Responses to Editor and Referee's comments

First of all, we would like to thank the Editor and Referee for their comments and suggestions, which improved greatly the presentations and interpretations in our revised manuscript. In the revised article, we have addressed all comments and suggestions from the Editor and Referee. Our point-by-point responses to the Referee's comments are outlined below. The Referee's original comments are shown in italics and our responses are given in normal fonts.

Referee #3

Comments:
This manuscript, which estimates albedo-induced radiative forcing (ARF) using satellite-derived land-use change (LUC) data at fine spatial resolution, has the potential to significantly impact our understanding of LUC effects. The authors' report of a lower ARF estimation using fine spatial resolution data than published values, suggesting a weaker cooling effect of LUC, is a promising finding. The manuscript is well written and interesting, the motivation to the work is strong, the methodology is well described, and the figures are engaging and effective.

Response: We thank the Referee's positive and encouraging comments which help us to improve this article considerably.

Main concerns:

1. As the authors have mentioned, LUH2 is more recent and at a finer spatial resolution than LUH1. Despite this, why was LUH2 data not used instead of LUH1 for comparison to GLASS-GLC?

Response: The LUH2 dataset collectively categorizes grass, shrub, and other surface types into Non-forest types, and the purpose of this study is demonstrate that highly-resolved LUC data could yield significant different RF from previous investigations, and to comprehensively assess the effects of transformation among major LU types. Molded RFs induced by land-use changes using LUH2 and GLASS-GLC might not be consistent due to different LU categories. In fact, the LUC-derived global RF reported in IPCC AR6 used LUH2 dataset (Fig. 1b).

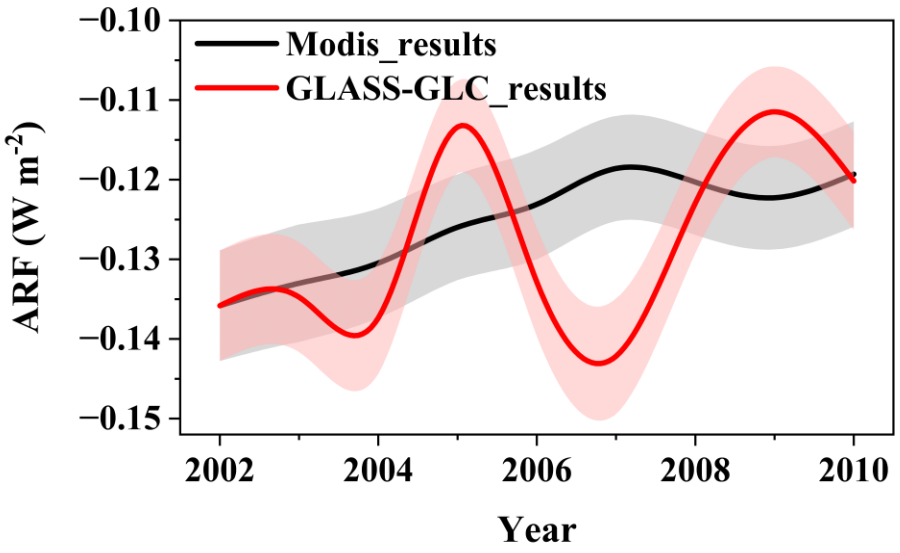
2. Temporal variation in LUC appears large for all regions, resulting in large fluctuations in ARF (Figure 1 and 2). Such large variations in LUC should be justified or studies reporting similar fluctuations should be cited.

Response: Following Reviewer's comment, we compared GLASS-GLC and MODIS LUC data, of which, the GLASS-GLC used satellite multi-source fusion approach and MODIS used direct MODIS sensor to derived their respective LUC inventories. The GLASS-GLC dataset spanning 1982-2015 but MODIS data is only available from 2000

onward. So, we replaced the GLASS-GLC by MODIS LULC data from 2002 to 2010 in the OSCAR model. The figure below shows annual fluctuations of the OSCAR simulated annual RF under global forestland changes using GLASS-GLS and MODIS from 2002 to 2010, respectively. Both RF results show annual fluctuations, though the RFs from the CLASS-GLC illustrate somewhat stronger oscillations. However, during this period, accumulated RFs subject to the global forestland changes driven by GLASS-GLC and MODIS LUC are 0.0165 Wm^{-2} and 0.0157 W m^{-2}, respectively, indicating only a 5% difference between the two satellite remote sensing derived LUC datasets.

Sun et al. (2022) compared the applications of six LULC products in the identification of LUCs in Northwestern China. Their results indicated, while the GLASS-GLC and MODIS (MCD-12Q1) were not superior to other four products (developed only for China), these two datasets were of most temporal and spatial consistency. This paper has been cited in the revised paper.

These discussions have been summarized in a new paragraph in section 2.2 (third paragraph).



Sun, W. et al. Land use and cover changes on the Loess Plateau: A comparison of six global or national land use and cover datasets. Land Use Policy 119, 106165 (2022).

Additional comment:

The authors have provided websites for downloading the GLASS-GLC data and OSCAR code but have not shared a repository to access the outputs of OSCAR model generated and analyzed in this study. I would encourage them to share a link to their model simulations.

Response: Done, thanks! We provide a repository to access relevant output data (https://doi.org/10.5281/zenodo.14586249).