This manuscript provides a detailed analysis of how land use changes in the Southeast Asia region affect vegetation greenness. Utilizing multi-source land cover datasets, it reveals how the transformation of land use since the 21st century has impacted vegetation greenness, based on machine learning algorithms and the SHAP interpreter. The topic of this manuscript is interesting, explaining why China and India, despite both being countries with rapidly developing agriculture, make significant contributions to greening trends, while the greening trend in Southeast Asia remains stagnant. However, certain aspects may need addressing before publication.

Major comments

1. The literature review concerning the driving mechanisms behind vegetation greenness changes in Southeast Asia appears to be incomplete and insufficiently detailed. It is essential to provide a more comprehensive overview of existing research to adequately situate the study within the current body of knowledge.
2. The methodology section requires significant revision due to several critical issues:
    - The use of citations is improper, with several missing references that need to be included to support the study's claims and methodology.
    - Details regarding the specific version of the dataset used and the preprocessing steps undertaken are absent, which is crucial for the reproducibility and integrity of the research.
    - The explanation of how multiple land cover datasets were harmonized lacks clarity, making it difficult to understand the approach taken.
    - Descriptions of scenario simulations are unclear. When introducing scenario simulation schemes, it is imperative to explicitly detail the calculation methods for assessing the impact of each factor, which would greatly enhance the manuscript's credibility and reliability.

Minor comments

1. The discussion mentions, "It is also important to note that our estimation of CRO or OP expansion was based on the assumption that the increased areas of CRO or OP since 2001 came from EBF." Such a crucial assumption should be stated in the methodology section.

2. On the basis of Figure 5, it would be beneficial to add the spatial distribution of dominant factors for each pixel. This enhancement would more clearly reveal whether the LAI trend for each pixel is positive or negative and which factors primarily drive these changes.

3. It would be preferable to represent Figure S2 as a scatter density plot (like Figure 4c,d) to facilitate the observation of changes in SHAP values with features, and to prevent potential misinterpretation arising from the clustering of scatter points.

4. There is an error in Equation (2) that needs to be corrected.

5. Figure 4c,d depicts the coupling effects of f_EBF with f_OP and f_CRO rather than the interaction effects mentioned in the caption, making it seem indistinguishable from Figure S2a. It is recommended to add SHAP dependence plots illustrating the interaction effects for a more in-depth analysis.

6. Previous studies have highlighted discrepancies between the cropland area changes provided by LUH2 and actual conditions in China and the United States. It is worth investigating whether a similar discrepancy exists in Southeast Asia. Meanwhile, the spatial resolution of the LUH2 dataset is too coarse for the purposes of this study.