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New insights on the ultramafic intrusions surrounding the Kunene Anorthosite Complex (SW Angola) from gravity, magnetic and radiometric data

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The Kunene Anorthosite Complex (KAC), located in SW Angola, is one of the largest anorthosite structures in the world. Dating from the Mesoproterozoic, its installation process is still not clear. Several mafic and ultramafic outcrops can be found surrounding the KAC. Once considered related with its emplacement, the study of these bodies may help us understand the history of this unique geological feature. While geochronological data show that they are synchronous, or possibly a bit younger, than the embedding granites and migmatites of Paleoproterozoic age, the question arises of whether they are intrusions installed in the host rock or if they are instead recycled remains of older Arch crust. The development of these outcrops in depth provides relevant clues regarding the origin of these bodies and their relationship with the Eburnean (~1.93-2.04 Ga) and Epupa-Namibe (~1.83-1.74 Ga) events. One of these mafic outcrops, designated the Hamutenha outcrop (Huíla Province) exhibits an elongated shape and a NW-SE orientation and is characterized by an internal zonation. Generally, the innermost part is composed of ultramafic rocks of (mostly harzburgites and dunites), with diorites outcropping in its NW and SE borders. The Hamutenha outcrop was previously identified for potentially bearing Cr, Ni and PGE mineralization.

Therefore, the aim of this study is two-fold. Firstly, it attempts to determine the development at depth of the mafic body to better understand its origin. Secondly, it tries to clarify the emplacement mechanisms responsible for the potential mineralization and to evaluate the likelihood of its economic potential. Aeromagnetic and ground gravimetric data acquired in the framework of project PLANAGEO (National Geology Plan for Angola) of which the National Laboratory of Energy and Geology (Portugal) was one of the partners, was used to create a magnetic vector model and a density contrast model of the Hamutenha body. These 3D models were interpreted in combination with the detailed geological observations and aeroradiometric data also from the PLANAGEO project, providing new insights on the underground lithological differentiation and geometry of this geological structure.