Dear Associate Editor,

Please find below how we have responded to the remarks of referee 1. We have also tried to improve the quality of the English of the paper. We hope that with all the modifications brought to the article, it could be now acceptable for publication.

Best regards,

Nadia Fourrié

Referee 1

The manuscript has been significantly improved. The work now makes sense and follows a logical structure, with reasonable support for the conclusions. There is only one main issue (the quality of English) which is not the responsibility of the scientific reviewers. Assuming this will be dealt with, if a few other minor changes can be addressed the manuscript will be acceptable for publication.

We thank Reviewer 1 for his/her comments which helped to improve, we hope, the quality of the manuscript. Reviewer 1's comments are in bold font, our answers are written with normal font.

Main

The quality of English needs improving, particularly in the first few sections, either by the authors or by copy editing. Some examples are listed below but there are many more.

We recognize that we are not native English speaking people. We tried to improve the quality of the English as you can see throughout the modifications we made in the text. We also took into account all the examples provided by the referee 1.

Minor

P3 L10 - "Intuitively, collocated AVHRR data provide information on surface properties…" Please remove "Intuitively" since the following statements are unarguable.

It was removed.

P3 L18 - Sentence including "background equivalents to AROME fields" does not really make sense. Background AROME fields are being used to simulate cloud-affected equivalents to the observations. You are right, the sentence was rewritten "This study was done in a 1D-Var framework using an advanced radiative transfer model (RTTOV-CLD) including profiles for liquid water content, ice water content and cloud fraction to simulate cloud-affected equivalents from background AROME fields."

P9 L 11 - Section title "Background departure check" is not an accurate description here: it is a comparison of standard deviations, not O-B. The referee is right and the title of the paragraph was modified with "Interclass homogeneity of the simulated cluster".

P11 L29-31 - "we decided to select … less than 0.8%" - why specifically 0.8%? Please explain in the text a little more, as it is still not entirely obvious why here. More explanations are now provided in the text: "This threshold allows to discard the population of observations with a large cloud cover and a large standard deviation ratio on the top right of the panels. It also allows to remove some observations for which the CO2-slicing algorithm has failed to retrieve a cloud top pressure and for which IASI cloud fraction is set to zero."

Table 3 columns 3 and 4 could be swapped for consistency with table 2. It was done

Section 5.1: please recap exactly how IASI observations are used in the control and in the experiment as it is still not clear (covering the McNally and Watts and the new test and anything else important) To understand Fig. 6, we also need to know if there is a channel set for which the homogeneity criteria are not applied, due to the lack of influence of clouds on these channels. More explanations on the application of the COMPR method are added in paragraphe 5.1: **"**In a second experiment called (EXP), we applied our COMPR approach (presented in the 3.2.4) on top of the Mc Nally and Watts cloud detection. As in Eresmaa (2014), these homogeneity criteria are provided to the McNally and Watts detection scheme and applied in its quick-exit scenario. This means that if the COMPR approach flags a homogeneous observation it can accelerate the decision of flagging the pixel as clear, but if the COMPR approach flags the observation as heterogeneous, the assimilation entirely relies on the McNally and Watts cloud detection scheme to discriminate which channels to assimilate. There is no specific channel set for which the homogeneity criteria are applied."

P20 L29 -"results show" -> "results suggest" since the results from section 5 do not directly address the question of whether cloudy observations are better filtered, although clearly the reduction in IASI FG departure std. dev. could have been caused by this. We agree and it was modified.

P20 L 31 - "3% of all observations are rejected" needs more context - what percentage of all IASI observations are kept in the control and in the experiment? Please add the required results to section 5 if these are not already present. We have modified the conclusion concerning the number of rejected observation compared to the reference. In overall, only around 19% of observations are kept for the assimilation. We have modified section 5.2 to add this information: "This proportion represents around 19.2% of the total amount of IASI observations available for the assimilation."
The last paragraph of page 20 was corrected. In average 1% of assimilated observations in reference are rejected in the experiment. "1% of assimilated observation in the reference are rejected with the homogeneity criteria. Depending on the spectral band, up to 15% of the number of total channels can be discarded with the use of the homogeneity criteria in the assimilation. The number of channels peaking high in the atmosphere (i. e. stratosphere) is of course not impacted by the homogeneity criteria, as the McNally and Watts algorithm always identifies them as clear."

P21 L1 - "neutral impact" - actually Figs. 8a and 9 mainly suggest improvements to short range forecasts, which is worth mentioning. But what about longer range forecasts, please could you say something on this. Regarding the forecasts scores, a very small positive impact at the 12-h forecast range for temperature and wind in the Southern Hemisphere when these selection criteria are taken into account on top of the McNally and Watts (2003) algorithm. However, at longer ranges, neutral impact is found.

Typos
P4 L7 - "according a following terrain" -> "with a terrain-following" Done

P4 L18 - "divervence" corrected

P4 L31 - "allows to simulate" -> "allows simulation of" Corrected

P6 L16 - "are found for example for the" - rewrite No major differences are found in the cloud structures as those present over the North Atlantic (30N-70N, 40W-0W) and above the Southern

Atlantic Ocean (30S-70S, 60W-0W). They often consist in an alternation of positive and negative values suggesting a misplacement of the cloud structures.

P8 L12 - “A IASI” -> “An IASI” The 2 occurrences were changed.

P8 L19 - “The first two ones” - remove “ones” here and later in the same sentence. Done

P8 L 27 - “determined by C_j WHICH is the cluster fraction” Done

P9 L1 - “calculed” -> “calculated” Corrected

P10 L3 - “If a IASI pixel do not” - use “an”, “does” Corrected

P9 L9 - “The distance of each cluster ..” is not a full sentence as lacking a verb. The previous sentence was rewritten: “The intercluster consistency check relies on the comparison between the properties of the different clusters within the IASI FOV, the distance between each pair of clusters as well as the distance of each cluster to the background in both infrared AVHRR channels.”

P20 L16 - “bakcground” It was modified.