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An Intercomparison of backscatter coefficient at 1064nm from satellite and ground-based measurements over coastal and non-coastal regions

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The direct comparison of spaceborne and ground-based LIDAR data in coastal and non-coastal regions is addressed in this study. The aim is to verify the possible differences and similarities in aerosol properties by doing an intercomparison of the backscatter coefficient at 1064nm (BC1064nm). The instruments used are a LIDAR onboard a satellite called CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation) and two ceilometers (CHM15K): One at Mace Head (western Ireland) and another one at Harzegerode (Germany). For cloudy days, aerosol backscatter and extinction are difficult to retrieve due to the large attenuation from clouds so a cloud-free scenario is essential. However, by analysing radar data it was possible to verify that that low clouds are present over Mace Head most of the time, even though scattered and/or optically thin. The reason for this is the influence of several meteorological phenomena in Mace Head since the facility is located on the west coast of Ireland. So, finding a completely cloud free scenario for this station matching CALIPSO's overpass was a challenge. Since the ground track of CALIPSO does not pass exactly over both instruments and since previous studies have shown that atmospheric aerosols present good horizontal correlation for tens to hundreds of kilometres, a minimum distance criterium of 100Km between CALIPSO's overpass and the stations were applied here. A series of such comparisons were performed before using satellite data and instruments from EARLINET. However, a direct comparison of BC1064nm using these two instruments mentioned before is new. This comparison will also show the possibility of combining satellite and ground-based data in order to use it as input data in weather models. Since satellite data are better for the top of the clouds and ground-based data are better for the bottom, the comparison and further combination of both can help to better understand aerosol cloud's properties, especially its thickness and vertical profile and consequently might be helpful to improve forecast models.