



Characterising Cameroon Line Volcanic Rocks based on their Magnetic Petrology

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A total of 200 volcanic rock samples collected from Cameroon have been analysed to study their petromagnetic characteristics. Thermomagnetic experiments and electron microscope observations on the samples indicate that the principal magnetic mineral and carrier of Natural Remanent Magnetisation in these rocks is titanomagnetite rich in titanium. These also indicate that the level and stability of magnetisation are dependent on the quantity and composition of the magnetic minerals (which are controlled by the composition of the original liquid magma), their oxidation states and grain sizes. The contribution of high and low temperature oxidation observed in some of the magnetic minerals was that of increasing their magnetic resistance. Rocks with abundant ilmenite lamellae in their titanomagnetite showed increased magnetic resistance during demagnetisation experiments. In the analysis the samples exhibited a considerable magnetisation spectrum indicating that most of them are strongly magnetic. The general tendency in experimental magnetism of an increase in magnetic resistance with decrease in grain sizes of discrete magnetic minerals is not respected in this natural system because of the effects of the presence of many ilmenite lamellae and mini fractures in some of the titanomagnetite grains. In this way, the conditions of low crystallisation temperature, high f_{o_2} and high PH_2O which were the conditions for the crystallisation of the most stable rocks (the hawaiites) on the line, were the conditions favourable for the acquisition of a stable magnetisation in the region. The low Curie Temperatures (74 - 250 °C) found for a majority of the rocks indicate that the lower crust in the region and the upper mantle could be non-magnetic. The high regional negative magnetic anomaly over the Cameroon Line that is not consistent with the small depth previewed by the Curie system and by the paramagnetic effect of the acid volcanic rocks in the region is probably derived principally from the differentiated

basalts.

Keywords: Cameroon, Magnetic, Minerals, Volcanic, Rocks.