

**MORRO DO LOPES GRANITES: PALAEOPROTEROZOIC ALKALINE MAGMAS
AND THEIR SIGNIFICANCE FOR SERRINHA NUCLEUS EVOLUTION,
NORTHEASTERN BAHIA, BRAZIL**

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INTRODUCTION

Morro do Lopes Granites (MLG) is a terminology which group several (>30) small granitic stocks and innumerable dikes, representing the last Palaeoproterozoic magmatic expression at Serrinha Nucleus (SerN). The SerN is interpreted as one of three ancient (Archaean) nuclei which constitute the basement of the São Francisco Craton at Bahia State. SerN terrain is constituted by Archaean gneissic-migmatites basement and volcano sedimentary sequences that record evidence of greenschist to amphibole grade metamorphism. Plutonic activity is represented by Archaean calc-alkaline granites (2.8 to 3.1 Ga) and Palaeoproterozoic calc-alkaline and TTGs (2.15 Ga) followed by alkaline rocks (2.07 to 2.10 Ga). The volcano sedimentary sequences, with Palaeoproterozoic ages, are interpreted as greenstone-belts terrains which result from Transamazonian Orogeny activities.

This study presents an overview of these late granitic bodies emplacement, which precisely constrain the end of Transamazonian Orogeny at the Northeastern Bahia State.

MORRO DO LOPES GRANITES AT SERRINHA NUCLEUS

Intrusive activity in the end of Transamazonian produced diverse alkaline plutons. The Morro do Lopes type was first recognized at the Southwestern area of SerN as the last products of regional extension following the back-arc basin closure. Later, compositionally similar granitoids were also recognized further North and East, presenting the same time range. A detailed geochronological study (Rios, 2002) of these stocks indicates that constituent rocks were emplaced during the interval 2070 to 2080 Ma. This late magmatic pulse produced K-granites similar to the early shoshonitic metaluminous monzonites (~2.1 Ga), although more differentiated and peraluminous. This magmatism was

widespread and hot enough to generate zircon crystals and overgrowths at the early rocks of Serrinha Nucleus.

MLG dominantly occur as small (< 10 km²) circular stocks, been constituted by isotropic fine to medium faneritic rocks, which are not affected by the Transamazonian deformation although some of them still show a very slightly elongated north-south shape. In field, just a few of these granites display positive topography, which makes difficult to locate them. They also occur as tabular shaped dikes, showing vertical to sub-vertical dip and varied dimensions up to 15 m larger. They cut all lithologies present at SerN. The isotropic and homogeneous MLG's rocks just present flow foliation structures, sometimes only perceptible by little variations on the gray tone of rocks. Younger aplogranite dikes, white colored and up to 5 cm large are quite common. Enclaves are extremely rare to absent, been represented by angular fragments of the gneissic-migmatitic and amphibolites from SerN basement.

PETROLOGICAL, GEOCHEMICAL AND ISOTOPIC DATA

Most petrological and geochemical data were obtained through detailed study of six distinct bodies: Marmota, Alto Bonito, Fazenda das Bananas, Maravilha, Barroquinha and Pedra Vermelha. The MLG are hololeucocratic and equigranular biotite-bearing, alkali-feldspar, grey monzogranites which grades to granodiorites and granites (s.l.), with rare plagioclase phenocrysts. Porphyritic texture is occasionally observable, although the phenocrysts of alkali feldspar and plagioclase constitute less than 20% of volume. The principal mineralogy is constituted by alkali feldspar, albite-oligoclase and quartz. Biotite is the principal mafic phase, and hornblende is absent on most outcrops. Allanite, apatite, zircon, titanite and occasionally opaque minerals (ilmenite, magnetite) and molibdenite represent

the accessory mineralogy. Secondary phases are white mica, carbonate and pistacite.

Chemically, these rocks are high fractionated ($\text{SiO}_2 > 69\%$), have high and variable Na/K ratios (0.70 to 5.38), with the predominance of most sodic features at the Northern bodies. They show variable ETR, Th, Sr and Zr enrichment and negative anomalies of P, Nb and Ti. They show post-collisional nature and arc signatures, suggesting the influence of AFC processes at their evolution (Peixoto, 2000).

Ages for MLG are now well determined. Historically, Brito Neves (1980) present a K-Ar (biotite) age of 1791 ± 53 Ma. This work allow to describe two zircon populations at MLG's rocks: (i) small zircons, pale pink to colorless, clear, transparent, euhedral grains; and, (ii) a relative rare, dark brown, subhedral to anhedral crystals, generally showing ellipsoid shapes and sizes up to 0.42 mm, which show inclusions and zones. Our Pb/Pb single zircon evaporation data for Marmota massif, performed at the PARA-ISO (Laboratory of Isotopic Geology of Pará) result in a minimum crystallization age of 2003 Ma and an inherited zircon aged 3002 ± 3 Ma. Additional U-Pb geochronology, performed at the Royal Ontario Museum, were applied to the other five studied bodies, result in ages from 2071 to 2080 Ma (Table).

Rb-Sr and Sm-Nd isotopic data also indicate affinity with the early shoshonites of SerN. MLG's present low Sr initial ratio (~ 0.7029), negative epsilon Nd (-4.07 to -10.54) and variable TDM (2.7 to 3.1 Ga), older than those presented by the other alkaline magmas of SerN (see Rios 2002). Our new U-Pb isotopic ages for these rocks confirm a younger age which, coupled with isotopic and geochemical data, suggest emplacement during the later pulse of Transamazonic.

Table. Geochronological results from studied MLG.

Massif	Zircon Age (Ma)	Method
Marmota	2003±3	Pb-Pb
Fazenda Bananas	2072±1	U-Pb
Alto Bonito	2076±6	U-Pb
Maravilha	2071±1	U-Pb
Barroquinhas	2073±1	U-Pb
Pedra Vermelha	2080±7	U-Pb

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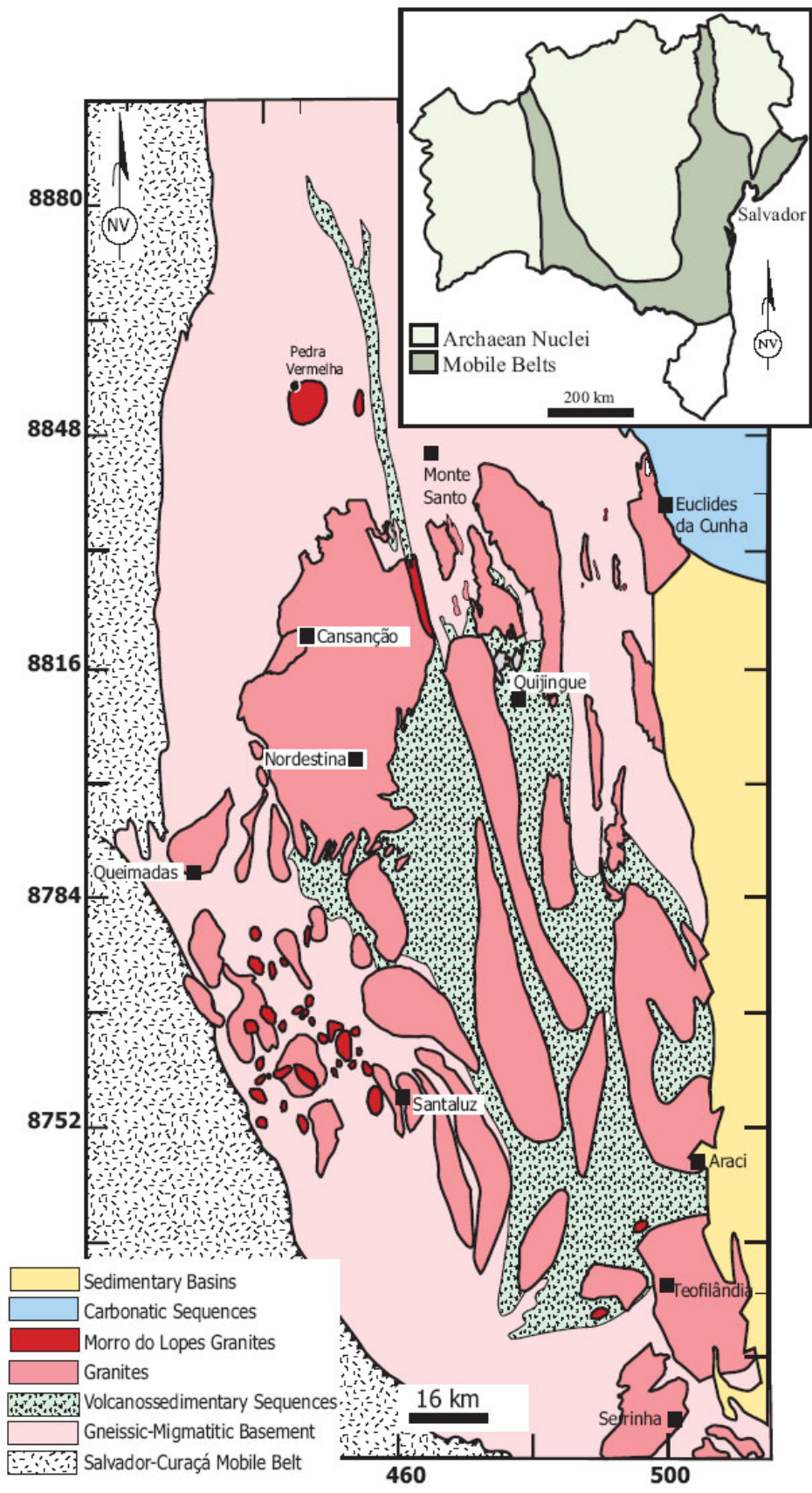
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RESUMO

Granitos Morro do Lopes (MLG) é a terminologia utilizada para agrupar vários (>30) pequenos stocks e inúmeros diques graníticos, os quais representam a última expressão do magmatismo Paleoproterozóico no Núcleo Serrinha (SerN). O SerN é interpretado como um dos três núcleos antigos (Arqueanos) que constituem o embasamento do Cráton do São Francisco no Estado da Bahia. Os MLG ocorrem predominantemente como pequenos ($< 10 \text{ km}^2$) stocks de formato circular, sendo constituídos de rochas isotrópicas de textura fanerítica fina a média, que não foram afetadas pela deformação Transamazônica apesar de alguns destes corpos apresentarem um formato ligeiramente alongado no sentido Norte-Sul. Os MLG são monzogranitos cinzentos, hololeucocráticos e equigranulares, constituídos de biotita e feldspato alcalino, e que gradam para granodioritos e granitos (s.l.), com raros fenocristais de plagioclásio. Quimicamente, estas são rochas altamente fracionadas ($\text{SiO}_2 > 69\%$), com razões Na/K altas e variáveis (0,70 a 5,38), com a predominância de feições mais sódicas nos corpos situados mais a norte. Eles apresentam conteúdos de ETR, Th, Sr variáveis, enriquecimento em Zr e anomalias negativas de P, Nb e Ti. Estes granitos demonstram natureza pós-colisional e assinaturas de arco, sugerindo a influência dos processos de AFC em sua evolução. A geocronologia U-Pb foi aplicada a cinco dos corpos estudados, resultando em idades que variam de 2071 a 2080 Ma. Estas novas idades U-Pb confirmam seu caráter tardio e, associadas aos dados isotópicos e geoquímicos disponíveis para estes granitos, sugerem que eles se colocaram durante o último pulso magmático Transamazônico.



8880
 8848
 8816
 8784
 8752

- Sedimentary Basins
- Carbonatic Sequences
- Morro do Lopes Granites
- Granites
- Volcanosedimentary Sequences
- Gneissic-Migmatitic Basement
- Salvador-Curaçá Mobile Belt

16 km

460 500



- Archaean Nuclei
- Mobile Belts

Salvador

200 km