Comments on "Revised identification of tropical oceanic cumulus congestus as viewed by CloudSat" by S. P. F. Casey et al.

This article re-evaluated the criteria adopted by Luo et al. (2009) to identify cumulus congestus using CloudSat data and suggested that some revisions are needed. It's a short but focused study and should be useful to the cloud community, especially those researchers who use CloudSat data. However, there remain a couple of major issues in the current form:

1) As pointed out by another reviewer (S. Tanelli), this manuscript misrepresented the previous study which it revisited – Luo et al. (2009). Luo et al. (2009) clearly stated that "these radar ETH conditions are the characteristics of active convective cores". In other words, the previous study didn't miss cumulus congestus because of negligence or carelessness, but it was intended to be exclusive, in order to single out convective cores inside larger cumulus congestus features. It's these convective cores that can be further analyzed using simple parcel theory, as did in a follow-up study (Luo, Z. J. , G. Y. Liu, and G. L. Stephens, 2010: Use of A-Train data to estimate convective buoyancy and entrainment rate, Geophys. Res. Letts. 37, L09804, doi 10.1029/2010GL042904). So, I echo Tanelli's viewpoint, that is, the authors should do justice to the previous paper and present it in a correct way giving it the credit it deserves. In particular in the abstract, the authors should avoid using strong words such as "bias" or "misrepresenting".

2) Some results contradict our common understanding of CloudSat /CALIPSO observations. The explanations presented by the authors are unsatisfactory. Some extra efforts are needed to make this a solid study.

(Lines 21-23 on p14888) states, "As expected, the mean CTH difference between CALIPSO and radar cloud mask 20 CTH is higher than between CALIPSO and radar cloud mask 40 CTH". If we assume that CALIPSO CTH is higher than that of CloudSat (most of the time), this means CTH(mask 40) > CTH(mask 20). This is clearly contradictory to what we know about CloudSat cloud masks. Cloud mask 40 means high confidence in cloud occurrence and should be observed at a lower level than cloud mask 20.

(Lines 24-27 on p14888) CTH_ CALIPSO < CTH_ CloudSat contradicts my understanding of how radar and lidar view cloud tops. Cloud top should consist of some very tiny particles so lidar will see them before radar does. The authors offered the possible explanation that some thicker clouds (tau > 3) hang above cumulus congestus so lidar signal gets attenuated (not seeing the underlying congestus). First of all, this hypothesis can be easily tested using CloudSat data alone since CloudSat will surely pick up those thick overlying clouds (tau > 3). It will be only a single morning's programming work to sort this out. Second, I don't believe this explanation as offered by the authors (i.e., CALIPSO being attenuated) will hold because even under total attenuation, CALIPSO will still be able to identifying the very top of this overlying cloud and will consequently assign a much higher CTH value. Something is fishy here.

Minor points:

1. (Lines 2-3, p14888) Why do some deep convective clouds have CTH of 2-3 km? Is this a CLDCLASS misclassification?
2. (Lines 8-17, p14888) At first, I was quite confused why the authors are so "obsessed" with cumulus and deep convection. Later, I started to realize that they serve as the candidate pool from which cumulus congestus clouds (3 km< CTH < 9 km) are selected. I think this point should be made clear earlier on.
3. (Line 8, p14890) Fig. 3 shows the global distribution of cumulus congestus. I don't think Yanai et al. (1973) is a relevant reference. Yanai never showed any "global" view of convective clouds. In those days, people built up their understanding of clouds based on data collected from radiosondes, which are very sparse over the oceans.
4. (Line 27, p14891) Although this is considered a major "limiting factor" by the authors, presence of 10 dBZ is also an important factor for identifying convective core. One man's noise is another man's signal. I think the authors should clarify this, that is, putting this "limiting factor" in a proper context.
5. (Figure 3) This figures shows the total number of congestus features, regardless of size. In other words, a congestus feature of 100 km wide will be counted with the same weight as one that is 10 km wide (one person, one vote, whether it's Bill Gates or a homeless – fair enough). But it may be a little misleading if people want to know how frequently cumulus congestus occurs over tropical oceans. In that case, size does matter. I personally prefer using occurrence frequency, instead of feature counts. After all, there might be some systematic differences in congestus size from one region to another (e.g., west Pacific Vs east Pacific).