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Sensitivity Analysis on Fu-Liou-Gu Radiative Transfer Model for different lidar aerosol and cloud profiles

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The aerosol and cloud impact on climate change is evaluated in terms of enhancement or reduction of the radiative energy, or heat, available in the atmosphere and at the Earth's surface, from the surface (SFC) to the Top Of the Atmosphere (TOA) covering a spectral range from the UV (extraterrestrial shortwave solar radiation) to the far-IR (outgoing terrestrial longwave radiation). Systematic Lidar network measurements from permanent observational sites across the globe are available from the beginning of this current millennium. From the retrieved lidar atmospheric extinction profiles, inputted in the Fu-Liou-Gu (FLG) Radiative Transfer code, it is possible to evaluate the net radiative effect and heating rate of the different aerosol species and clouds. Nevertheless, the lidar instruments may use different techniques (elastic lidar, Raman lidar, multi-wavelength lidar, etc) that translate into uncertainty of the lidar extinction retrieval. The goal of this study is to assess, applying a MonteCarlo technique and the FLG Radiative Transfer model, the sensitivity in calculating the net radiative effect and heating rate of aerosols and clouds for the different lidar techniques, using both synthetic and real lidar data. This sensitivity study is the first step to implement an automatic algorithm to retrieve the net radiative forcing effect of aerosols and clouds from the long records of aerosol measurements available in the frame of EARLINET and MPLNET lidar networks.