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Magnetic Fabrics of the Piracaia pluton, SE Brazil

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Magnetic fabric and rock magnetism studies were performed on the four units of the 578 ± 3 Ma-old Piracaia pluton (NW of São Paulo State, southern Brazil). This intrusion is roughly elliptical (~ 32 km^2), composed of (i) coarse-grained monzodiorite (MZD-c), (ii) fine-grained monzodiorite (MZD-f) which is predominant in the pluton, (iii) monzonite heterogeneous (MZN-het), and (iv) quartz syenite (Qz-Sy). Magnetic fabrics were determined by applying both anisotropy of low-field magnetic susceptibility (AMS) and anisotropy of anhysteretic remanent magnetization (AARM). The two fabrics are coaxial. The parallelism between AMS and AARM tensors excludes the presence of a single domain (SD) effect on the AMS fabric of the units. Several rock-magnetism experiments performed in one specimen from each sampled unit show that for all units the magnetic susceptibility and magnetic fabrics are carried by magnetite grains.

Foliations and lineations in the units were successful determined by applying magnetic methods. Most of the magnetic foliations are steeply dipping or vertical in all units, and are roughly parallel to the foliation measured in the field and in the rocks which surround the pluton. In contrast, the magnetic lineations present mostly low plunges for the whole pluton. However, for two sites they are steep.

Thin section analysis show that rocks from the Piracaia pluton were affected by the regional strain during and after emplacement since magmatic foliation evolves to solid-state deformation in the north and south of the pluton, indicating clearly that magnetic fabrics are related to this strain. Otherwise, the lack of solid-state deformation at outcrop scale and in thin sections precludes deformation in the SW of the pluton. This evidence allows us to interpret the observed magnetic fabrics as primary in origin (magmatic) acquired when the rocks were solidified as a result of magma flow, in which steeply plunging magnetic lineation suggests that a feeder zone could underlain this area.