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Characteristics of the magnetic phases within a ferrugineous paleoweathering profile in the Massif Central, France

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Paleoweathering features of the French Massif Central are complex and the chronological correlation between continental paleosurfaces and marine deposits have proven to be challenging. Paleomagnetism has offered the most reliable method for determining the age of such azoic formations. Lateritic paleosols generally develop over long periods of time and display numerous heterogeneities resulting form successive pedological evolutions. The paleomagnetic signal in such formations is undoubtedly complex to interpret let alone date. Consequently, detailed petrographical, mineralogical and magnetic studies have been undertaken in order to discriminate the coexisting magnetic phases.

We present results from the “Les Mottes” siderolithic section in the French Massif Central. The assemblage of coexisting iron oxide phases varies within the profile. Petrographic and rock magnetic analyses identified both goethite and hematite as the main magnetic carriers. Hematite’s occurrence is varied and the distribution of each occurrence type is homogenous or heterogeneous dependent on the observation scale. Samples are dominated either by viscous goethite and coarse grained hematite, by finer grained pigmentary hematite with remanences of chemical origins, or by superparamagnetic nanoparticles of hematite. Overall, iron oxide mineralogy, grain size and type of occurrence are the dominant factors dictating the origin and reliability of the recorded paleomagnetic signal.

Characterising the multiple magnetic phases was an essential prerequisite for inter-

preting the paleomagnetic directions recovered from the paleoweathered material and determining the age of the "les Mottes" section through palaeomagnetism (Ricordel, 2007).

Ricordel, C., 2007. Datations par paléomagnetisme des paléoaltérations du Massif central et de ses bordures : implications géodynamiques. Thèse de doctorat, Mines Paris, Paris, pp. 172.