THE AGE OF THE TRES PIEDRAS GRANITE, NM, USA: A CASE OF LARGE SCALE ISOTOPIC HOMOGENIZATION

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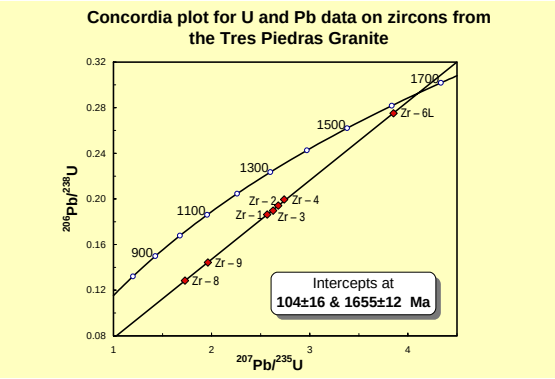

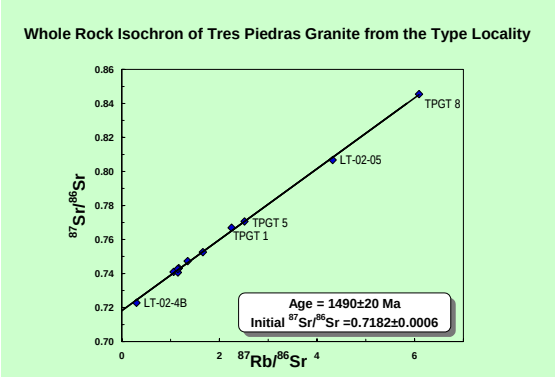

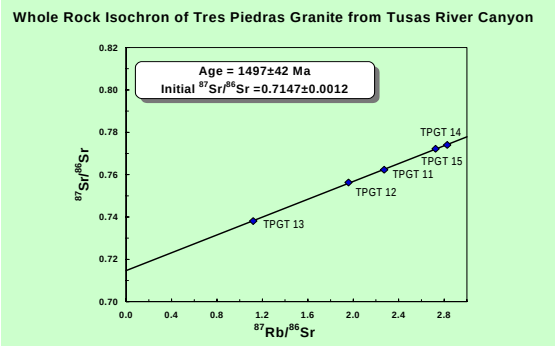

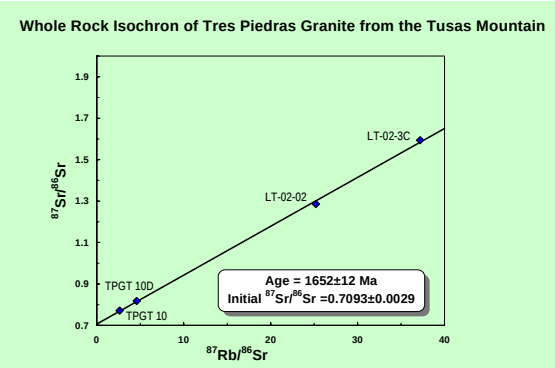

Introduction

The Tres Piedras Granite, exposed in the Tusas Mountain within the crystalline province of Eastern Rio Arriba Country, New Mexico, USA, is a granitic gneiss, which exhibits relict igneous textural features. The present study has obtained U-Pb zircon ages and Rb-Sr whole rock ages for the Tres Piedras Granite.

Results, Discussion & Conclusions

The zircons removed from the Tres Piedras Granite delineate a chord that represents concordia at 1654 Ma and 98 Ma with a concordant point at 1654 Ma (Fig 1). Although there is no dated activity for this region at approximately 98 Ma, the episodic Pb loss is preferred because 1650 Ma diffusion analysis will not fit the data points.

Rb – Sr whole rock data points obtained from the Tres Piedras Granite yields a distinct isochron for each outcrop sampled. The age and apparent initial Sr^{87}/Sr^{86} ratios of the Tres Piedras Granite outcrops (approximately 50 square meters of collecting area at each exposure) are as follows: Tres Piedras Granite Type Locality: 1493 +/- 21 Ma and 0.7183 +/- 0.0006 (Fig 2); Tres Piedras Granite – Tusas River Canyon: 1501 +/- 44Ma and 0.7145 +/- 0.0013 (Fig 3); and Tres Piedras Granite – Tusas Mountain: 1661 +/- 17 Ma and 0.7102 +/- 0.0071 (Fig 4).

If the concordant zircon point at 1654 Ma indicated the time of crystallization, then some type of disturbance must have occurred in the Rb-Sr isotopic system of the Tres Piedras Granite to cause the Type locality and Tusas River Canyon isochron ages to differ from the zircon discordia intercept age. This difference is explained by large-scale isotope homogenization (during metamorphism) of Sr on the scale of kilometers.

The metamorphic effect is also evident in thin section of the granites from the Type Locality and Tusas River Canyon. The feldspars are altered to mica and some of the quartz have been recrystallized to finer grains where as those from the Tusas Mountain are unaltered and have large grains of quartz and feldspars.

Finally Lanzirotti and Hanson (1997) have dated the age of regional metamorphism from the garnets and staurolites of Rinconada formation to be 1461+/- 13 Ma which might have homogenized the granites on kilometer scale.

Figures (from top to bottom)
Fig 1. Upper intercept of the concordia on the Tres Piedras granite zircons at 1654 Ma.
Fig 2. Rb-Sr whole rock age of the Tres Piedras Granite from the Type Locality.
Fig 3. Rb-Sr whole rock age of the Tres Piedras Granite from the Tusas River Canyon.
Fig 4. Rb-Sr whole rock age of the Tres Piedras Granite from the Tusas Mountain.