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The Atmospheric Boundary Layer (ABL) height is a key parameter in air quality research as well as in order to parametrize numerical simulations and forecasts. The identification of thermally stable layers has been one of the most common approaches in order to estimate this height. However, radiosonde's coarse temporal resolution is not enough to investigate the diurnal cycle of the ABL. Remote sensing has overcome this problem with a high temporal resolution. The backscatter retrieved by ceilometers elucidates the height that aerosols are able to reach and therefore has been used to estimate ABL height. Additionally, the implementation of Doppler lidars, and the velocity profiling provided by them, makes possible to investigate ABL via turbulence variables. However, different retrievals of ABL height are not usually coincident with each other and this issue becomes more evident over topographically complex terrain, such as Mexico City. It has been previously shown that the aerosol layer and the convective boundary layer height are generally not coincident over mountainous terrains. In this presentation we show that, at daytime hours, the convective boundary layer height (retrieved with Doppler lidar data) is lower than the aerosol layer height (retrieved with ceilometer data) during one year over Mexico City. Diurnal and monthly variabilities are discussed and the remote sensing-retrieved heights are compared with thermally stable layers estimated from radiosonde data. We show that multiple thermally stable layers develop, the upper ones are similar to the ceilometer retrieved heights and the lower ones are approximately as high as the Doppler lidar ones. Finally, the influence of radiation and precipitation over the retrieved heights is discussed over the year. The present research illustrates how the comparison between ceilometer backscatter and Doppler lidar ABL height retrievals can contribute to investigate the complexity of the ABL height over the mountainous terrain of Mexico City.