



The role of lithological properties on badland development

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Badlands can develop on a variety of bedrock and/or weathered material. Mineralogical and physico-chemical characteristics of these materials play a key role in badland hillslope processes depending on environmental conditions. Over time, surface material properties change, and formed regolith tends to stabilize, as a function of slope and climate conditions. In order to identify the most important material properties for initiation and development of badlands 55 samples of weathered and unweathered sediments from 14 badlands worldwide were analysed. Following properties were identified on all samples: mineralogical composition, grain size composition, Electrical Conductivity (EC), Total Dissolved Salts (TDS), pH, Sodium Adsorption Ratio (SAR), Total Organic Carbon (Corg) and porosity. Obtained results were tested for “site signatures” (SAR/EC, SAR/pH and particle size/pH) and results confirmed that mineralogical properties, especially clay mineralogy, grain size and geochemical properties of parent material are essential for badlands erosion processes. However, porosity and sorting of material showed to be important properties for enhancing erosion processes on smectite-poor sediments. Furthermore, it was determined that Corg plays a significant role in material susceptibility to erosion. Regardless of the clay mineralogy and geochemical properties, higher content of Corg tends to improve material resistance to dispersion. Therefore relationships between SAR/Corg and Corg/EC for badland material classification are suggested as an addition to “site signatures”.