Author's response to reviews

Title: Spatiotemporal delay of hand foot and mouth disease in response to weather variation: a case study in Shandong province

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Response to reviewers’ comments

Reviewer 1
1. Major Compulsory Revisions
1) The study area is in Shandong Province, you found only wind speed and RH is significantly correlated with HFMD prevalence rate. It is better to add the comparison with the results from previous studies in Shandong in the Discussion part.
A: We add reference 31 ‘Time series analysis of weather and hand, foot, and mouth disease in Rizhao, Shandong, 2009-2012’ to confirm our study results.

2. Minor Essential Revisions
1) The resolution of all the figures needs to be improved.
A: We draw all the figures in a high resolution again.
2) Add the scale to Figure 3, 5, 7.
A: We add the scale to those figures.

3. Discretionary Revisions
1) In the background, it is better to add “HFMD has been upgraded to a Class C communicable disease since 2008 in China.”
A: We add this sentence in the 1st paragraph of the section ‘Background’.
2) It was mentioned that this paper provides a reference for short-term prediction of HFMD rate in Shandong. Could you give some accuracy assessment of the results?
A: The study target of this manuscript is using SVD method to estimate the spatial-temporal correlation between meteorological elements at different spatiotemporal scales and HFMD prevalence rate in Shandong Province
counties. In this study, we use randomized trial method proposed by Wallace to test the statistic significance of all spatial-temporal correlation values calculated by SVD. We detail this process in the last paragraph of the section ‘SVD method’. We also point out that ‘only wind and RH satisfy the = 0.05 significance level Monte Carlo test’ in the section ‘Results’.

3) Regarding the title of this paper, it is better to include SVD method, since one of the highlights is that this is the first study in China using the SVD method to evaluate the effects of meteorological anomalies at different spatiotemporal scales on HFMD incidence.

A: The title is changed to ‘A study on spatial-temporal delay of hand foot and mouth disease in response to weather variation based on SVD: a case study in Shandong province, China’.

4) SVD is another mathematical method compared to Getis-Ord Gi* and geographically weighted regression models, it is better to analyze the difference of these methods, and then give your opinion why choose SVD method.

A: We add the difference of methods and the reason to choose SVD in the first two paragraph of the section ‘Discussion’.

5) It is better to give some brief description why temperature is not significantly correlated, since in previous HFMD studies, temperature is a very important factor.

A: Because we used the data of summer and early autumn in the study, the temperature variables including the maximum temperature, the minimum temperature, and temperature difference in every county of Shandong do not change significantly.

Reviewer 2

1: As the author said, a large number of hand foot and mouth disease (HFMD) outbreaks were reported during 2008 in China. But the highest incidence of HFMD stratified by month was in 2010 in Shandong Province. Why in this paper the data of 2008 was chosen to analyze the spatio-temporal effects?

A: It is a very good suggestion. However, we have acquired only the HFMD disease data of 2008 from China CDC so far. We will analyze 2010 HFMD data in Shandong Province if we can get that data.

2: The report from Hong Kong has observed a relationship between average wind speed and HFMD incidence, and the association between relative humidity also has been found from other reports. The difference is it is the first study in China using the SVD method to evaluate the effects. Please explain the advantages of SVD method?

A: We add the advantages of SVD in the 2nd paragraph of the section ‘Discussion’ and the 1st paragraph of the section ‘SVD method’.

3: In this paper it was found that “HFMD incidence anomalies are also better explained by RH anomalies within the period of eight weeks prior. This differs
from previous research results, possibly because of the location of Shandong Province.” Please explain what kind of location?

A: The province is located on the eastern edge of the North China Plain and in the lower reaches of the Yellow River (Huang He) and extends out to sea in the form of the Shandong Peninsula. The northwestern, western, and southwestern parts of the province are all part of the vast North China Plain. The center of the province is more mountainous. The east of the province is the hilly Shandong Peninsula extending into the sea. The annual average precipitation is 550-950 millimeters with a decrease from the southeast to northwest. It mainly rains in summer. We add this into the section ‘study site’.

4: In discussion, the authors said: “There may be a threshold effect of average RH on HFMD incidence.” In this paper what is the threshold?

A: The threshold is that ‘When monthly average humidity is >62% or <50%, HFMD may be inhibited’.

5: The expression of term should be standard in the text, Such as incidence / prevalence.

A: We revise the manuscript according to this comment.