

Interactive comment on “Estimation of atmospheric mixing layer height from radiosonde data” by X. Y. Wang and K. C. Wang

Anonymous Referee #1

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General comments The paper is motivated by the requirement to know mixing layer height (MLH) for air quality studies and climate change discussions. The measurement data, which are used for the task to estimate MLH, are from radiosondes launched from 79 stations over North America during the period from 1998 to 2008. Such data are available from the Stratospheric Processes and their Role in Climate Data Center (SPARC). The different methods to solve this task and the different analyses results are discussed in detail. A new method is proposed and demonstrated to determine MLH by integrating different methods. The new method handles cloud also. The problems during high humidity and cloudiness are discussed. Finally, the spatial variation of MLH over North America is shown. The paper addresses relevant scientific questions within the scope of AMT. It completes the knowledge about layering of the lower atmosphere.

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The paper presents novel concepts, ideas and tools. The scientific methods and assumptions are valid and clearly outlined so that substantial conclusions are reached. The description of experiments and calculations are sufficiently complete and precise to allow their reproduction by fellow scientists. The quality and information of the figures must be improved (see below). The related work is well cited as well as the number and quality of references appropriate i.e. the authors give proper credit to related work and clearly indicate their own new/original contribution. The title clearly reflects the contents of the paper. The abstract must be improved (see below). The overall presentation is well structured and clear. The language is fluent and precise but should be improved in the figure captions (see below). The mathematical formulae, symbols, abbreviations, and units are generally correctly defined and used but should be improved in some details (see below). **Specific Comments** Why space-borne and not ground-based lidar measurements were used? Lidar measurements detect particles i.e. an atmospheric compound and not a meteorological parameter as from radiosonde measurements is used to detect MLH. This is not discussed. There is no comparison performed but a link to a reference is given only so that this statement cannot be part of the abstract and the conclusions. **Technical corrections** Page 1251, lines 3-5: This sentence is not understandable. Page 1252, equation (1): The units of the factors are not defined. Page 1258, lines 18, 19; page 1273: over North America instead of over the North America Fig. 2: It is confusing what black dotted and black solid line mean. Fig. 4: existing instead of existed. All figure captions are too long. Some of the details should be described in the main manuscript. The language should be improved in all figure captions. The quality of all figures should be improved by increasing the number of pixels.

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