Interactive comment on **"A high-resolution air temperature data set for the Chinese Tianshan Mountains in 1979–2016"** *by* **Lu Gao et al.**

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Producing the high-resolution air temperature dataset in the mountain area is useful for regional climate or hydrological studies. The general target of this study is important. I have some suggestions and comments in below:

1. The method and the used lapse-rates should be more detail described in section 3.3.

2. In table 1, is the elevation of the sites as same as the height from the 1 km SRTM DEM grid? it seems not the same (from P9, l18 ., I recommend to list the sites height in 1km DEM.

3. Addition to comment 2. As the height in DEM grid and site point is different, in P6

l13, why do you use averaged 9 grid points to evaluate the downscaled results. In my opinion, since each point in 1 km grid is downscaled according to its DEM height and ERA height, the nest grid point or the nest height grid of 9 point should be used for comparison.

4. The lapse rate varies in the different topographical situation and different timestamp like during the nighttime (Li et. al. 2014). The authors should discuss more about the method and results on the diurnal scale.

5. The authors produce the data from ~25 km to 1 km resolution. The total grid points are 818126, however, only 24 observation stations are used in validation. And in Figure 2-4, the authors only present comparison results at 4 stations, which probably have the best results. In addition, the authors only validate this 6-hourly dataset at a daily scale. To my point, the validation is somehow insufficient. It is not enough to conclude the reliability of this dataset, at least in the current level of discussion of the manuscript. I recommend the authors present some comparison analysis with ERA-Interim on the diurnal scale, and have more validation results with the station observations. Although very limited stations exist in this area, I know the diurnal max. and min. temperatures are provided in CMA station datasets, and these could be used in robust validation.

6. As the dataset provide temperature in 38 years, the authors should show some validation in annual and seasonal scale for this long period. In the spatial scale, I recommend to validate the dataset in each sub regions based on hydrology basin or climate zone or different elevation ranges. Figure 5 and figure 6 can not give much information of any performance skill of this dataset.

7. The dataset is very not friendly to use to me. As NetCDF format, I recommend to provide each file for the whole area at each timestamp (or each day, each month, each year) like most Grid datasets did (APHRODITE, TRMM, China meteorological forcing data from CAS. et. al.). It will be much easier for regional climate or hydrology studies. Or save as the GRIB format like the reanalysis dataset.

Reference:

Li, Y., Z. Zeng, L. Zhao, and S. Piao (2015), Spatial patterns of climatological temperature lapse rate in mainland China: A multi–time scale investigation, J. Geophys. Res. Atmos., 120, 2661–2675, doi:10.1002/2014JD022978.

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C3