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Determination of the atmospheric boundary-layer height over Sofia based on lidar ad radiosoundings data

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The atmospheric boundary layer height can be determined with high time and spatial resolutions using lidars and consecutive aerological soundings. That height defines the volume in which various pollutants spread, especially over an urban area in a mountain valley. Moreover, the interplay between orography and weather conditions creates complex vertical profiles with multiple layering. This work aims at following of the seasonal variations of the mixing layer (ML) and residual layer (RL) height and their interaction over the city of Sofia (situated in a mountain valley). The experimental lidar data were taken during different seasons in 2005 to 2007. The analysis of the lidar data uses S-function and its standard deviation and second derivative. The dynamic of the different layers development during various seasons is determined. Analysis and comparisons with the operational aerological soundings at 12:00 UTC in Sofia are also performed. This study is concentrated within clear sunny days and moderate wind. In conclusion it should be noted that during the all seasons two different types of ML, regarding the height reached and the manner of development, are observed: ML reaching low height with gradual increase in height during the day and ML reaching high height with two stages of development - slow in the beginning and rapid at the end of the experiment.