

# Review of „AROME-WMD, a real-time mesoscale model designed for the HyMeX Special Observation Periods“

by

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## Overall comment:

This paper describes the skill and performance of the AROME-WMED model in predicting heavy precipitation events in the north-western Mediterranean and compares the results with forecasts of the operational AROME-France model using data of two spatial observation periods. AROME-WMED is based on AROME-France and was used to support instrument deployment in the two field campaigns using an adjusted model domain. AROME-WMED is the first research version of the AROME model with its own data assimilation system that was run operational for a long period.

Generally the paper is well written but can be improved by being more precise at some places (see detailed comments). Since lots of acronyms are used within the paper and not all of them have been defined before their first occurrence a list of acronyms would be useful. Since no error analysis of the observational data is discussed within this paper it should be mentioned somewhere in the text that the observations are assumed to represent the truth.

## Detailed comments:

1. Within this work the standard deviation ( $\sigma$ ) is used as a measure for the forecast errors. However, it is more common to use the root mean square error (rmse) which is the same as the standard deviation in the case there is no bias; usually rmse is larger than  $\sigma$ . Why was  $\sigma$  used instead of rmse?
2. In line 16 of the abstract it is stated that “The overall performance of AROME-WMED is good....”. What does “good” mean? Same for “...similar to...” (line 16) and “... less accurate ...” (line 18). It would be useful to state some hard numbers here.
3. P 1803, line 29: “A specific...”. This sentence is unclear and should be rephrased.
4. P 1804, line 22: This sentence (...In Sect. 3, the...) is unclear and should be reformulated.
5. P 1805, line 2: Since different domains and grid points are used it might be useful to mention that both models have a 2.5 km grid. This is only mentioned for AROME-France.
6. P 1807, line 24: “...over a long period.” Could this be more precise?
7. P 1809, last paragraph: “EUCOS”, “BLBPs” have not been defined before. Same for “IASIA” on p 1810, line 24. All acronyms should be checked for explanation before first occurrence and, as mentioned above, a list of acronyms should be included.
8. P 1811, line 25ff: It is stated that a code change has been performed during SOP1. Did this affect the results in a noticeable way? Was some verification done to show that this change in code does not affect the results? One or two sentences for clarification would be useful (either in this paragraph or in the Concluding Remarks on p 1823 where this issue is also addressed in line 18).
9. P 1817, line 10: However, missing data do not occur...”. This sentence is not clear. Does this mean that there is no day with missing data at all stations? Maybe this can be formulated more clearly.

10. P 1819, line 10: Looking at Figure 16 the maximum of FBIAS is 1.8 (1.3 is stated). How is the rapid increase in FBIAS at higher thresholds in Fig 16 explained when compared with the decrease of FBIAS at high thresholds shown in Fig 10?
11. P 1823, line 2ff: One sentence explaining the reason why AROME-France gives better results in terms of temperature, humidity, wind and precipitation for SOP2 should be included (in this paragraph or in paragraph 4, "Forecast evaluation during the second Special Observation Period").

#### **Textual comments:**

1. P 1803, line 20: "...of Mediterranean Sea..." should be "...of the Mediterranean Sea..."
2. P 1808, line 20: Is "estimation of the estimation of the error..." correct?
3. P 1814, line 10: "Rainaud et al. (2014)" should be "... (2015)" as in the list of references.
4. P 1822, line 22: "Once the field campaign over" should be "Once the field campaign was over"
5. P 1824, line 18: Better "Frequency BIAS (FBIAS) and Equitable Threat Score (ETS) ..."
6. P 1829, line 18: "*Murphy, A. H.: A new vector partition of the probability score, J. Appl. Meteorol., 12, 595–600, 1973.*" listed in the reference list is not mentioned within the paper. Remove or include reference somewhere in the text.

#### **Figures & Figure captions:**

1. P 1834, Figure 3: Use "(lower panel)" instead of "(left panel)".
2. P 1842, Figure 11: There are no stars in this figure. The figure caption should mention this in a way (e.g. by adding "No differences are statistical significant at the 90% level in this case").
3. Some of the figures are very small and details are hard to see (especially Figures 6, 7, and 8) while others are quite large but only have little detail (especially Figures 11, 13, 14, 17 and 18). It should be checked if these figures could be resized.