

## ***Interactive comment on “BOREAS – a new MAX-DOAS profile retrieval algorithm for aerosols and trace gases” by Tim Bösch et al.***

**Anonymous Referee #2**

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This paper reports a new MAX-DOAS profiling algorithm detailedly. The algorithm is based on a scientific and reasonable method. The results have good correlation with the results from the other instruments. However, from the paper, it appears that the algorithm is similar to the other profiling algorithms based on the optimal estimation method.

The title of this paper is about a NEW algorithm, so you should highlight what is really NEW and innovative in your algorithm, and what are the advantages comparing to the other MAX-DOAS profiling algorithms. These points should also be included in the Abstracts.

In Figure 4, readers cannot easily distinguish between the curves corresponding to E2 and E3. Different line styles should be used for the curves of different episodes (also

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in the other similar figures). In the right-hand chart, the pre-scaled a priori profiles ought to be depicted. Moreover, I cannot understand about how are the a priori profiles pre-scaled.

In the chapter about CINDI-2 campaign (4.3), the results are compared with the results from other instruments. However, it is also important to compare with the MAX-DOAS result from the same instrument but retrieved with the other algorithms.

Some well-known and fundamental introductions can be simplified. For example, it is unnecessary to explain the definition of single scattering albedo in detail and show the equation.

In the description of the algorithm, it is better to use the symbols that are commonly used in the related papers. For example, in Equation (3), it is better to use “AMF” instead of “M”, “SCD” instead of “S”, and “VCD” instead of “V”. In Equation (5), you can just use “BAMF” instead of the curlicue M.

Minor corrections:

Page 1, Line 4: “in a second part” -> “in the second part”.

Page 9, Line 5: If  $\Delta y$  is a vector, then it should be described as “has  $N \cdot M$  elements” instead of “has the dimension  $N \cdot M \times 1$ ”; otherwise it should be described as a matrix. Similarly, Line 10, the state vector  $\Delta x$  should have “L elements”. Line 11, “ $N \cdot M \times L$ ” -> “ $(N \cdot M) \times L$ ”.

Page 20, Line 14: “CINDI2” -> “CINDI-2”.

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