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Operation of a decision support system for radiation fog forecasting (PARAFOG) based on humidity profiles forecasting

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PARAFOG is a new decision support system for radiation fog forecasting based on analysis of the attenuated backscatter measured by automatic LIDAR-ceilometers (ALC) that provide information about the aerosol-particle hygroscopic growth process (Haeffelin et al., 2016). It is important to be able to track this process over a sufficiently deep vertical profile to capture activation at the surface or aloft where it occurs first. The monitoring of the hygroscopic growth process in altitude can provide useful warnings to airport forecasters about when radiation fog is likely or not likely to impact air traffic.

The computation by PARAFOG of the hydroscopic growth function is activated when atmospheric conditions, based partly on the relative humidity measured at the surface are favourable to hydroscopic growth. In some fog case studies the humidity conditions higher up seem to be favourable but PARAFOG is not activated to track the potentially hygroscopic growth process because humidity conditions at the surface are not yet met to activate PARAFOG. By these conditions the duration of the fog formation monitoring is reduced.

To improve the duration performance of PARAFOG monitoring, the humidity profiles of the ECMWF L137 model level (first levels) together with the humidity measurements at the surface are used to activate PARAFOG potentially earlier. In this study, we will show the impact and the benefit to use ECMWF humidity profiles forecasting on PARAFOG applied to the ALC attenuated backscatter dataset measured at Uccle (Belgium).

Citation: Haeffelin, M., Laffineur, Q., Bravo-Aranda, J.-A., Drouin, M.-A., Casquero-Vera, J.-A., Dupont, J.-C., and De Backer, H.: Radiation fog formation alerts using attenuated backscatter power from automatic lidars and ceilometers, Atmos. Meas. Tech., 9, 5347-5365, doi:10.5194/amt-9-5347-2016, 2016.