Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-542-RC2, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Diurnal variability of the Atmospheric Boundary Layer height over a tropical station in the Indian Monsoon Region" *by* Sanjay Kumar Mehta et al.

Anonymous Referee #2

Received and published: 12 September 2016

Review of the article titled "Diurnal variability of the atmospheric boundary layer height over a tropical station in the Indian monsoon region" by Mehta and coauthors for publication in the Atmospheric Chemistry Physics.

The authors have used data collected by the radiosondes over a tropical station and deduced the boundary layer height. The data were collected over 3-year period during various field campaigns. They have shown the diurnal, and seasonal cycle of boundary layer depth. Further they have classified the boundary layer structure into different categories like convective, stable and residual and have reported the statistics of those as well. The authors have made a good attempt to report the statistics but they fall short in deriving any scientific conclusions from them, leaving the reader with a feeling

that no manuscript is simply a collection of statistics. I suggest the manuscript to go through a thorough revision before being published. Below I have listed my major and minor concerns.

Major Concerns: 1) As I mentioned earlier, the paper seems like a collection of statistics. You have mentioned in the abstract that various studies have reported the boundary layer depth from that station. So I am not sure of the purpose of this paper is to validate them, or to report them again or to gain some scientific insights on the causes of the changes in the boundary layer depth. It will be good if you can clarify it in the introduction section. 2) As you have radiosonde data, I suggest you calculate the lifting condensation level (LCL) and also report its variation for the different boundary layers. Please refer to Bolton (1980) regarding the calculations. Add the LCL to Figure 8 and 10. 3) You can calculate the equivalent potential temperature and saturation equivalent potential temperature from Bolton (1980) and then further calculate the convective available potential energy (CAPE) and Convective Inhibition (CINE). These are very important quantities and will make the article very robust. 4) You have reported the Cloud top heights (CTH) from the satellite measured TBB. It will be great if you report the cloud base height and cloud top heights from the radiosodes themselves. The RH measurements will tell you when the sensor is passing through cloud layers. The derived cloud base height then can be added to figure 8 and 10. You can then classify the thermodynamic structure based on cloud thickness rather than cloud top heights. 5) You have made a very good attempt at classifying the BL structure as convective+residual, stable, stable+convective etc. It will be very nice if you can make a cartoon similar to Figure 9.21 of Wallace and Hobbs book with actual values you have for the summer and winter seasons. Thanks.

Minor concerns: 1) The shades are not visible in the Table. 2) Line 15: Please add MSL after lat, lon 3) Line 22: I would say "constant" rather than "steady". 4) Line 36: You mean Stull 1988 not 1998. 5) Line 39: You mean to say "convective" and not "convection" 6) Line 45-60: what about the role of shear and radiation. 7) Line 65-70:

Might be good to refer to Schmidt and Niyogi. 8) Line 74: You mean to say “remote sensing” not “remote sounding”. 9) Line 90: “launches” and not “launchings”/ 10) line 92: “has” and not “have”/ 11) Line 97: Please list the full-form of the acronum CAWSES 12) Line 165: It might be good to mention that the reported drift is below 4km. 13) Line 425-426: Please rephrase. “Attains” is misleading. 14) Figure 3 legend is incorrect. 15) Figure 4: I believe you have listed the lines for sunset and sunrise backwards. 16) Figure 6a: Why do you have two black bars surrounding the yellow bars.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-542, 2016.