Prediction of future soil erosion risk in Japan considering climate change

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Approximately 70% of crop land in Japan is classified as hilly or mountainous areas, and soil erosion occurs in these lands due to heavy rains. Under such circumstances, prediction of future climate change in Japan was reported that the frequency of short-term heavy rains with daily precipitation exceeding 50mm will increase nationwide by an average of 25% at the end of this century. From this report, it is expected that soil erosion will be more severe in the whole of Japan in the future, and it is urgent task to understanding future erosion risk in crop land and to consider countermeasures. From above background, the purpose of this study is to predict future soil erosion using a process based model Water Erosion Prediction Project, WEPP, in consideration of future climate change in Japan.

The current and future weather prediction data was used from MarkSim (DSSAT weather generator), NARO (Agro-Metorological Grid Square Data), and ELPIS-jp data set (prepared National Agriculture and Food Research Organization). These data sets include spatially downscaled daily precipitation, temperature, and solar radiation from GCM output. As a tentative result, for data of MarkSim and NARO, future daily precipitation decreased. This trend does not match the original GCM output due to insufficient spatial resolution and time intervals of the dataset. Therefore, it is suggested that the MarkSim and NARO may not represent the future increase of heavy rain in Japan. On the other hand, for data of ELPIS-jp, future precipitation is increasing nationwide and the number of rainy days is decreasing. It is similar trends as in GCM original output. Therefore, the ELPIS-jp is a better database comparing above two databases to represent the increasing of heavy rainfall events with climate change. For the final results, WEPP simulations using CLIGEN data created by ELPIS-jp are to be executed. The results will be used to identify rainfall factors related to changes in erosion amount and areas requiring countermeasures.

Keywords: WEPP Model, MarkSim, NARO, ELPIS-jp, Global warming