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## A model for continental-scale water erosion and sediment transport and its application to the Yellow River Basin

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A large-scale water erosion and sediment transport model is introduced and applied to predict continental-scale hydrological transport processes at the Yellow River Basin in China. Our model couples the Atmospheric and Hydrological Modelling System (AHMS) with the CASCade 2 Dimensional SEDiment (CASC2D-SED), by considering a scale-adaptive water erosion parameterization and eight possible flow directions of the channel routing model. Here, the AHMS-SED is applied to simulate the water erosion processes in the Yellow River Basin over 10 years with a spatial resolution of 20 km. The simulated daily sediment fluxes from four major hydrological stations along the Yellow River (namely, Tangnaihe, Lanzhou, Toudaoguai and Huayuankou) are compared with corresponding observations. There is a quantitative agreement between these observations and modelling results at all stations. Our results demonstrate the good performance of the new scale-adaptive parameterization and the integrated AHMS-SED, paving the way for the studies of water erosion and sediment transport at large scales. We also show how of our numerical simulations can be used to predict the evolution of sediment transport in the Yellow River Basin under consideration of specific climate change scenarios.