

## U-Pb ZIRCON AGES OF SOME CLASSIC GRANITES OF THE BORBOREMA PROVINCE

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### INTRODUCTION

The Borborema Structural Province, in Eastern Northeast of the South American Platform, is a branching system of orogens which evolution was developed during the Neoproterozoic among different descendants of the Rodinia supercontinent (such as “Parnaíba Block”, São Luis-West Africa and São Francisco-Congo-Angola Craton). Its extension in the African continent (Pan African Systems) has been recognized - by many different authors - in the area between Togo and Gabon.

First of all, some main characteristics may be mentioned to this province: (i) the participation of the reworked Paleoproterozoic basement (basement inliers, with different sizes and roles in the geotectonic evolution), (ii) different types of fold belts (in terms of different tectonic behavior and lithostratigraphic assemblages), and (iii) the remarkable granitic plutonism. A recent synthesis for the evolution of this province may be found in Brito Neves et al. (2000).

About 35 years ago a previous and classical paper by Almeida et al. (1967) had preliminarily discriminated a series of granitic typologies, as “Conceição” type, “Itaporanga” type and so on, mostly based upon general geological features and petrographic grounds. A numerous and outstanding group of scientific articles has since then been developed on these granites up to present, with remarkable enrichment of new petrological, isotopic and geochemical data. Additionally, many new granites occurrences have been reported in that structural province, where that preliminary classification has somehow been preserved. The papers of Sial (1986), Ferreira et al. (1998), Santos & Medeiros (1999) and Brito Neves et al. (2000), may be suggested as good syntheses on this subject, among a very rich and proliferating bibliography. It is necessary to remark the special emphasis on this subject given by the group of petrologists (NEG-LABISE) of the Department of Geology of Universidade Federal de Pernambuco, with remarkable bibliographic documentation available (e.g. Almeida et al., 2002; Guimarães et al., 1998; Guimarães & Almeida, 2001).

### THE GRANITIC PLUTONISM

The granitic plutonism of the Borborema Province is rather important and widespread in terms of occurrence. Many granitic occurrences intrude supracrustal belts of Eo-Neoproterozoic (Cariris Velhos Orogeny) and Mid and late Neoproterozoic (Brasiliano collage). Other granitic occurrences are intrusives in the basement inliers

of Paleoproterozoic, sometimes forming large batholiths. Some other granites are clearly related to the linear shear belts, which gave the final geometric-geologic shape to the Borborema Province. Even, in the distal reworked marginal zones of the cratonic nuclei of São Francisco (“Sobradinho Massif”, to the south) and São Luis (“Granja Massif”, to the north) granitic occurrences has been recorded. This remarkable granitic plutonism has been matter of outstanding number of bibliographic references, so including many Master dissertations and PhD theses, as well as it has been subject of scientific articles of important national and international symposia (e.g. ISGAN I and II; Hutton symposium).

### GEOCHRONOLOGICAL DATA

Samples of these classical types of granites, collected in their typical localities, were submitted to geochronological determinations by U-Pb method, in order to fulfill a demand of the geological community, because most of the previous determinations were run with methods of lower accuracy. These new obtained data were now reunited with some preexisting U-Pb data from other granitic bodies (most of them run during the last decade), in order to try to make possible to recognize the main stages of granitic plutonism of the Borborema province as a whole.

With all data assembled – and having the geological development of the province in mind – it was possible to distinguish three major stages of granitic plutonism (Table 1): 650-625 Ma, 580-560 Ma and 540-520 Ma. The first two groups of ages use to assemble those granites that have many times been related to arc plutonism, while the latter time interval assembles those granites in close association to the events of escape tectonics of the Brasiliano-Pan African collage (Jardim de Sá et al., 1999), which has preceded the assembly of a supercontinental landmass (Western Gondwana). Actually, these span of time of these intervals are far from the wishable table, but this is the result that can be stated at the present moment of geochronological knowledge (at reconnaissance scale). The idea was to draw this preliminary and realistic approach, in order to establish a first basis that could step by step be improved with the advent of further data.

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**Table 1.** Main geochronological determinations (Ma) of granitic rocks of Borborema Province (U-Pb and Pb-Pb).

\* Rb-Sr age \*\* Sm-Nd age; # of these work

LATE BRASILIANO	NORTHERN DOMAIN			TRANSVERSAL ZONE	SOUTHERN DOMAIN		
	NW CEARÁ	CENTRAL CEARÁ	R. G. NORTE				
	507 ± 36 (Meruoca)			505 ± 4 (Palmeira) 517 ± 18 (Jati/Bodocó)	528 ± 4 (Águas Belas)		
	532 ± 4		530 ± 54 * (S.Algodão)	540-520 (Diversos)			
532 ± 6 (548 ± 24 *) (Mucambo)							
			557 ± 13 * D. Inês	551 (Tuparetama)	555 ± 20 * (Rajada)		
	563 ± 17 (Tucunduba)			570 ± 10 (S. João) 570 ± 24 (Queimadas) 572 ± 20 (S. Branca) 573 ± 45 # (Catingueira) 574 ± 54 (Solidão)			
						574 ± 32 (NW S.Quitéria)	
						576 ± 24 (Caraúbas) 578 ± 14 ** (Caxexa) 579-555 (Acari) 579 ± 7 (S. Rafael) 580 ± 4 (Tourão)	580 ± 4 # (Itaporanga)
				581 ± 2 (C. Grande)			
				583-591 (Brejo M. Deus) 585 ± 2 588 ± 12 (Faz. Nova)			
		591 ± 10 (Chaval)					
			593 ± 5 (Umarizal)	592 ± 7 (B. Jardim)		593 ± 5 (Correntes)	
	EARLY BRASILIANO		599 ± 16 (Poço Verde)				613 ± 8 (S. Catú) 614 ± 18 (C. João Sá) 616 ± 4 (Caiçara) 624 ± 5 (A. Branca)
						612 ± 9 * (Tabira)	
			614 ± 2 (Central Ceará) 622 ± 4 (Sul Fortaleza)			621 ± 14 (Tabira)	
			> 620 (Teixeira) 635 ± 9 # (Conceição) 638 ± 5 (Brejinho) 644 ± 5 (Timbaúba) 651 ± 15 # (Tavares) 750 ± 20 (Riacho Icó)				
630 ± 18 (NW Ceará)			628 ± 11 (Macaiba)				
		660± 15 (S. Quitéria) 665± 40 (W Ceará)					