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Abstract

Space-borne High Spectral Resolution Lidar (HSRL) can separate the Rayleigh (molecular) and Mie (cloud and aerosol particles) backscatter returns. As a result it can provide, on a global scale, vertical profiles of the physical and optical characteristics of clouds and aerosols. Current technological developments in Europe in the context of the Aeolus and EarthCARE missions, will allow the implementation of HSRL at 0.355 μm. In this context we present a methodology to evaluate the measurement accuracies of the backscatter and extinction coefficients as well as, the optical depth in clouds. Measurements accuracies are estimated for 1) when the profiling capabilities of the lidar can be used (measurements inside the cloud layers) and 2) when using the Rayleigh cloud measurements in the layers just above and below the cloud (when case 1 is not appropriate). For given measurement accuracies, the types of clouds that are possible to probe with the HSRL are also presented. Additionally the radiative impact of the general characteristics of the measurement and its accuracy is discussed as well, especially those related to cirrus clouds.

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