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Analysis on underlying connectivity mechanisms of a mesoscale dryland river basin, NE Spain

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Reliable, comprehensive and long-term measurements of sediment fluxes are of high need, for a successful model development and modelling of erosion, sediment transport, retention and remobilization in order to better understand the (inter-)relation of these sedimentological transport processes, hereafter named connectivity mechanisms. A lack of knowledge exists specifically for regions of dry climates. Here, connectivity phenomena depend on static geomorphologic and vegetation characteristics of the basin (e.g., slope, elevation, soil, exposure or vegetation) as well as dynamic patterns like rainfall events, which often exhibit a high variability in space and time (rainfall intensity and duration). The dryland catchment of investigation is the Iábena (445 km^2) river basin, located in the central Spanish Pyrenees, North-East Spain. The largest sediment source is a badland area within the middle reaches. The river discharges into the Barasona reservoir, which provides important water supply for the region's agriculture. The capacity of the reservoir is gradually reduced by sediment delivery of the river basin. This causes the necessity of investigation of erosion and sediment transport processes. So far, erosion studies for the region concentrated on the quantification of sediment concentration and delivery, sediment budgets and adjacent modelling for management purposes. The undertaken mesoscale conceptual modelling is of insufficient accuracy for predictions of erosion rates, most likely due to the insufficient conceptualization of the connectivity between hillslope and main stream. Furthermore, potential characteristics and locations of temporary sediment storages within the basin have yet to be investigated in detail. Consequently, this study provides a spatial analysis of unknown static and dynamic connectivity features within the river basin. The analysis bases on a Digital Elevation Model (DGM), maps of vegetation distribution, soil type and geology. Furthermore, rainfall and discharge records from different periods are studied. Regarding the individual features and their combination, potential regions of strong or weak connectivity to the main stream will be extracted, hence giving an insight into the connectivity-characteristics of the basin's sub-regions. The results will serve as an input for the design of a hydrological and sedimentological measurement network to be installed within the Isábena basin. And finally they will direct toward an improved conceptual modelling of sedimentological connectivity for mesoscale dryland river basins.