EMS Annual Meeting Abstracts
Vol. 15, EMS2018-520, 2018

The Atmospheric Boundary Layer heights in central Amazonia during the experiment GoAmazon 2014/5.

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The heights of the atmospheric boundary layer (ABL) were measured and estimated using data collected during GoAmazon 2014/5 Experiment, which was held in central Amazonia (Manaus, AM) during the years 2014 (considered a typical year in terms of rainfall) and 2015 (a dry year due to the occurrence of ENSO 2015/16). The experiment used the US ARM DOE Mobile Facility installed for 2 continous year. Differents methods/sensors were used (continuous data from ceilometer, sodar, LIDAR and a radar RWP and in situ radiosondes launched at specific times (at 2, 8, 14, 20 local time (GMT-4 hours). The estimates from the minisodar during nighttime was based on the assumption that the Wind maximum is the height of the ABL. On average, the Nocturnal Boundary Layer (NBL) is around 300 m and this height is very stable during the night (due to the weak and intermittent turbulence). The minisodar presented the lowest depth values. The ceilometer data and radiosondes matched very well, with differences around 30 m only. For the Convective Boundary Layer (CBL), the values are around 1200-1300 m height, being the year 2015 deeper (due to the less rainfall and more sensible heat fluxes as a consequence of the surface energy partition). The Lidar measurements showed a good agreement with the early morning growth of the CBL (shallow depth between 300-900 m), especially for the typical year (2014). As the year 2015 was very dry and more polluted (due to the higher rate of tropical forest deforestation that had occurred at the neighborhoods), its data may have been contaminated. After noon, the Lidar showed the lowest values of the instruments analyzed (an underestimation of $\approx$ 125 m at early afternoon, when the convection is very active. The RWP presented the higher values for the NBL (although this overestimation is less than 80 m), very coherent results for the shallow CBL (until noon) and an underestimation ($\approx$ 175 m) for the deeper convection (afternoon times). In general, all the instruments showed a reasonable and common pattern and these data can be seen as representative of the daily cycle from ABL for Central Amazonia.