The origin of RM, and magnetic mineralogy of the Cretaceous to Jurassic nepheline basanites from Nigeria and the Cretaceous basalts from the Syrian Arab Republic (Part XI)

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Abstract: The Cretaceous to Jurassic nepheline basanites from Nigeria and the Cretaceous basaltic rocks from the Syrian Arab Republic were studied. Dominant among the Fe-Ti oxides in all studied rocks are the titanomagnetites (Ti-Mt-es) with the compositional coefficient x in the range x ≈ 0.7 - 0.05 (in the formula $Fe_{3-x}Ti_xO_4$). These x coefficients are influenced by the so far unprecise analyses due to coexistence of Ti-Mt-es with ilmenite-hematites (Ilm-Hem-es) in volcanic rocks. It is revealed that in some basaltic rocks there coexist the Ti-Mt-es together with Ilm-Hem-es, even in the same individual Fe-Ti grains they may intergrow each other. In some cases the Ilm-Hem-es are in detectable form, but in other cases they are shielded within a formerly oxidized part of the original Ti-Mt in the rocks. These Ti-Mt-es, especially those with high portion of ulvöspinel (Usp) are the carriers of soft, mostly unstable natural remanent magnetization (NRM). Despite the fact, that Ti-Mt-es acquired the primary RM in the time of their origin, they are not able to preserve their original RM. They are metastable, so they have very strong tendency to be easily altered in the field. The Ilm-Hem-es, like all Fe-Ti oxides, are also metastable. As the rhombohedral phases are more stable compared with Ti-Mt-es, they can carry the TRM in rocks. They have a tendency to be transformed e.g. from original composition with high portion of ilmenite (Ilm), in favour of a stage with lower content of Ilm, and consequently in favour of more oxidized form containing e.g. hematite (He) and pseudobrookite (Psb), according to formula: $Ilm_{42}Hem_{58} \rightarrow Ilm_{15}Hem_{85} \rightarrow Hem + Psb$. There are only casual, either individual rock samples, or only negligible parts of volcanic body in both the nepheline basanites from Nigeria and basaltic rocks from the Syrian Arab Republic of reversed RM. The stable component of this RM is of CRM origin. Other magnetic minerals - hematite, magnetite, maghemite, which are present nearly in all studied rocks, are of secondary origin, and consequently they are the carriers of the secondary magnetization of the CRM origin. So, the primary magnetization is hardly present in such old rocks.

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