Solid Earth Discuss., 7, C1678–C1680, 2015
www.solid-earth-discuss.net/7/C1678/2015/

Solid Earth Discussions

Interactive comment on "Multi-quadric collocation model of horizontal crustal movement" *by* G. Chen et al.

G. Chen et al.

ddwhcg@cug.edu.cn

Received and published: 30 December 2015

On behalf of my co-authors, thanks a lot for your positive and constructive comments and suggestions on our manuscript. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our research. The responds to your comments are as flowing:

Short Comments: On the other hand, some details should be noticed and some questions need clear explanations as follows: 1. Vector or matrix writing symbols should be unified. 2. Matrix B occurred in Eq. (8) seems different with the matrix B in Eq. (1), so it needs explanations. Matrix Ms and Matrix D first occurred in Eq. (8), so they also need explanations. 3. In the multi-quadric collocation method recommended by

authors, an inverted double curved surface is used, but the choice of smoothing factor and nodes included in the inverted double curved surface isn't mentioned by authors. 4. As for external checks, the velocities of 85 high precision GNSS points are used as the only way in the paper. Are there other ways to check the results externally, such as researching results in geophysics?

Authors' Reply: (1) We have checked the manuscript and we can make sure that all vectors and matrices in the revised text are uniform. (2) Actually, the matrix B in Eq.(8) is the same as the matrix B in Eq.(1). It denotes the coefficient matrix of size n$\times$u, where n and u are the station quantity and estimated parameter numbers. Matrix Ms in Eq.(8) means multi-quadric kernel function matrix, which here is the same as Gs's in Eq.(7). We have revised it in the next version. Matrix D in Eq.(8) represents the variance matrix of observe error. We have added the explanation of it in the revised manuscript. (3) It is really true as you suggested that determining the smoothing factor is important when we use inverted double curved surface model. The purpose of using smoothing factor is to change the shape of kernel function and obtain the best fitting result and precision. However, There are not accurate common applicable functions can be used to determine smoothing factor except some empirical functions. In our paper, we determined the best value of smoothing factor based on the actual distribution of data. In the revised manuscript, we have added the part about this content. (4) In this paper, we concentrated on verifying the precision and validity of multi-quadric collocation model proposed in this paper when estimating velocity field. The velocities of a set of 1070 reference stations were obtained from the Crustal Movement Observation Network of China, and the corresponding velocity field established using the new combined estimation method. A total of 85 reference stations were used as external check points. We think that this is the most intuitive and direct way to evaluate the results obtained in the paper using multi-quadric collocation model. It is really true as you said that if we analyze results using geophysics models, our results would be more convincing. However, as the limit of manuscript length, we did not extend the contents too much. We will continue this interesting work in the next step following your

suggestions.

Special thanks to you for your good comments.

Interactive comment on Solid Earth Discuss., 7, 3359, 2015.