Comments from Reviewer #4:

This study presents a 30-meter resolution dataset of Soil and Water Conservation Terrace Measures in China. The manuscript is generally well-structured, and the dataset holds significant value for accurate soil erosion assessment and for supporting soil and water conservation planning. However, I have several suggestions and comments that may help improve the clarity and rigor of the paper:

Response: We appreciate you very much for your positive comments concerning our manuscript. Those comments are valuable and helpful for improving our manuscript. We followed all comments and made revisions and responses carefully. A point-by-point reply to the comments are listed below.

1. Lines 61–63:

The authors mention that ignoring terrace types could lead to inaccuracies in soil erosion assessments. I recommend expanding on this point to clarify the mechanisms through which different terrace types influence erosion rates. This would help to better justify the necessity of developing a terrace-type-specific dataset.

Response: Thank you for your insightful comment. In the Introduction of the revised manuscript (Lines 61-68), we further elaborated on the mechanisms by which different terrace types influence soil erosion rates. It now stands as follows:

"The effectiveness of terraces in SWC varies according to type. Level terraces, characterized by flat cultivated surfaces, can effectively reduce the amount, velocity, and energy of surface runoff and increase water infiltration, thereby effectively preventing the transportation of sediment (Wei et al., 2012; Chen et al., 2013; Arnáez et al., 2015). Zig terraces increase water infiltration and reduce runoff by creating micro-catchments (Wang et al., 2004). Conversely, slope terraces, with their uneven surfaces, are more prone to generating runoff than level terraces or zig terraces (Wei et al., 2016). Level terraces exhibit the most effective SWC benefits (Oliveira et al., 2012). Compared to slope terraces, level terraces can reduce runoff by 56.5% and sediment by 53.1% (Chen et al., 2017). Ignoring terrace type can lead to inaccuracies in soil erosion assessment, and the absence of long-term terrace data hinders analyses of soil erosion trends."

2. Spatial Resolution Clarification:

Please explicitly state the spatial resolution of the final product in the Data and Methods section. Additionally, if input datasets used in the production process have differing spatial resolutions, please clarify how this issue was handled (e.g., resampling methods or resolution harmonization techniques).

Response: Thank you for your advice. We have explicitly specified the spatial resolution of the final product in the Methods section (Line 82-84). In this study, we used only 30 m resolution Landsat imagery and 30 m resolution Copernicus DEM data, without performing any data resampling or resolution conversion. In addition, we provided detailed information on the data in the supplementary materials (Table S1).

"Figure 1 illustrates the framework of 30-meter resolution terrace mapping. The workflow includes sample collection, feature calculation, classification implementation, post-classification processing, and accuracy evaluation. Detailed information on each stage of the terrace mapping process is provided below."

Table S1. The multitemporal data series used in this study.

Data name	Year	Spatial resolution (m)	Data sources
Landsat-5/8 surface reflectance (SR) data	2000, 2010, 2020	30	The data is accessible via GEE and is provided by the United States Geological Survey (USGS) (https://earthengine.google.com/).
Copernicus DEM	2010	30	The data is accessible via GEE (https://earthengine.google.com/).
GlobeLand30	2000, 2010, 2020	30	The data is provided by the National Geomatics Center of China (NGCC) (http://www.globallandcover.com/).

3. Validation with Statistical Data:

Has the dataset been validated or cross-referenced with any official statistical records on terrace areas, either at the national or regional level? If feasible, a comparison with statistical data, including breakdowns by terrace type, would strengthen the credibility and applicability of the dataset.

Response: Thank you for the valuable suggestion. Due to the lack of official terrace area statistics at the national and regional levels, we are unable to conduct comparative verification. To ensure the reliability of the dataset, we evaluated dataset accuracy using 14,986 field survey samples from the China's First National Census for Water. The results indicate that the dataset exhibits high accuracy. The average overall accuracy (OA) of the terrace was 91.7% and the average F1 score was 83.4%. For different terrace types, the average OA was 89.4% and the average F1 score was 78.9%.

4. Comparison with Existing Datasets:

To further highlight the value and potential advantages of the newly developed dataset, I suggest comparing it with existing terrace-related datasets (if available). This could include spatial consistency, classification accuracy, or coverage of different terrace types.

Response: Thank you for your constructive comments. At the national scale, only two terrace datasets are currently available: the 2018 China Terrace Map (CTM2018) (Cao et al., 2021) and the 2017 China Terrace Map (CTM2017) (Li et al., 2024). These datasets do not further classify terrace types, so we were only able to compare terrace coverage. In the revised manuscript, we conducted a comparative analysis of product consistency across different geographic regions in China (Figure 4). Additionally, due to the lack of validation samples for 2017 and 2018, we were unable to assess the classification accuracy of CTM2018 and CTM2017. To analyze the differences among the three datasets, In Section 4.1, we compared terrace areas at the provincial scale and analyzed the causes of these discrepancies. It now stands as follows (Lines 203-212, and 278-288):

"*Figure 4 illustrates the spatial consistency between SWCTMD and the two existing datasets: the 2018 China Terrace Map (CTM2018) (Cao et al., 2021) and the 2017 China Terrace Map (CTM 2017) (Li et al., 2024). SWCTMD exhibits the highest accuracy. Compared with SWCTMD and CTM2018, CTM2017 exhibits relatively lower accuracy for both typical terrace and non-terraces areas (regions A, B, C, D F and G in Fig. 4b). For typical terraces, SWCTMD and CTM2018 show similar identification performance (regions A, B, C and F in Fig. 4b). However, for atypical terraces, such as zig terraces located in Yunnan Province, SWCTM successfully identifies these as terraces, whereas CTM2018 fails to identify them as terraces (regions E in Fig. 4b). Conversely, for non-terrace areas situated in the Middle-Lower Yangtze River, SWCTMD accurately classifies these as non-terraces, while CTM2018 erroneously identify them as terrace areas (regions G in Fig. 4b). At the provincial scale, the majority of provinces exhibit larger terrace areas in SWCTMD compared to both CTM2018 and CTM2017 (Tables S8 and S9).*"

"We compared the 2020 terrace area estimated by SWCTMD with those from CTM2018 and CTM2017. SWCTMD exhibited the largest terrace area compared to CTM2018 and CTM2017. The areal discrepancies can be attributed to the following reasons. First, CTM2017 and CTM2018 predominantly focused on the most typical level terraces, whereas our research encompasses a broader range of terrace types, including non-typical terraces such as slope terraces, zig terraces, and slope-separated terrace. Second, each dataset employed distinct cropland for terrace classification. SWCTMD utilized the union of cropland with slopes exceeding 2° from the 2000, 2010, and 2020 GlobeLand30 cropland data, whereas CTM2018 employed only the 2010 GlobeLand30 cropland data, and CTM2017 adopted FROM-GLC cropland data. Third, CTM2018 excluded isolated patches smaller than 9,000 m² from its classification scheme. However, since SWCTMD constrains its classification to cropland with slopes exceeding 2°, the identified terrace areas in Anhui, Fujian, Jiangxi, and Zhejiang provinces were smaller than those from CTM2018. In these provinces, CTM2018 included terraces with slopes below 2°, which is classified as non-terraces according to the technical regulations of the third nationwide land survey. Overall, our dataset provides more comprehensive coverage for terraces and exhibits higher accuracy and robustness."

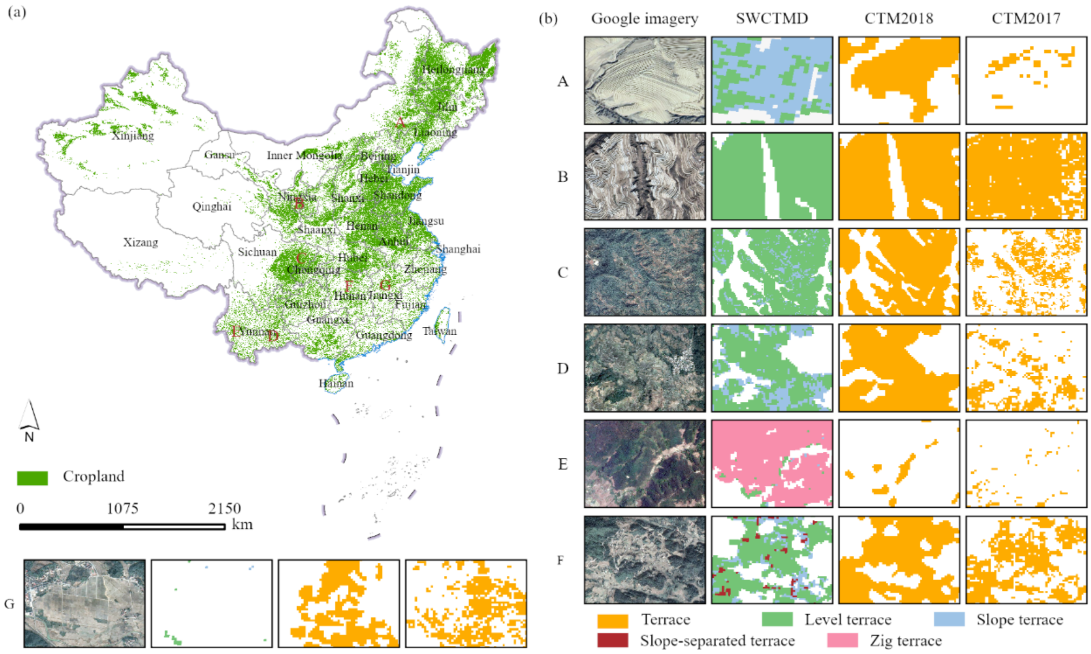

Figure 4. Regional comparisons of the three terraces datasets. (a) The distribution of cropland in China in 2020. (b) The spatial distribution of the three terraces datasets.