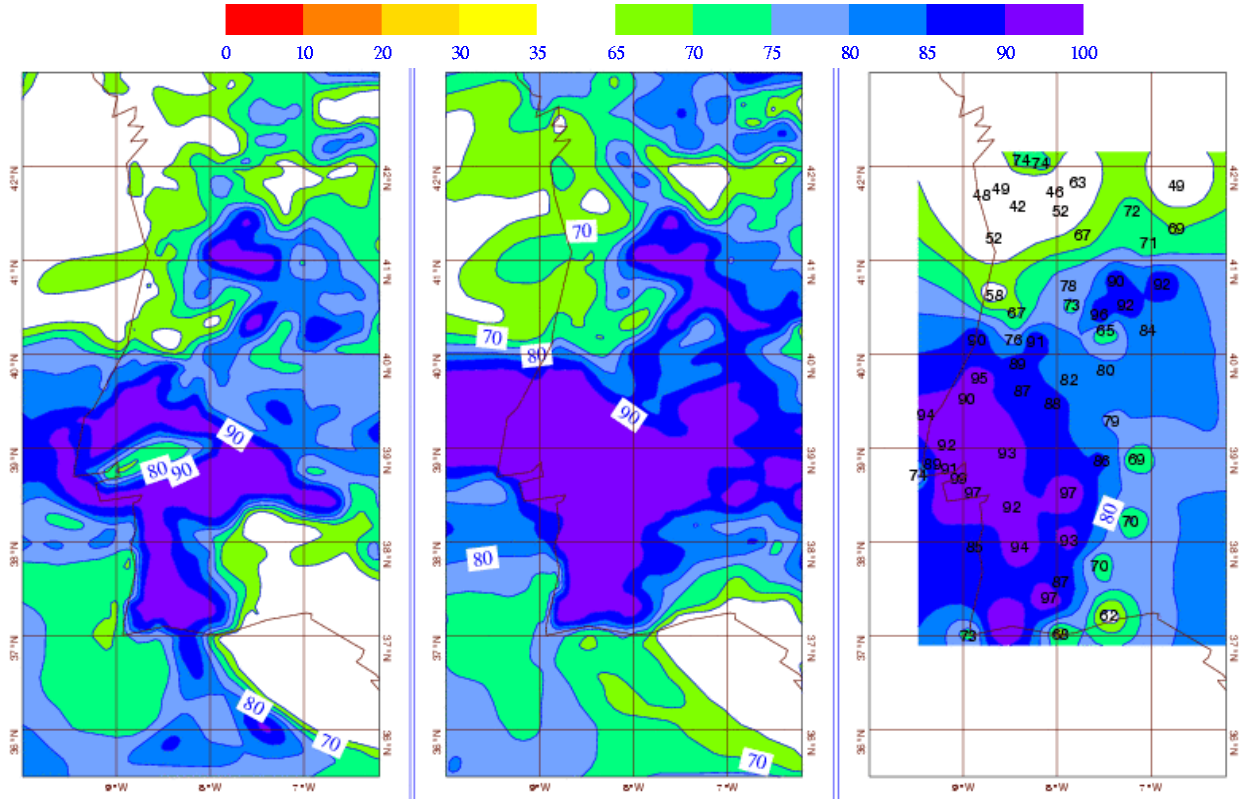

Figure 6 – Relative humidity at 2m (%) valid at 12UTC of 29/01/2006, forecasted by operational ALADIN (left) and using AL28 (middle), from the 00UTC run. Observations in the right panel.

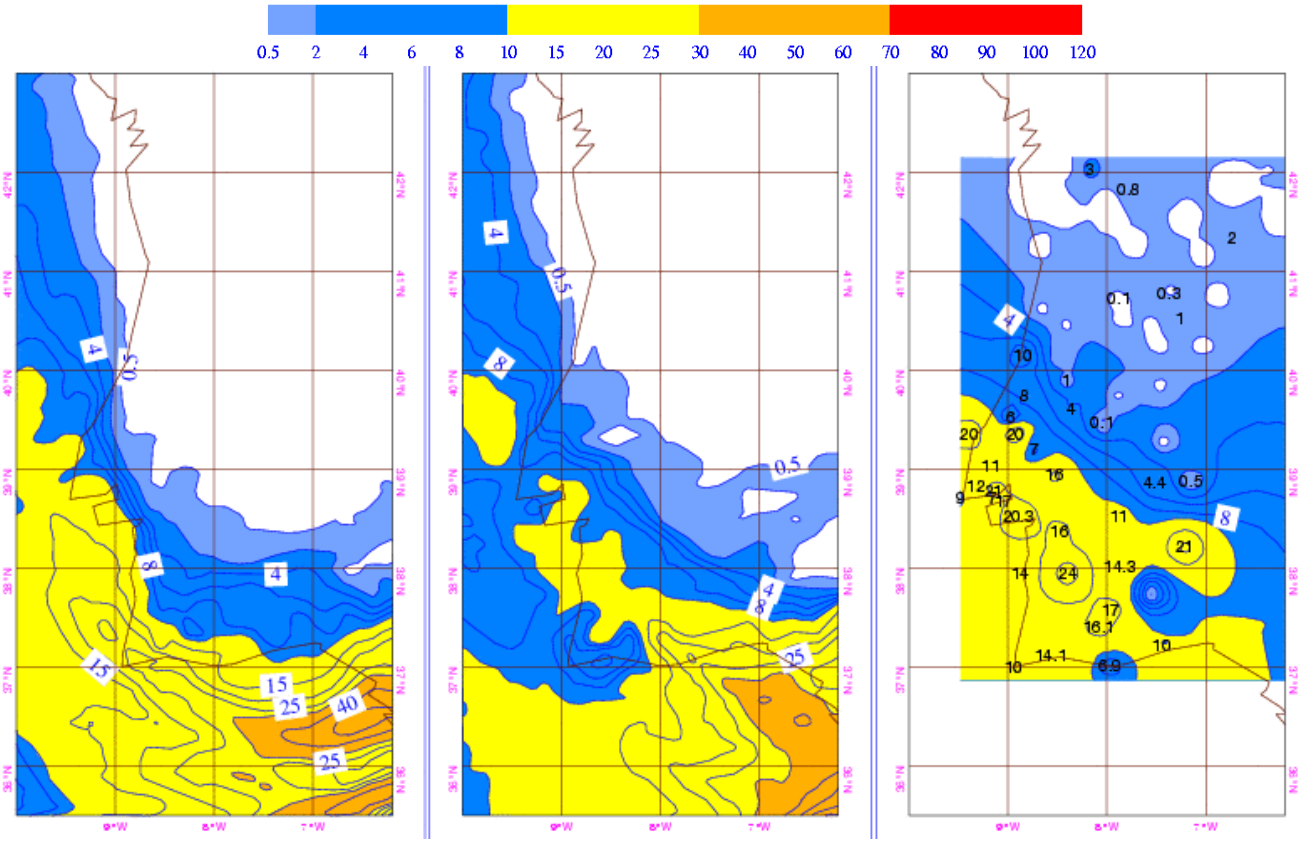

Figure 7 Accumulated precipitation (mm) in 24 h (between 00 and 24UTC of 29/01/2006), forecasted by operational ALADIN (left) and using AL28 (middle), from the 12UTC run of 28/01/2006. Observations in the right panel.

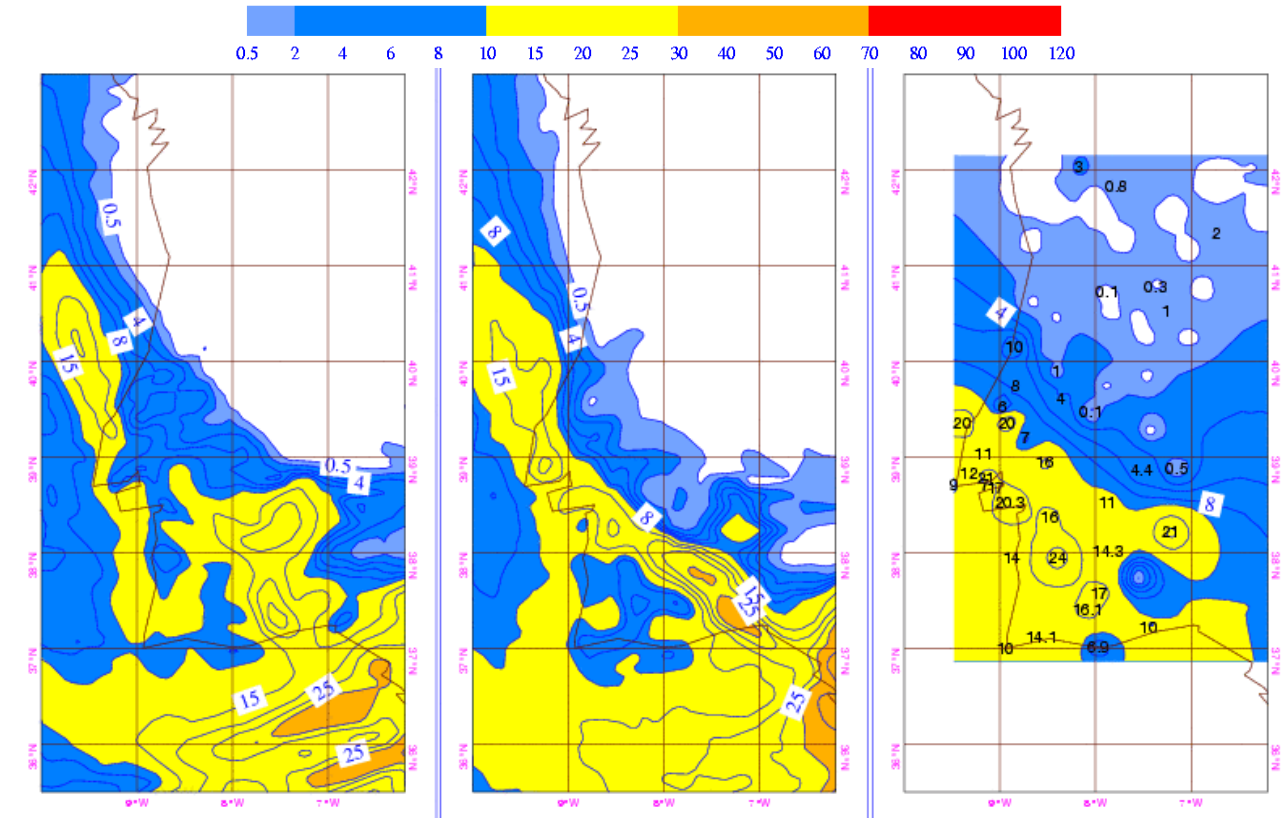

Figure 8 Accumulated precipitation (mm) in 24 h (between 00 and 24UTC of 29/01/2006), forecasted by operational ALADIN (left) and using AL28 (middle), from the 00UTC run. Observations in the right panel.

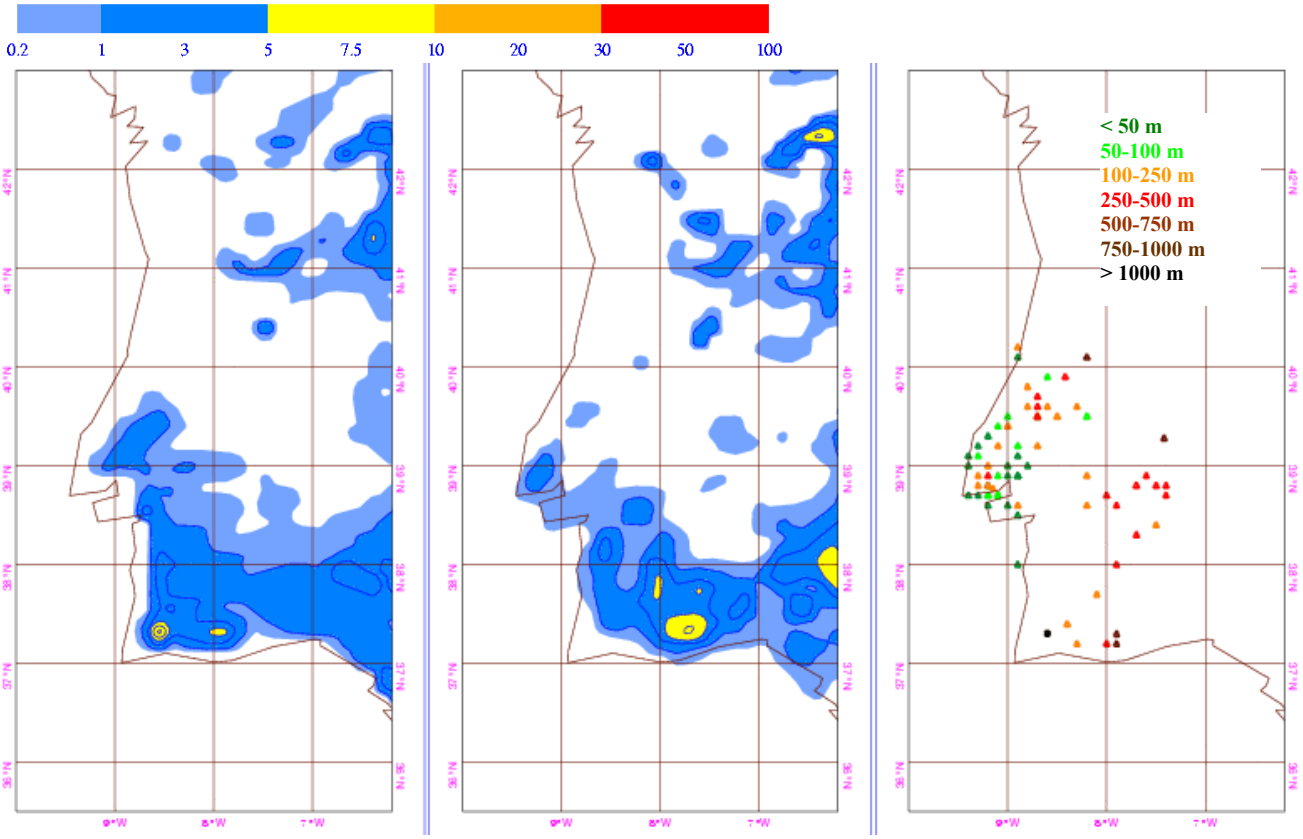

Figure 9 - Accumulated snowfall (cm) in 24 h (between 00 and 24UTC of 29/01/2006), forecasted by operational ALADIN (left) and using AL28 (middle), from the 12UTC run of 28/01/2006. The right panel shows the height of locations where snowfall was observed.

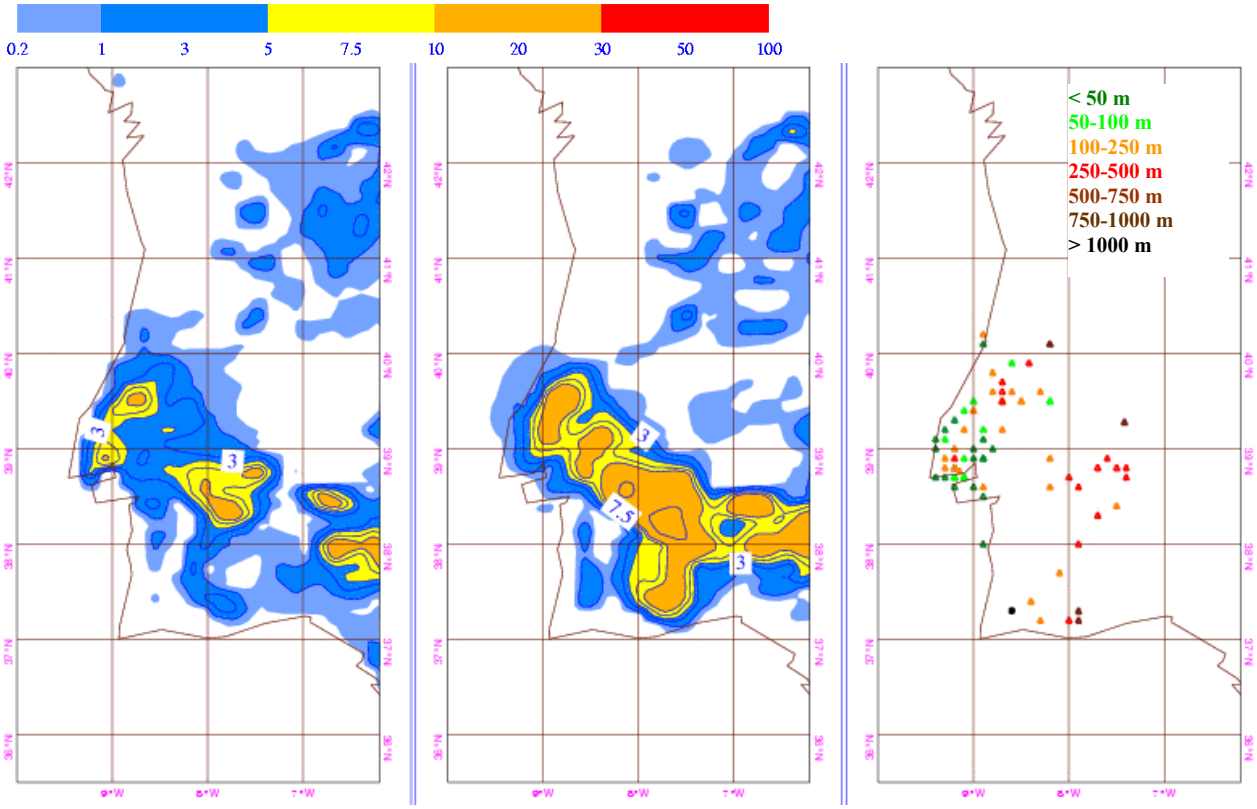

Figure 10 Accumulated snowfall (cm) in 24 h (between 00 and 24UTC of 29/01/2006), forecasted by operational ALADIN (left) and using AL28 (middle), from the 00UTC run. The right panel shows the height of locations where snowfall was observed.

Figures 9 and 10 show the comparison between the 24h accumulated snowfall forecasted by the two ALADIN configurations, respectively, from the12UTC (H+24) and 00UTC (H+12) runs. The height of the locations where snowfall was observed is also presented in these figures. One can see that ALADIN was able to alert to the occurrence of significant snowfall in uncommon areas, mainly in the 00UTC run. In particular, ALADIN forecasted snowfall in coastal areas in center of Portugal and in Southern regions, in locations with low altitude, where the occurrence of snowfall was reported. However, due to the lack of snowfall data it is not possible to validate the snowfall amount.

3. Conclusions and perspectives

In this particular case, AL28 outperformed the operational ALADIN configuration. In near future we intend to study subjectively the performance of both systems in other extreme weather events and also to make an objective verification.