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The Impact of Climate Change in Rainfall Erosivity Index on Humid Mudstone Area

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It has been quite often pointed out in many relevant studies that climate change may result in negative impacts on soil erosion. Then, humid mudstone area is highly susceptible to climate change. Taiwan has extreme erosion in badland area, with annual precipitation over 2000 mm/y which is a considerably 3 times higher than other badland areas around the world, and with around 9-13 cm/y in denudation rate. This is the reason why the Erren River, a badland dominated basin has the highest mean sediment yield in the world, over 105 t km2 y.
This study aims to know how the climate change would affect soil erosion from the source in the Erren River catchment. Firstly, the data of hourly precipitation from 1992 to 2016 are used to establish the regression between rainfall erosivity index (R, one of component for USLE) and precipitation. Secondly, using the 10 climate change models (provide form IPCC AR5) simulates the changes of monthly precipitation in different scenario from 2017 to 2216, and then over 200 years prediction R values can be use to describe the tendency of soil erosion in the future.
The results show that (1) the relationship between rainfall erosion index and precipitation has high correction (>0.85) during 1992-2016. (2) From 2017 to 2216, 7 scenarios show that annual rainfall erosion index will increase over 2-18%. In contrast, the others will decrease over 7-14%. Overall, the variations of annual rainfall erosion index fall in the range of -14 to 18%, but it is important to pay attention to the variation of annual rainfall erosion index in extreme years. These fall in the range of -34 to 239%. This explains the extremity of soil erosion will occur easily in the future.
Keywords: Climate Change, Mudstone, Rainfall Erosivity Index, IPCC AR5