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Structure of the Early Cambrian Tastil batholith (Salta, Argentina)

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The Tastil batholith, located in the Eastern Cordillera of the Andes, spreads over more than 500 square kilometers and is mainly emplaced in the Puncoviscana Formation, of Neoproterozoic to Eopaleozoic age. The main structures in the country rocks are tight folds with angular geometry, which only locally develop a spaced axial-planar cleavage. Fold axes plunge 30° to N350°. The dominant northward strike of the bedding within the Puncoviscana Formation is parallel to the batholith's elongation.

Three main facies are recognized in the batholith: grey granodiorite, dacite porphyry and red granite. The dacite porphyry shows lamprophiric texture. The red granite is commonly affected by hydrothermal processes and presents features like intergrowths between quartz and k-feldspar and miarolitic cavities, which indicate a shallow emplacement level. It is worth noting that the three facies contain magnetite and that the magnetite grains appear as elongate inclusions along the (001) cleavage of the biotite crystals very often. The emplacement sequence is, from older to younger: (1) grey granodiorite, (2) dacite porphyry (526±1,3Ma) and (3) red granite (517±2Ma). The gray granodiorite intruded the Puncoviscana Formation and is intruded by the red granite. The relationships between the red granite and the dacite porphyry are complex and suggest the existence of several magmatic pulses of dacite porphyries.

The three facies form roughly concordant sheeted bodies that display N–S strikes and variable dips. Along the northwestern side of the batholith, the red granite and the gray granodiorite display a magmatic contact. In contrast, at the eastern side of the batholith, the contact between the same two facies is a west-dipping Andean reverse fault responsible for the overthrusting of gray granodiorite over red granite.

The magnetic susceptibility values (K) from the grey granodiorite (K= 8.77x10-3 SI), dacite porphyry (K= 22.86 x10-3 SI) and red granite (K= 9.13 x10-3 SI) are typical of ferromagnetic granitoids. The strike of the magnetic foliation in the grey granodiorite and the dacite shows similar patterns, with maxima at around N30ºE. In contrast, the magnetic foliation in the red granite records a complex distribution due to the late hydrothermal alteration. The most relevant points inferred from the magnetic fabric study are:

1)The presence of a circular pattern in the southern part of the batholith and the radial arrangement of the magnetic lineation trends. We interpret these structural features evidence the root zone of the grey granodiorite.

2)The northern part of the batholith shows a sheet-like shape and outlines an asymmetrical antiform. Since the axial surface of such antiform is parallel to, and its eastern limb is bounded by, a N-striking and W-plunging reverse fault, we consider that this fold is associated to the development of the Andean thrust.