This manuscript improved the parameterization scheme in terms of topography and cloud multi-scattering and generated a 1-km DSR product over the Tibetan Plateau. The topic is interesting and the DSR generation over Tibetan Plateau has been a great challenge over years. Overall, this study achieved high-accuracy DSR estimation over Tibetan Plateau, yet some details need to be clarified. I hope the authors could conduct some of my suggestions and comments, which may help to make this study much better. Here are some major concerns:

1. In L134, as far as I know, MCD18A1 now offers a 1 km daily DSR. Letu et al. (2022) also generated a DSR product with topographic consideration at 10-min and 0.05° over East Asia-Pacific. I would like to know what is the advantage of the generated DSR in this study compared with them. A comparison with them would enhance the superiority of this study. See Letu et al. (2022) A New Benchmark for Surface Radiation Products over the East Asia–Pacific Region Retrieved from the Himawari-8/AHI Next-Generation Geostationary Satellite.
2. For Table 1, this method relied on atmospheric products, so a sensitivity analysis could be conducted to show the reliability and possible issues of the method. For example, introduce 10% random errors (this error depends on the performances of atmospheric products) to the input, and see how much the estimation result change.
3. In Table 2, could you please offer the slope and aspect of the stations? Here is a big concern that most stations are located in relatively flat areas in mountains, and as Figure 7 showed that DSR varied greatly with different terrain conditions, the 1 km* 1 km pixel has sub-topography, and the ground-measured shortwave flux could not represent the pixel-scale DSR in mountains. I think it is a great challenge to evaluate DSR products over mountainous areas. See Yan et al. (2020) An Operational Method for Validating the Downward Shortwave Radiation Over Rugged Terrains.
4. In Table 3, could you provide the sample size of each site at each timescale? I find that the sample size in Figure 3 was not large (N=155 on monthly scale), so I am afraid the different performances were attributed to the sample size in the validation.
5. In L525, did you consider the shelters from surrounding mountains to the target pixel's DSR? e.g., sky view factor and shadow. You can see that sky view factor matters, especially under cloudy sky: Ma et al. (2023) Estimation of fine spatial resolution all-sky surface net shortwave radiation over mountainous terrain from Landsat 8 and Sentinel-2 data

Here are some minor concerns:

1. Could you be specific about what is high resolution (i.e., maybe < 5 km?) and what is coarse resolution in this study? Is the estimated DSR at an instantaneous scale? I am curious how you upscaled it to ten-day and monthly timescales for evaluation.
2. In L62, I would like to know why the DSR could exceed the solar constant.
3. In L116, the references in the 1990s are old, now many all-sky DSR products have been released.
4. In L120, you mentioned many parameterization schemes did not consider the DSR attenuation caused by clouds carefully enough. This sentence is subjective, and could you please give some references? The next sentence should be improved, too.

5. In L289, these DSR products need to be introduced in the Data Section. I think CERES_SYN_1h should be CERES SYN1deg-1 Hour, am I right?