Reviewer #1

#RC1.1 Overall, I believe that the manuscript contains relevant and interesting content that deserves to be published. Furthermore, it is well written and understandable. I recommend publishing it after the authors have kindly considered the few aspects that I would recommend improving.

We thank the reviewer for this positive feedback.

#RC1.2 The only general aspect I would recommend improving is in the Results and Discussion sections. The results are explained with so many values and details that the reader runs the risk of losing the overview. This is tried to be remedied in the Discussion and Conclusion. Neverthelss, I would try to take better care and add, after or before each section explaining much details, a sentence summarising and explaining the highlights and the general picture. Sometimes the authors have already summarised the results, but if this could be improved a little more I think it would help the reader a lot.

Thank you for this recommendation. This is a good suggestion and we will add key messages wherever it is necessary.

#RC1.3 Affiliation after the author list: wrong space at the beginning "3 Univ. Grenoble Alpes, CNRS, IRD, Grenoble INP, Grenoble, France"

Thank you for noticing this wrong space, this will be corrected.

#RC1.4 L104: please reformulate this sentence better introducing “Italy phenomenon”

Thank you for this comment. We agree that the sentence was unclear. We propose to replace it with the following sentence:

“In winter, easterly weather fronts coming from the Italian Alps (Garavaglia et al., 2010) can bring large amounts of precipitation in the most Easterly regions of the French Alps.Generally, these meteorological events do not reach the foothills of the French Alps.”

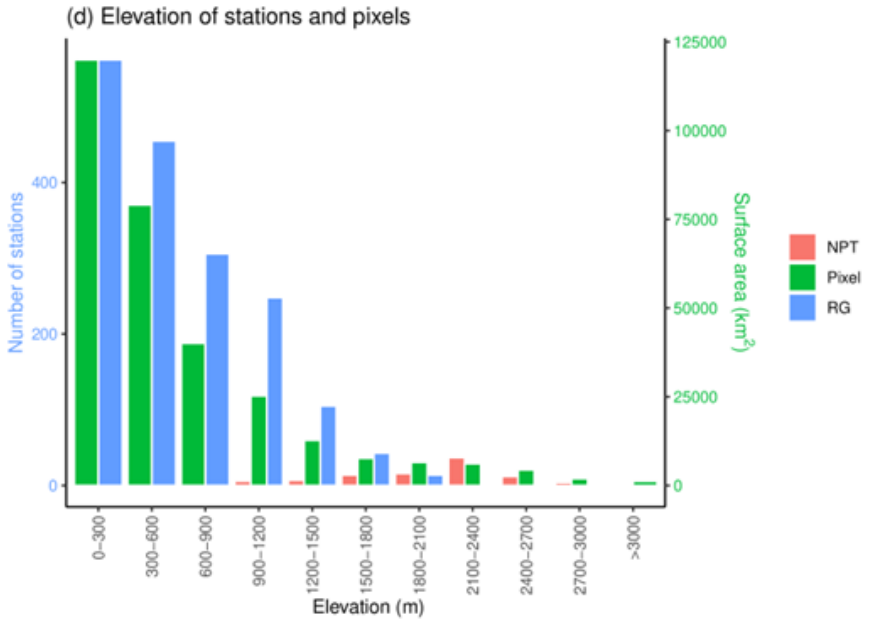
#RC1.5 L120: I got stuck on the word massif, then realised that in the next sentence it is explained and put between apostrophes. Please introduce it better..

Thank you for this comment. We propose to replace l. 119-122 by:

“In this study, we consider three spatial scales: the regional scale (10,000 km2), the sub-regional scale (1,000 km2), and the catchment scale (100 km2). The sub-regional scale consists of areas named “massif”, which forms a set of continuous reliefs, often separated by rivers and valleys. An ensemble of massifs constitutes a mountain range (Alps, Pyrenees). In the French Alps, 23 massifs have been identified through climatological homogeneity of precipitation in Pahaut (1991). PLR computation will be conducted at the massif (climatological homogeneity) and catchment (hydrologic interpretation) scales.”

#RC1.6 Already in Fig. 1 it would be interesting to know the area in the different altitude classes as well as the number of stations.

We thank the reviewer for this suggestion. We propose to replace Figure 1-d by the following figure which also shows the surface area for each band of altitudes:



#RC1.7 1: It would be useful to reduce the white space between the subfigures and enlarge them. They are currently very small and difficult to read.

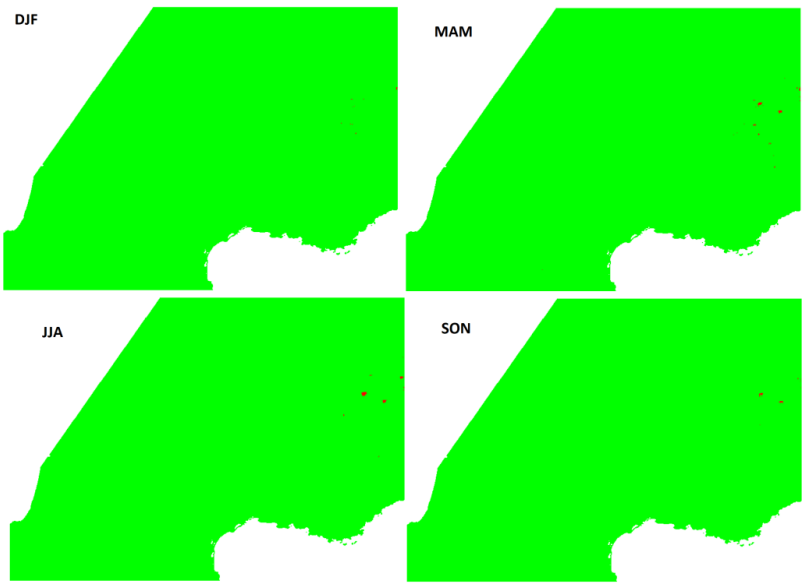
Thank you for this suggestion. We agree with the reviewer that the subfigures are difficult to read. The extra white spaces will be removed from Figure 1.

#RC1.8 L190-191: The other datasets also cannot be defined as homogeneous (change in instrumentation, station density,...)

Thank you for this suggestion. We will add the following sentence: “Some gridded precipitation products present non-homogeneous data because of their large temporal depths. Most radars have been integrated since 2006, and others have been gradually incorporated since 2015 to fill the gaps of measures in mountainous regions (Beck and Bousquet, 2013). The use of SERVAL and COMEPHORE is therefore tainted with temporal non-homogeneity. Station density also affects the temporal homogeneity of COMEPHORE, CERRA-Land, and SPAZM. Change of instrumentation have been corrected in COMEPHORE and SPAZM with an homogenisation of rain gauges precipitation (Gottardi 2009, Mestre et al., 2013).”

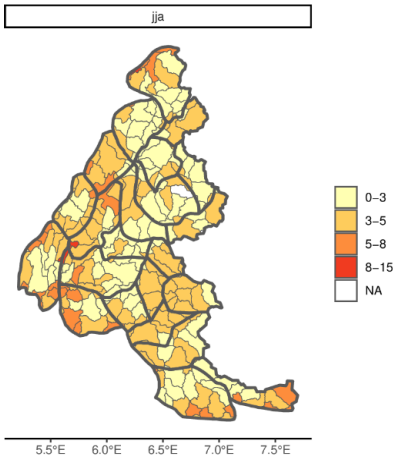
#RC1.9 L215-219: What influence does this correction have on the PLRs?

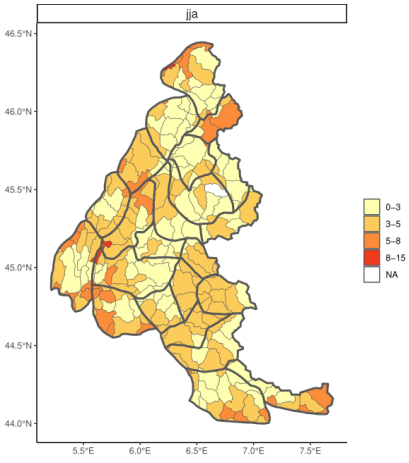
The correction of AROME concerns very few pixels (less than 0.05 %). It impacts very slightly the PLRs, which were computed with a lot of pixels.On the figure below, the corrected pixels are colored in red. The maximum number of corrected pixels is in summer (JJA). They are all located in the Alps.



First correction of AROME

For the summer season (JJA), this correction of AROME mostly modifies the PLRs for two catchments in the Mont-Blanc massif, with an increase of PLRs values. It does not change the interpretation of the spatial variability of PLRs.

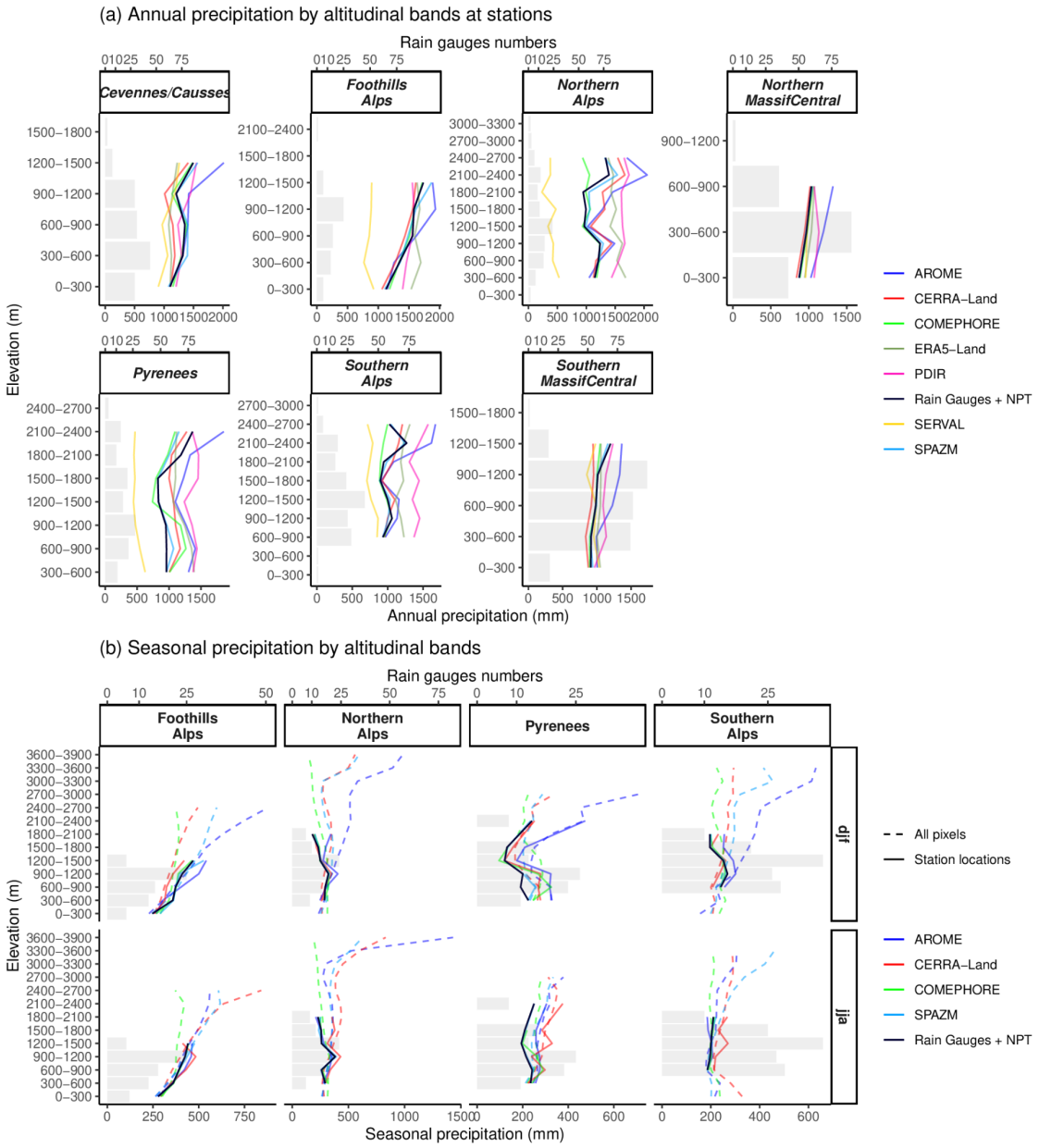




PLR (%/100 m) with corrected AROME PLR (%/100 m) with raw AROME

#RC1.10 3 (b): Hard to see the black line. In addition the abbreviation “RG” is explained in the manuscript, but it would be helpful to mention it again in the Figure caption.

Thank you very much for this suggestion. We agree with the reviewer that the black line was difficult to discern and that the abbreviation explanation was missing. We propose to replace figure 3 by the following figure.



#RC1.11 L403: How was the value of 0.5 chosen?

This threshold of 0.5 for the R^2 was chosen arbitrarily. It does not affect the PLR values, but it helps the interpretation of these values. In our specific case, an R^2 = 0.5 suggests that 50 % of the seasonal precipitation variability can be explained by the altitude. 50 % of this variability is significant in our context, given that the variability of precipitation cannot be totally explained by the altitude. This threshold is not uncommon and has been used in other studies (Sevruk, 2002).

#RC1.12 L549: “m” instead of “mp”

Thank you for noticing this error. This will be corrected.