

Subsurface paleoweathering in basement rocks. Geomorphology and tectonic relationships. Cartographic application in the north western Massif Central (Creuse, France)

Observations and interpretations about the main features of subsurface paleoweathering are presented in granitic rocks of the north western Massif Central. The survey and realisation of geological maps using the concept of shallow paleoweathering is tested on the St-Sulpice-les-Champs sheet at a scale of 1/50,000 (Rolin *et al.*, in prep). In granitic rocks, the weathering profile shows different alteration horizons (Wyns, 1998). From the bottom to the top they can be described as follows: 1) healthy granitic bedrock, 2) granite with horizontal fractures, 3) boulders occurring at the interface between weathered and fresh rocks, 4) grus showing, at its base, sheeting phenomenon, then 5) grus showing the original textures of the parent granites, and in the upper part 6), original textures of parent granites being completely lost. On the St-Sulpices-les-Champs geological map, despite a high level of stripping, the thickness of the weathering profile may reach up to 30 m high.

After a geomorphological analysis of the benches of the studied area, the weathering profile of the granites has been mapped from field observations. If we consider the hypothesis that the weathering profile observed is associated with the same paleosurface on the studied area, we can suppose an approximately same altitude for the bottom of the weathering profile, revealed by the boulders, for one unique lithology. It is thus possible to show tectonic – geomorphology relationships related to vertical faults, which distorts the weathering front. This theory helps geologists to map the faults and to estimate their vertical offsets (up to 50 m).

If we compare the map of the weathering front elevation and the geological map, it appears sufficiently precise to argue that the alveolate/cellular etching formation is mainly related to structural features and not only to the lithology.

The use of DEM (Digital Elevation Model) allows an optimisation of prospecting subsurface paleoweathering situated in slight slope areas and to locate vertical faults strongly underlined by the valleys. From all of these new results we can propose a schematic 3D diagram of alveolate/cellular etching in the studied area.

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Rolin P., Cartannaz C., Salen F., Thalouarn N., Delwalle B. (in prep). Carte géologique de la France à 1/50 000 Feuille St Sulpice les Champs, n° 666 et notice explicative.

Wyns R. (1998) - Modélisation de la géométrie (altitude, épaisseur) des arènes granitiques du bassin-versant lozérien de la Truyère (Lozère, Massif central). Rapport BRGM R 40191, 18 p.