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Weathering landforms exposure and erosion phases in Pedriza de Manzanares (Spanish Central Range)

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The phases of erosion can be reconstructed measuring the position and dimensions of exposed granite underground weathering landforms. We afford a first approach of this kind of "erosion history" in the area of Pedriza de Manzanares.
Pedriza de Manzanares is the main part of the Natural Park of High Manzanares River Basin. The area is part also of the Late Paleozoic granites of the Spanish Central Range, intruded during the Variscan orogeny, and uplifted to its present position during Alpine orogeny. The granite shows a complex fracture pattern (related to Variscan and Alpine processes) that defines a landscape with alternance of regolith-connected-depressions and fresh granite outcrops with abundant bornhards and boulders.
Pedriza (as most people call it) is a well known area for its granite landforms which attract tourism, educators and rock climbers. In this area, the contrasting hydrological behaviour of fresh and weathered granite, especially in fractures areas, produces small aquifers with a high recharge from adjacent impermeable surfaces.
These conditions have been studied in relation to the soil water availability (for both human and ecosystems), and in relation to the geomorphic edaphic processes (taffoni, flared slopes, etc.). In previous works (García et al., 2008, Centeno et al., 2010) a conceptual model using MS-Excel was devised which provided the basis by which were defined the relevant variables and their interconnections (landforms, climate, hydrogeology).
From the standpoint of soils water (and the related weathering processes or ecosystem characteristics), this is especially important in semi-arid and arid climates, as has been appreciated by practising farmers for many years, for the contrast in productive potential in stark between the regolithic and rocky areas.
At the same time, granite weathering is enhanced by the persistent presence of water in the regolith and, as a consequence, many microforms are initiated or evolve under the regolith -something well known from the work by Twidale and Borne (1975) and Twidale (2002) when they studied the episodic exposure of these landforms.
Now, we can identify some correlation between variables like taffoni's magnitude, regolith-outcrop ratio and taffoni organization in levels. In addition, these levels of taffoni allow us to identify several phases of regolith erosion in most regolith unit, in different settings and altitudes.

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