EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-629, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

An automatic Planetary Boundary Layer height retrieval method with compact EZ backscattering Lidar

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Bigger strongly urbanized cities in the world are often exposed to atmospheric pollution events. To understand the chemical and physical processes that are taking place in these areas it is necessary to describe correctly the Planetary Boundary Layer (PBL) dynamics and the PBL height evolution. For these proposals, a compact and rugged eye safe UV Lidar, the EZLIDAR™, was developed together by CEA/LMD and LEOSPHERE (France) to study and investigate structural and optical properties of clouds and aerosols and PBL time evolution. EZLIDAR™ has been validated by different remote and in-situ instruments as MPL Type-4 Lidar manufactured by NASA at ARM/SGP site or the LNA (Lidar Nuage Aerosol) at the Laboratoire de Metereologie Dynamique LMD (France) and during several intercomparison campaigns. EZLIDAR™ algorithm retrieves automatically the PBL height in real-time. The method is based on the detection of the slope of the signal linked to a sharp change in concentration of the aerosols. Once detected, the different layers are filtered on a 15mn sample and classified between nocturnal, convective or residual layer, depending on the time and date. This method has been validated against those retrieved by the algorithm STRAT from data acquired at IPSL, France, showing 95% of correlation. In this paper are presented the results of the intercomparison campaign that took place in Orleans, France and Mace Head, Ireland in the framework of ICOS (Integrated Carbon Observation System) project, where the EZ Lidar™ worked under all weather conditions, clear sky, fog, low clouds, during the whole month of October 2008. Moreover, thanks to its 3D scanning capability, the EZLIDAR was able to provide the variability of the PBL height around the site, enabling the scientists to estimate the flux intensities that play a key role in the radiative transfer budget and in the atmospheric pollutants dispersion.