



Boundary-Layer Height by ceilometer and radiosounding in Sofia valley for specific cases

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Sofia is the biggest city in Bulgaria and it is located in a valley elevated 550 – 600 m asl, surrounded completely by mountains with different height. In this situation, the profiles of meteorological parameters differ from those above flat homogeneous terrain. The valley is characterised by local circulations, the effect of which on vertical profiles is not studied in detail. In particular, the determination of the boundary-layer height (BLH) is challenging task due to multiple inversion layers often observed in radiosounding records. Every winter, the valley suffers from persistent strong fogs during anticyclonic situations and the observation of BLH with ceilometer is quite challenging. Therefore, in this study, two types of instruments are used – radiosounding and ceilometer. The aerological sounding is launched in the eastern part of the city at Sofia aerological observatory (WMO 15614) at 12h UTC. The ceilometer of Sofia University is positioned near the city centre in a park. Two main cases are analysed: persistent fog over the valley in winter and convective almost cloudless situations during summer. Two periods of about 10-15 days duration were chosen for the study, covering winter of 2015 and summer of 2013. During hot cloudless days the BLH determined by ceilometer and radiosoundings is similar. During foggy periods, the direct method of radiosounding provides profiles and information about the vertical extend of the foggy layer. The ceilometer signal does not penetrate through the fog, but the high resolution of the ceilometer observations allows to identify start, duration and end of persistent fog situations. The measured profiles of both periods and methods are compared with MM5 mesoscale model forecasts at noon.