

## ***Interactive comment on “Methodology for determining multilayered temperature inversions” by G. J. Fochesatto***

### **Anonymous Referee #3**

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This paper describes an algorithm used to objectively separate inversion layers in a vertical profile of temperature. The author describes the technique in Section 2 and then goes on to discuss the errors associated with this algorithm and how a user of the algorithm can set parameters to detect thermal layers of different lapse rates. After this, the algorithm is applied to a single sounding to demonstrate the algorithm and how the settings change the ability of the algorithm to reproduce the original profile. Finally, a discussion of the applications of this algorithm to different datasets and the weaknesses of the algorithm summarize the paper.

#### General Comments

Paper Strengths: A method such as this is a valuable contribution to the meteorological

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literature and the author makes multiple references to areas of atmospheric science this algorithm could assist in. With a good portion of the field focusing on high-temporal resolution solutions to atmospheric profiling, feature-tracking algorithms such as this is useful. In addition, methods that summarize the data are useful to operational meteorologists who must navigate the fire hose of data they must sort through to produce forecasts.

Paper Weaknesses: A key weakness of this paper is the vague and somewhat unfocused text. It was difficult at times to determine a roadmap within the different sections as to explain why the described method works as various definitions of key terms in the context of the algorithm are not made. In addition, consistent terminology is needed to help guide the reader. Multiple grammatical errors and confusing language make this paper difficult to read. Future revisions should correct these weaknesses as they greatly impact the ability to understand and implement the algorithm.

#### Specific Comments

- 1.) The methodology for the convergence error correction in Section 3 would do well with a figure to help clarify the example in the second paragraph as well as the different thermal profiles used to characterize Figure 3.
- 2.) The terms SBI, EI, shallow inversion, cold layer, free troposphere, stratified layer are not explained, but are referenced in Table 2. Are these key layers identified by the algorithm? How are these specified?
- 3.) Here are a few examples of the confusing language and grammatical issues in the paper: Line 25 (page 1) to Line 2 (page 2), Line 18-20 (page 3), Lines 24-27 (page 3), Lines 21-24, page 5.
- 4.) Is there a larger dataset (i.e. the 10-year dataset mentioned) that could be used to help understand more about the error properties and recommended settings of the method? This may help any reader who wishes to implement this algorithm understand what to expect in terms of the performance of the method. Given that the

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author has experience with implementing this method to different datasets (via different references he has been an author on where the algorithm has been used), I get the feeling his experiences and challenges could provide a more through discussion of the algorithm's properties and motivation for the algorithm's development than what is offered.

5.) Within the conclusions, the author mentions "However the application of this methodology to a real case produces an overall error in the resampled profile that is different from the prescribed preset convergence factor epsilon." This statement identifies what seems to be a rather important problem with the method described in Section 3 that is used to modify the algorithm parameters to get an expected result. How significant is this problem on average? What has been done to rectify it when this method has been used elsewhere? Perhaps the issues raised in Comment 4 could be tied together with this.

6.) Figure 1. . .the caption should say which way does the sequence goes (left to right or right to left?)

7.) Rather than directly referencing the figures generally as summary illustrations of a point, it would be helpful to the reader if the author guided the reader's eye through the details of the figure. This would be especially helpful with Figure 3 as there weren't any clear steps in the example (paragraph 3 of Section 3) to use Figure 3 and the paragraph utilizes phrases like "the thermal gradient relaxes". Also, there is no final recommended epsilon value for this example.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 10559, 2014.