**The Scale Height of Background Tropospheric Aerosol over Mauna Loa Observatory, Hawaii**

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The concept of exponential change is often used for the molecular density of the atmosphere. The scale height appears as H in the formula n(z) = Const * exp(-z/H) where n(z) is the density as a function of altitude z. Above Mauna Loa Observatory (MLO) at 19.6 deg N. latitude, H is about 9 km. Averaging the decades-long record from the NOAA aerosol lidar (532 nm) at MLO shows an irregular altitude profile of aerosol extinction heavily influenced by tropospheric clouds and Asian dust. But simply using the median of the profiles instead of the average produces a function remarkably close to an exponential decrease. Shown in Fig. 1 the aerosol scale height at MLO in the troposphere is 2.49 km. The camera lidar record produces nearly the same scale height but lower in magnitude. The profiles should match, but the difference is explained by the camera lidar profile being normalized just below the tropopause to zero aerosol, when in reality the lidar measures a small but real aerosol scatter. The Boulder lidar scale height, calculated in the same way, is very similar (2.41 km). This simple relationship may be useful to distribute aerosol in models and should represent the central Pacific ocean region. Calculating extinction from lidar backscatter, or camera lidar scatter, requires an assumption of an Extinction to backscatter ratio. The value of 20 sr used here is often used to represent tropospheric aerosol, but since it is a constant the scale heights would not be effected by using a different value.

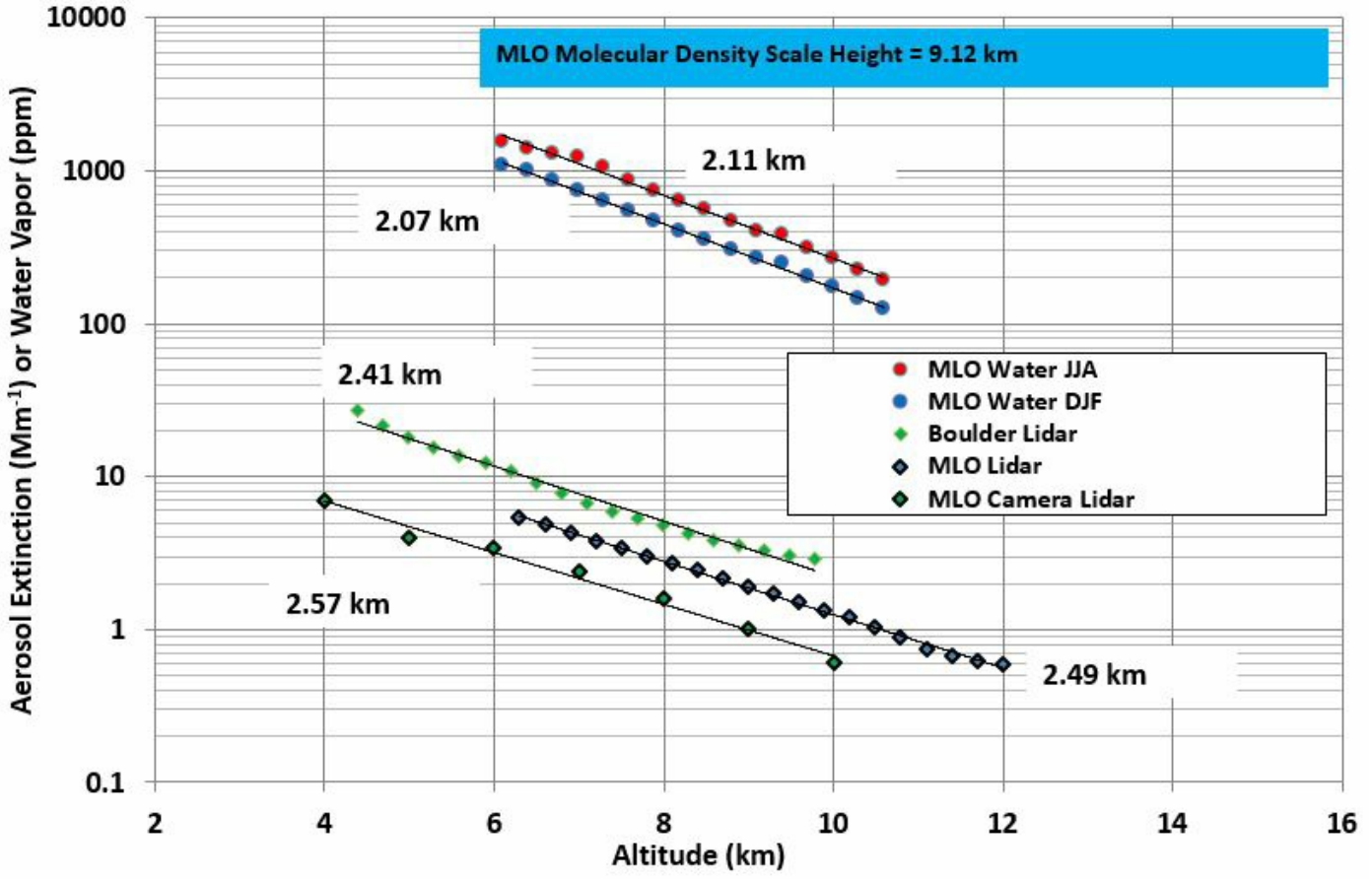


**Figure 1.** Figure 1. Tropospheric scale heights. The MLO water profiles come from the water and nitrogen Raman channels of the lidar and are averaged. The Boulder and MLO lidar and MLO camera lidar profiles are from the median of the individual profiles.