This is the reply to the report from Referee #2.

Our replies are written in *italics* after the referee's comments.

We would like to thank the referee for taking the time to review our paper.

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Scientific Significance: 2 While this manuscript does not contain significant new scientific advances in the field, it does provide a good documentation of data processing algorithms used to process the Metop/GRAS operational refractivity data products. For this reason, I believe publication of this manuscript in AMT is warranted.

Scientific Quality: 2 The scientific quality of this manuscript is good. It provides a logical presentation of the research, it cites and discusses previous work. It follows the OLC approach by Gorbunov (2002), but it should provide more specific details on how this implementation is different from Gorbunov 2002 and whether these algorithm differences are significant. This work does not mention data gaps that are known to exist in GRAS BA data. The authors should discuss how they process through these gaps and what impact they may have on inversion errors.

Presentation Quality: 1 The manuscript is presented with high quality. The text and figures are clear and concise.

Comments for Authors:

- It is known that GRAS CAF bending angle data have gaps. How does the GRAS SAF process through data gaps in BA? Please describe.

The operational NRT data from EUMETSAT CAF may contain some gaps and missing values for bending angles and latitudes and longitudes. We do not process over data gaps but cut off the BA data at the first instance of a missing value for either the bending angle or the latitude and longitude coordinates. If there are more than one block of data we use the longest block.

page 2194, lines 14-16: "The approach differs from the approach by Lohmann (2005) as well as that of Gobiet and Kirchengast (2004)...". This approach differs from the OLC (Gorbunov, 2002) as well. Please specify clearly the algorithm differences between the described implementation and

the OLC implementation (Gorbunov 2002). Once the differences are mentioned, those important differences should be explained in more detail. As pointed by Gorbunov (2002): "Really important is what climatological data are used for the initialization at big heights, and what estimations of signal and noise covariances are used in the height range 30-50 km." Is searching through a library of background profiles compared to using fixed profile an important difference? Is 2-parameter fit compared to 1-parameter fit an important difference? Application of the background error estimates obtained in UTLS for the upper stratosphere (Gorbunov 2002, Lohmann 2005, this study) is based on the assumption that they are fractionally about the same in these height intervals. How justified is this assumption? Besides fitting of the background and dynamic error estimation, Lohmann (2005) also considered the vertical error correlations. How important is that difference?

A detailed discussion of the statistical initialization method is beyond the scope of this paper. Our approach is generally based on (Gorbunov, 2002; Lohmann, 2005; Gobiet and Kirchengast, 2004) with some small modifications.

Pg 2195, line 10: "Estimation of ionospheric signal and noise variance using the highest part 10 (above 50 km) of the occultation." Is there a maximum height considered when estimating this noise so E-layer scintillations are not included? Please state.

Yes, there is also an upper height limit that excludes strong variations from the signal and noise estimates. The limit is estimated dynamically and never exceeds 80 km. A detailed description of the algorithm is beyond the scope of this paper. The text will be updated to clarify this.

page 2195, line 11: "Calculation of relative mean deviation of neutral bending angle from the model bending angle using the data at heights 1235 km (giving an estimate of the model variance)." By "model bending angle", does this mean "model bending angle that has been scaled and offset"? Please clarify.

Yes, we mean the background bending angle profile after the fitting. The text will be updated to clarify this.