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Towards future soil erosion estimates under the combined effect of global land use and climate changes

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Human society lives on a cultivated planet where agriculture covers about 38% of the surface. Despite the recognized relevance for a sustainable intensification of farming, the effects of future global climate dynamics and associated agriculture and land-use changes on soil erosion have not been quantified yet. Here, we present the results of a modelling approach to estimate potential global soil erosion changes between 2015 and 2070 under three alternative Representative Concentration Pathway scenarios (RCP 2.6, RCP 4.5, RCP 8.5) and 14 General Circulation Models (GCMs). Global soil erosion estimates are obtained using version 1.2 [*In prep*.] of the recently published RUSLE-based Global Soil Erosion Modelling platform (GloSEM) [*Nature communications* **8**, 2013 (2017)]. Unlike version 1.1, effects of permanent crops, managed pasture and temporary disturbed forest loss are spatially defined based on a probabilistic land use allocation approach.

In 2012, our baseline run of GloSEM predicts an annual average potential soil erosion amount of 35.9 (+5.6/-2.4) Pg yr^{-1}, with an estimated gross carbon (C) displacement by soil water erosion of 2.5 (+0.5/-0.3) Pg C yr^{-1} [*Global change biology* **24**, 3283-3284 (2018)]. Regarding the combined effect of future land use and climate projections, our modelling results suggest that the climate is the major driver of soil erosion change. In the most severe scenario, the combined land use and climate simulations show a possible increase of about 60% of soil erosion rates in 2070.

References

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