

## ***Interactive comment on “Remapping precipitation in mountainous area based on vegetation pattern” by Xing Zhou et al.***

### **Anonymous Referee #3**

Received and published: 21 December 2016

#### General comments:

Gridded precipitation data are very useful for hydrological application and others and ground-observation-based ones have been developed for many regions. This study investigated a methodology to develop gridded precipitation data for the Nu River basin based on the ground-observed precipitation combined with vegetation indices. As an interpolation method, the data fusion may be a strong tool especially for a sparse observation area. Its application to the Nu River with sparse observations may contribute to expanding a hydrological knowledge. This paper requires some more analyses to make readers more convinced of the effectiveness. Therefore, I recommend to revise this manuscript based on comments below before publication.

#### Major comments:

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The regression for RME uses all the data at the gauge stations and for the entire years. Such regression provide the climatological mean relationship between precipitation and NDVI. This regression cannot be applied for individual year as seen Table 1 where the coefficients distinct vary with year. Authors must mention the limitation of the proposed method in an appropriate paragraph.

Judging from Figure 6, climatological mean annual precipitation seems to depend on elevation. The dependence of precipitation on elevation is a well-known fact. In order to clarify the effectiveness of your method, it is better to compare the geographical distributions of climatological mean precipitation between your methods and a method by a regression between precipitation and elevation. A figure of the difference between the two may provide an important suggestion about strong points of your method.

Specific comments:

L66: The objective of this study should be more specified in terms of spatio-temporal scale: climatological annual mean and 1 km.

L103: The center of a certain box is not used in computing the averaged value of the grid box? If so, please provide a reason.

L157: The number of rain gauge stations in the Nu River basin seems smaller than 13 as long as it is judged from Figure 2.

L158: Moreover, the 59 stations are not plotted on Figure 2.

L159: Please explain what you mean by “climatic and topographic conditions are consistent with the Nu River basin.”

L162: You use three terminologies: uncertainty, reliability, and accuracy in the 3.2.1 subsection. Please provide short definitions if you distinguish them in this manuscript.

L163: In this paragraph, please provide the spatio-temporal resolution of the MODIS

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dataset. L176: “m” in “merged” should be in standard font.

L185: How do you classify an upscaled 1 km pixel when it is composed of two forest and two cropland pixels? You do not consider the mixed pixel? If so, please provide this information.

L196: Readers may know the rationale about the selection of the regression form. Not by “not shown here” but “judging from Figure 3” is better.

L202: Did you use these results when you draw Figure 6? If not, why don't you use these important information?

L220: Two spaces exist between of and regression.

L222: Scenario should be Scenarios.

L242: Please provide rationale about the use of the IDW method here.

L264: Precipitation by the RME method often the largest among the three in Figure 10 is reasonable? Can you validate this precipitation estimates larger than the other two by sub-basin water balance such as observed river discharge =  $P - E$ . In other words, large amount of precipitation is better than small one in order to explain the observed river discharges.

L295: As mentioned above, in addition to RME+T and RME+H, how the regression of T or H onto precipitation works for producing climatological mean annual precipitation like Figure 6.

Figures 1: Font color should be the same as in outline color of boxes.

Figures 2, 6, 7, 8, and A2: Minutes and seconds should be removed from the annotations of the coordinates. Font size should be enlarged so as to see them easily.

Figure 4: Please provide explanations about two symbols in the figure caption.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-611, 2016.