General Comments:

This study introduces a novel approach to reconstructing and merging global daily L-band Vegetation Optical Depth (L-VOD) data at a 9-km resolution from 2010 to 2021. The authors integrate datasets from the SMOS and SMAP satellites. They use a three-dimensional discrete cosine transform-based penalized least square regression (DCT-PLS) method to fill gaps in the data, followed by a spatiotemporal fusion model (STFM) based on non-local filtering to enhance the spatial and temporal continuity of the dataset. This material is important for long-term canopy and vegetation change studies. The manuscript is well-prepared, and the VOD data are valuable and should be published in *ESSD*. However, I have some questions about the data and their seasonal pattern, hope the authors can clarify them and confirm the data quality.

Specific Comments:

In Fig. 6, the description indicates that the rectangles emphasize some extreme value "reconstruction" results, but why does the first panel with a 30% missing proportion have a rectangle in the "Original" part line (magenta color)?

For Fig. 6 and Fig. 7, the colors for "Reconstructed" and "Original" are too similar. Please consider using more distinct colors, such as red and blue or black and blue. Additionally, the y-axis uses different scales in these figures. I suggest using the same y-axis scale range to better compare the relative size differences.

In Fig. 10, the x- and y-axes represent VOD. What do the colors and the color bar indicate? Please clarify their meaning.

In Fig. 18, VOD_st has more blank data compared to VOD_resmap. Can you provide a clearer explanation of why VOD_st is considered close to VOD_resmap (line 490)?

In Fig. 19, the red boxes and zoomed-in plots show that the reconstructed data appear smoother and free of striping. However, it is difficult to conclude that the reconstructed data are necessarily better. Why was the Black Sea region chosen as an example instead of another region with a higher VOD signal?

Data part:

1. Each data file includes only one time step and has a file size of 3.7 MB. I suggest merging them by year into a single NetCDF file.
2. I selected VOD data from two days: summer (2021-07-07, left panel) and winter (2021-01-07, right panel). In the Eastern US and many other regions, the seasonal pattern appears reasonable, with higher VOD in summer and lower VOD in winter in the Northern Hemisphere. However, in Sweden (red rectangle) in Europe, the summer VOD (~0.6) is lower than the winter VOD (~0.8). Additionally, the black boxes indicate that the western US, Alaska and western Canada have higher VOD in winter (almost as high as Amazon rainforest, VOD >1.0). Please confirm whether this seasonal pattern is reasonable in those regions.

3. There are large areas of missing data in Russia, China, and Japan during winter, but a specific spot in Russia appears red. Please confirm whether this pattern is reasonable.