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Erosion in a landscape evolution context: LISEM and LAPSUS

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In many erosion studies only contemporary erosion is assessed, assuming this to be the direct or indirect effect of human influence. In geomorphological studies, erosion is viewed as a naturally occurring process in the context of landscape evolution. This study aims to bridge the gap between these two contrasting views. In the study area (Guadalentín Basin; SE Spain) two models are applied: the short-term, event-based model LISEM (Limburg Soil Erosion Model) and the long-term landscape evolution model LAPSUS (Landscape Process Modelling at Multi-Dimensions and Scales). LISEM is a physically based erosion model that spatially simulates erosion and sedimentation after a rainfall event. It needs relatively many and detailed input parameters and rainfall data. LAPSUS is a landscape evolution model (LEM) which optionally includes the processes: water erosion and deposition, biological and frost weathering, soil creep, solifluction, landsliding, dust deposition and erosion due to tillage. The model uses relatively simple process descriptions, input maps and average annual rainfall. Theoretically LISEM is expected to perform better than LAPSUS due to more detailed processes and input variables. However, spatial variability of the required characteristics is high in the study area, giving rise to high uncertainty in input and output. Therefore, LAPSUS may give better results despite the simpler process descriptions and input maps. Currently, the two models are being calibrated and validated for the study area individually. Eventually, we aim to combine the two models, to get insight in erosion processes in the context of longer-term landscape evolution. Apart from uncertatiny and performance issues, questions that include i) Does one major rainfall event cause geomorphic changes or is the sum of many events of lower magnitude more important? Particularly in the semi-arid environment of SE Spain, this would enhance insight in process dynamics. And ii) can we simulate the observed erosion and sedimentation without including processes related to human influence, e.g. erosion due to tillage? This latter question can not be answered without involving the longer-term, natural erosion processes and gives insight in the possible drivers of erosion and sedimentation processes.