Responses to Anonymous Referee #1:

General Comment:

Data fusion across satellite and gauge precipitation data has been widely concerned around the world in the last decade and also has been investigated by many studies in China. In this study, the authors aim to develop a fusion framework to improve the precipitation estimation in mountainous areas. The framework is then applied to the Nu river basin, a place with high altitude and complex topography and also with distinctive climate. From this perspective this study is meaningful. I would suggest that this paper be accepted with a few minor revisions.

Response: We highly appreciate the reviewer's positive feedback. Our detailed responses are given after each comment (italics) below.

Specific Comments:

1) *Page-7, line 158, "59 gauges are available", which are not consistent with the number of stations in Figure 2.*

Response: We thank the reviewer for pointing out the inconsistency between the original Fig. 2 and text. We now have corrected Fig.2 with all the 59 gauges displayed, which is reproduced as follows:

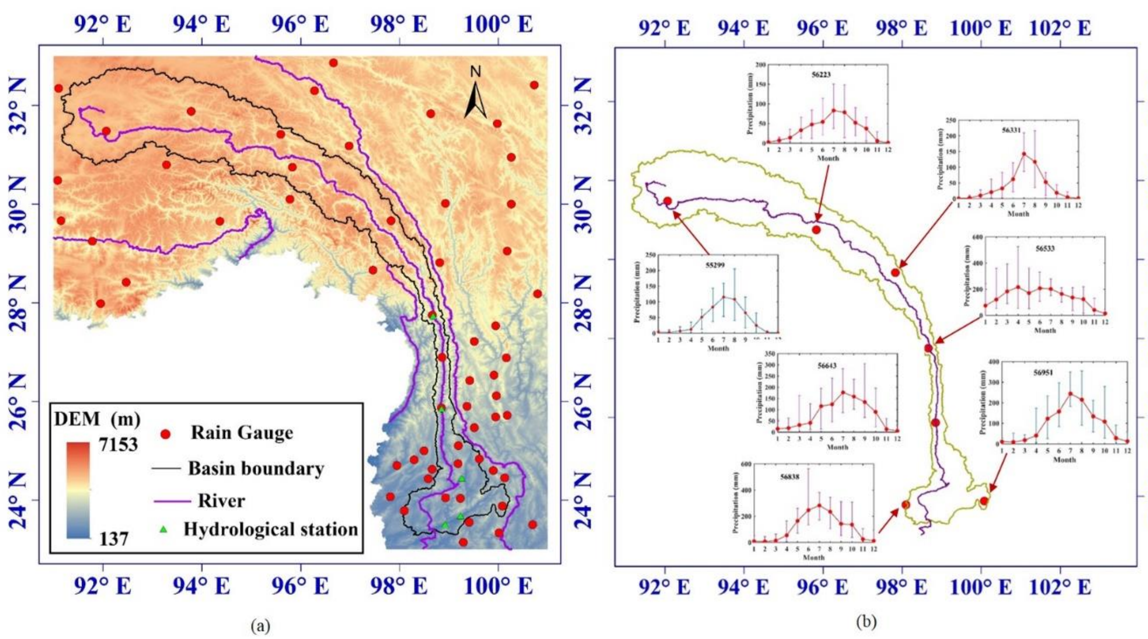

Figure 2 (a) Terrain map of the study area (the Nu-Salween basin and its adjacent areas), (b) The distribution of precipitation during the year across the Nu River.

2) *Page-7, line 164, it is suggested that a sentence be given to describe the temporal and spatial resolution of MOD13A3 and MYD13A3 vegetation products*

Response: The temporal and spatial resolutions of the MOD13A3 and MYD13A3 products are 1 month and 1 km, respectively. This description will be inserted into the revised manuscript in line 165, page 7.

3) *Page-8-9, line 208-209, "It is also noted that R2 values of RMIs for drier years are less than wetter years. . .. . .". Time-lag effects of vegetation responses to precipitation can be considered to explain this phenomenon.*

Response: We thank the reviewer for the valuable suggestion. Although several studies indicate that vegetation responses to precipitation with a time lag varying from several days to 3 months according to different vegetation types, climates and latitudes (Wang et al., 2003; Bao et al., 2007; Long et al., 2010; Wu et al., 2015; Lin et al., 2015), such time-lag effects are not apparently observed in the monthly NDVI data we used in the Nu River application.

By comparing the annual NDVI with that of 1 month time lag (Fig. R1a), we see minimal difference between them with over 75% of the samples showing less than 1% difference (Fig. R1b). As such, we think that the time-lag effects of vegetation responses to precipitation are not capable of explaining smaller R^2 values of drier years than wetter years.

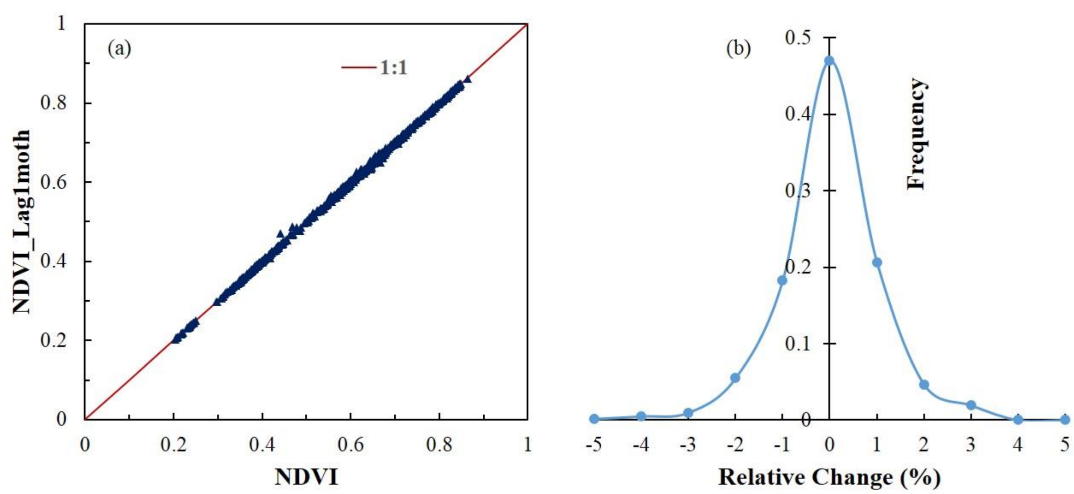

Figure R1 (a) Comparison between yearly mean NDVI and yearly mean NDVI with 1 month lag, (b) frequency distribution of 1 month lag NDVI's relative change to NDVI without time lag

4) *Page-12, line 299, "the negative regression coefficient of temperature in RME+T indicates that precipitation decrease as the temperature increase". I don't agree that your explanation of negative*

regression coefficient of temperature shows that that precipitation decreases as the temperature increase.

Response: We thank the reviewer for pointing out the careless wording in this statement. Such statement was directly inferred from the negative regression coefficient of temperature to precipitation, with the aim to show the inconsistent trends of precipitation with temperature and elevation. We have reworded the statement in the revised manuscript as follows:

> "The negative regression coefficient of temperature in RME+T indicates inconsistent trends between precipitation and temperature."

5) *Some detailed should be paid more attention. For example, line 191, correct website should be given; In Figure 2, legend of DEM should not be 0 in this region.*

Response: These details have been corrected/explained as follows:

1) The correct website address is added as: http://data.cma.cn/data/detail/dataCode/SURF_CLI_CHN_MUL_DAY_V3.0/keywords/v3.0.html.
2) In Figure 2, the bottom left corner is located in the Bay of Bengal where several few pixels have altitude value of zero.

References:

Bao, Y., Song, G., Li, Z., Gao, J., Lü, H., Wang, H., Cheng, Y. and Xu, T.: Study on the spatial differences and its time lag effect on climatic factors of the vegetation in the Longitudinal Range-Gorge Region, Chin. Sci. Bull., 52(2), 42–49, doi:10.1007/s11434-007-7005-5, 2007.

Brunsdon, C., McClatchey, J. and Unwin, D. J.: Spatial variations in the average rainfall-altitude relationship in Great Britain: an approach using geographically weighted regression, Int. J. Climatol., 21, 455–466, doi:10.1002/joc.614, 2001.

Lin, Y., Xin, X., Zhang, H. and Wang, X.: The implications of serial correlation and time-lag effects for the impact study of climate change on vegetation dynamics – a case study with Hulunber meadow steppe, Inner Mongolia, Int. J. Remote Sens., 36(19–20), 5031–5044, doi:10.1080/01431161.2015.1093196, 2015.

Long, H., Li, X., Bao, Y., Huang, L. and Li, Z.: Time lag analysis between vegetation and climate change in Inner Mongolia, in 2010 IEEE International Geoscience and Remote Sensing Symposium, pp. 1513–1516., 2010.

Wang, J., Rich, P. M. and Price, K. P.: Temporal responses of NDVI to precipitation and temperature in the central Great Plains, USA, Int. J. Remote Sens., 24(11), 2345–2364, doi:10.1080/01431160210154812, 2003.

Wu, D., Zhao, X., Liang, S., Zhou, T., Huang, K., Tang, B. and Zhao, W.: Time-lag effects of global vegetation responses to climate change, Glob. Change Biol., 21(9), 3520–3531, doi:10.1111/gcb.12945, 2015.