General comments:

This paper provides a comprehensive evaluation of the CMA-MESO model's ability to predict downward long-wave irradiance (DnLWI) in China, using extensive high time-resolution in-situ measurements. The study is significant as it identifies the model's performance under various atmospheric conditions and highlights discrepancies particularly under overcast, dry, and cloudless scenarios. The authors also pinpoint the influence of cloud cover and the stable nocturnal boundary layer on the model's accuracy. This thorough assessment offers valuable insights for improving the radiation schemes in NWP models and underscores the importance of accurate cloud representation in enhancing model reliability. The manuscript is suitable for publication, once minor revisions are made.

The title of the manuscript, "Evaluation of radiation schemes in the CMA-MESO model using high time-resolution radiation measurements in China: I. Long-wave radiation," is somewhat misleading. The study exclusively assesses downward long-wave irradiance (DnLWI), without addressing other aspects such as downward long-wave irradiance in specific atmospheric layers or upward long-wave irradiance. The authors can find their suitable words to clarifying this in the title would better reflect the manuscript's focus and scope. Probably, for instance, change "Longwave radiation" to "surface downward Longwave radiation".

Specific comments:

1. Line 132: "quality control". The pygeometer measurements are only valid within certain spectral ranges. Did this 'quality control 'step consider the

response function of the pygeometer? To validate the LW radiation scheme using in-situ pygeometer measurements, signals of DnLWI predictions from the CMA-MESO that are beyond the pygeometer's spectral range must be filter out. Did this 'quality control 'step consider masking those signals?

2. Lines 161-162: " ….were taken as input parameters into the MODTRAN model " I wonder if the atmospheric profile inputs used to drive the RRTM in the CMA-MESO and MODTRAN are identical? So that comparisons between RRTM and MODTRAN are reasonable to be make.
3. Line 324-331: Figures 2u-y show performances of various versions of the CMA-MESO model. Are there any possible reasons explaining the different performance across various versions of the CMA-MESO model? I recommend the authors to added 2-3 sentences (or probably more sentences) to simply elucidate this somewhere in the text.
4. Line 400-406: " …… were replaced with ….. the middle latitude summer, the middle latitude winter…… " The 88 profiles predicted by the CMA-MESO are 3-h forecast field across 8 hours cycle per day. Right? The Total inputs for MODTRAN include 33 layers, this first 19 layers are from CMA-MESO, the remaining 14 layers are from standard atmosphere (e.g., the middle latitude summer, …. The tropical atmosphere). What are the rationalities for this treatment?
5. Line 409-410: "clouds were transformed… " If clouds were predicted by the CMA-MESO (only 19 layers), how to present clouds for the remaining 14 layers? All were set to zero for the last 14 layers?
6. Line 521: "Figure 8. Spectral …..". Does the figure 8 represent a specific atmospheric layer? for the 2m height ? or does it integrate the entire atmospheric profile?