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Effects of climate change on soil erosion: Estimates using newly-available regional climate model data at a pan-European scale

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Erosion by water is among the most severe threats to soil in Europe. Moreover, delivery of eroded sediment to river channels causes many environmental problems including diffuse pollution, transport and storage of fine sediment and associated contaminants, degradation of aquatic ecosystems, and changes in flow conveyance capacity and flood frequency due to in-channel and overbank sedimentation. Whilst rates of soil erosion are sensitive to changes in surface runoff, spatially-explicit predictions of future erosion rates under changing climatic conditions are not widely available. The objective of this presentation is to describe a modelling framework suitable for addressing interactions between climatic, hydrologic, geomorphic and biogeochemical processes at national and regional scales, and to provide a preliminary evaluation of the potential impact of future climate change on soil erosion, and sediment delivery and transport in river channels and floodplains. Our modelling system combines elements of the PESERA soil erosion model with the Grid-to-Grid river flow model to provide regional projections of sediment delivery and transport. The combination of these two models permits the explicit consideration of catchment-wide erosion rates as well as the identification of areas where erosion is locally important. In this presentation, we investigate the sensitivity of the model to changes in climate and land-use, and we give an initial assessment of the effects of climate change on soil erosion using a driving data from a perturbed-physics ensemble of climate simulations made using the Hadley Centre Regional Climate Model.