High-resolution landform-regolith mapping in a greenstone belt context of the Soudanian zone: Implications to mineral exploration

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We present a new protocol of high-resolution landform-regolith mapping that takes into account the specificity of West African morpho-climatic context and allows for the definition of new soil geochemical exploration criteria. Particular attention was given to glacis/pediments that are transportation slopes occupying an overwhelming part of the subregion. The map is based on extensive fieldwork and complementary photo-interpretation. Field mapping was undertaken at 1:10 000 scale on the basis of Lidar data converted into topographic sheets with 1 m contours. Twenty map units have been defined that are grouped under four main types of landform-regolith association. The first type relates to the relicts of the West African paleolandsurface sequence: (i) paleolandscape relicts with their pristine capping duricrust (bauxite and/or ferricrete), (ii) paleolandscape relicts from which the duricrust cap was stripped-off, (iii) erosional paleolandscape relicts exposing an earlier regolith that it contributed to exhume and (iv) residual hills resulting from the degradation of the paleolandsurfaces. The second type comprises recent erosional landscapes exposing various types of material: (i) bedrock and saprock, (ii) saprolite, (iii) various weathering horizon(s) under scree-capped slopes and (iv) lithosoils. The third type comprises functional landsurfaces and their clastic sedimentary overburden in transit: functional pediment/glacis and alluvial fans. The fourth type corresponds to accumulation landforms that are represented by alluvial terraces along the main mature river drains.

Given the nature of the regolith exposed by each landform-regolith map unit, the twenty map units have been grouped into four categories to produce a soil prospectivity map. This map aims to help interpreting soil geochemical surveys and targeting favourable sampling sites where the regolith is still linked to its underlying parental bedrock. Apart from being key for interpreting surface geochemical anomalies, such maps should further help locating unsuspected resources (concealed under transported regolith) and targeting areas of potential supergene concentration of metals.