Response to editor's comments

l133: I think the sentence "This manuscript contains a number of sections" does not contain any specific useful information. I suggest to start the paragraph with "In the Sections 2 and 3 of this paper, the full details of the retrieval schemes and ... of ACE and MIPAS, respectively, are discussed."
We have corrected the text.

l150: It would be advantageous to give a reference for the 3km altitude resolution of ACE-FTS; it is not always clear how the ACE altitude resolution is defined but with a quotation of a paper where this issue is discussed you can easily avoid to include a lengthy discussion of this in your paper.
There are several ACE papers in which vertical resolution is discussed. We have now included a reference to a paper in which optimal estimation is used to evaluate the vertical resolution of the CO retrieval for a particular occultation. They conclude that the resolution for that occultation was 3.9 km in the mesosphere and 1.4 km in the mid-troposphere. We use the value of ~ 3 km, which is approximately the average of these two numbers.

l175: This sounds as if the altitude grid of the retrieval is the native grid of the tangent heights, and the interpolation to the 1km grid is kind of post-processing, correct? If so, it might be clearer to start in l 174 with "During the retrieval the state vector is sampled on an altitude grid co-inciding with the tangent altitudes of the measurement. The retrieved VMRs are then interpolated..."
The point is correct, so we have made the change as requested.

l223 ff: I think it is correct what you have done here but the reader might miss how S_a changes during the sequential retrieval. I suggest: "For this work, the initial a priori estimate is taken from ... 2007); after each step of the sequential estimation x and S_a are updated according to the results of the preceding step." (Correct?)
We have made the change, but note that it is x_a and S_a that are updated.

l226: Is the MIPAS retrieval also performed on the tangent altitude grid? If so, please mention this here.
On line 222 in this draft, we explain that Eq.2 is applied at each tangent height. We have added a few words after 'interpolated' to reinforce the point.

l236: I assume this setting of the diagonal elements refers only to the initial Sa, which will be updated during the sequential estimaltion. Correct? If so, then please add "the initial Sa diagonal elements".
We have made the change.

l402: if you want to do me a favour, you could add a reference to my recent AMTD paper on this issue ("Smoothing error pitfalls"; current status: AMT in press)
Since the paper is now in press, we will add a reference to it.