

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

Anonymous Referee #2

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The authors present a high-resolution (1km, 6h) air temperature data set for the Chinese Tianshan Mountains from 1979 to 2016 based on a downscaling method. This topic is quite interesting and the data set would be useful for the potential end-users who focus on the alpine climate and cryosphere issues in the Tianshan Mountains. In general, this paper is well-written for most parts. However, a major revision is needed before it is published in ESSD. General Comments: 1. The mentioned downscaling method in the paper has been validated in the Alps Mountains and the Tibet Plateau. However, the relative references (Gao et al., 2012, 2017) named this method as “elevation correction” rather than “downscaling”. What is the difference between these two methods or terms? For me, they are the same. Thus, which one is more appropriate? 2. 24 meteorological stations are not enough for validation for such

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a large area (more than 80000 points). Is there any other data resources could be used for further validation? 3. The authors pointed out that about 24% of RMSE was reduced by the downscaling method compared to the original ERA-Interim. Is it good enough? How to evaluate the data set (or any reference/standard) is good enough for end-users? 4. For my understanding, the downscaling method is mainly based on the elevation (DEM). Is it possible to get higher resolution data set if we use the 100 m DEM? The ERA-Interim product provides 3-hourly forecast data. Thus, is it possible to obtain 3-hourly data set for whole Tianshan Mountains? 5. How to evaluate the lapse rate is correct or appropriate for the downscaling? The lapse rate varies significant in different topographical situations and time period. 6. Precipitation is another basic and important variable for climate and environmental models. Can you produce any high resolution precipitation data set using some similar methods for this region? Specific comments: 1. Although the authors listed many references about the downscaling method, I believe it is necessary to clarify the method specific for the readers who are not familiar with downscaling method. 2. The downscaling method is more appropriate named “elevation correction”. Since only elevation is involved. The conventional circulation variables such as wind, sea level pressure, humidity are not considered in the downscaling method. 3. The data set is not friendly to download and use. The data set is divided into so many sub-files. Is it possible to find a more easy way for users? 4. The downscaled data at some sites are worse than the original ERA-Interim data. Why? The authors should discuss this issue. It is very important because only 24 sites are available for validation. 5. If someone plans to run a hydrology model in a small catchment in the Tianshan Mountains. How to adjust the data set points to match the model grids? 6. I found that the data amount is around 187G. How to process such large data set? What is software or platform to process it? Maybe, the authors could provide some codes for data processing. 7. I am not sure the data set could capture the temperature changes in the micro-topography since the original data is 0.25 degree. The slope and aspect of mountains also affect the temperature significant, especially in the night. 8. Can other temperature downscaling methods be used for the

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high-resolution data set? And why? 9. Some expression and description of language is not clear. A native speaker would be helpful for the improvement of readability for the whole context.

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