The relationship between aerosol backscatter coefficient and atmospheric relative humidity in an urban area over Athens, Greece, using Raman lidar and radiosonde data - DTU Orbit (13/12/2018)

**The relationship between aerosol backscatter coefficient and atmospheric relative humidity in an urban area over Athens, Greece, using Raman lidar and radiosonde data**

In this article a statistical assessment concerning the relationship between the aerosol backscatter coefficient (β aer) and the relative humidity (RH) in the lower and middle troposphere, over Athens (Greece), is presented. For the purpose of this study, correlative radiosonde and aerosol backscatter lidar data were analysed for a period of 4 years (January 2003–December 2006), as obtained in the framework of the European Aerosol Lidar Network (EARLINET) project. The vertical profiles of the aerosol backscatter coefficients were measured by a combined Raman/elastic lidar system at ultraviolet (355 nm) and visible (532 nm) wavelengths. The correlation coefficient (R) of the vertical profiles of the RH against the backscatter coefficient of aerosols was investigated in altitudes within the free troposphere (0–6000 m). The altitude range was divided into three areas: 0 m up to the top of the Planetary Boundary Layer (PBL); PBL up to PBL + 2000 m; and PBL + 2000 m up to 6000 m. The properties and seasonal variations of the height of the PBL were also studied. The annual mean PBL height over Athens was found to be (1320 ± 480) m, while during the warm period of the year (spring–summer) the PBL was higher than during the cold period (autumn–winter). Regarding the correlation coefficient (R), low (0–0.5) and medium (0.5–0.8) R values were mostly observed during the warm months of the year. For the aerosols originating from the Balkan area the highest correlation was observed at both wavelengths (R = 0.71 at 355 nm and R = 0.41 at 532 nm), especially during the years 2003 and 2005 (R = 0.61 at 355 nm and R = 0.93 at 532 nm). The almost linear correlation of this type of aerosols can be attributed to the fact that these remained for a longer time in a coherently alternating atmosphere, therefore having the tendency to become homogenized.

**General information**

State: Published
Organisations: Test and Measurements, Wind Energy Division, Risø National Laboratory for Sustainable Energy, National Technical University of Athens, National Observatory of Athens
Contributors: Angelou, N., Papayannis, A., Mamouri, R., Amiridis, V., Tsaknakis, G.
Pages: 8983-9006
Publication date: 2011
Peer-reviewed: Yes

**Publication information**

Volume: 32
Issue number: 24
ISSN (Print): 0143-1161
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.93 SJR 0.796 SNIP 0.853
Web of Science (2017): Impact factor 1.782
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2 SJR 0.804 SNIP 1.059
Web of Science (2016): Impact factor 1.724
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.86 SJR 0.849 SNIP 1.025
Web of Science (2015): Impact factor 1.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.79 SJR 0.856 SNIP 1.184
Web of Science (2014): Impact factor 1.652
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.53 SJR 0.784 SNIP 1.097
Web of Science (2013): Impact factor 1.359
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes