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Regolith development and dynamics in the loamy badlands of the central Spanish Pyrenees

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Badlands are one of the most dynamic morphologies, because its torrential hydrological response and great capacity of sediment yield. Badland occurrence in the southwestern slope of the Pyrenees is associated to loamy bedrock outcrops, which are very prone to weathering by physical and chemical processes. These morphologies are the main sediment source area in the headwaters of the rivers Aragón and Gállego, which frequency characterises the landscape of the "Canal de Berdún" that is a high and long valley located at 800-900 m.a.s.l. The climate is Mediterranean with some Continental and Atlantic influences, and a marked seasonality. These climatic patterns are favourable to badland development and dynamics. The aim of this work is to study the temporal and spatial patterns of weathering in mountain badlands. The study has been performed in a small basin (45 ha, 19 % badlands, 75% forest and 6% meadow) taking into account the slope exposition. Temporal patterns of regolith dynamics are obtained through measuring periodically (1 to 3 weeks) some superficial physical variables (0-10 cm): bulk density as the main indicator of regolith weathering; surface mechanical resistance to evaluate crusting development; and shear strength for particle detachment susceptibility estimation. The relationships between these indicators and some environmental variables (moisture, precipitation and temperature) were also analysed. The sampling period begun in January 2004. The results show the effectiveness of the method, allowing temporal comparison of regolith weathering rates. The northern exposures are more sensitive to changes, which are reflected in more marked seasonal variability of bulk density and mechanical resistance. Higher contents of moisture and lower temperatures in the north-facing slopes increase the weathering efficacy of freeze-thawing processes. Otherwise, in south-facing slopes, the most effective process is the thermoclastism, due to higher daily thermal oscillation. The development

and dynamics of regolith in the north-facing exposition is bigger than in the south one.