

About shape and development of sterile bodies in phosphatic deposits

Armand Boujo

Universidade de São Paulo, Brazil

In their interesting paper [5], Kchikach et al. intended to map the sterile bodies under the Quaternary cover, the latter causing serious problems in the exploitation of open cast phosphatic deposits of Sidi Chennane (northeast to the Oulad Abdoun, large sedimentary basin called 'Plateau des Phosphates'). These problems have been mentioned since the first prospection works [10].

The geophysical method used (electrical resistivity) brought encouraging results and its calibration close to wells and diggings ensures the quality and reliability of this approach. The latter was deliberately restricted to a purely applied aspect, but the excellent study presented here leads to a very interesting geological reflection. Why are these sedimentary ground features isolated the ones from the others? What kind of guide does govern their distribution? What part can be ascribed to weathering?

In fact, the shape of the sterile bodies in which is observed the lithological succession of the adjacent unweathered deposit evokes a weathering phenomenon, a partial dissolution, even a leaching of carbonates, clays, etc. This results in a compaction of the different layers. This compaction is more accentuated in the middle of the affected zone and more restricted on the border, which would explain the 'small flexures' pointed out by the authors. In the uppermost part of the series, above layer B, the dissimilar shape of the sterile body still quite reflects that of the unweathered deposit, being characterised by a strong decrease of

the calcareous beds, which is counterbalanced by an increase of much softer layers.

In further works, maybe would it be judicious to try to highlight the possible occurrence, in the basement of the 'Plateau des Phosphates', of vertical ground features related to episodes of Alpine orogenesis; the latter could perhaps also reflect back (although very damped by Senonian marls) on the Cretaceous–Eocene cover.

It is also to be noted that this 'case history' is very important for the understanding of the post-phosphatic history of the Oulad Abdoun deposit. The latter exhibits specific and unknown features for the last transformations affecting this type of deposits in the world. These transformations, whose origin is often supergene, even pedological, results in a favourable way such as deposits of residual concentration, for example, in Morocco (Sidi Daoui) [3, 7]; in Brazil (Olinda) [11], (Congaçari) [9]. In Senegal, the result is favourable in the Taïba deposit, where weathering generates a sometimes complete leaching of carbonates [6, 11], but quite unfavourable when is observed a development of iron and aluminium oxihydroxides, which is very detrimental to the ore exploitation (border of the Taïba deposit and Thiès [4], or the settlement of sand-filled palaeochannels within the phosphatic layer [1, 2, 10]. The different features of the weathering of phosphatic series are synthesised in the paper by Lucas et al. [8].

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