The authors have verbosely and comprehensively answered to all 3 reviewers comments. This resulted major revisions that that significantly improved the manuscript:

1. The study is now set in the context of the ARTMIP framework thereby direcvtly addressing a big readership already in the introduction. Also the relavant literature is now mentioned in the context of regional AR detection and the specific advancement of the introduced algorithm is clearly outlined.

2. The description of the algorithm (which is always challenging) has has been likewise improved. A new schematic figure has been added in the appendix that greatly facilitates the readability of the text passage.

3. A sufficient description of the aerosol physics in the WRF model is now added. And at many places additional explanations have been made where required.

4. The description of experiments has significantly improved.

5. The uncertainties, sensitivity and potential limitations of the algorithm are now well explained and discussed in section (e.g. section 3.1.1). The greatly increases the trust in this method.

6. Figs 15 and 18 were added to show the differences to demonstrate the aerosol effect on accumalated AR precipitation in addition the thickness plots.

7. Concerning the issue of internal model noise and thus significance of the results (raised by reviewers 2 and 3) the authors have addressed this by implementing a quick significance test to the figures highlighting the differences in layer thickness (Figure 9 &12). This is here completely sufficient. To make this really robust would require expensive ensemble runs (e.g. Ho-Hagemann et al, 2020) to assess the full internal random short term noise. However, this is not necessary within the scope of the current study which introduces a new detection algorithm.

Ho-Hagemann, H.T.M.; Hagemann, S.; Grayek, S.; Petrik, R.; Rockel, B.; Staneva, J.; Feser, F.; Schrum, C. Internal Model Variability of the Regional Coupled System Model GCOAST-AHOI. *Atmosphere* **2020**, *11*, 227. https://doi.org/10.3390/atmos11030227Ho-Hagemann, H.T.M.; Hagemann, S.; Grayek, S.; Petrik, R.; Rockel, B.; Staneva, J.; Feser, F.; Schrum, C. Internal Model Variability of the Regional Coupled System Model GCOAST-AHOI. *Atmosphere* **2020**, *11*, 227. https://doi.org/10.3390/atmos11030227

The above 7 major changes greatly improved the manuscript. Thus, from my point of view, I can fully recommend the publication of the revised version.

**Some final rather cosmetic comments the authors may consider:**

From the reply to rev #1:
**The threshold value is an absolute value stablished by the user. It is not latitude dependent and it is not determined by computing percentiles, at least in the algorithm itself. However, we recommend computing them beforehand to decide the threshold. For instance, we have chosen an IVT threshold of 300 kg m-1 s-1, based on the 99th percentile value of the IVT on L1 (260 kg m-1 s-1). As for the L1 question, detection line 1 extents over a wide range of latitudes but we do not think that any of them are more represented than the others. In fact, this methodology is also applied by other ARDTs. In the figure below, we show the distribution of the mean impact latitude of the identified ARCI ARs (similar results were found for the other experiments), which turned to be more or less even.**

I agree there is at least no significant increase with the higher latitudes up to 44°N. However, what would be if L1 would extend up to 55 ot 65 °N. Would you recommend then the use of latitude dependent values to detect Ars impacting the UK or Norway? If so, you may consider mentioning this.

**Line 64: Nevertheless, it should be taken into account that the spatial tracking given a fixed time step method may not be suitable for data obtained from RCMs whose spatial limits are very close to the detection area. This is the case for most of the RCM runs, as they are primarily land-focused."**

That’s true. However, not the limited size of domain may be problematic but the also fact that ARs loose moisture after landfalling which makes so that mapping over land methods with fixed time stepping deliver very uncertain results.

In my point of view Appendix D1 could be omitted. It is used in the main text to identify which of the aerosole treatment experiment is closest to observations. But a general statement about this would likely require more than two cases studies.