Dear Reviewer,

Thank you for your letter and for the reviewer's comments concerning our manuscript. We have addressed issues including further expansion and/or clarification on certain aspects of the paper. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval. The corrections have been marked red in the revised manuscript. Point by point responses to the reviewers' comments are listed below this letter.

Specific comments 1:

1. The PD value is important in the geographical detector model, which is a new and novel tool to investigate the relationship between factors and results. In the paper, it shows that a higher PD indicates that the driving factor has a larger impact on the outcome. As it is a new indicator, the author should explain the meaning of PD by detail. Based on the case study, it should explain how a higher PD indicates a higher explanation of driving factors determining the karst rocky desertification evolution.

Response to comment No. 1

We explained how the model calculates the PD and what a higher PD means in the revised manuscript as follows:

"The geographical detector model overlays the distribution of K (e.g., E-KRD in our study) over several strata of driving factors of D (i.e., one of driving data). D_i (where i=1, 2,… n, and *n* is the number of categorical types of D) are the discrete attributes associated with a stratum of driving factors of D, which is denoted as $D=\{D_i\}$ (Li et al., 2013; Wang et al., 2010b), then the study regions were divided to sub-regions (D_1, D_2, … D_n). The mean value and the dispersion variance of K (denoted as $\sigma^2_{K_{D,i}}$) can be calculated by the model."

"When the $\sigma^2_{K_{D,i}}$ of each subregion is small, the variances between sub-regions is large and the PD is large (which means that such a division explains most or even all of the spatial K variation). Therefore, a higher PD indicates that the driving factor (D) has a larger impact on K."

Also in the result we show the mean values of E-KRD indices for different levels of driving data to show significant differences as follows:

"For example, the PD of lithology shows that it has the greatest impact. According to the model, the mean values of improvement indices for three lithological types show significant differences, and their ranks are as follows (with the number in brackets as the corresponding index value): clastic rock mixed with limestone/dolomite (32.6) > limestone interbedded with clastic rock (27.7) > homogenous limestone/dolomite (22.3)."

"The PD of soil, which has the highest ranking, shows that it is the most important of the driving factors influencing KRD deterioration. Table 6 shows significant differences in the mean deterioration KRD index between the eight soil types. The order of mean values of deterioration index for the eight soil types is: acidic lithosol (-57.0) ≈ purplish soil (-53.1) > terra rossa (-36.6) ≈ yellow soil (-35.3) > paddy soil (-33.3) > calcareous soil (-28.7) > skeletal soil (-23.8) > rendzina (-15) (where " ≈ " denotes that there is no significant difference between deterioration index of the two variables)."

Specific comments 2:

2. The paper found that there is no significant difference observed between the impacts of natural and anthropogenic factors. This is an interesting finding and is argued with previous studies, which considered anthropogenic activities as being more significant in KRD than natural factors. To make a more creditable result for readers, the author should give more evidence to support this conclusion with the case study or the relative reference.

Response to comment No. 2

In the field survey, we can find an interesting phenomenon to support our conclusion. In adjacent regions of carbonate rock formation and non-carbonate rocks (granite) under nearly the same conditions of human factors, there is an obvious karst rocky desertification in areas with the carbonate rock outcropping. In contrast, areas with non-carbonate rocks are covered with lush vegetation. Then we had the idea of quantifying the relative importance of natural and anthropogenic factors.

Further, a historical study showed that the spatial distribution of suspect karst rocky desertification in Guizhou in 1940 is similar to the present situation in 2005. Within this stage of the rapid population growth, the spatial distribution stays relatively stable. Above evidence indicated that we cannot overemphasize the impact of anthropogenic factors.

Above content we have added to the revised manuscript as follows:

"In the field survey, it can find that a significant contrast in adjacent regions with carbonate rock and non-carbonate rocks (granite) but under nearly the same conditions of anthropogenic factors. There is an obvious KRD in areas with the carbonate rock outcropping. In contrast, areas with non-carbonate rocks are covered with lush vegetation. Further, a historical study showed that the spatial distribution of suspect KRD in Guizhou in 1940 is similar to the present situation in 2005 (Han et al., 2011). Within this stage of the rapid population growth, the spatial distribution stays relatively stable. Above evidence indicated that we cannot overemphasize the impact of anthropogenic factors."

Han, Z. Q., and Yang, S. C. : A comparative study of the distribution of suspect karst rocky desertification recorded in the archives from the 1940s and that from today's survey, Journal of Chinese Historical Geography, 26, 32-40, 2011 (in Chinese).

Special thanks to you for your good comments.

We tried our best to improve the manuscript and made some changes in the manuscript. We appreciate for Editors/Reviewers' warm work earnestly, and hope that the correction will meet with approval.

Once again, thank you very much for your comments and suggestions.