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MAGNETIC FABRICS, PALEOMAGNETISM AND GEOCHEMICAL STUDY OF EARLY-LATE CRETACEOUS MAFIC DIKE SWARMS FROM THE NORTH COAST OF SÃO PAULO STATE, BRAZIL: PRELIMINARY RESULTS

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Dike swarms from the coastline of São Paulo State are widespread along the Serra do Mar between São Paulo and Rio de Janeiro. The studied swarms occur mainly along the coast in the São Sebastião, Ubatuba cities and IlhaBela Island, which is thought to belong to Santos-Rio de Janeiro swarm. The swarms crosscut Proterozoic polymetamorphosed rocks of the Costeiro Complex and alkaline stocks. The dikes are basic tholeiitic, intermediate, alkaline and lamprophyres in composition, and they crop out side by side in the beaches and falls. They range from a few centimeters up to 2 m wide for the lamprophyres and alkaline, and up to > 10 m for the basalts. Their trend is predominately N40-50E with vertical dips. It is believed that the basaltic activity occurred during the Early Cretaceous and was then partly coeval with Ponta Grossa and Florianópolis dike swarms. The other dikes are, however, younger than the basalts. These swarms are presently being studied by geochemical and magnetic methods, and the preliminary results are shown. The emplacement of the dike swarms is related to the processes of separation between South America and Africa and then with the opening of the Atlantic Ocean. Oriented samples from around 245 dikes, widely distributed throughout the studied region were collected for geochemical and magnetic measurements. Sample orientations were determined using both magnetic and sun compasses, whenever possible. At least 15 and up to 20 cores, using a gasoline-powered rock drill, were collected from each site (dike) for which the strike and thickness could be determined. Both margins of the dikes were symmetrically (whenever possible) sampled, together with the center. Magnetic fabrics were determined by applying both anisotropy of low-field magnetic susceptibility (AMS) and anisotropy of anhysteretic remanent magnetization (AARM). Rock magnetism properties indicate that pseudo-single-domain grains of almost pure magnetite carry the magnetic fabrics. However, some lamprophyre dikes show an unusual magnetic behavior probably due to the presence of the iron carbonate siderite which was detected in magnetic measurements at liquid helium temperature. Normal AMS fabric acquired during magma flow is dominant in the swarms, and its K_{max} -Kint plane is parallel to the dike plane while the magnetic foliation pole (K_{min}) is perpendicular to it. The analysis of the K_{max} inclination permitted to infer that the dikes were fed by horizontal ($K_{max} < 30^\circ$), inclined ($60^\circ < K_{max} < 30^\circ$) up to vertical ($K_{max} > 60^\circ$) flows independently of the chemical composition. AARM fabric is either coaxial or not coaxial or better defined than AMS fabric. In addition, both normal and reverse polarity directions were found in the dike swarms indicating that at least two magmatic events occurred in the studied region. The combination of magnetic anisotropies, paleomagnetic and geochemical data suggest that dikes from the same source were emplaced in at least two magmatic events.