Geosci. Model Dev. Discuss., 6, C1816–C1818, 2013
www.geosci-model-dev-discuss.net/6/C1816/2013/

Geoscientific Model Development Discussions

Interactive comment on "On searching for optimized set of physical parameterization schemes in a multi-physics land surface process model" *by* S. Hong et al.

S. Hong et al.

spark@ewha.ac.kr

Received and published: 30 October 2013

Reply to the interactive comments by the Anonymous Referee #1

We appreciate the referee's comments. The comments could have been more helpful if the referee had specified problems in more detail. Below we have tried to deliver the importance of our study more clearly to help the referee's understanding on our work.

The main idea of this study is to propose an effective method to search and extract an optimal scheme combination by coupling a genetic algorithm (GA) and a land sur-

face model with multi-scheme options (Noah-MP). As numerical models tend to include more sophisticated physical processes, the number of optional parameterization schemes increases rapidly. Therefore finding the optimal scheme set by trial and error requires almost infinitive model runs. By employing GA we can find such an optimal scheme set in an objective way with much less amount of computational time. We believe that this study is sufficiently innovative to be published in *Geoscientific Model Development* because:

1. There is almost no previous study that attempted to find an optimal set of schemes in any numerical model;
2. This is the first time to apply an objective optimization tool (GA) to a numerical model in an attempt to find an optimal scheme set; and
3. This application can be extended to any geoscientific numerical model.

The concept of the natural selections by elitism in GA can help to build a valuable base for further calibrations and improvements because the elitism will be regionally different and represent local characteristics. The proposed GA approach reduces the computing time and resources by searching and extracting the optimal scheme combination for a certain region in a very effective manner; thus making it easier to apply to multiple regions. Although the referee suggested that we need to do more analysis, we already showed results by applying our method to four different regions in East Asia. We think this is more than enough to report a new approach in finding an optimal set among multiple physical schemes in a numerical model. We are currently conducting more experiments, especially focusing on optimization of uncertain parameters from the optimized scheme set, and are preparing for a subsequent report.

We expect that applications of our proposed approach will be very diverse and extensive, but for this study we limited our research scope to suggest a new approach and to demonstrate its capability and effectiveness in extracting the optimal combination from a number of physical schemes in several different regions. We believe that this study proposed a new approach that can be extended to any numerical model in the fields of Geosciences and thus is sufficient to be considered for publication in *Geoscientific Model Development*.

Interactive comment on Geosci. Model Dev. Discuss., 6, 4511, 2013.