A relevant recent publication for *Atmospheric Lidar Fundamentals* 9781316518236

In Chapter 7, we discussed atmospheric temperature and wind measurements by different lidar techniques and processes for different atmospheric regions, including Cabannes scattering (CS), Rayleigh integration (RI), rotational Raman (RR) and laser induced fluorescence (LIF). The difference between these techniques was discussed and their performances were compared utilizing individual metrics. We see this as a shortcoming, which has now been addressed in a paper by Chiao-Yao She, David A. Krueger and Zhao-Ai Yan in Applied Optics as an open access article. Here, the authors have introduced the concept of single-photon measurement uncertainty as the figure of merit for performance comparison of all these different lidar types. The article may be downloaded from **https://doi.org/10.1364/AO.484453**.

Comparative study of lidars for measuring atmospheric temperature and wind

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Abstract: The uncertainty of lidar measured atmospheric temperature *T* or line-of-sight (LOS) wind *V* is inversely proportional to the signal-to-noise ratio (SNR) of the received photocounts. We term the proportionality constant, which depicts the efficacy of the measurement method, the single-photon (or unity SNR) measurement uncertainty for *T* and/or *V* measurement. In this study, we use the single-photon measurement uncertainty as the figure of merit to compare and understand the practical differences between Cabannes scattering (CS), Rayleigh inversion (RI), rotational Raman (RR), and laser induced fluorescence (LIF) lidars for atmospheric temperature and wind measurements, and to optimize the choice and receiver design of a lidar system for a potential application.

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