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Copernicus GmbH

Dear Editor.

Please find enclosed our manuscript, entitled "Upper altitude limit for Rayleigh lidar," which we request you to consider for publication as an *Original Article* in *Copernicus GmbH*.

Rayleigh lidar is commonly used for measuring atmospheric temperature profiles up to about 90–100 km. Above this region, the technique becomes invalid because of changes in atmospheric composition. This study uses the NRLMSISE-00 model to simulate lidar signal profiles (photon count), enabling a quantitative analysis of the biases and errors associated with extending Rayleigh lidar temperature measurements above 100 km. We also investigate the biases associated with applying a nominal correction for the change in atmospheric composition with altitude. Our simulations indicate that, in practice, the upper altitude limit for Rayleigh lidar is imposed more by the accuracy of the temperature or pressure used to seed the temperature-retrieval algorithm than by accurate knowledge of the atmospheric composition.

This manuscript has not been published elsewhere and is not under consideration by another journal. We have approved the manuscript and agree with submission to *Copernicus GmbH*. There are no conflicts of interest to declare.

We believe that the findings of this study are relevant to the scope of your journal and will be of interest to its readership. The manuscript has been carefully reviewed by an experienced editor whose first language is English and who specializes in editing papers written by scientists whose native language is not English.

We look forward to hearing from you at your earliest convenience.

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