

#### Major concerns:

1. The study asserts a higher accuracy than that of satellite products but does not provide a comprehensive comparison with a broad range of such products. Moreover, the accuracy indicated by the data appears comparable to some recently developed satellite products (Li et al., 2021). It would be beneficial to acknowledge or ideally, compare with, notable satellite products like MCD18A1 (Wang et al., 2020), DSCOVER (Hao et al., 2020), and GeoNEX (Li et al., 2023). MCD18 is the official MODIS radiation dataset incorporating instantaneous direct and diffuse radiation estimations. DSCOVER provides daily scale estimates of the diffuse and direct components, while GeoNEX boasts the highest accuracy for estimating daily and monthly global radiation. Adding rRMSE as an extra matrix could further enhance intercomparison across studies.
2. The products generated are site-based, implying discontinuity on a spatial scale. Figure 9 demonstrates numerous gaps in remote areas such as northwest China where active CSP are present. If there are minimal differences in accuracy and information between this station-based data and satellite products, the rationale for opting for station-based data needs to be more convincingly presented.
3. The long term availability is the highlight of this datasets, but the potential applications of the long term solar radiation data is not explained in detail. The authors should elaborate on this point in the introduction and consider incorporating a more extended analysis of the three radiation variables within the manuscript.

#### Minor concerns:

1. Tables and equations should be improved aesthetically, possibly through the use of a LaTeX package.
2. Please consider adopting color schemes that are accessible to readers with color vision deficiencies.

#### Reference

- Hao, D., Asrar, G. R., Zeng, Y., Zhu, Q., Wen, J., Xiao, Q., & Chen, M. (2020). DSCOVER/EPIC-derived global hourly and daily downward shortwave and photosynthetically active radiation data at  $0.1^\circ \times 0.1^\circ$  resolution. *Earth System Science Data*, 12(3), 2209–2221.
- Li, R., Wang, D., & Liang, S. (2021). Comprehensive assessment of five global daily downward shortwave radiation satellite products. *Science of Remote Sensing*, 4, 100028.
- Li, R., Wang, D., Wang, W., and Nemani, R.: A GeoNEX-based high-spatiotemporal-resolution product of land surface downward shortwave radiation and photosynthetically active radiation, *Earth Syst. Sci. Data*, 15, 1419–1436, <https://doi.org/10.5194/essd-15-1419-2023>, 2023
- Wang, D., Liang, S., Zhang, Y., Gao, X., Brown, M. G., & Jia, A. (2020). A new set of MODIS land products (MCD18): Downward shortwave radiation and photosynthetically active radiation. *Remote Sensing*, 12(1), 168.