Comments from Reviewer #1:

The paper A 30 m annual cropland dataset of China from 1986 to 2021 provides a remarkable attempt at creating national knowledge on the spatial and temporal patterns of cropland in China. In general, it is a well-written and useful study and I enjoy the reading. The following comments are my suggestions for ensuring its messages are clear ad grounded behind the results.

> Thanks for your positive comments. Based on your constructive suggestions, we have carefully revised our manuscript to better present the methods and results. Please find our detailed responses to your comments below.

1. Definition of cropland. Can I say that here you excluded all cash crops, like tea garden, citrus, etc. (in addition to sugarcane), all of which are widely distributed in Southern China. If so, it may be necessary you clearly mentioned this point in your manuscript.

> Thank you for pointing it out. We would like to reiterate the definition of our annual cropland, which is **a piece of land of 0.25 ha in minimum (minimum width of 30 m) that is sowed/planted and harvestable at least once within the 12 months after the sowing or planting date**. One fundamental criterion for discerning annual cropland from other crops is that its vegetation signals in remote sensing imagery must demonstrate noticeable variations over a 12-month period, reflecting the planting and harvesting activities. In this regard, certain exceptions are excluded in the definition of annual cropland: (1) Perennial crops like sugarcane and cassava, which have longer vegetation cycles and are not planted annually. However, if they are planted and harvested within a 12-month timeframe, we would consider them as croplands for that specific year. (2) Fruit, tea, and coffee plantations, as their vegetation signals more closely resemble those of trees. (3) Greenhouse crops, as they exhibit distinct remote sensing characteristics compared to other cropland types. (4) Small plots such as legumes that do not meet the minimum size criteria of cropland.

To further illustrate the differences between our defined annual cropland and other crops (such as tea and citrus that you mentioned), we selected seven agricultural regions, mainly located in Southern China, to compare their remote sensing images and associated NDVI time series. Fig. R1a depicts a typical rice field in Hengyang, Hunan, where the NDVI signals fluctuate periodically within a one-year span. In comparison, other plantations including perennial sugarcane, cassava, fruit trees, tea, coffee, and greenhouses exhibit distinct characteristics (Fig. R1b-g). Given their perennial nature, sugarcane and cassava may not undergo annual harvests, resulting in consistently high NDVI values in certain years (as indicated by the red circles in Fig. R1b-c). Fruit trees, on the other hand, continue to grow over several years rather than being harvested in a single year like conventional crops. Consequently, despite experiencing phenological changes, NDVI time series for fruit trees consistently maintain high values, typically exceeding 0.4 (Fig. R1e-f). Regarding greenhouse crops, their NDVI values are generally lower than those of conventional crops, with the maximum value not surpassing 0.6 (Fig. R1g). Therefore, they are not considered cropland in this study.

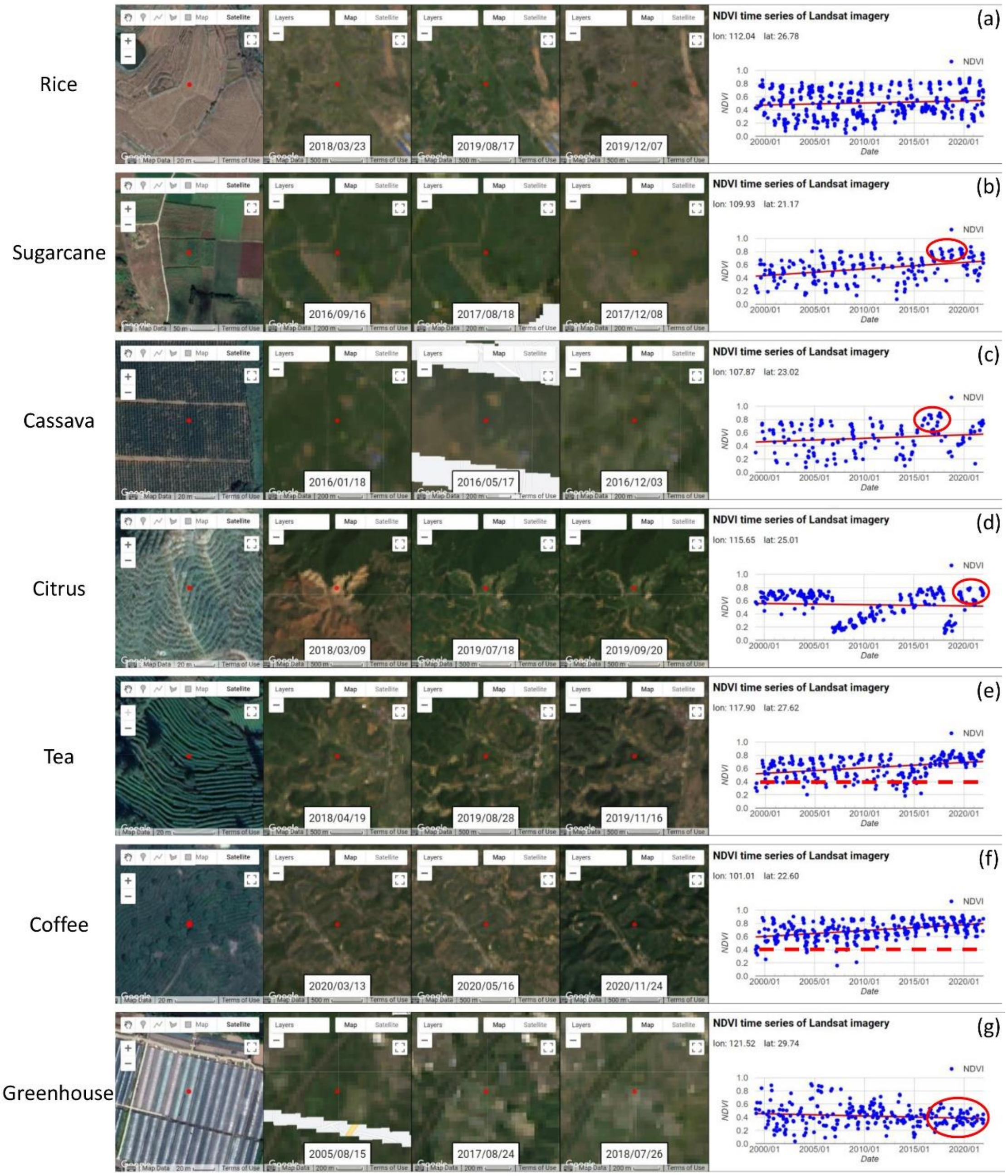

Figure R1. Comparisons of satellite images and NDVI time series between annual cropland defined in this study and other crops. (a) Rice fields in Hengyang, Hunan. (b) Sugarcane plantation in Zhanjiang, Guangdong. (c) Cassava crops in Nanning, Guangxi. (d) Citrus trees in Ganzhou, Jiangxi. (e) Tea gardens in Wuyishan, Fujian. (f) Coffee trees in Pu'er, Yunnan. (g) Recent greenhouse construction in Ningbo, Zhejiang. All the figures are generated using © Google Earth Engine.

In the revised manuscript Section 2 (Lines 116-127), we have reorganized the definition of cropland for better clarity, which is duplicated as follows:

"Annual cropland in this study is defined as a piece of land of 0.25 ha in minimum (minimum width of 30 m) that is sowed/planted and harvestable at least once within the

12 months after the sowing or planting date. This definition aligns with the criteria established by the Joint Experiment of Crop Assessment and Monitoring (JECAM) network (Defourny et al., 2014) and adopts a shared scope of cropland that meets FAO's Land Cover Meta Language (Di Gregorio, 2005). One crucial criterion for discerning annual cropland in this study is that its vegetation signals in remote sensing imagery must demonstrate noticeable variations over a 12-month period, reflecting the planting and harvesting activities (Fig. S1a). Consequently, certain exceptions are excluded in the definition of annual cropland: (1) Perennial crops like sugarcane and cassava, which have longer vegetation cycles and are not planted annually (Fig. S1b-c). However, if they are planted and harvested within a 12-month timeframe, we would consider them as croplands for that specific year. (2) Fruit, tea, and coffee plantations, as their vegetation signals more closely resemble those of trees (Fig. S1d-f). (3) Greenhouse crops, as they exhibit distinct remote sensing characteristics compared to other cropland types (Fig. S1g). (4) Small plots such as legumes that do not meet the minimum size criteria of cropland."

Additionally, we have incorporated Fig. R1 into the supplementary materials Fig. S1.

2. Intercomparison. I am happy the CACD was well validated with some published land cover products. However, it seems all selected reference datasets are single/multiple epoch maps. How about the agreement level with some cropland dynamic products, e.g., https://glad.umd.edu/dataset/croplands. In this way we can directly know how good or the accuracy of changed cropland, including both cropland expansion and loss.
> Thank you for the valuable suggestion. In the revised manuscript, we have included comparisons of multi-epoch cropland products across regions (Figs. R2-6, respectively corresponding to supplementary materials Figs. S12-16). Taking the GLAD dataset you mentioned as an example, it shows satisfactory performance in northern China (Fig. R2). However, there is a considerable level of misclassification and underestimation of GLAD data in southern China (Figs. R3-5), which is also corroborated in the comparison with statistical data (Fig. 8 in the manuscript). In addition, we identified classification errors in products like CLCD and CLUD, which failed to detect cropland losses due to airport construction in 2017 in Chengdu, Sichuan (Fig. R6). We are confident that these in-depth analyses will provide readers with a more comprehensive and nuanced understanding of the similarities and distinctions among various products.

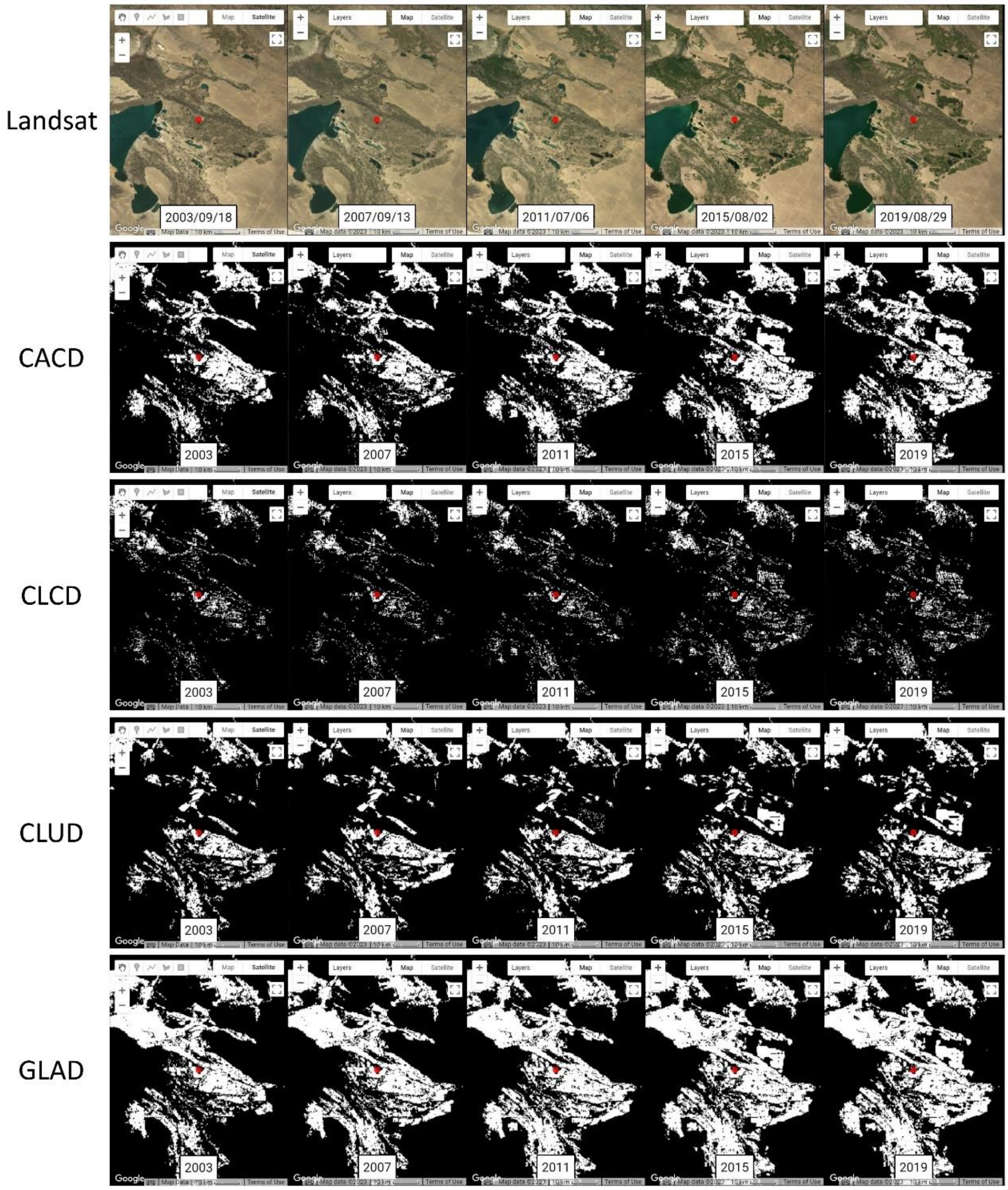

Figure R2. Comparisons of Landsat images and cropland products across years in Altay, Xinjiang, with cropland shown in white and non-cropland shown in black. All the figures are generated using © Google Earth Engine.

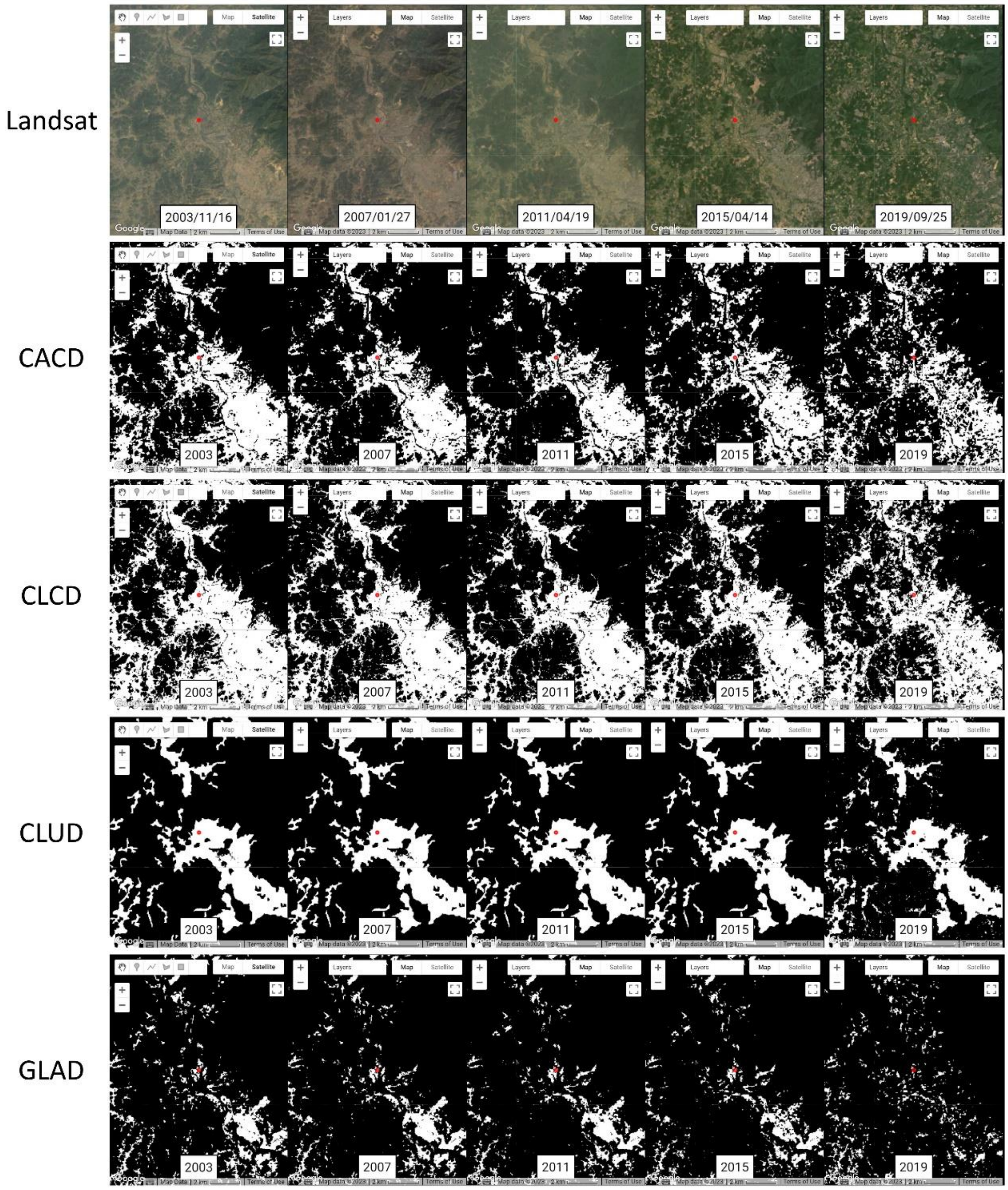

Figure R3. Comparisons of Landsat images and cropland products across years in Liuzhou, Guangxi, with cropland shown in white and non-cropland shown in black. All the figures are generated using © Google Earth Engine.

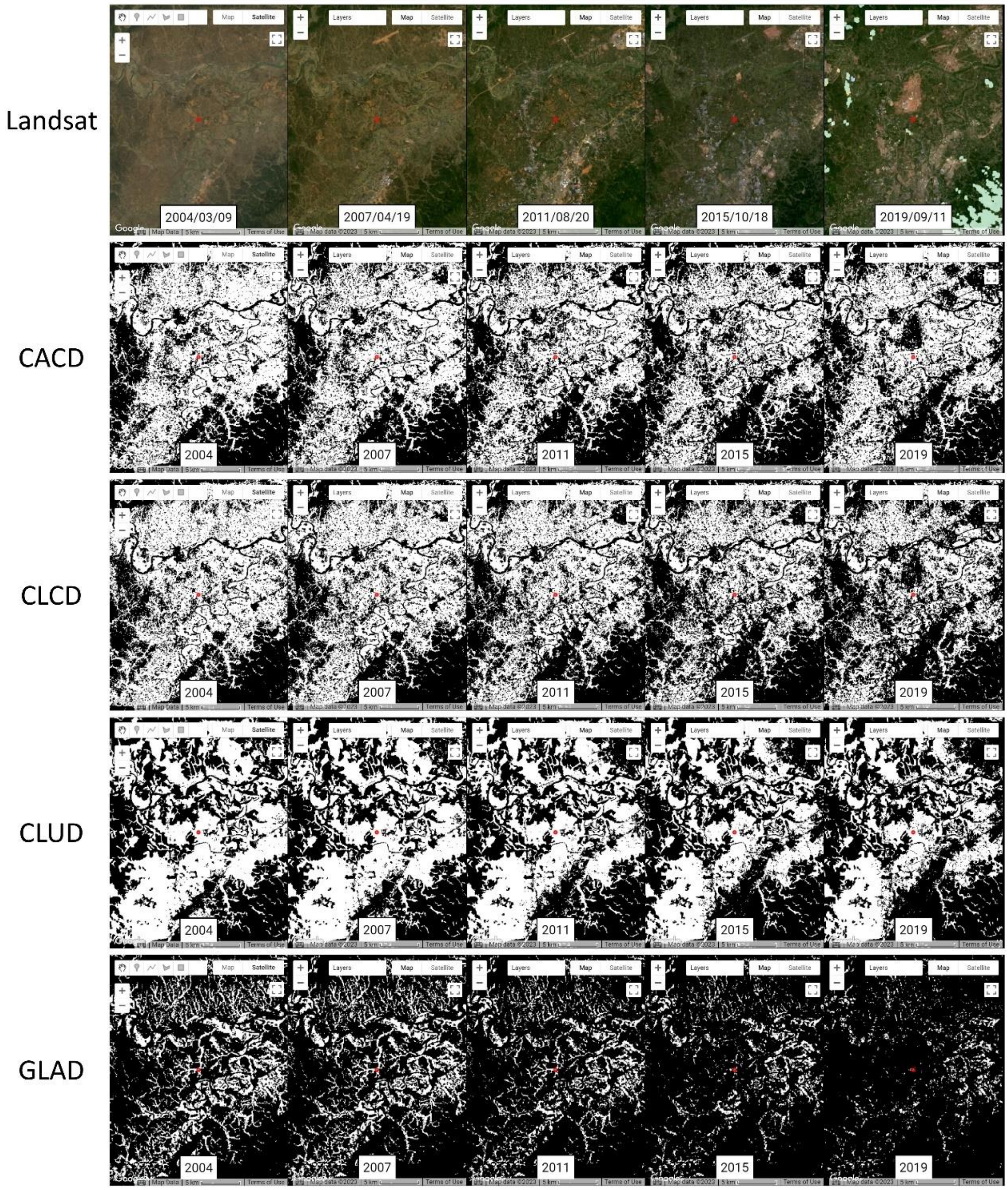

Figure R4. Comparisons of Landsat images and cropland products across years in Ganzhou, Jiangxi, with cropland shown in white and non-cropland shown in black. All the figures are generated using © Google Earth Engine.

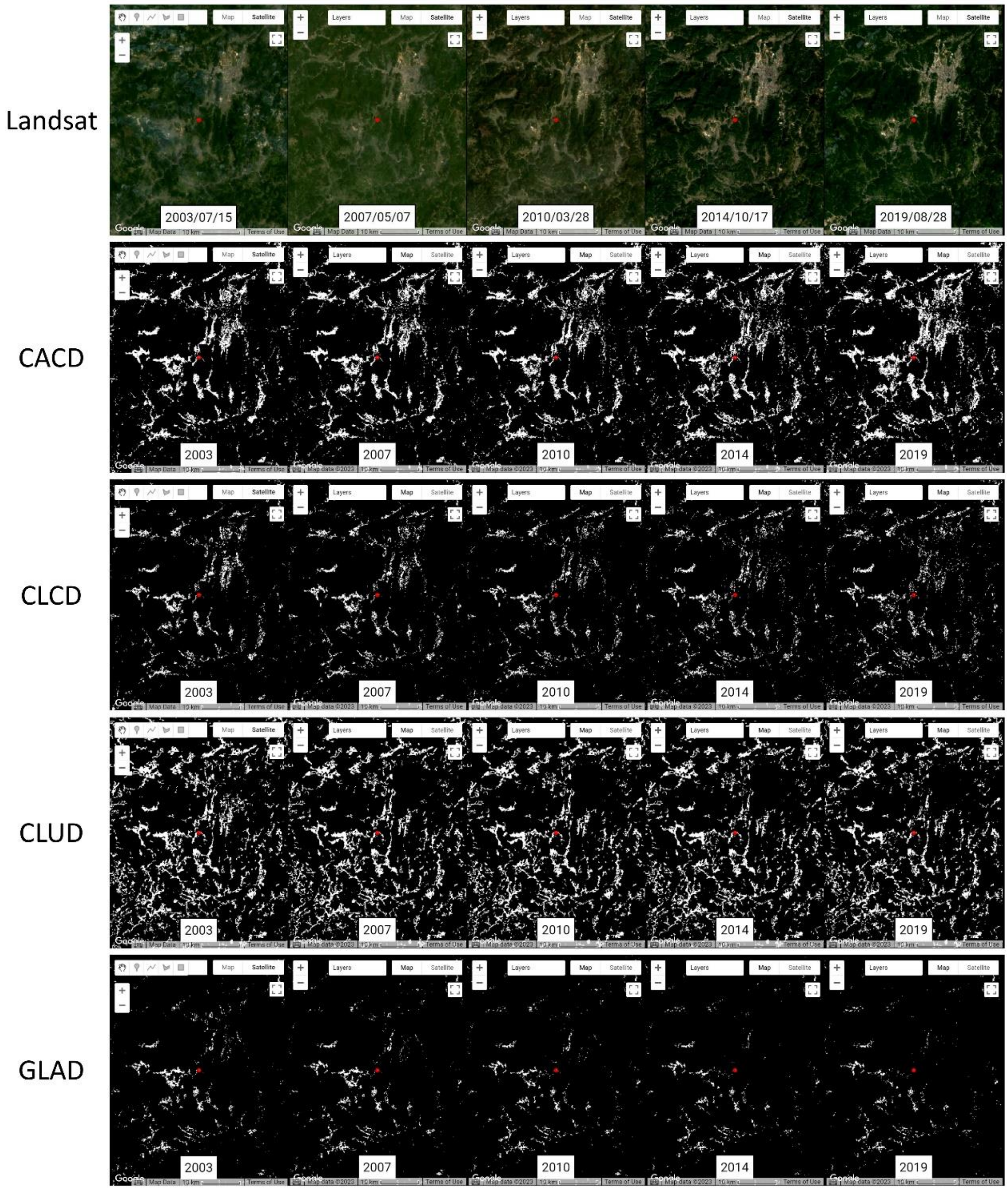

Figure R5. Comparisons of Landsat images and cropland products across years in Longyan, Fujian, with cropland shown in white and non-cropland shown in black. All the figures are generated using © Google Earth Engine.

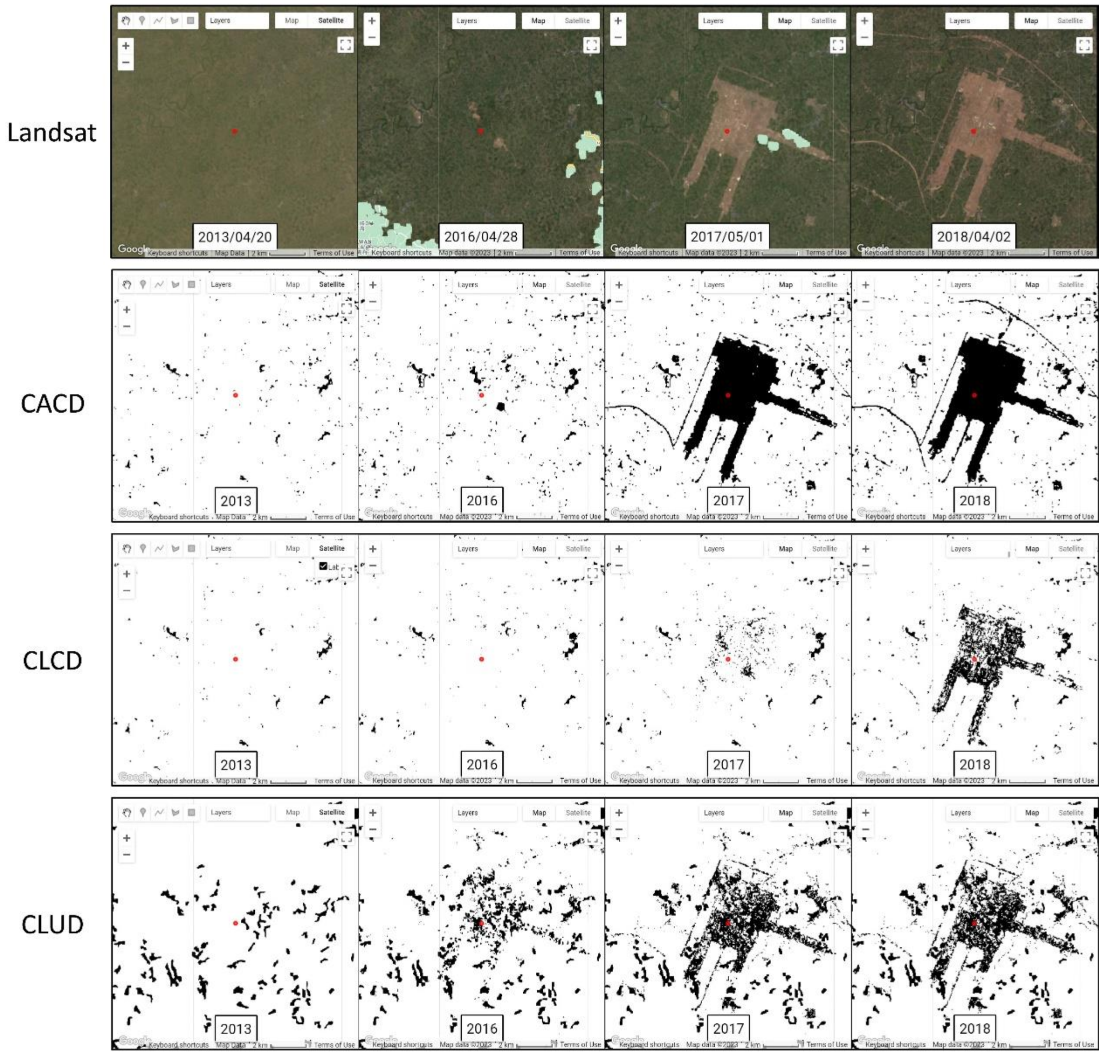

Figure R6. Comparisons of Landsat images and cropland products across years in Chengdu, Sichuan, with cropland shown in white and non-cropland shown in black. All the figures are generated using © Google Earth Engine.