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Atmospheric Measurement Techniques Discussions

Interactive comment on "A method to improve the determination of wave perturbations close to the tropopause by using a digital filter" *by* P. Alexander et al.

P. Alexander et al.

peter@df.uba.ar

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The method is essentially empirical, but arguments have been presented to substantiate the procedure (mainly page 6, lines 6-9). In addition, a major point is that a statistical validation of the method with realistic data (NCEP reanalysis profiles and theoretical wave spectra) has been exhibited in Figure 7 (and the corresponding explanations in the text). We know from the synthetic profiles the exact contribution of waves, so trial and error with different procedures led us to our suggested method, which is not an optimal solution to the problem. However, we believe that it is the best option that we have at hand among the presently available imperfect alternatives. We will expand

the present description of options separating background and waves in a new version of the manuscript with their advantages and drawbacks. Our method will not give the same quality of outcome in all cases, but if we work with a large number of profiles, we could expect reasonable results from the statistical point of view. In brief, the method has no basic theoretical background, but it is a simple empirical approach and it has been validated with thousands of synthetic profiles based on real temperature data and theoretical wave spectra.

We would also like to include a short comment on empirical formulations that do not have a sound theoretical background. Science has many examples of successful empirical laws which originally had no basic theoretical arguments. In some cases the substantiations were found at a later time and in others not. Among the former examples, Fourier's and Ohm's laws respectively on heat and electric conduction. Among the latter cases, there is for example no theory which shows that the entropy of a closed system will never decrease or that allows a formal derivation of the Schrödinger equation, but the use of these empirically tested ideas has been extremely useful. Trial and error has shown that they are adequate. Of course, we do not want to compare our method with all those scientific benchmarks, but we just mention them as examples of our point of view.

Specific comments Page 3, line 9-10: we see no problem in eliminating the statement in a new version. Page 3, line 7-10: we believe that the comment refers to page 4 instead of page 3. We will complete the explanation in a new version. Figure 2: ok, we will eliminate it as it coincides with a comment by Referee 1. Page 6, line 3-10: we give a rather general explanation, because no specific description of filters is intended, as it would partially change the focus of the work. We will add a sentence in the new version stating that if the cut-offs was very sharp, then the second filtering would not have a significant effect. We will also include a figure with our filter response. Page 6, lines 14-15: ok, the problems are not removed, but just attenuated (see the reduction close to the dotted line and in general in the variance calculation in Figure 7). We will

change the statement.

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