

Laser remote sensing of tropospheric aerosol over Southern Ireland using a backscatter Raman LIDAR

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Raman backscatter coefficients, extinction coefficients and lidar ratios were measured with a ground based Raman lidar system at University College Cork, Ireland, during the periods of July 2012 – August 2012, April 2013 – December 2013 and March 2014 – May 2014. Statistical analysis of these parameters in this time provided information about seasonal effects of Raman backscatter coefficients and the altitude of the top of the planetary boundary layer.

The mean of the altitude of the top of the planetary boundary layer over these time periods is 950 ± 302 m. The values are larger in summer, 1206 ± 367 m, than in winter, 735 m. The altitude of the top of the planetary boundary layer measured at Cork is lower than most EARLINET stations. Raman backscatter coefficients above and altitude of 2 km are highest in summer and spring where the values are greater than $0.28 \text{ Mm}^{-1} \text{ sr}^{-1}$. Winter values of Raman backscatter coefficient are less than $0.06 \text{ Mm}^{-1} \text{ sr}^{-1}$. These seasonal effects are consistent with most EARLINET stations.

Large aerosol loads were detected in July 2013 due to a Canadian forest fire event. HYSPLIT air-mass back trajectory models were used to trace the origin of the detected aerosol layers. The aerosol forecast model, MACC, was used to further investigate and verify the propagation of the smoke. The Lidar ratio values and Klett and Raman backscatter coefficients at Cork, for the 4th July, the 7th to 9th of July and the 11th July were compared with observations at Cabauw, Minsk, Granada, Bucharest, Sofia and Garmisch. Lidar ratio values for the smoke detected at Cork were determined to be between 33 sr and 62 sr.

The poster will discuss the seasonal changes of Raman backscatter coefficients and the altitude of the top of the planetary boundary layer at Cork. An investigation of a Canadian forest fire event measured at Cork will be compared with other data from the EARLINET database.