

Response to comments by Reviewer #1:

We would like to take this opportunity to gratefully thank the reviewer for his/her constructive comments and recommendations for improving the paper. An item-by-item, point-by-point response to the interesting comments raised by the reviewer follows.

The topic addressed is within the scope of HESS. The manuscript is generally well organized and results are clearly presented. This manuscript investigated the potential of GPF used as a snow data assimilation scheme across different snow climates, the results presented in this manuscript will help develop new data assimilation scheme and improve the simulation accuracy of land surface model that leads to improve weather and climate prediction. In my opinion, this manuscript could be accepted for publication in HESS after the following comments are addressed.

Comments:

Line 106: “Above studies” may need some recent references.

Reply: We agree that recent literature on particle filter is missing in the Introduction section, and we will include recent literature in this section.

Line 245: “The number of particles was set to 100” have been expressed in line 225, I suggest deleting one.

Reply: Thanks for your sincere and constructive suggestions and we will delete this sentence.

Line 250: the variance scaling factor of the temperature was set to 2.0, why this value was chosen, 3.0 or other value can be used here?

Reply: Thanks for your sincere and constructive suggestions. The variance scaling factor of the temperature was referenced the method of Lei et al. (2014), and the value was obtained through repeated attempts and experiments.

Line 259: What does the “SD” is refer to? Do you mean SD is the abbreviation of snow depth?

Reply: Thanks for your sincere and constructive suggestions. Here the SD is the abbreviation of snow depth and we will remark in the text.

The abstract should provide some numerical values from the performance metrics of the results.

Reply: Thanks for your sincere and constructive suggestions. We will provide some numerical values from the performance metrics of the results in the abstract and rewrite the abstract seriously.

Line 236: Except for the air temperature and precipitation can be perturbed, whether other meteorological forcing variable can be perturbed, such as relative

humidity and wind speed? As far as I know, the wind speed has great impact on the distribution of snow.

Reply: Thanks for your sincere and constructive suggestions. The snow depth is influenced by precipitation and temperature, specially, snow is highly sensitive to the air temperature. We agree that the wind speed and other meteorological forcing variables, like longwave radiation, shortwave radiation, have great impact on the distribution of snow. In this study, we attempt to examine the performance of genetic particle filter at site scale and the distribution of snow at regional scale was not considered, so we just perturbed the air temperature and precipitation.

The English writing has to be polished.

Reply: Thanks for your sincere and constructive suggestions. We will proof-read the whole manuscript to fix the language and grammar issues, and an English writing service will be purchased for this paper.