

The manuscript introduces the new characteristics of the Tracking and Object-Based Analysis of Clouds (tobac) v1.5 Python package. The updated features include 3-D tracking, splitting and merging, internal spectral filtering, and treatments of periodic boundary conditions. The computational efficiency of tobac v1.5 is also enhanced significantly compared to earlier versions after coding optimization. Overall, the manuscript is well-written, well-organized, and easy to read. Most of the figures are helpful and clear. The topic is within the scope of GMD. The new characteristics of tobac v1.5 are essential to the scientific community and deserve to be introduced in a new manuscript. Here, I have some comments for the authors to improve the manuscript before publication further.

Line 1-3: Could you please use a better title?

Line 32: Delete “diffusive, advective”? Do you think diffusion and advection are neither dynamic nor thermodynamic processes?

Lines 281-282: I don’t understand the logic of this sentence. If there are just a few examples of splits and mergers in the atmosphere, why is there a clear need for splits and mergers processing within tobac?

Line 292: What do you mean by minimizing the movement of the object centers?

Line 325-331: Is Figure 8 consistent with the descriptions here? T2 in cell 1 is neither the last nor the first feature. What do you mean by linking the last feature of a cell to the first feature of a nearby cell? I may misunderstand something, but I need more detailed clarification of the method. In addition, could you please provide two real examples: one for merging and one for splitting? The purpose is to ensure that tobac works as you expect.

Lines 347-355: Yes, it is hard to select an appropriate distance parameter since you used the distance between features. Did you consider using the distance between segmentations? I meant the minimum distance between two segmented regions. It might eliminate the issue in Figure 9.

Lines 427-431: Why did you remap the brightness temperature dataset? According to the last paragraph, the segmentation could be conducted on the new (brightness temperature) grid. If so, plotting on the original GEOS-16 satellite grids would be more beneficial to introduce the new characteristic of tobac. In addition, in Line 430, I didn’t find the top-right feature marked by the grey dot. Did you mean that in the top-left corner?

Section 4.3: Could you please provide more details about the PBC treatments? I can understand the improvements from Figures 14 and 15 but don’t understand what you did to achieve them (I guess you just extended the x dimension to include the data from the next timestep in Figure 14). Is your method still valid if a feature crosses the boundary two times? In Figure 14c, the feature crosses only one boundary. If the feature is large enough, crossing another boundary on the right (or more), can tobac v1.5 get the correct result?

Lines 493-496: Please rewrite it with shorter sentences.