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A detailed paleomagnetic investigation of Cretaceous igneous rocks: New contributions from Colombia and Paraguay

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We present rock magnetic results, paleodirections and –intensities from Cretaceous samples from two locations from South America. On the one hand we report paleomagnetic results from the Western Cordillera of Colombia from 15 sites north of Cali. These volcanic rock samples were related to age determinations from close localities of 92.5 $\pm$ 1.1 Ma on average, occuring during the Cretaceous Normal Superchron (CNS). On the other hand we show results from an alkaline dike swarm in the Asunción Rift, Eastern Paraguay. Previous investigations suggest that these dikes extruded in a rather short period of 126-127 Ma, during normal and reversed polarity field configuration, right before the onset of the CNS.

Rock magnetic measurements of both sites show that the main magnetic component is a low-coercivity mineral, e.g., (titanium)magnetite, with a large range of grain sizes from multi- to single domain, or mixtures of several grain sizes in a sample. For the Colombian site we obtained an average Virtual Geomagnetic Pole (VGP), whose latitude compares well with those for South and North America of Besse and Courtillot (2002) with a similar age. For the determination of the Virtual Dipole Moments (VDMs) the Thellier-Coe method did not give successful results, probably due to minerals in the range of multidomain grain size. Therefore, we applied the multispecimen protocol on ten specimens. Six successful determinations produced an average VDM of 2.3 x 10^{-22} Am^2. This value is rather low, but in good agreement with other data from the same time period. Directional investigation of the Eastern Paraguayan dike swarm show highly clustered promising results with six out of 22 sites having an $\alpha_{95} \leq 10.0^{\circ}$. Most of these sites show a reversed polarity; however, one intermediate polarity site has a very reliable direction as well. This and the occurrence of normal polarity sites suggest that the dikes may have not appeared at the same time but rather during the transition from normal to reversed polarity right before the CNS at around 126-127 Ma. Specimens from nine sites are promising for paleointensity determination due to their linear vector diagrams showing one component, the occurrence of magnetite as magnetic carrier, and their magnetic stability. Future work will be focused on a more concise investigation of the directions. This includes the measurement of specimens from a second field campaign located close to the first one. Furthermore, paleointensity determinations are planned, after choosing the most successful specimens.