A comparative study of cloud and aerosol properties from satellite observations and ground-based measurements conducted over a coastal station of Ireland

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Clouds and aerosols play an important role in the weather and climate system of the Earth. Their observation and continuous monitoring has become an essential part of a better understanding of the atmosphere. Satellite-based and ground-based instruments are tools for continuous observations of various properties of clouds and aerosols. A combination of these two modes of observation not only yields an improved understanding of the Earth system, but, also enables us to address differences among observations and instrumentations.

In this study we will present an inter-comparison of satellite-based observations with ground-based remote sensing instruments. The different remote sensing satellite instruments that will be put to use are CALIOP (Cloud-Aerosol Lidar with Orthogonal Polarization), SEVIRI (Spinning Enhanced and Visible Infra-red Imager) – a 12 channel imager, and CloudSat – operating a 94 Ghz cloud profiling radar. The ground-based station is located at Mace Head, at the west coast of Ireland. By means of a set of ground-based remote sensing instruments, clouds and aerosols are continuously observed over Mace Head. This set of instruments include a Doppler cloud radar measuring at 35.5 Ghz, a Jenoptik ceilometer, operating at 1064 nm, a microwave radiometer and an infrared radiometer operating at 10.5 μm. In tandem, these instruments provide various properties of clouds and aerosols over the western Irish coast. Particular attention will be given to compare cloud base height, cloud top height and attenuated backscatter values, among others. Different levels of satellite data - in accordance to their matching footprints over Mace Head- will be used to highlight various cases.