



XV SIMPÓSIO DE GEOLOGIA DO CENTRO-OESTE  
AVANÇOS NA GEOLOGIA DO BRASIL CENTRAL  
GOIÂNIA, 03 - 06 DE SETEMBRO DE 2017

# EVOLUÇÃO TECTÔNICA DA FAIXA BRASÍLIA MERIDIONAL história, conhecimento atual e problemas em aberto

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*TEKTOS - Grupo de Pesquisas em Geotectônica  
Faculdade de Geologia - UERJ*



**TEKTOS**  
Grupo de Pesquisa  
em Geotectônica FGEL-UERJ

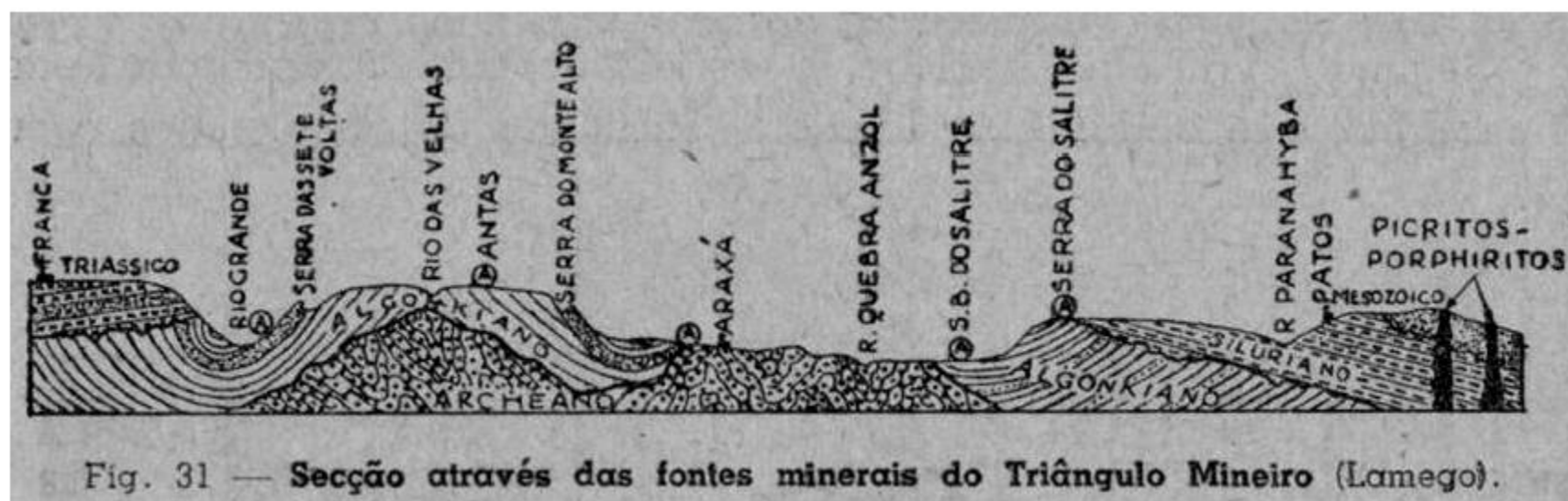
# **SINOPSE DA APRESENTAÇÃO**

- 1- Evolução do conhecimento**
- 2- Compartimentação tectônica**
- 3- Evolução tectônica**
- 4- Questões em aberto**

## 1- Evolução do conhecimento, e das ferramentas

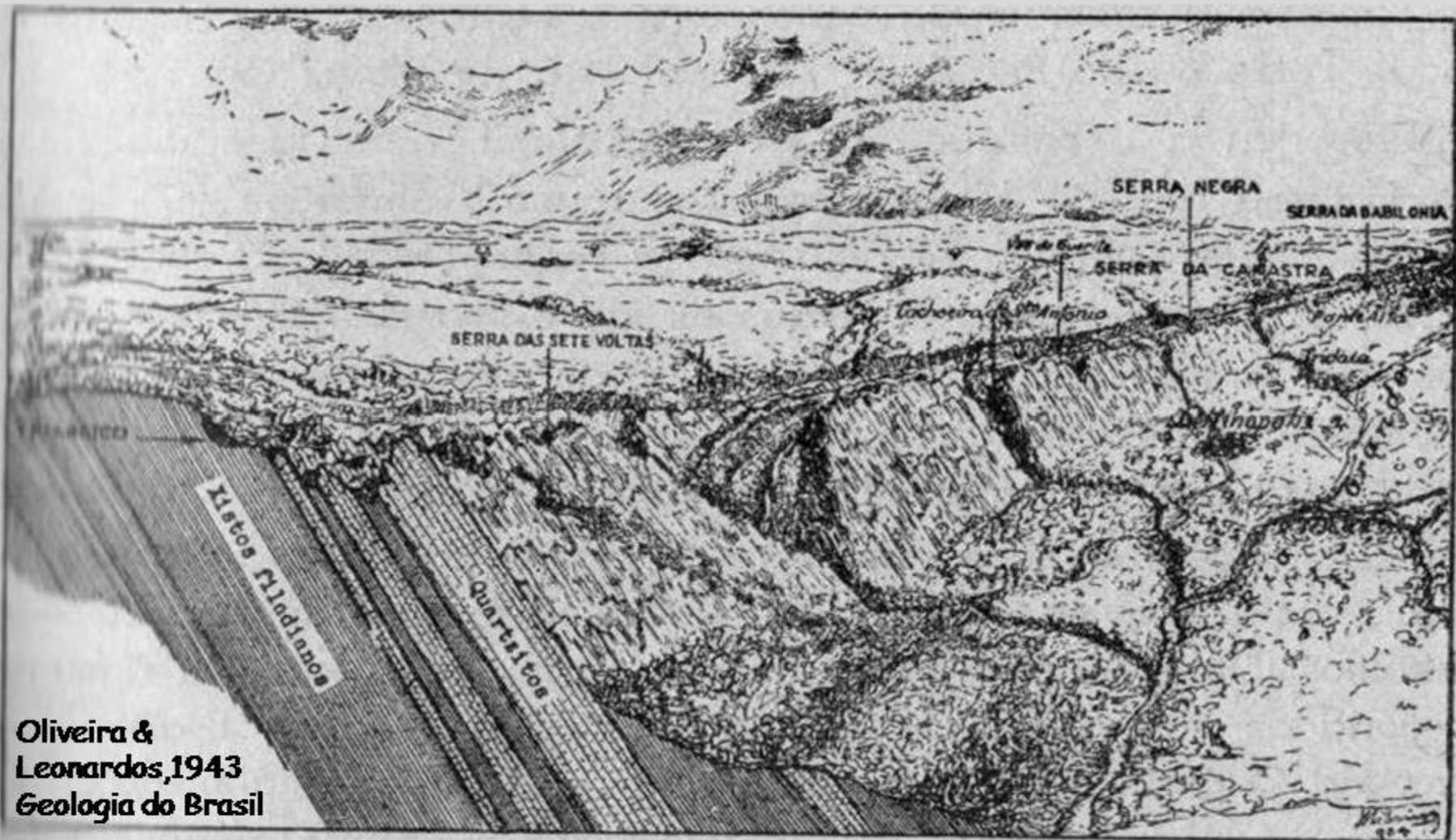
<u>Década</u>	<u>Fase</u>	<u>Referências (todos com et alli)</u>
<b>Pré- 1960</b>		
<b>1960 -1980</b>		
<b>1990-2000</b>		
<b>2000- hoje</b>		

<u>Década</u>	<u>Fase</u>	<u>Referências (todos com et alli)</u>
<b>Pré- 1960</b>	<b>Pioneira, heroica de reconhecimento</b>	<b>O. Derby, E. Oliveira, A.I Oliveira, O. Leonardos, D Guimarães, A.R. Lamego, Otavio Barbosa</b>



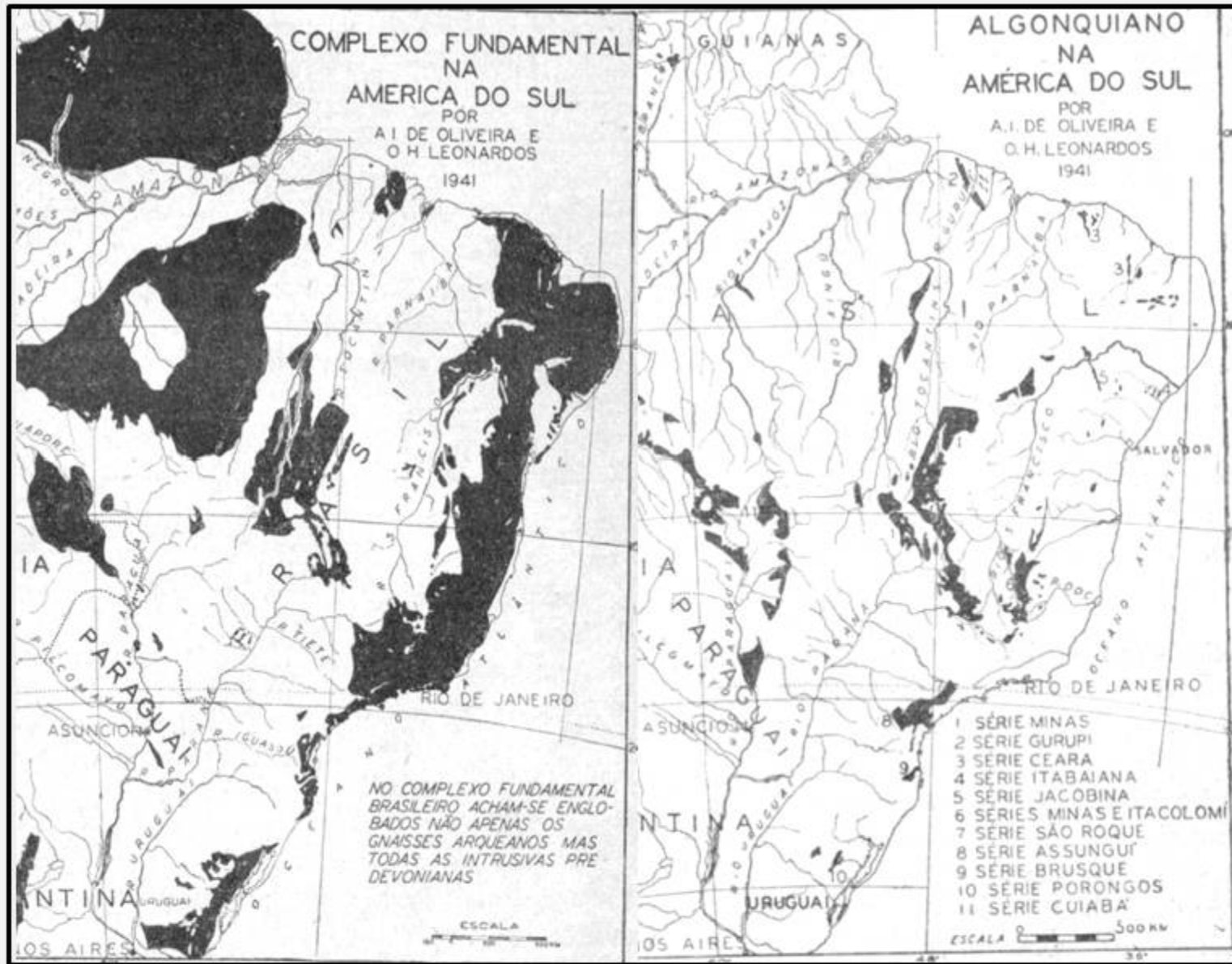
Oliveira & Leonardos 1943 *Geologia do Brasil*

Escarpa de quartzito da série Minas (huroniano), na serra da Canastra, entre Passos e Araxá, oeste de Minas (Lamego).



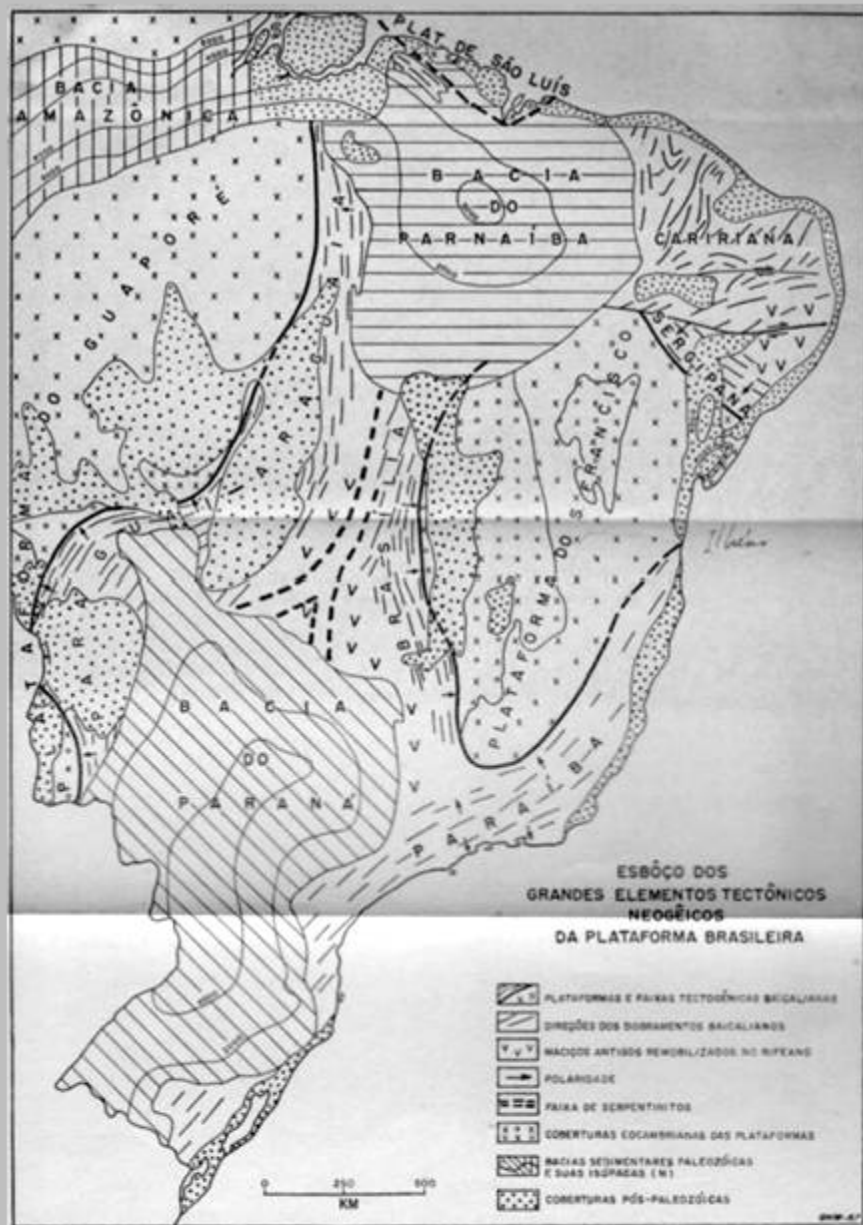
Oliveira &  
Leonardos, 1943  
Geologia do Brasil

## Oliveira & Leonardos 1943- Geologia do Brasil

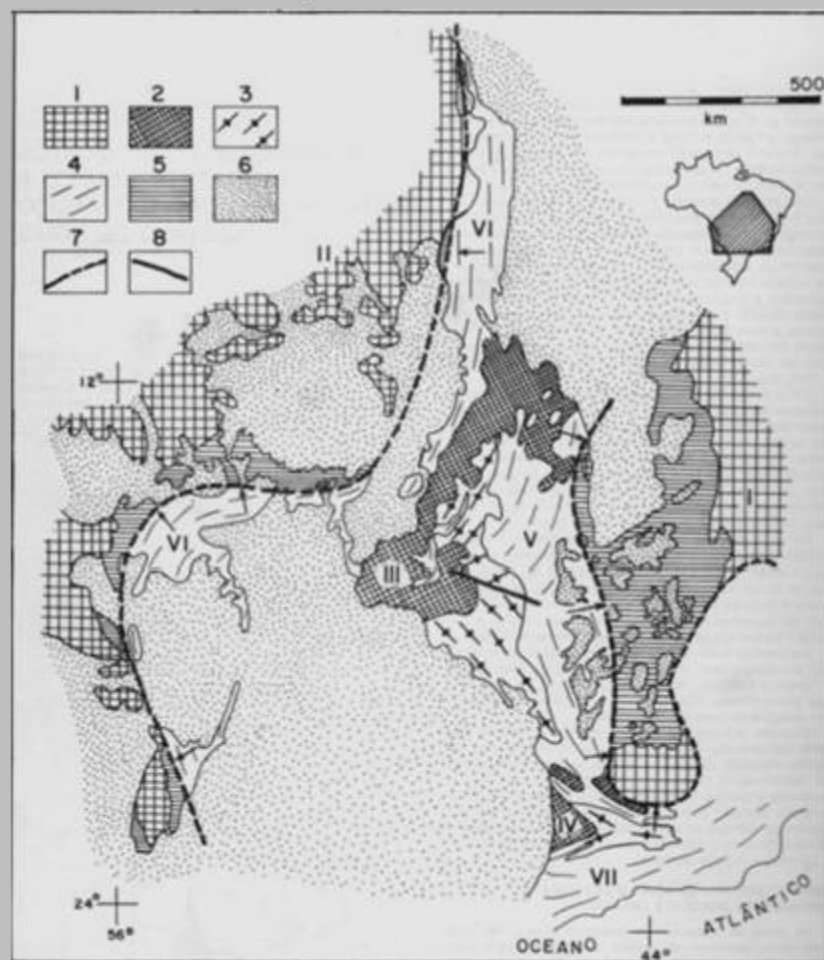


<b>Década</b>	<b>Fase</b>	<b>Referências (todos com et alli)</b>
<b>1960 -1980</b>	<b>Mapeamento, Pesquisa mineral</b>	<b>Costa, Branco, Fuck, Dardenne, Danni, Marini, Jost, Braun, Schobbenhaus</b>
	<b>Sensoriamento remoto</b>	<b>USAF, PROSPEC, RADAM LANDSAT</b>
	<b>Geocron K-Ar, Rb-Sr Gravimetria Geotectônica</b>	<b>Amaral, Hasui, Almeida, Fuck Haralyi Almeida, Fuck, Hasui</b>

## Almeida, 1967, Origem e Evolução Da Plataforma Sul Americana



## Marini et alli, 1984





Dardenne 1978  
CBG Recife v.1

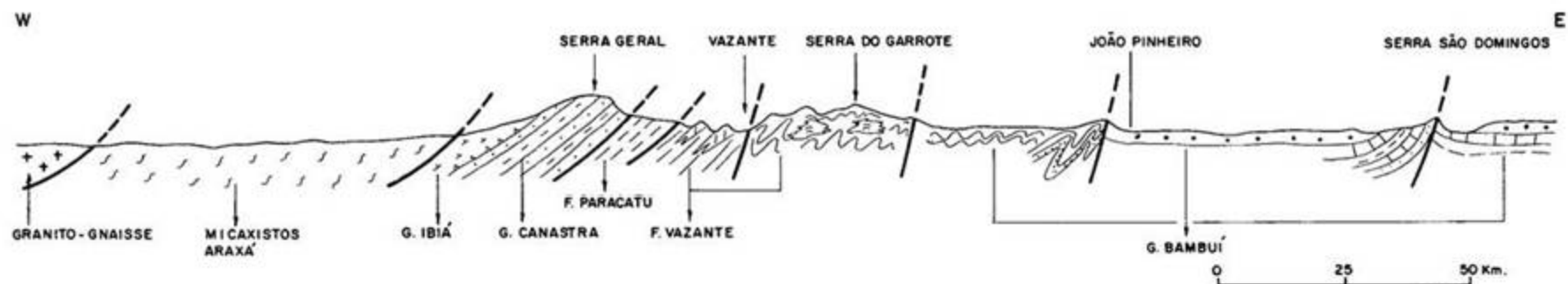


FIG. 4b - SEÇÃO ESQUEMÁTICA MOSTRANDO AS RELAÇÕES ENTRE OS GRUPOS ARAXÁ, CANASTRA E BAMBUI

<b>Década</b>	<b>Fase</b>	<b>Referência (todos com et alli)</b>
<b>1990-2000</b>	Mais mapeamento 100.000 Geocron U-Pb, Sm-Nd Grav-Mag Estratigrafia seq. Termobarometria	PRONAGEO Pimentel Ussami, Mantovani Alvarenga, Guimarães Moraes
<b>2000- hoje</b>	SHRIMP, LA-ICPMS Sísmica refração, Sismologia, RF Quimioestratigrafia Grav-mag-rad alta res.	Pimentel, Dantas Soares, Fuck Assumpção Babinski, Santos CPRM, CODEMIG

# Principais revisões sobre a Faixa Brasília

Marini, Fuck, Dardenne, 1984  
Marini, Fuck, Danni, Dardenne,  
Loguercio, Ramalho, 1984

O Pre-Cambriano do Brasil

Geologia do Brasil, DNPM

Dardenne, 2000  
Pimentel, Fuck, Jost, Ferreira Fº,  
Araújo 2000

31<sup>st</sup> IGC, Tect Evol S. America

Pimentel et al., 2004;  
Valeriano et al, 2004  
Valeriano et al., 2008

Geologia do Cont. Sul Americano

Geol. Soc. London Spec. Publ.

Pimentel et al 2011  
Pimentel 2016

J South Am Earth Sciences  
Brazilian Journal of Geology

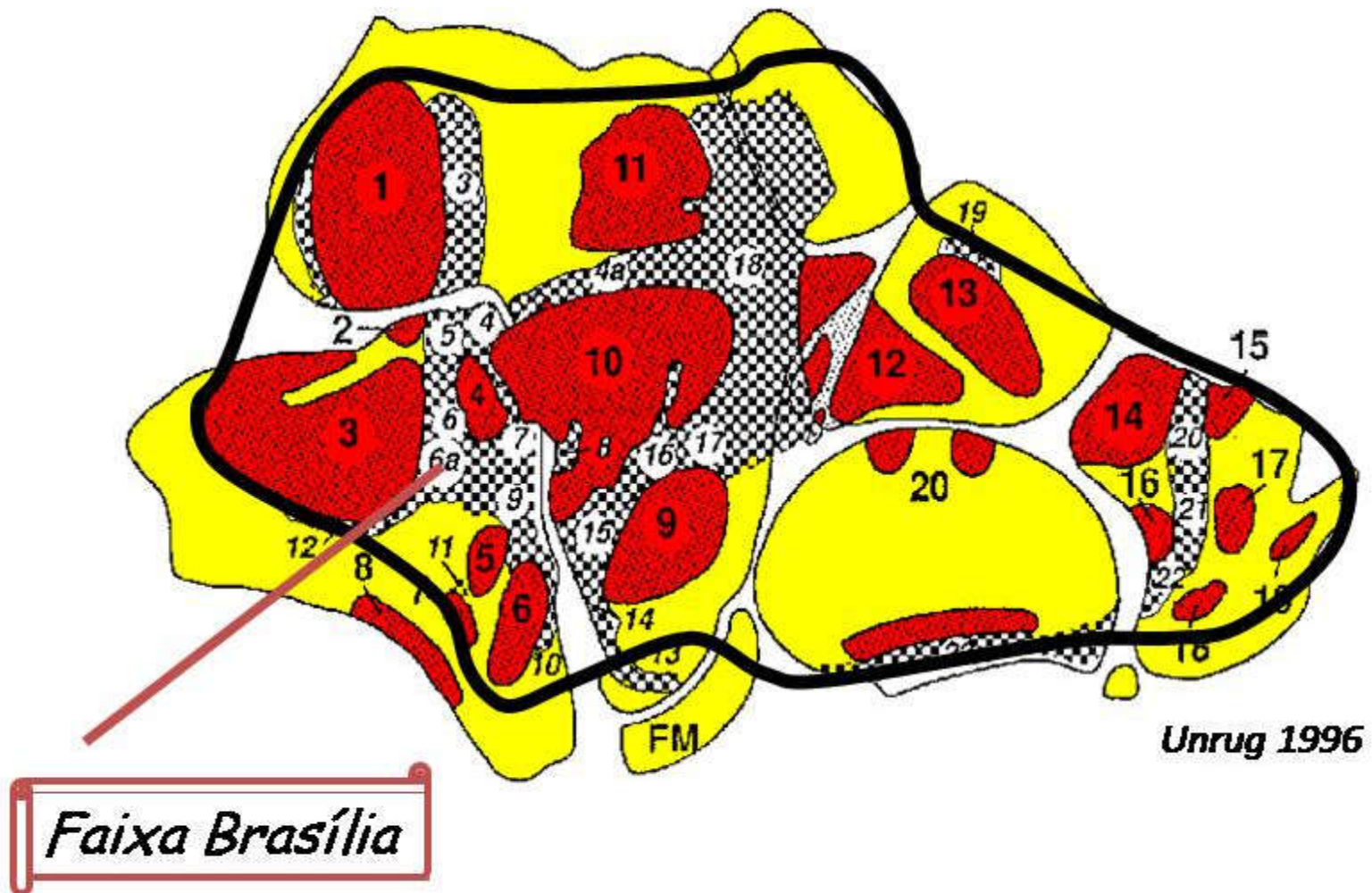
Reis, Alkmim et alli 2017  
Fuck, Pimentel, Alvarenga, Dantas 2017  
Valeriano 2017

São Francisco Craton , Springer



## **2- Compartimentação tectônica da Faixa Brasília Meridional**

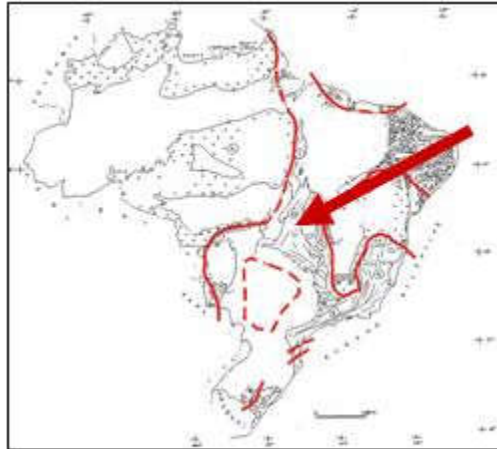
~ 500 Ma: Faixa Brasília no meio de Gondwanaland



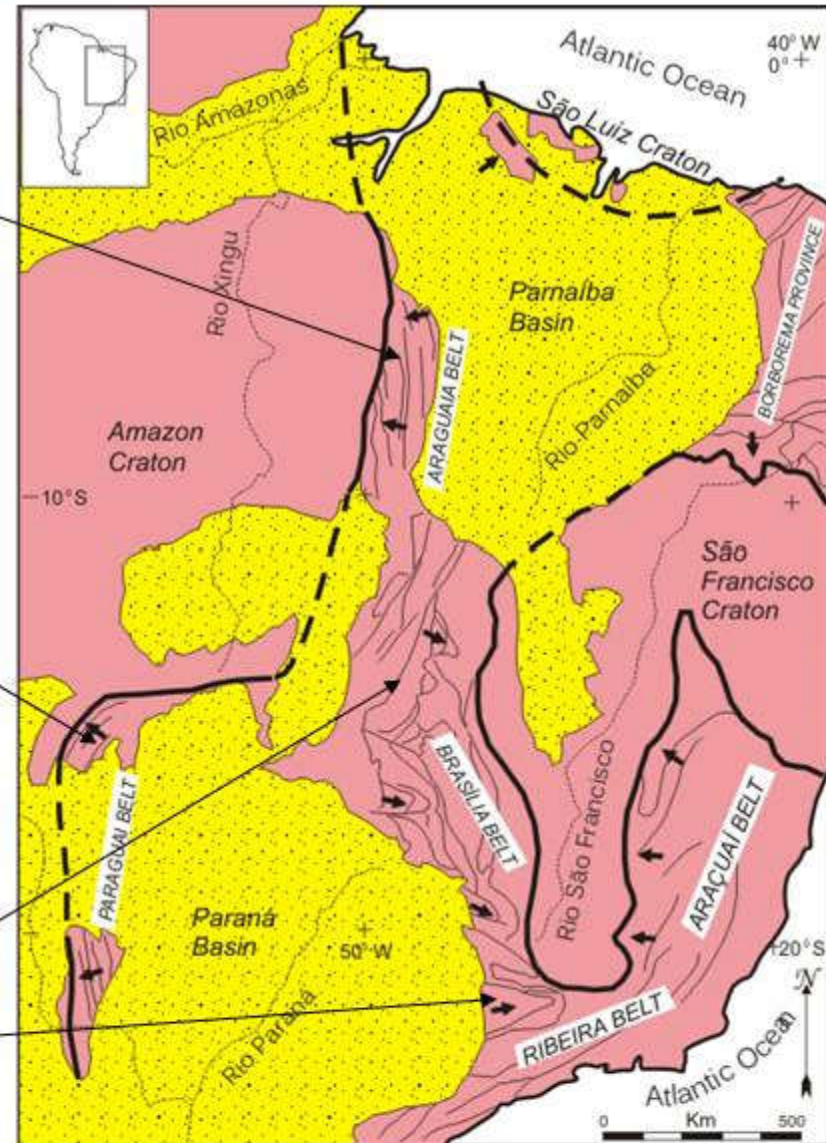
## 2- THE TOCANTINS PROVINCE

Araguaia belt

Paraguay belt

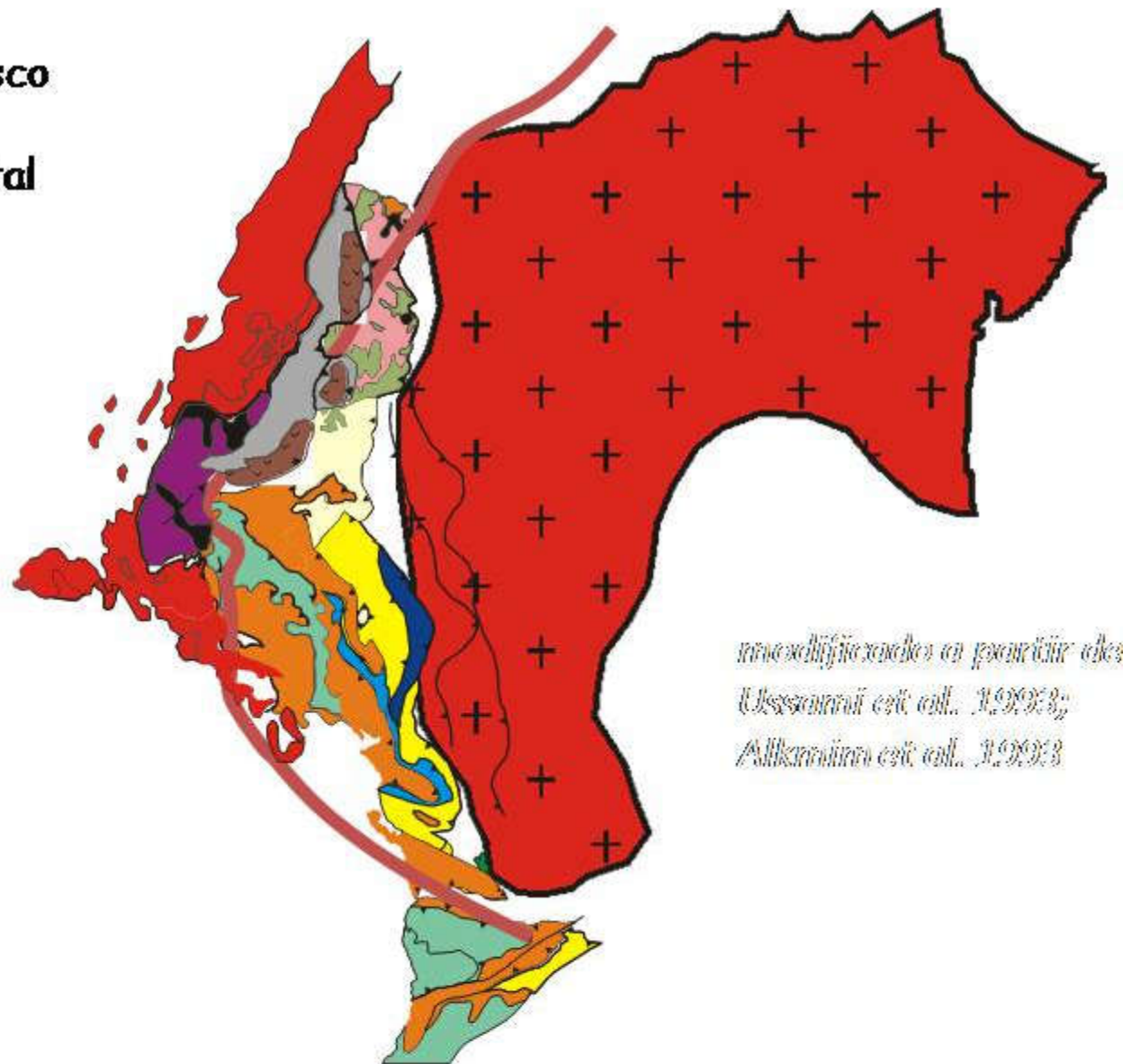


Brasilia belt

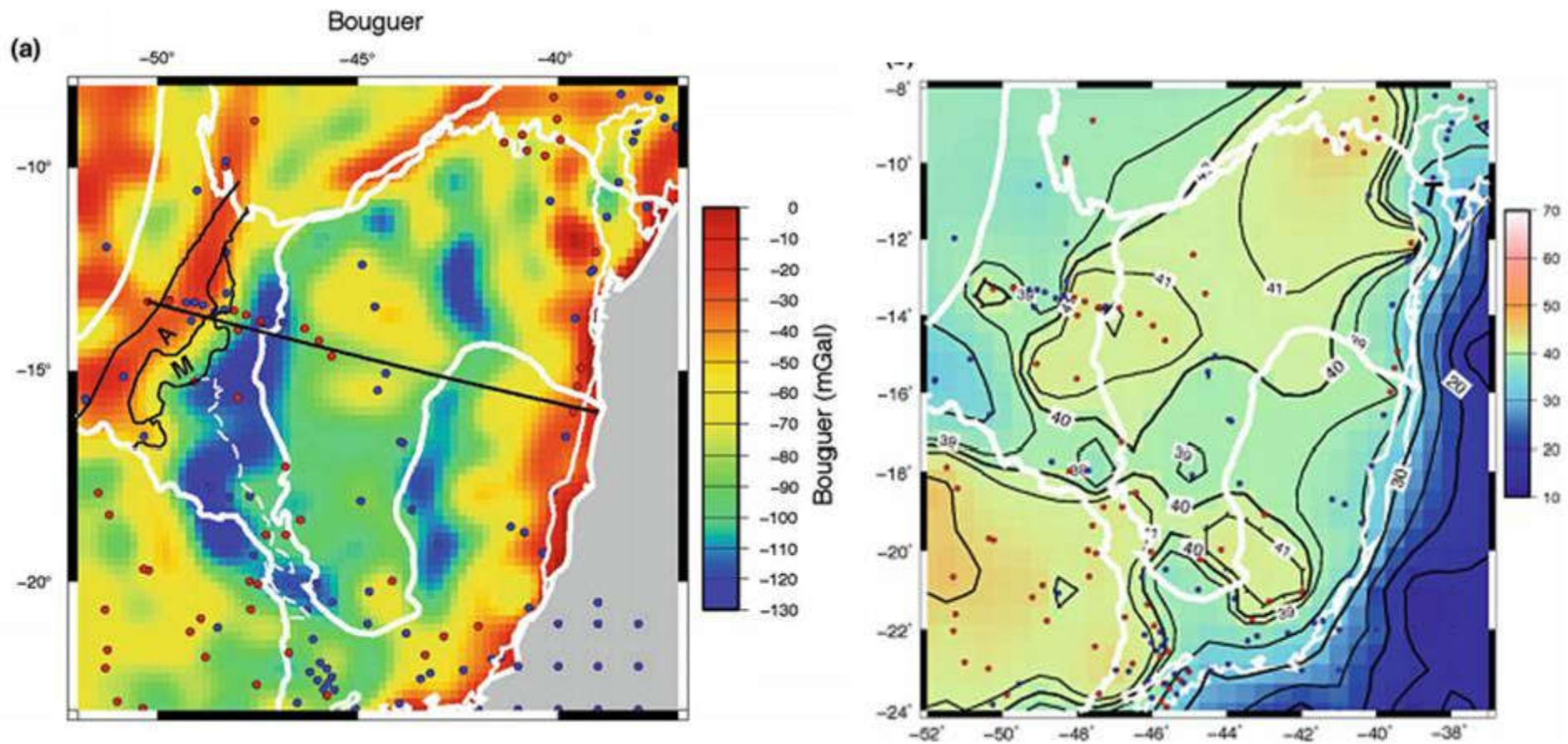


Valeriano et al. 2008, modified.

**Cráton do São Francisco**  
*Versus*  
**Paleocontinente São Francisco**  
**e sua margem passiva oriental**

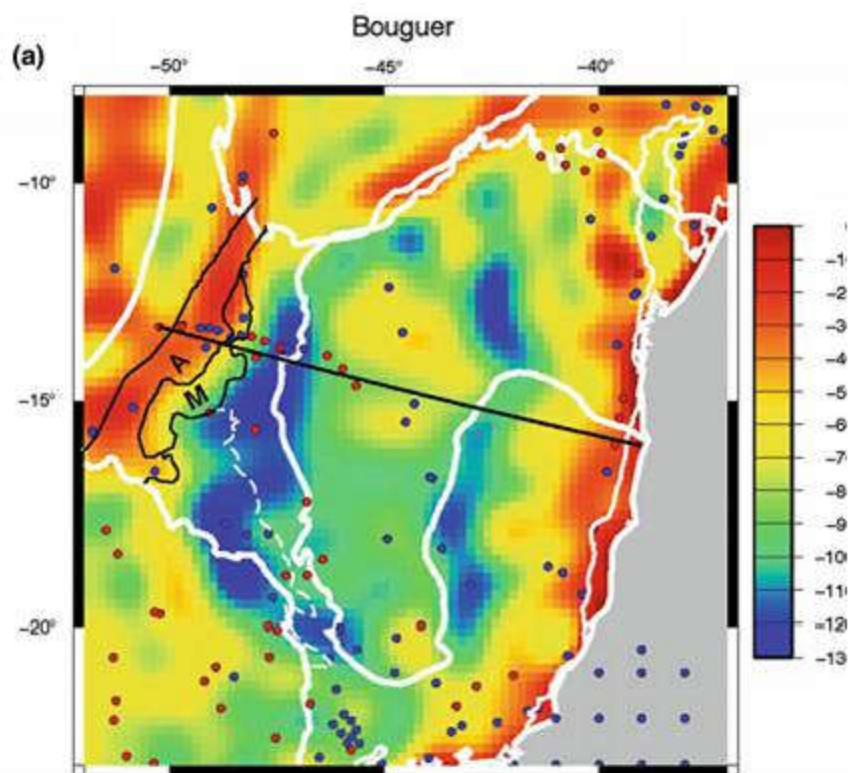


*modificado a partir de  
Usseneroff et al., 1993;  
Alkercina et al., 1993*

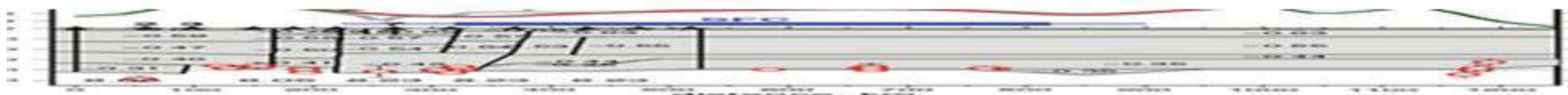
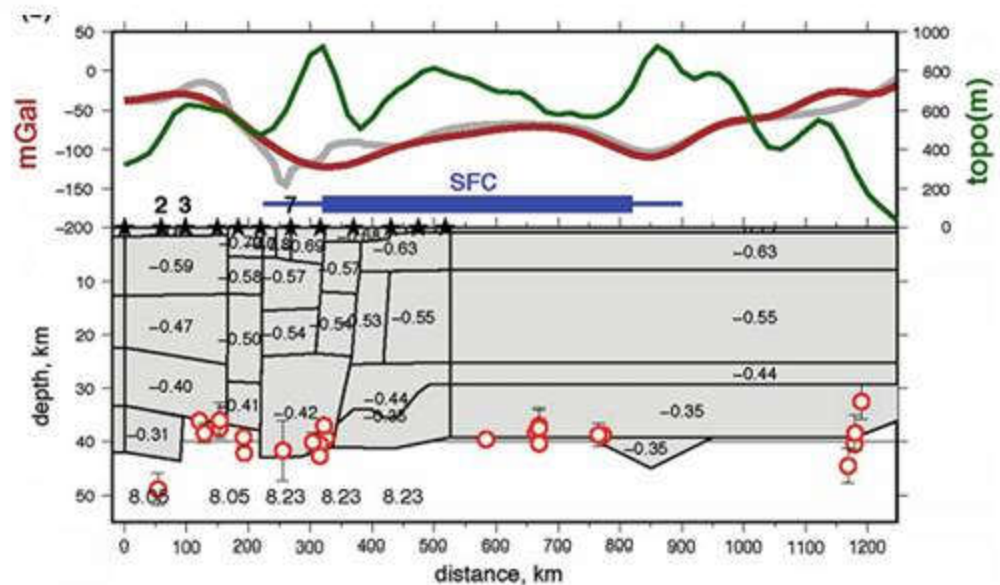


Assumpção et al., 2017





Assumpção et al., 2017



Soares et al., 2006

# COMPARTIMENTAÇÃO TECTÔNICA:

Características de um orógeno  
acrescionário

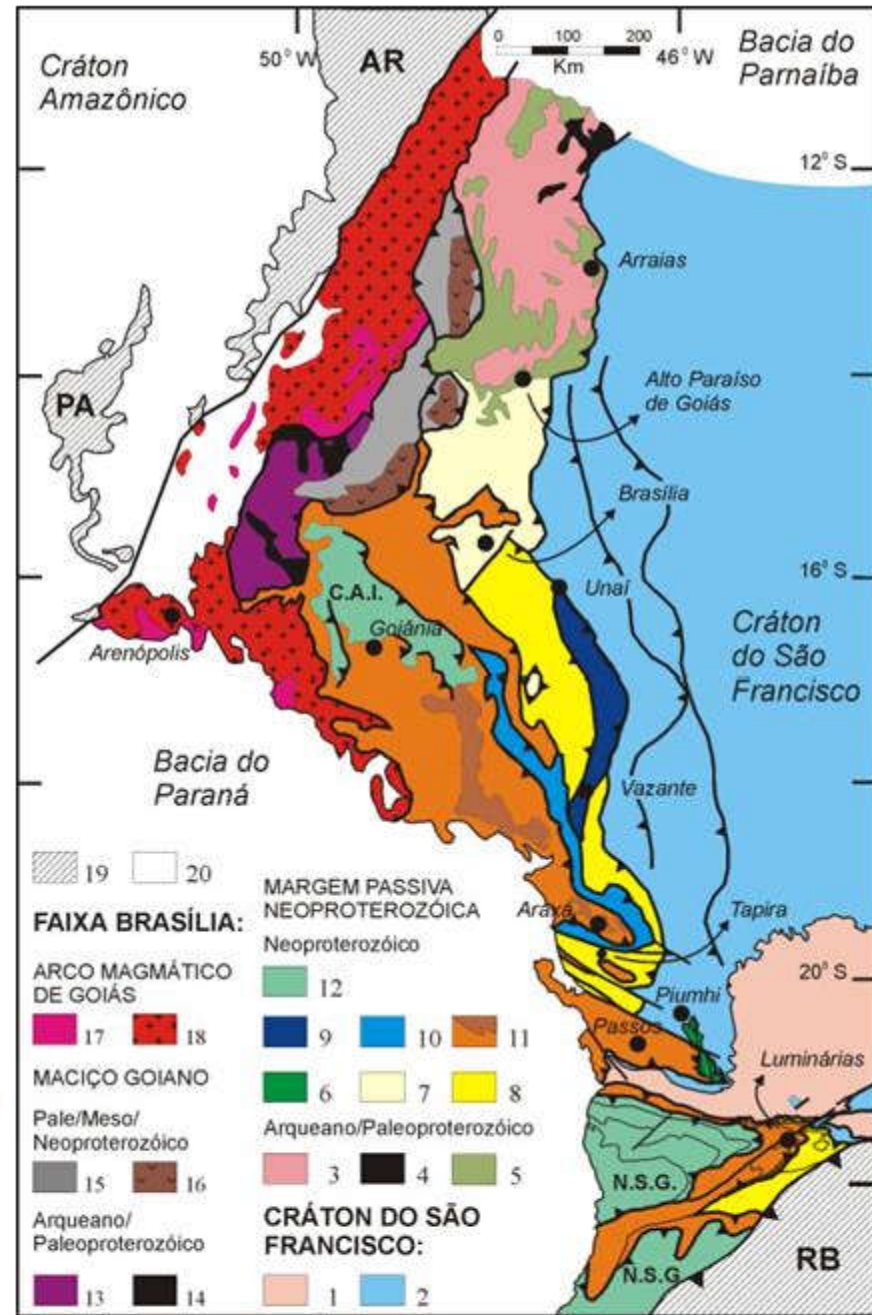
Metamorfismo de alta P

Vastas nappes subhorizontais

Granitogênese muito discreta

*Valeriano et al. 2004*

**Valeriano et al. 2004**



7/33

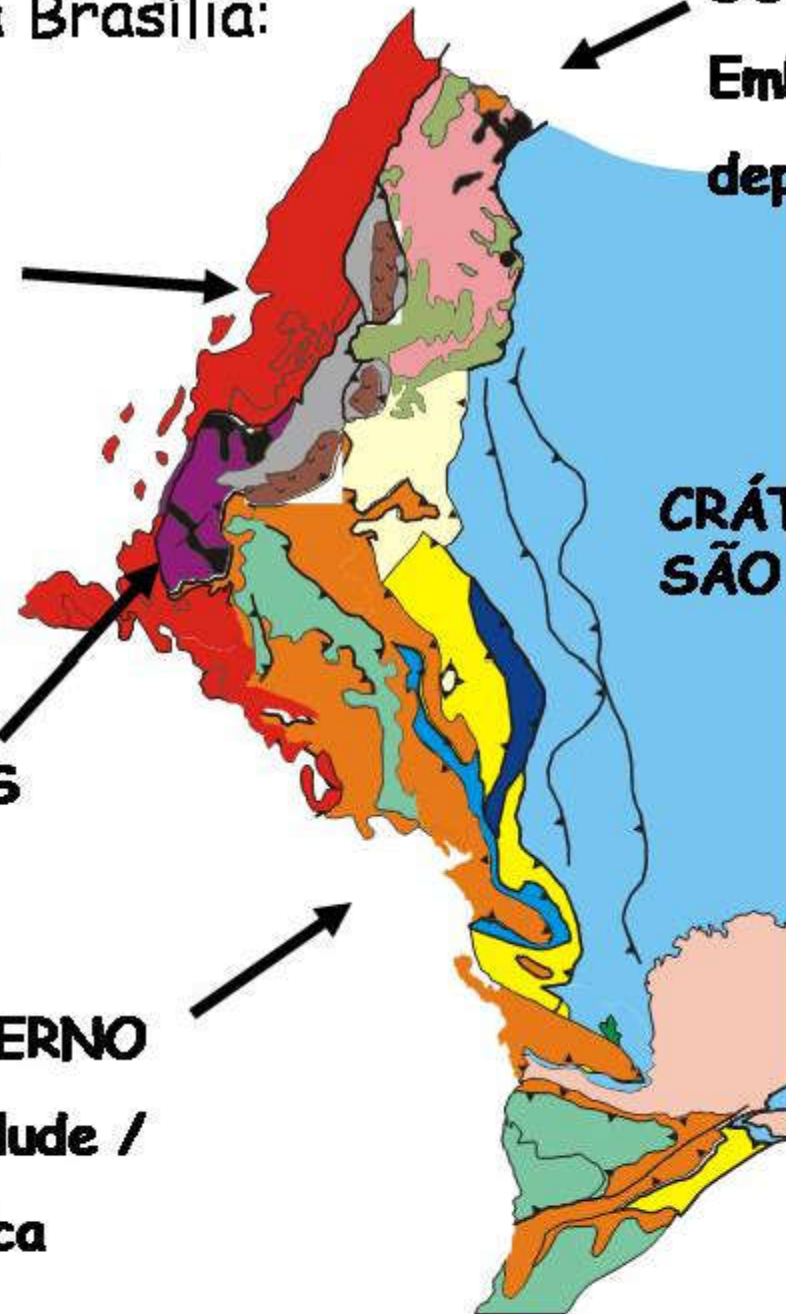
Terrenos da Faixa Brasília:

**ARCO MAGMÁTICO  
DE GOIÁS**

**DOMÍNIO EXTERNO**  
Embasamento +  
depósitos plataformais

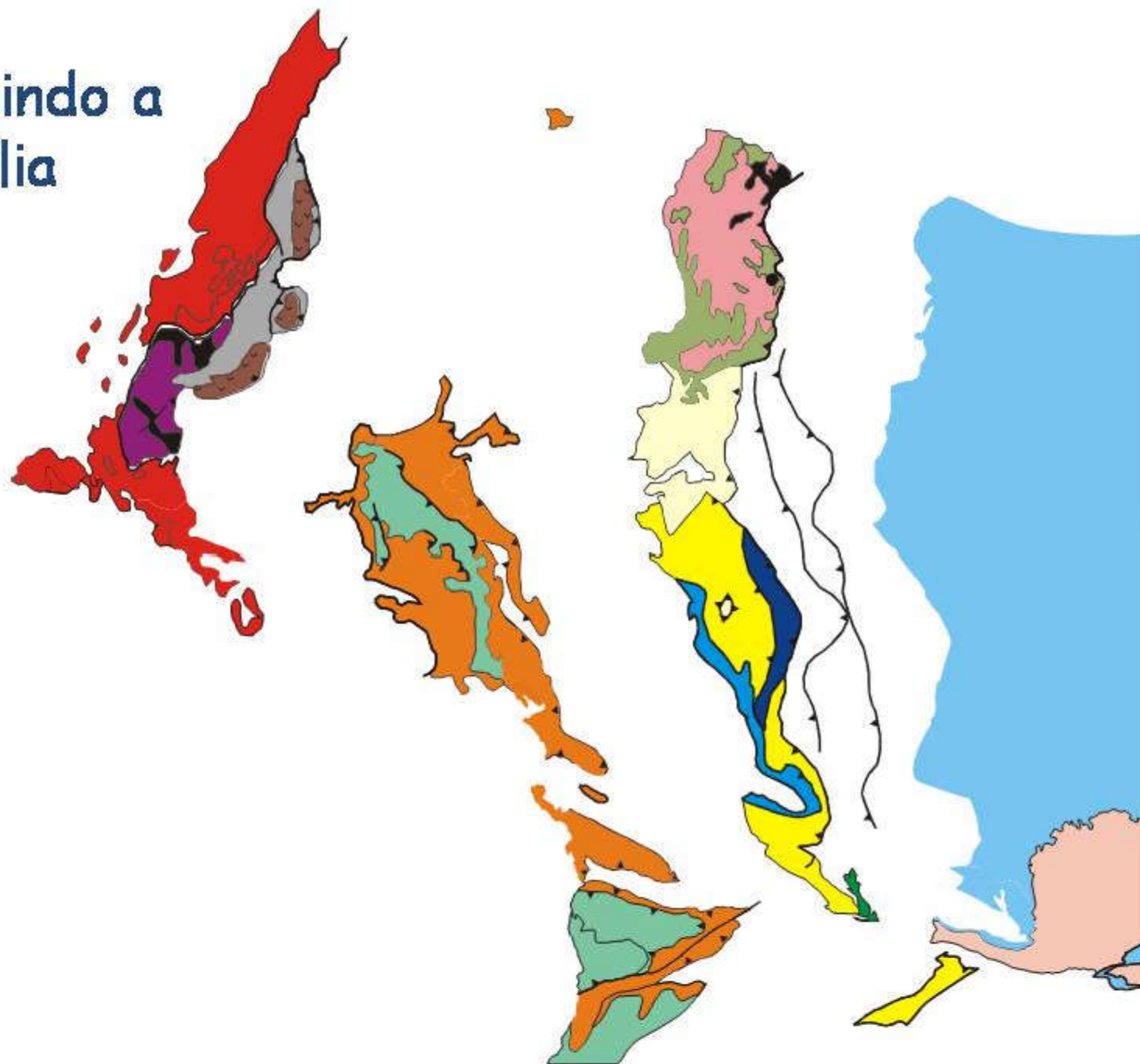
**MACIÇO DE GOIÁS**  
Microcontinente

**DOMÍNIO INTERNO**  
Depósitos de talude /  
Mélange ofiolítica



**CRÁTON DO  
SÃO FRANCISCO**

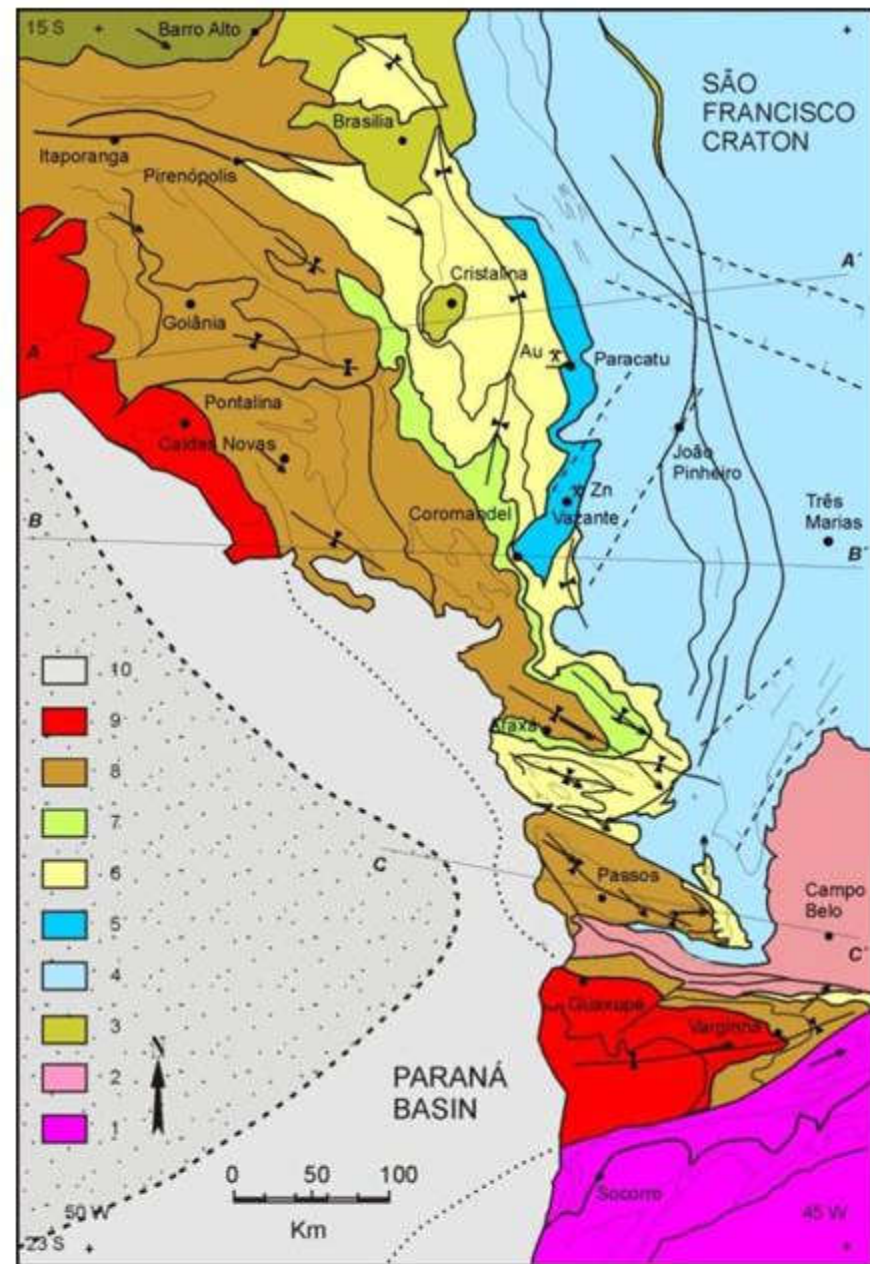
# desconstruindo a faixa Brasília

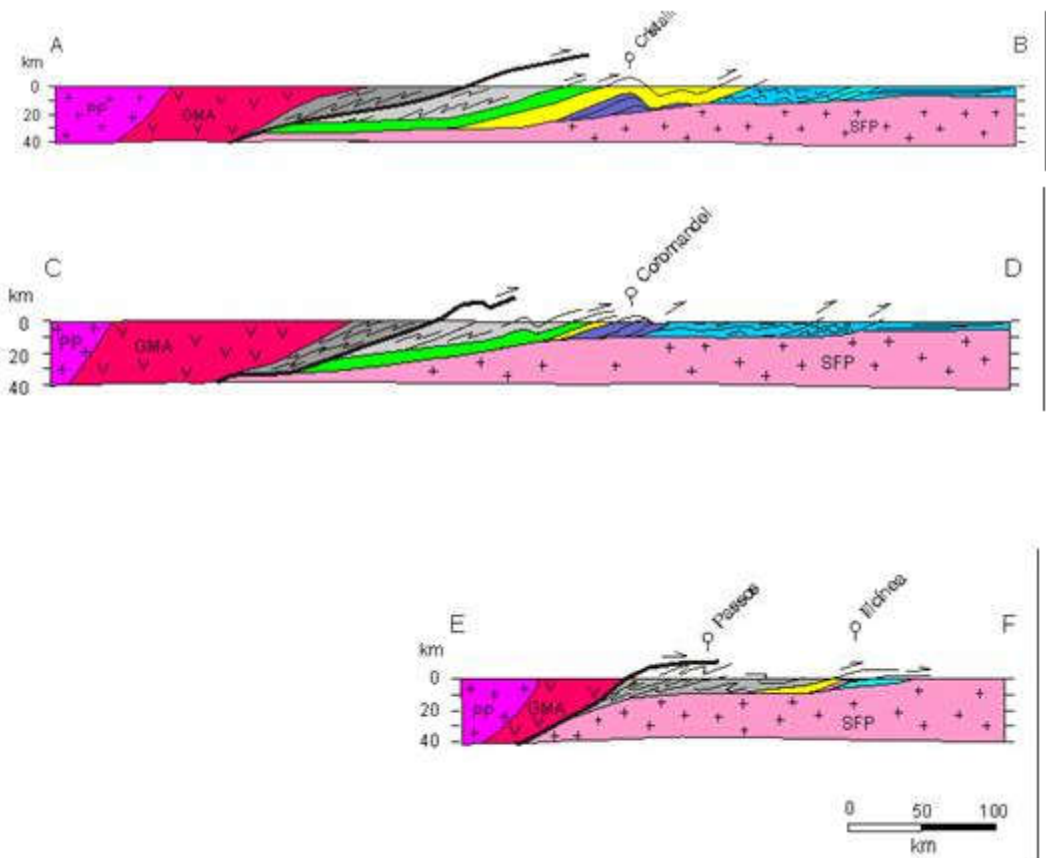
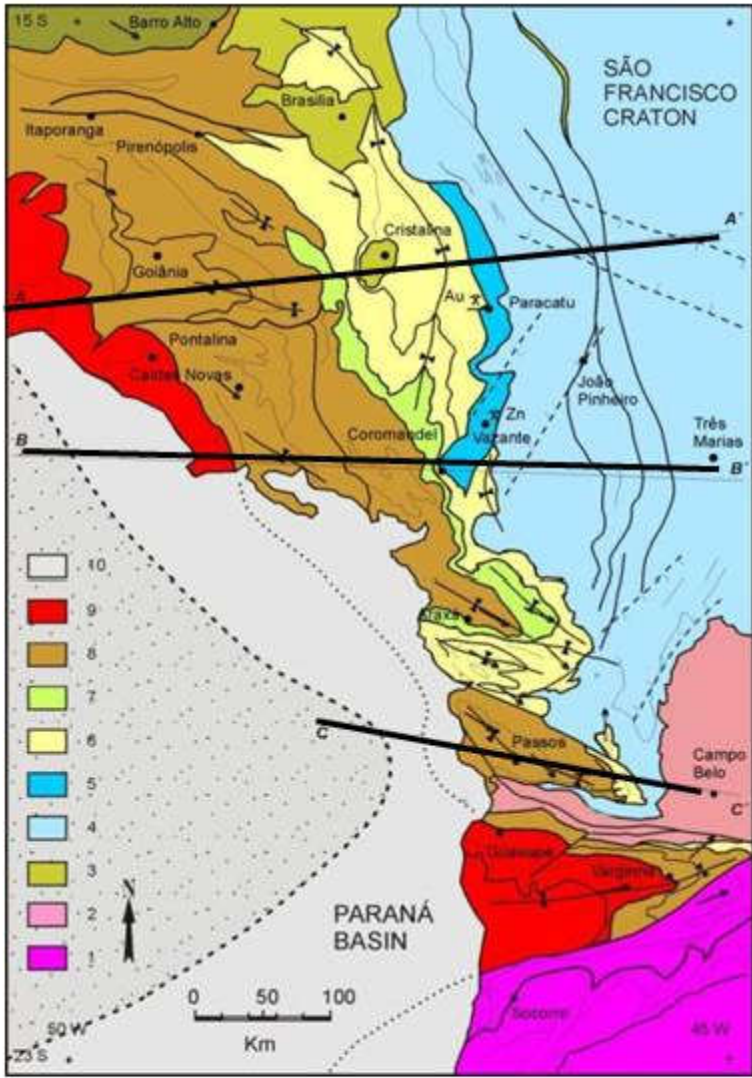


# O embasamento cratônico

(só no Sul)

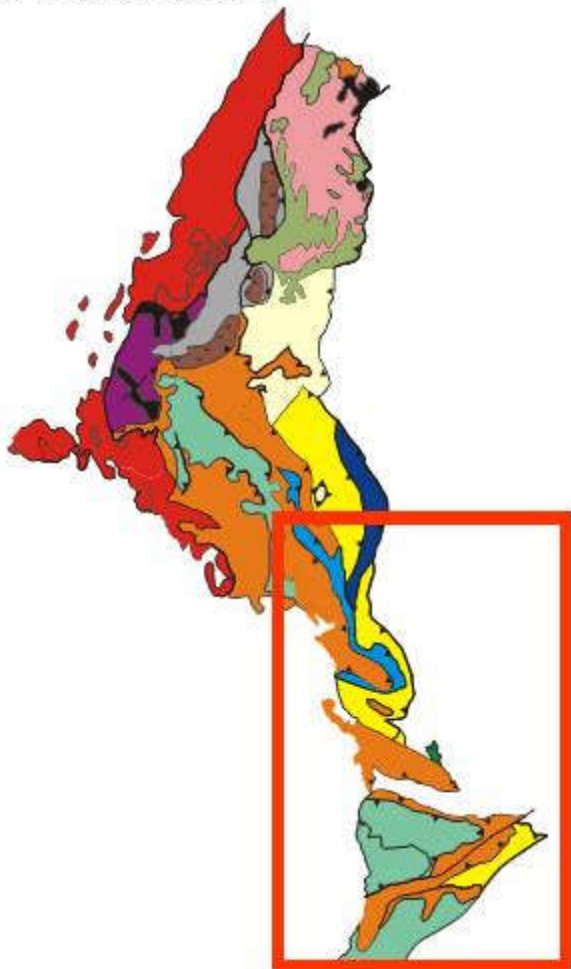
Valeriano, 2017,  
In Heilbron, Cordani & Alkmim  
Springer



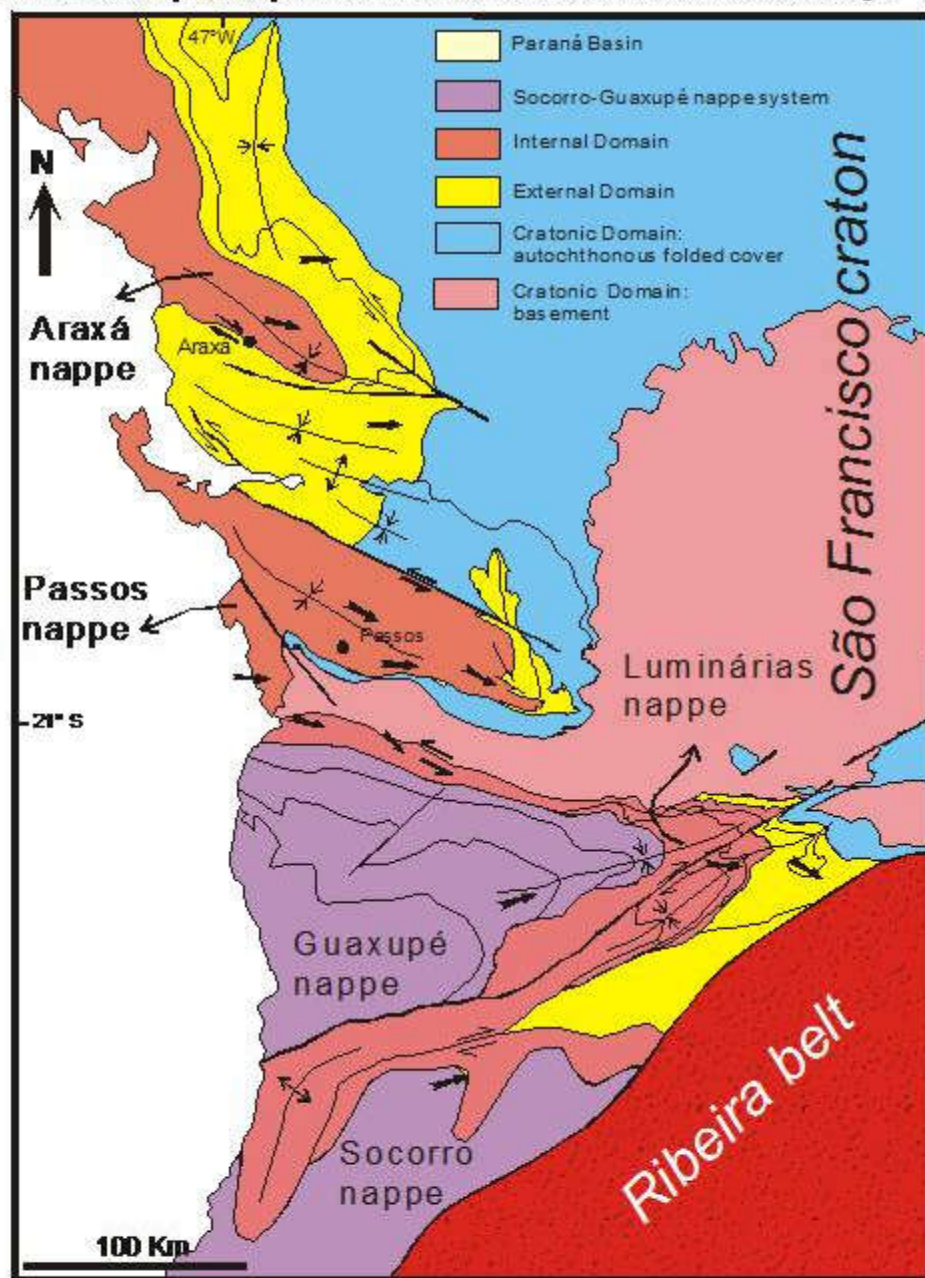


**Valeriano, 2017,  
In Heilbron, Cordani & Alkmim  
Springer**

# Ebasamento cratônico autóctone



Valeriano et al., 2000, Revista Brasileira de Geociências 30:195-199.

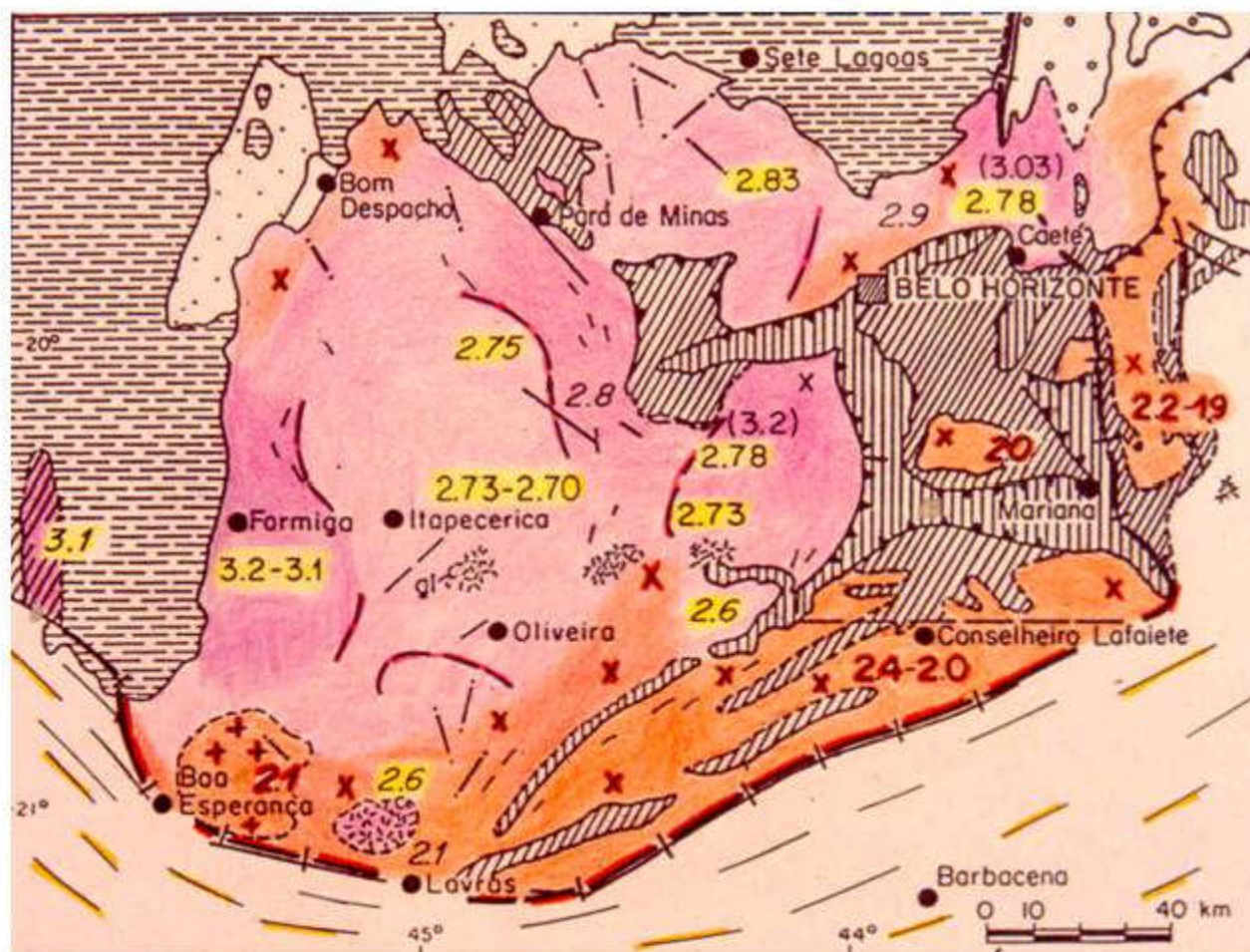


**COMPLEXOS CAMPO BELO,  
CAMPOS GERAIS,  
DIVINÓPOLIS, ETC.  
3.1 - 2.9 Ga  
2.7-2.6**



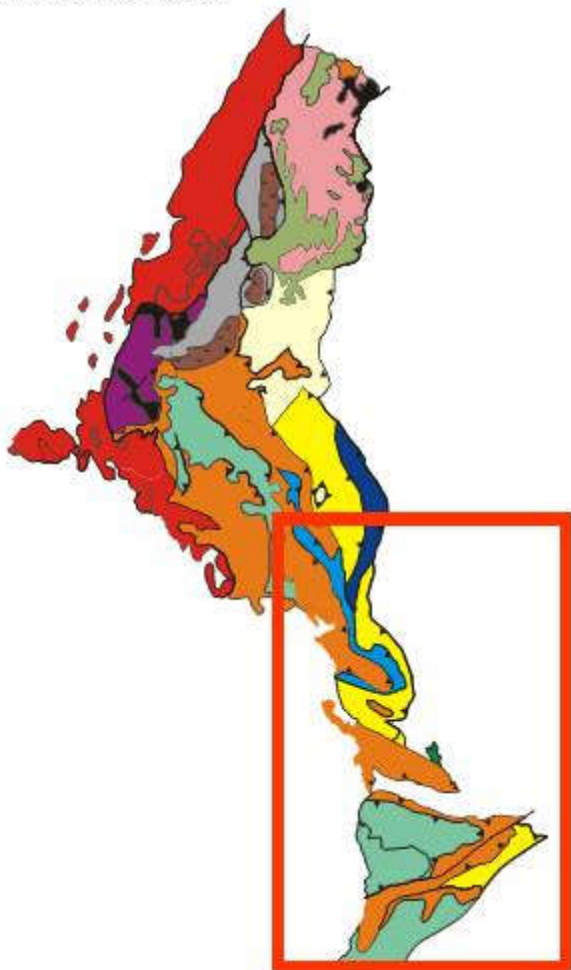


## O CINTURÃO MINEIRO (2.2-2.0 Ga)

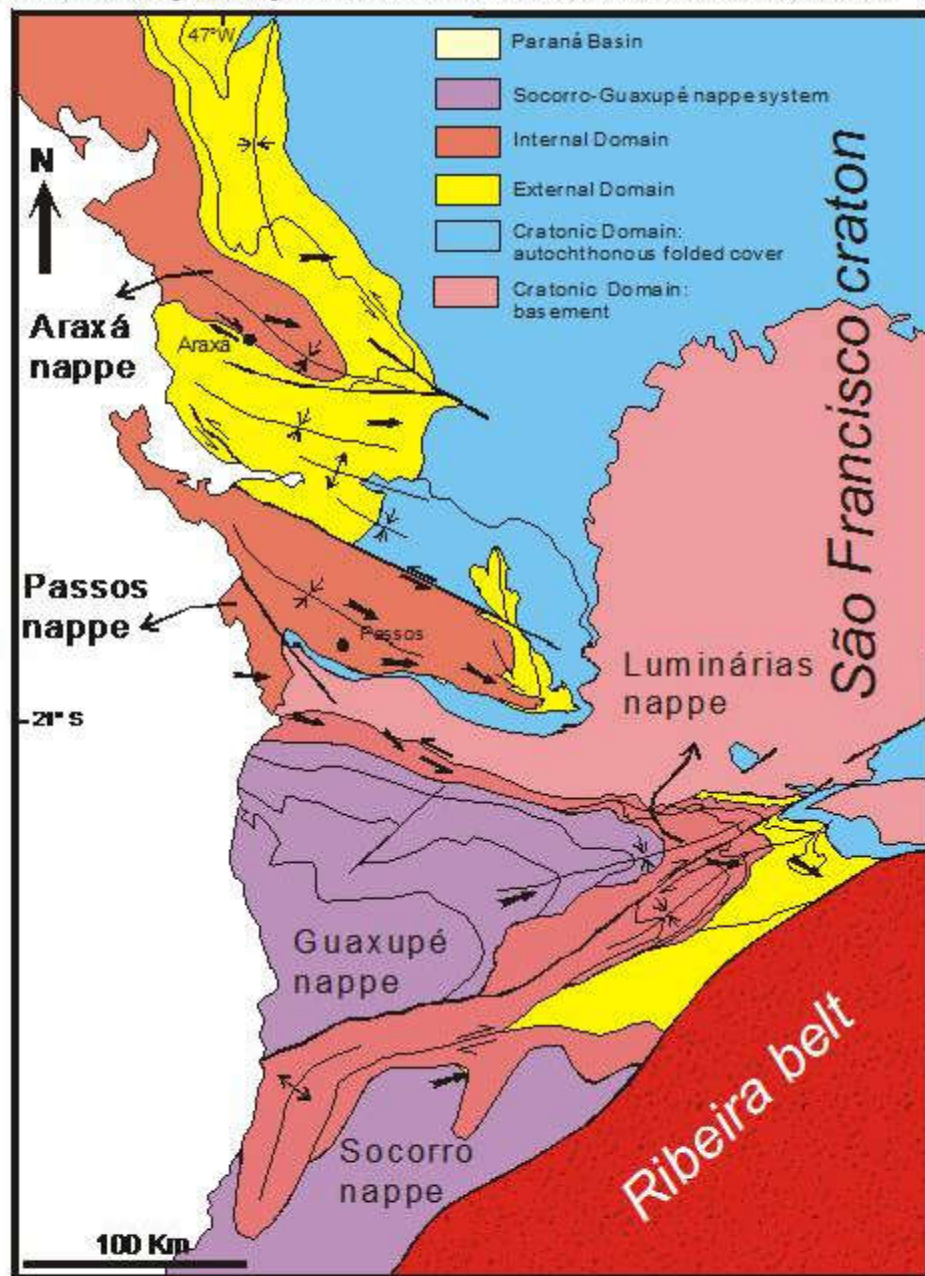


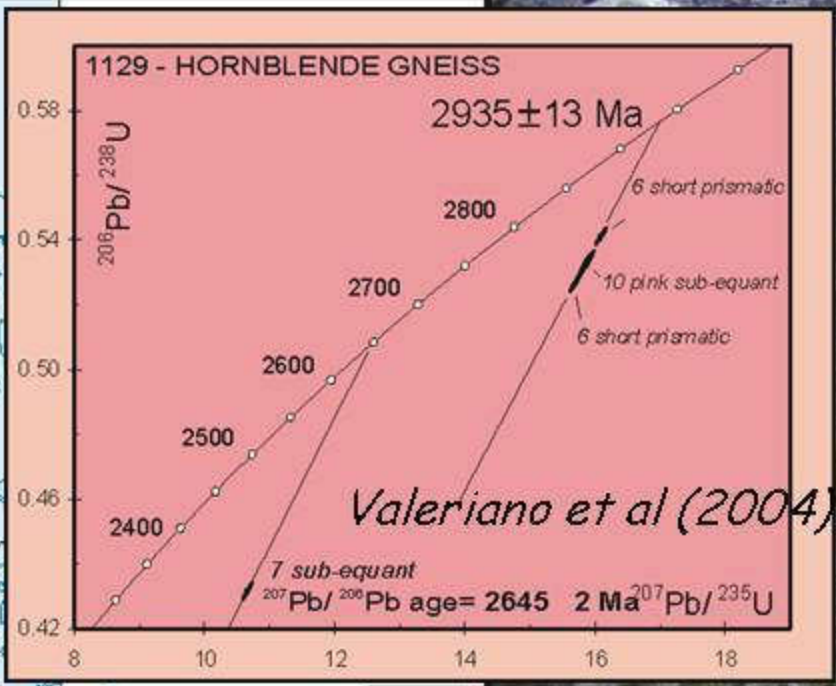
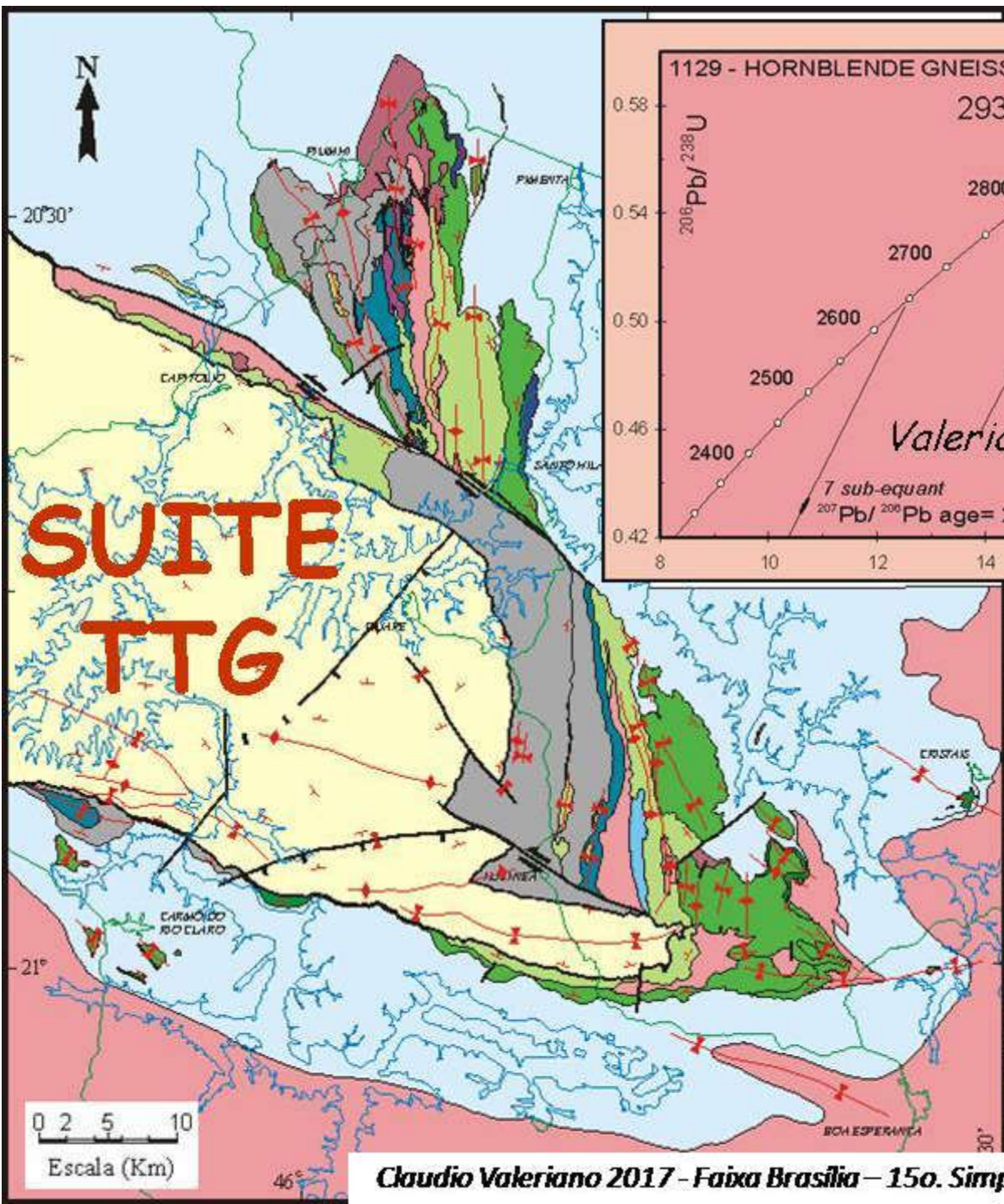
*Teixeira, 1990*

# Ebasamento cratônico alóctone



Valeriano et al., 2000, Revista Brasileira de Geociências 30:195-199.





## PIUMHI GREENSTONE

Ribeirão Araras

Metabasaltos almofadados e  
komatiitos intrudidos por  
soleiras de microgabro

3.1 Ga (U-Pb)

Nuno Machado & Alfonso Schrank,  
1989)

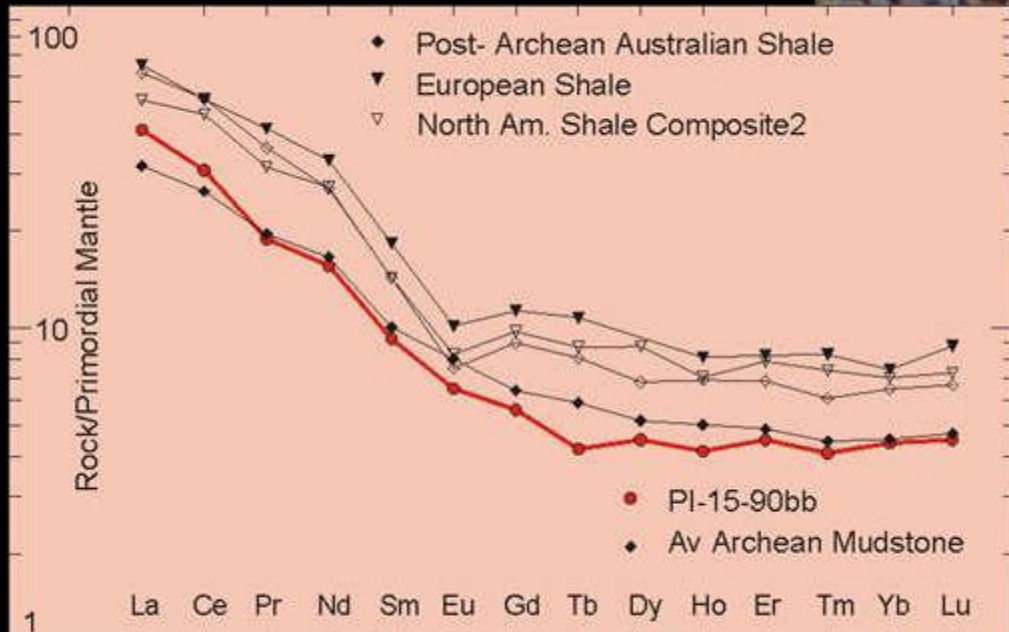
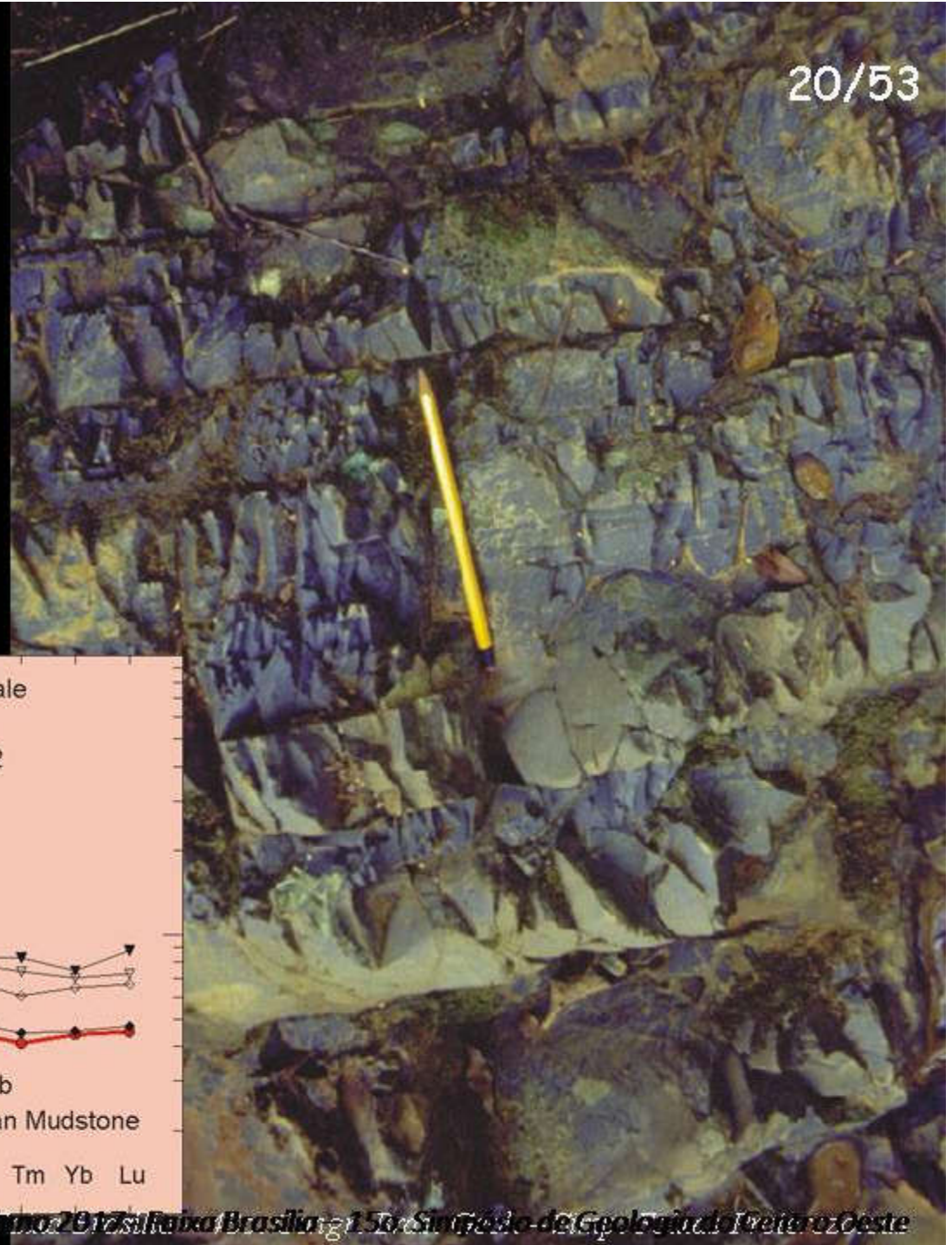
17/53

# UNIDADE TURBIDÍTICA

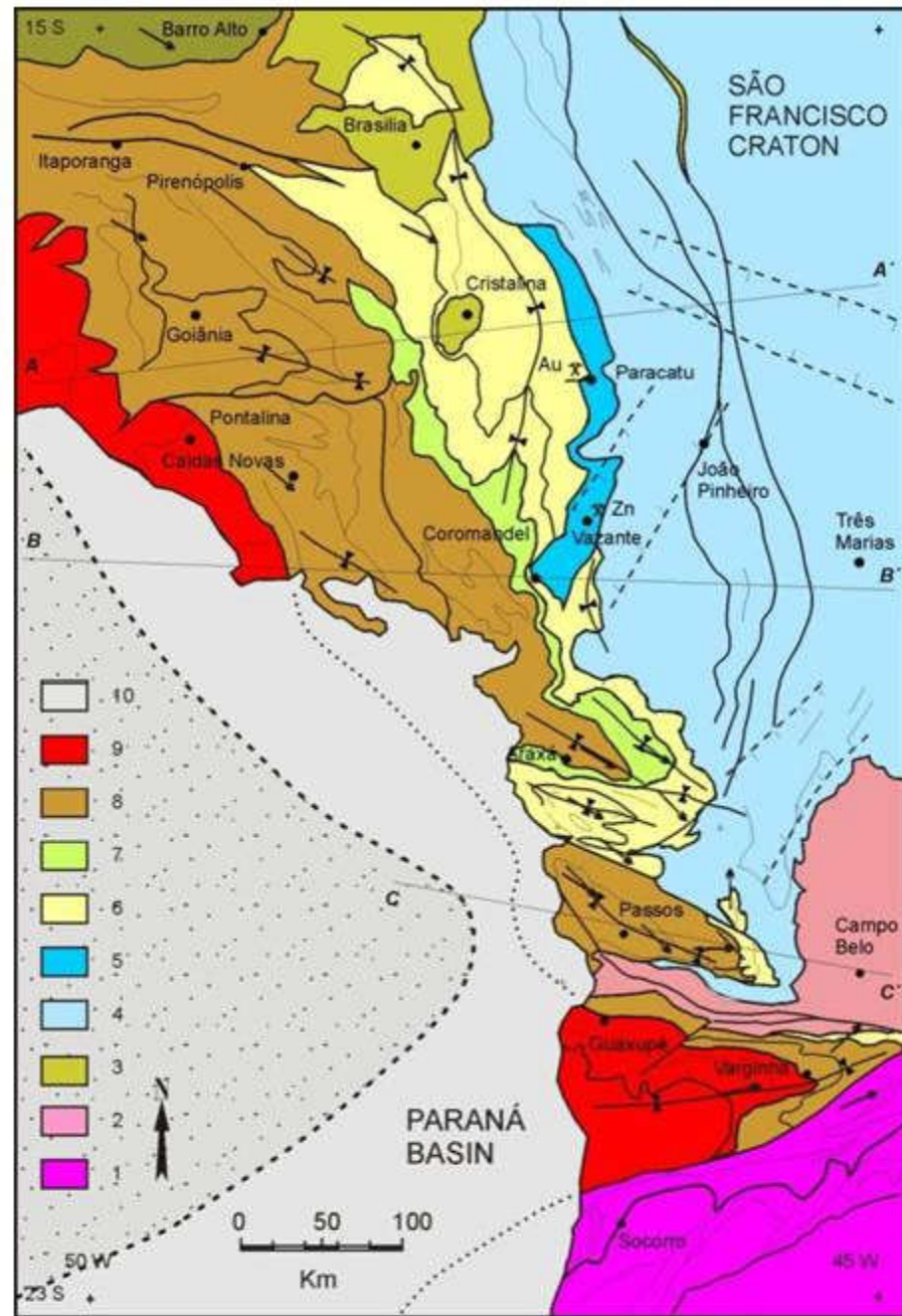
20/53

Sm-Nd:

T<sub>dm</sub> 2.47  
2.52  
2.75 Ga



# UNIDADES METASSEDIMENTARES DA MARGEM PASSIVA SUDOESTE DO PALEOCONTINENTE SÃO FRANCISCO

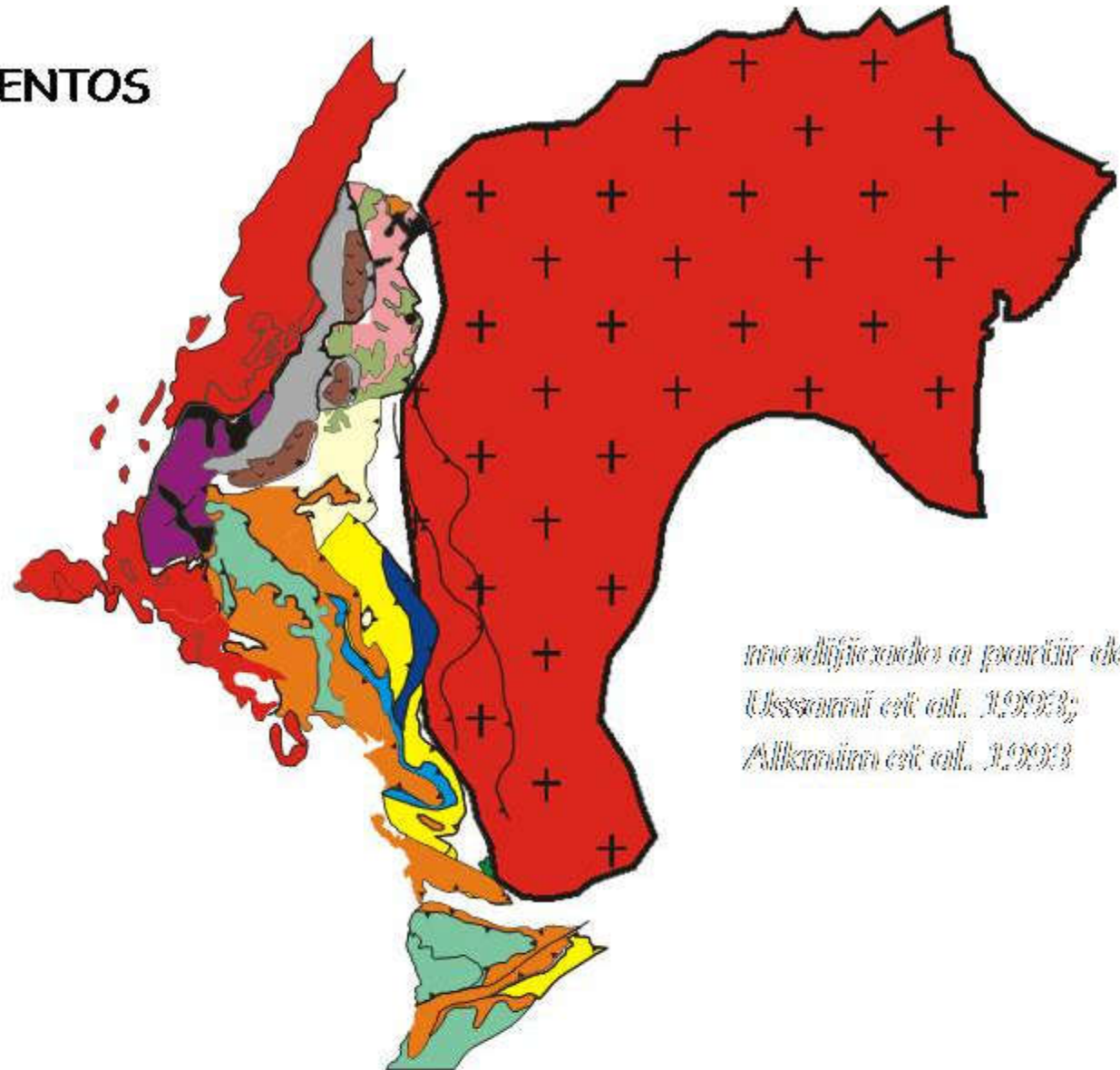


## DOMÍNIO EXTERNO

### SISTEMA DE DOBRAMENTOS E CAVALGAMENTOS

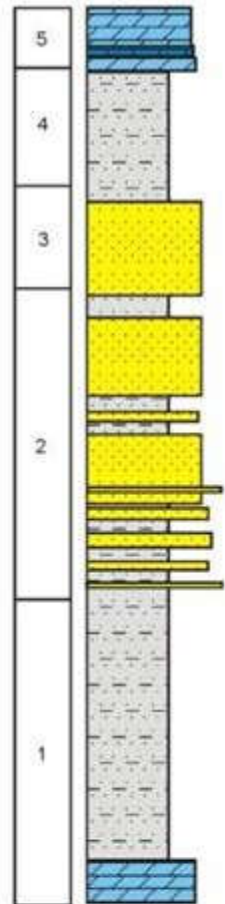
Sedimentação proximal  
(muito quartzito)

Fácies xisto verde



# ZIRCÕES DETRÍTICOS E IDADES MODELO Sm-Nd

Pimentel et al., 2011



## GRUPO PARANOÁ:

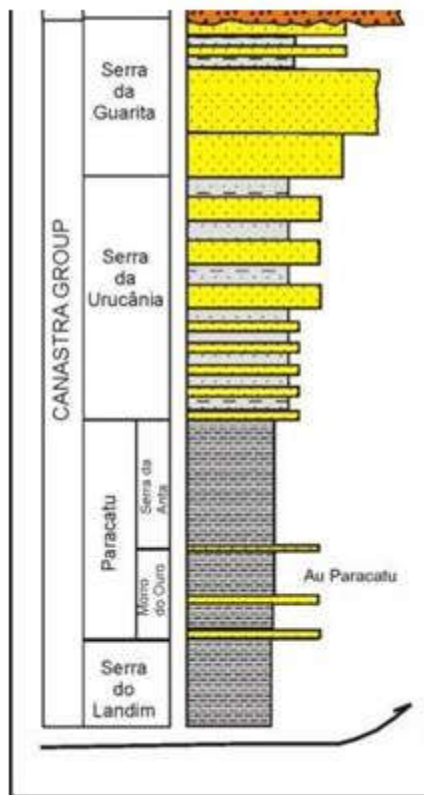
Litho-stratigraphic Unit	U-Pb detrital zircon ages		Sm-Nd model age T <sub>dm</sub> (Ga) (n) <sup>*</sup>	Reference
	Youngest zircon/xenotime (Ma)	Main modes (Ga)		
<b>PARANOÁ GROUP</b>				
			2.03 to 2.27 (6)	Pimentel et al. (2001)
Northern Brasília belt	1042 (diagenetic xenotime)	1,54 - 1,78 - 2,15 - 2,70 - 2,85 - 3,10 - 3,43		Matteini et al. (2012)

\*- (n) = number of Sm-Nd samples

Alvarenga et al., 2012



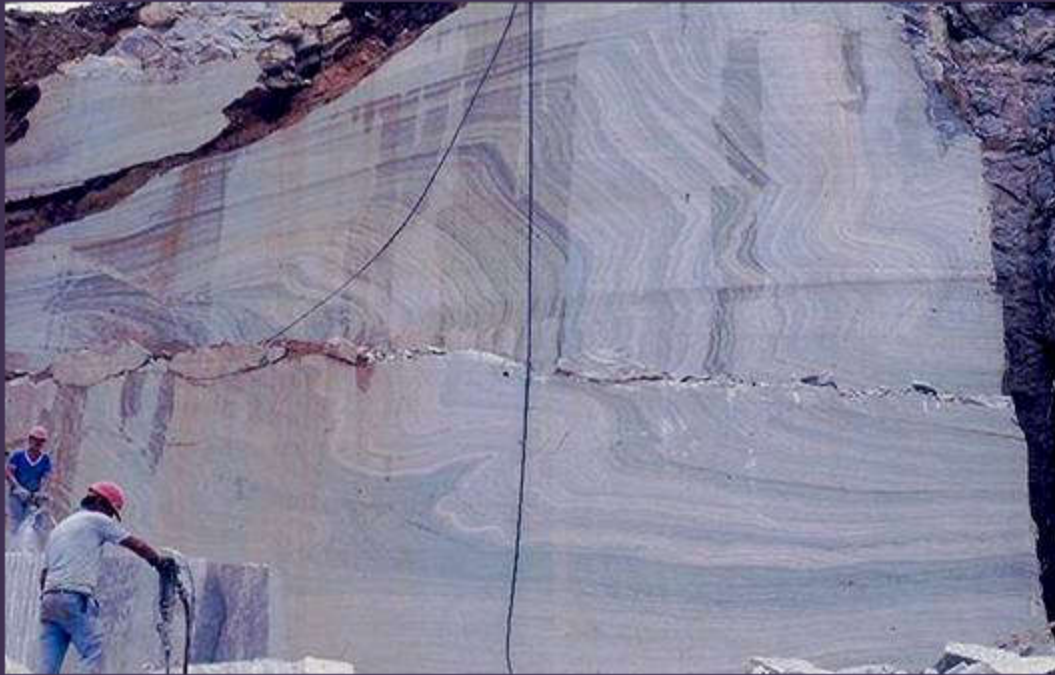
# GRUPO CANASTRA:



Dias et al., 2011

Litho-stratigraphic. Unit	U-Pb detrital zircon ages		Sm-Nd model age $T_{dm}$ (Ga) (n)*	Reference
	Youngest zircon/xenotime (Ma)	Main modes (Ga)		
<b>CANASTRA GROUP</b>				
metapelites			1.90 to 2.34 (6)	Pimentel et al. (2001)
Passos nappe	1011	1.3		Valeriano et al. (2004)
	1030		1.47 to 1.87 (4)	Rodrigues (2008)

\*- (n) = number of Sm-Nd samples



Pedreira de mármore  
Campos Altos

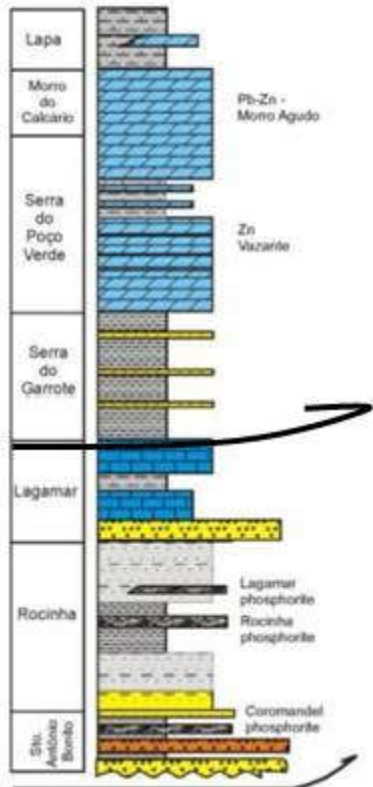






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# GRUPO VAZANTE:

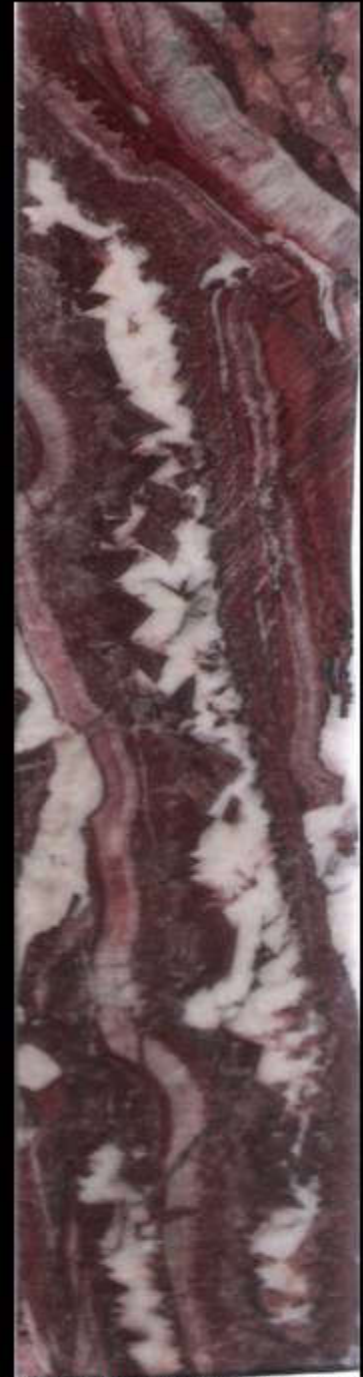


Dardenne, 2000

Litho-stratigraphic Unit	U-Pb detrital zircon ages		Sm-Nd model age Tdm (Ga) (n)*	Reference
	Youngest zircon/xenotime (Ma)	Main modes (Ga)		
<b>VAZANTE GROUP</b>				
			1.70 to 2.10 (13)	Pimentel et al. (2001)
	935±14	0.94 - 1.16 - 1.21 - 1.53 = 1.81 - 2.08 - 2.15 -	1.67 to 2.76 1.90 to 2.08 (17)	Rodrigues (2008); Rodrigues et al. (2012)
			1.41 to 2.40 (9)	Santana (2011)

**Margem passiva proximal:  
Grupo Vazante, dolomitos com estromatólitos colunares**





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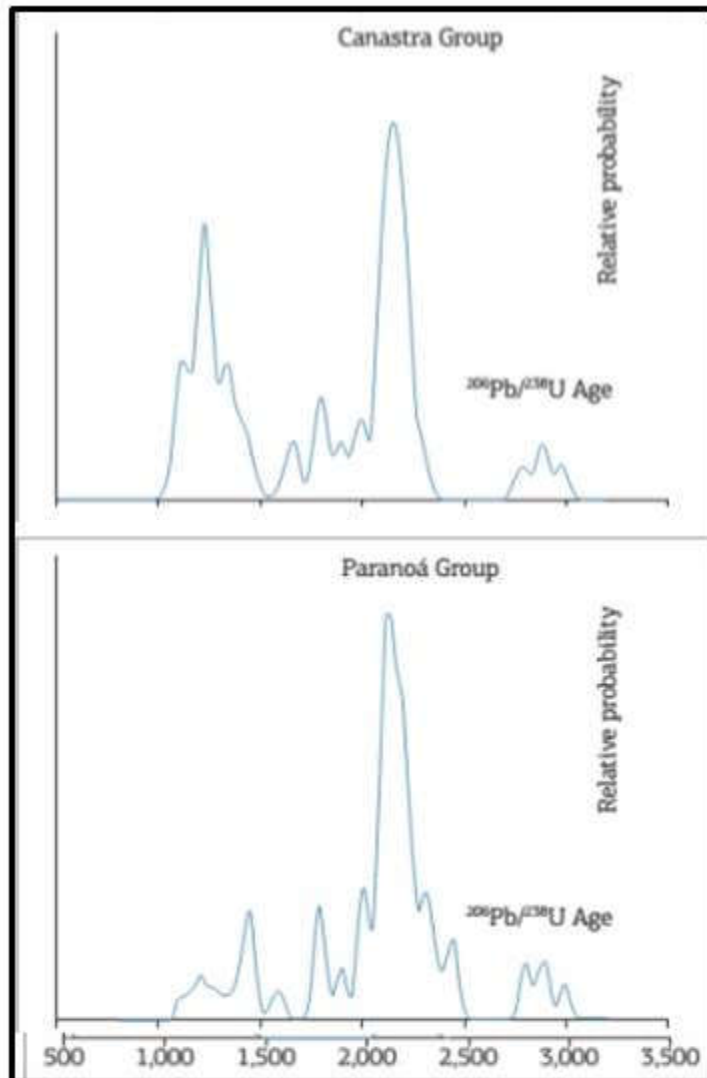


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## ZIRCÕES DETRÍTICOS NOS GRUPOS CANASTRA E PARANOÁ

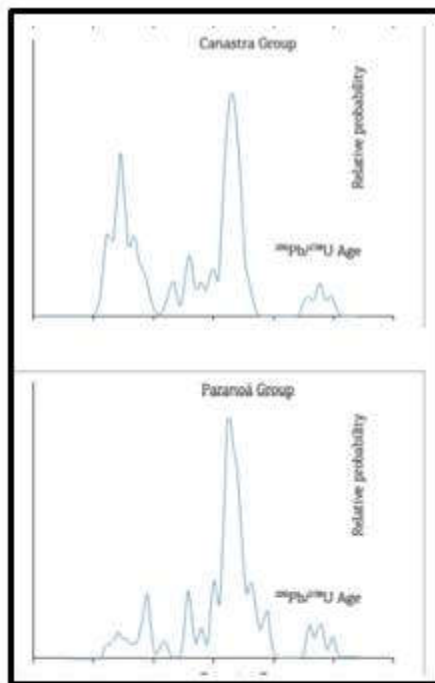


Pimentel, 2016 Brazilian  
Journal of Geology

# GRUPOS CANASTRA E VAZANTE: MARGEM PASSIVA NEOPROTEROZOICA

## ZIRCÃO DETRÍTICO:

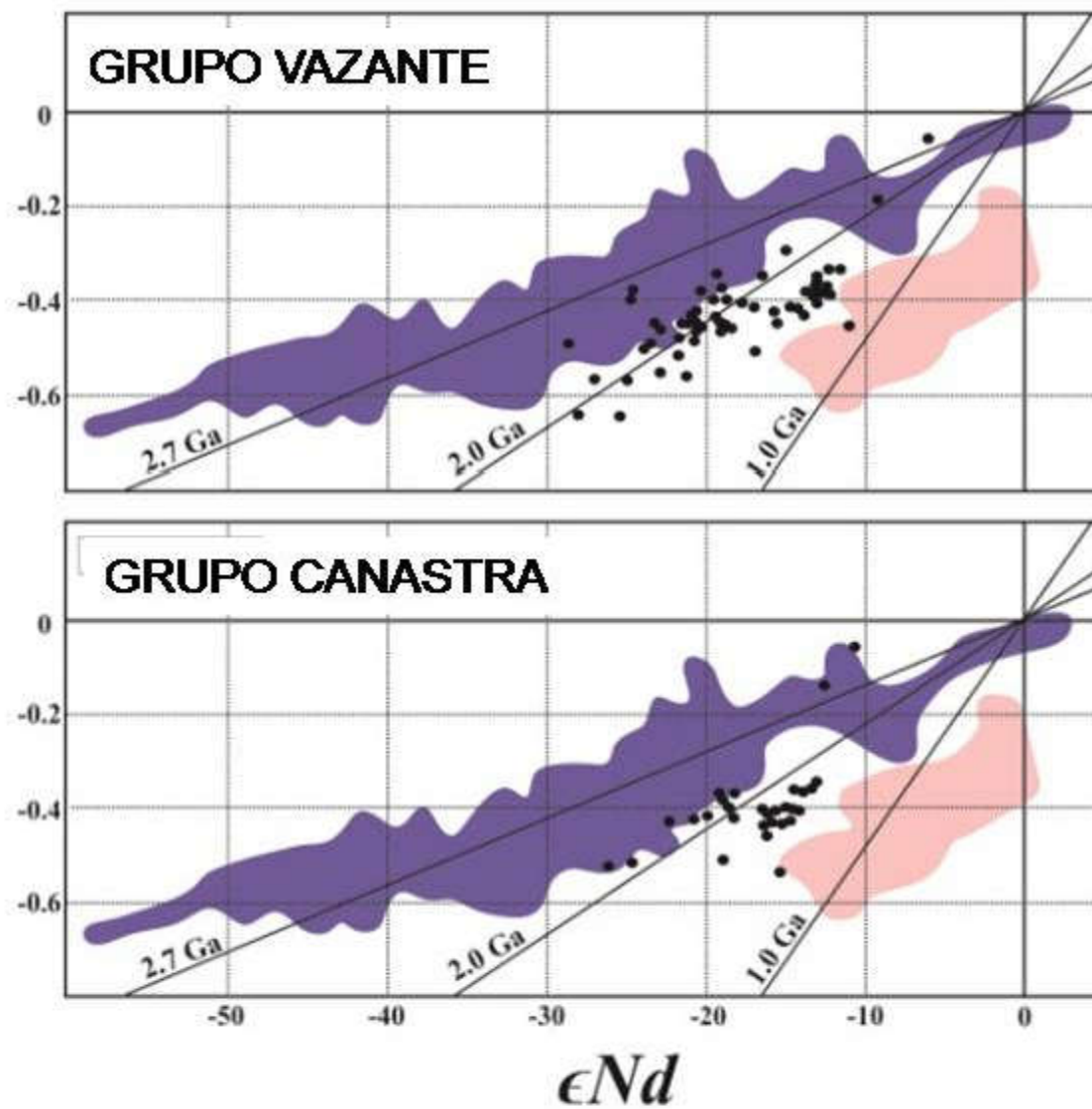
Litho-stratigraphic Unit	U-Pb detrital zircon ages	
	Youngest zircon/xenotime (Ma)	Main modes (Ga)
<b>CANASTRA GROUP</b>		
metapelites		
Passos nappe	1011 1030	1.3
<b>VAZANTE GROUP</b>		
	935±14	0.94 - 1.16 - 1.21 - 1.53 = 1.81 - 2.08 - 2.15 -



Pimentel, 2016

O QUE NOS DIZEM OS ISÓTOPOS DE NEODÍMIO EM ROCHA TOTAL?

# O QUE NOS DIZEM OS ISÓTOPOS DE Nd e Sr EM ROCHA TOTAL?



Manuela Carvalho  
(2016)

**DOMÍNIO INTERNO**

**NAPPES METAMÓRFICAS**

**Dobramento isoclinal**

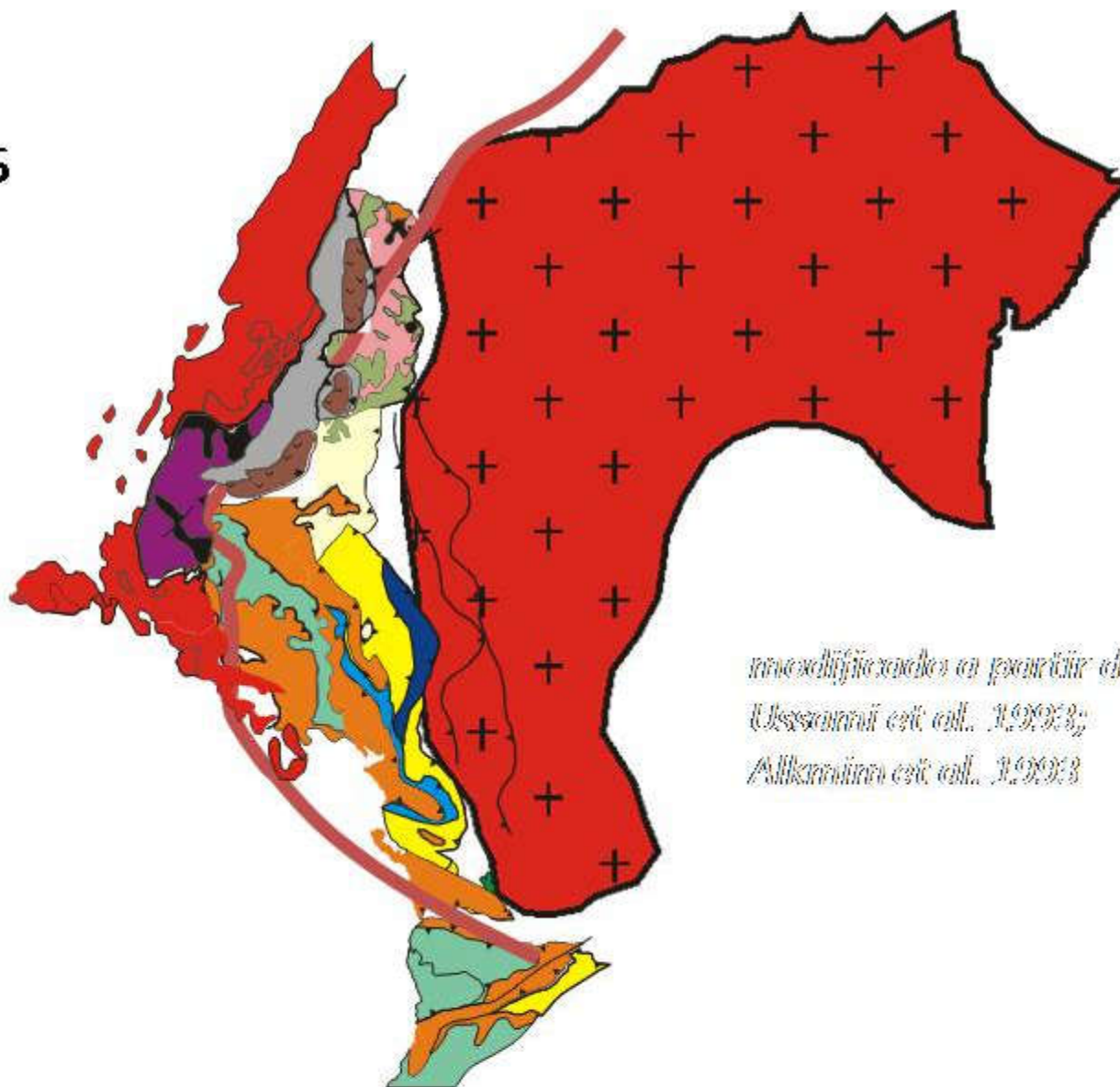
**Fácies xisto verde alto  
a anfibolito e granulito**

**Predominam metapelitos**

**remanescentes**

**Oceânicos**

**(chert, pelitos carbonosos  
máficas, ultramáficas)**



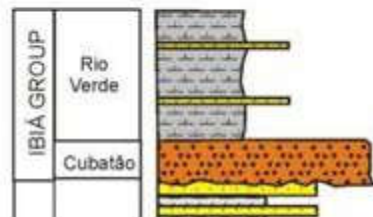
*modificado a partir de  
Usseneroff etc coll. 1993;  
Alkerciano etc coll. 1993*

## GRUPO ARAXÁ:

Litho- stratigraphic. Unit	U-Pb detrital zircon ages		Sm-Nd model age T <sub>dm</sub> (Ga)	Reference
	Youngest zircon/ xenotime (Ma)	Main modes (Ga)	(n)*	
<b>ARAXÁ GROUP</b>				
<u>Metapelites</u>			1.0 to 1.3 1.8 to 2.1 (26)	Pimentel et al. (2001)
<u>Anápolis-Itaucu nappe</u>	643	0.67 - 1.05 - 1.5 - 2.0	1.19 to 1.37 1.76 to 2.18 (8)	<u>Piuzana et al. (2003)</u>
<u>Araxá nappe</u>			1.9 (1)	<u>Seer et al. (2001)</u>
<u>Passos nappe</u>	607±1	0.95 - 1.25 - 1.75 - 2.15 - 2.40 - 2.95 - 3.0		<u>Valeriano et al. (2004)</u>

\*- (n) = number of Sm-Nd samples

# GRUPO IBIÁ:

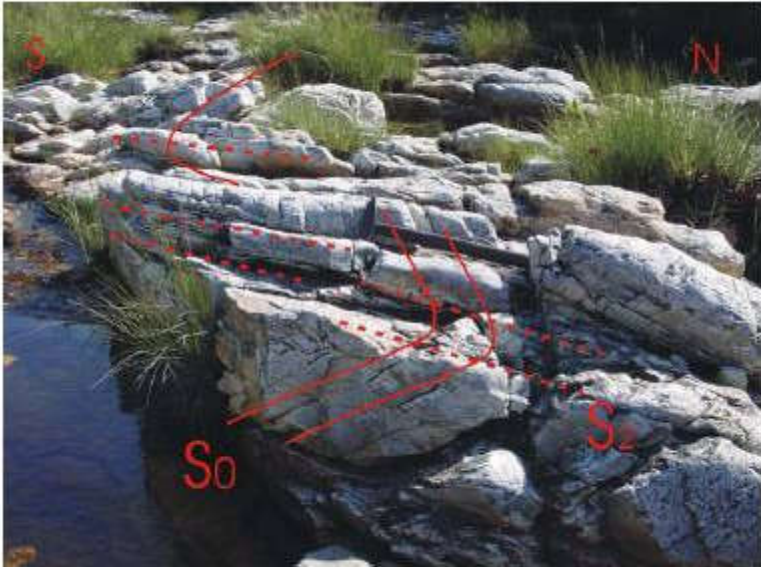


Litho-stratigraphic Unit	U-Pb detrital zircon ages		Sm-Nd model age Tdm (Ga) (n)*	Reference
	Youngest zircon/xenotime (Ma)	Main modes (Ga)		
<b>IBIÁ GROUP</b>				
Rio Verde Fm			1.16 to 1.33 1.93 to 2.01 (7)	Pimentel et al. (2001)
			1.16 to 1.33 (3)	Seer et al. (2001)
	636±21	0.64 – 0.67 – 0.72 – 0.76 – 0.83 – 0.88 – 0.96 – 1.07	1.46 (1)	Rodrigues (2008)
	639±15	0.69 – 0.88 – 1.57 – 1.72 – 1.95 – 2.53	1.20 to 1.24 (3)	Dias et al. (2011)
			1.58 to 2.69 (2)	Klein (2008)
Cubatão Fm (pebbles)			2.20 to 2.47 (3)	Pimentel et al. (2001)
	935±11	0.94 – 0.99 – 1.19 – 1.37 – 1.60 – 1.84 – 1.99 – 2.14 – 2.54	1.77 to 1.89 (2)	Rodrigues (2008)
Cubatão Fm (matrix)	922±16	1.20 - 1.54 - 1.87 - 2.10 - 2.50 - 2.72		Dias et al. (2011)



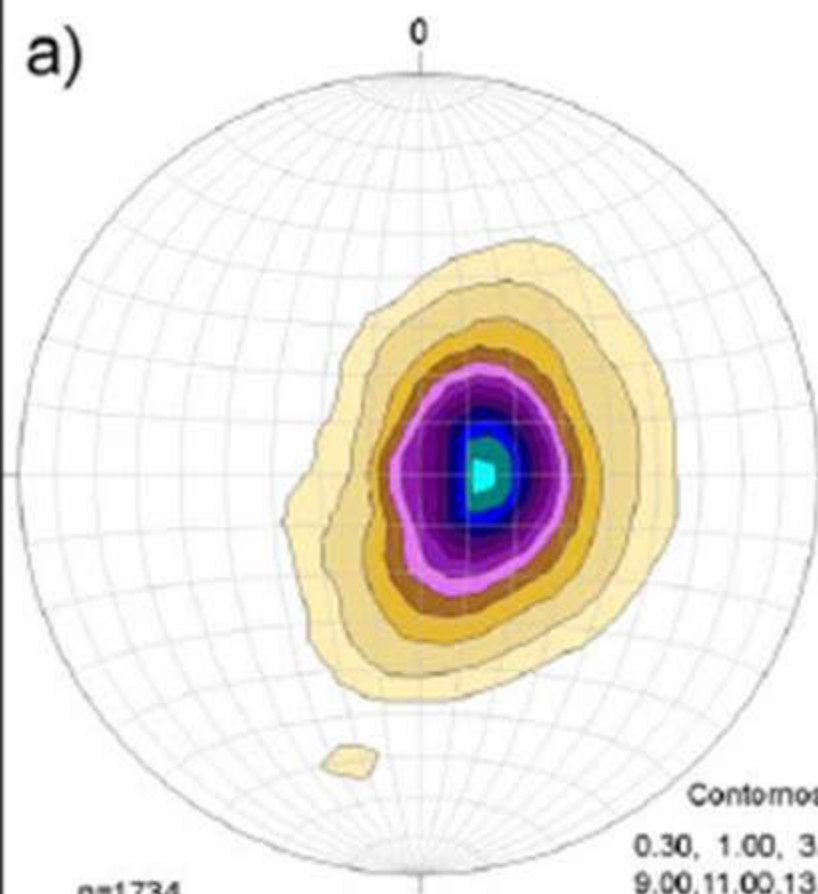
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Pólos de Foliações S0, S1 e S2

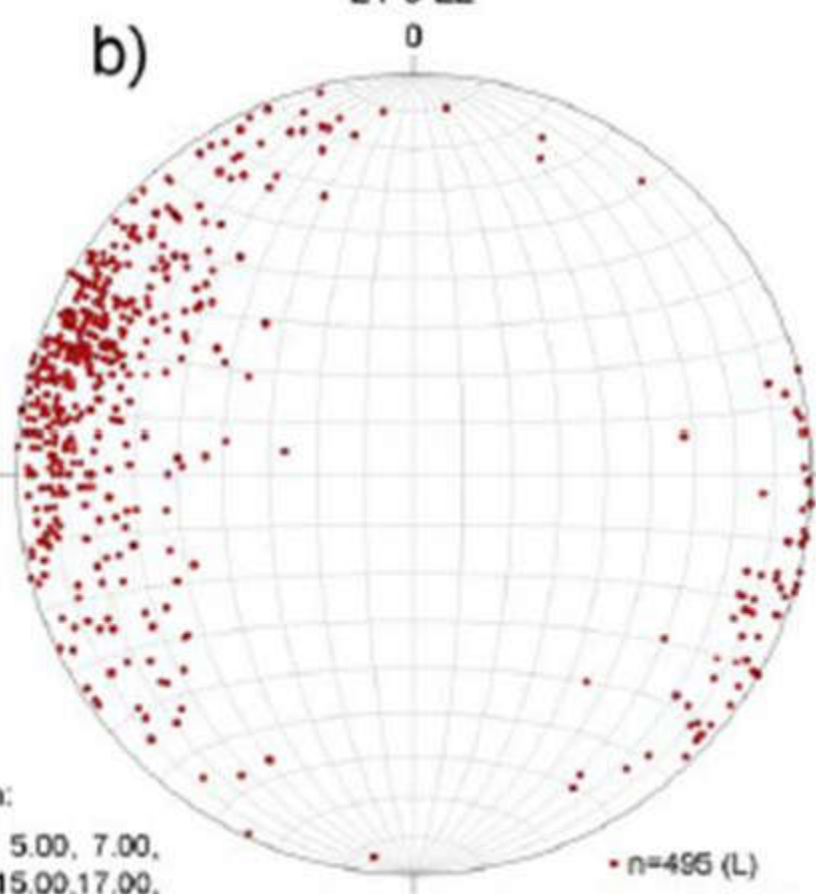
a)



n=1734  
max. Dens. = 22.68 (90/78)

Lineações de Estiramento e Mineral  
L1 e L2

b)



n=495 (L)  
Num total: 495

Contornos em:

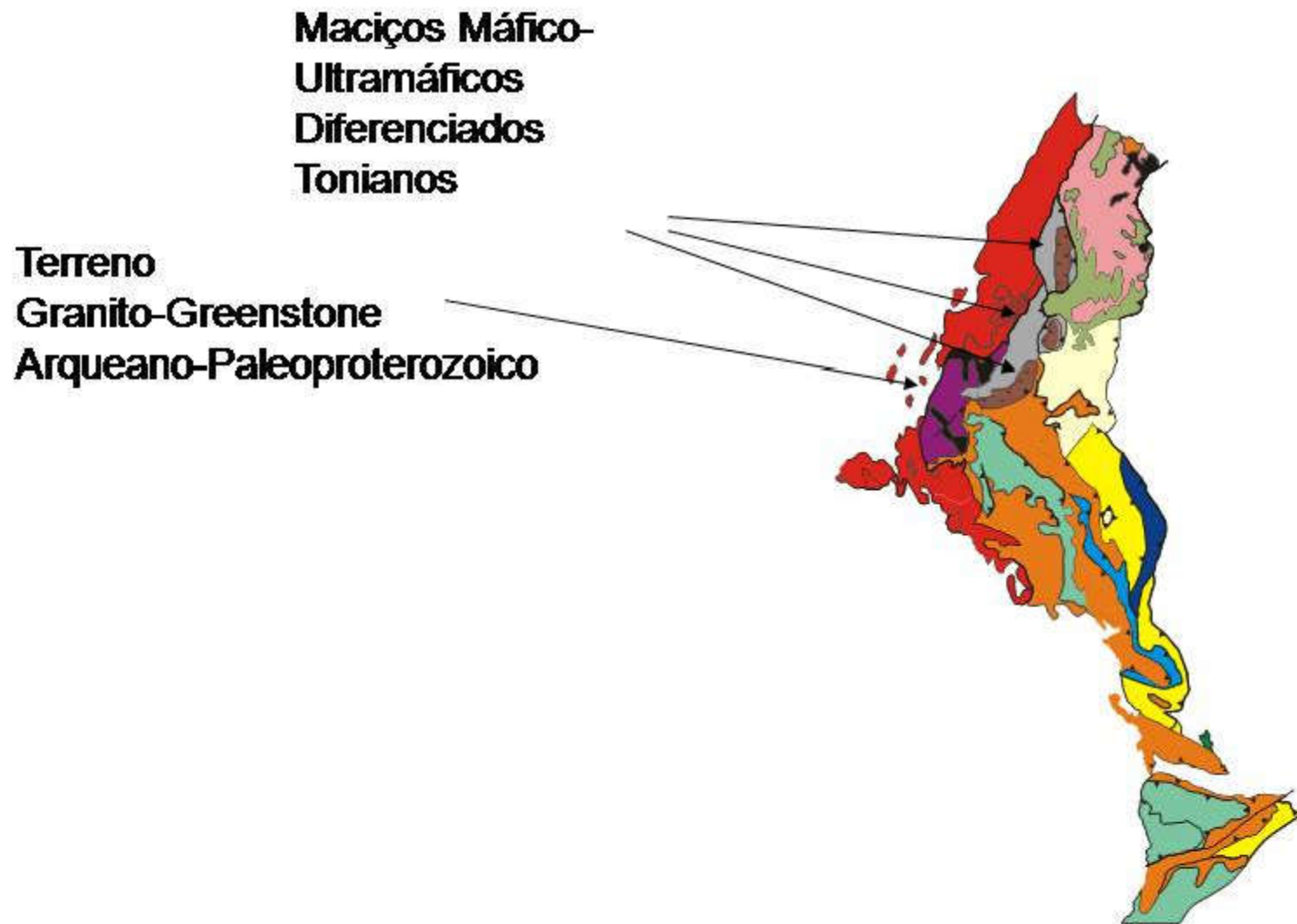
0.30, 1.00, 3.00, 5.00, 7.00,  
9.00, 11.00, 13.00, 15.00, 17.00,  
19.00, 21.00,

(Múltiplos de distribuição aleatória)

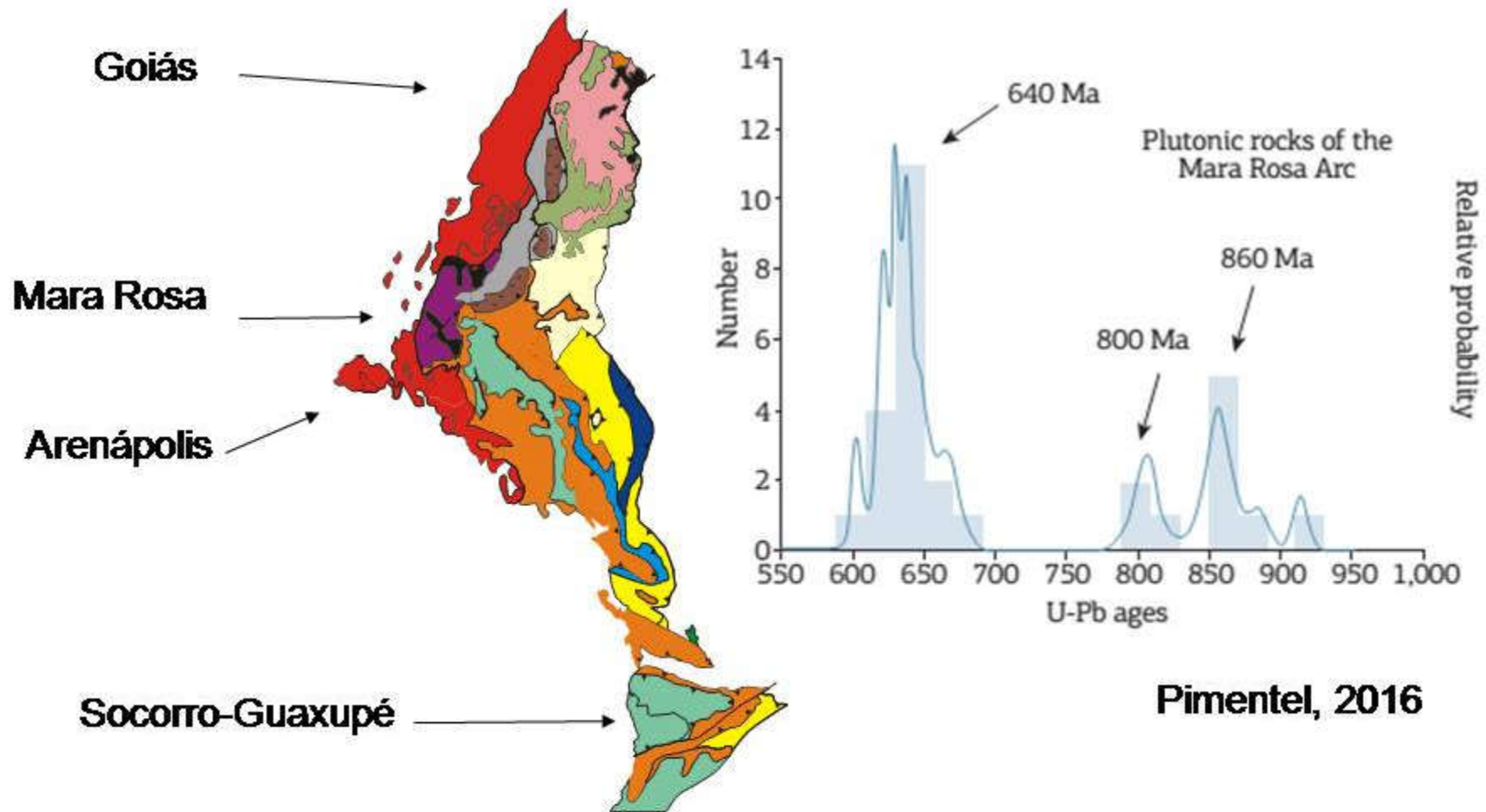




# MACIÇO GOIANO: um microcontinente exótico?



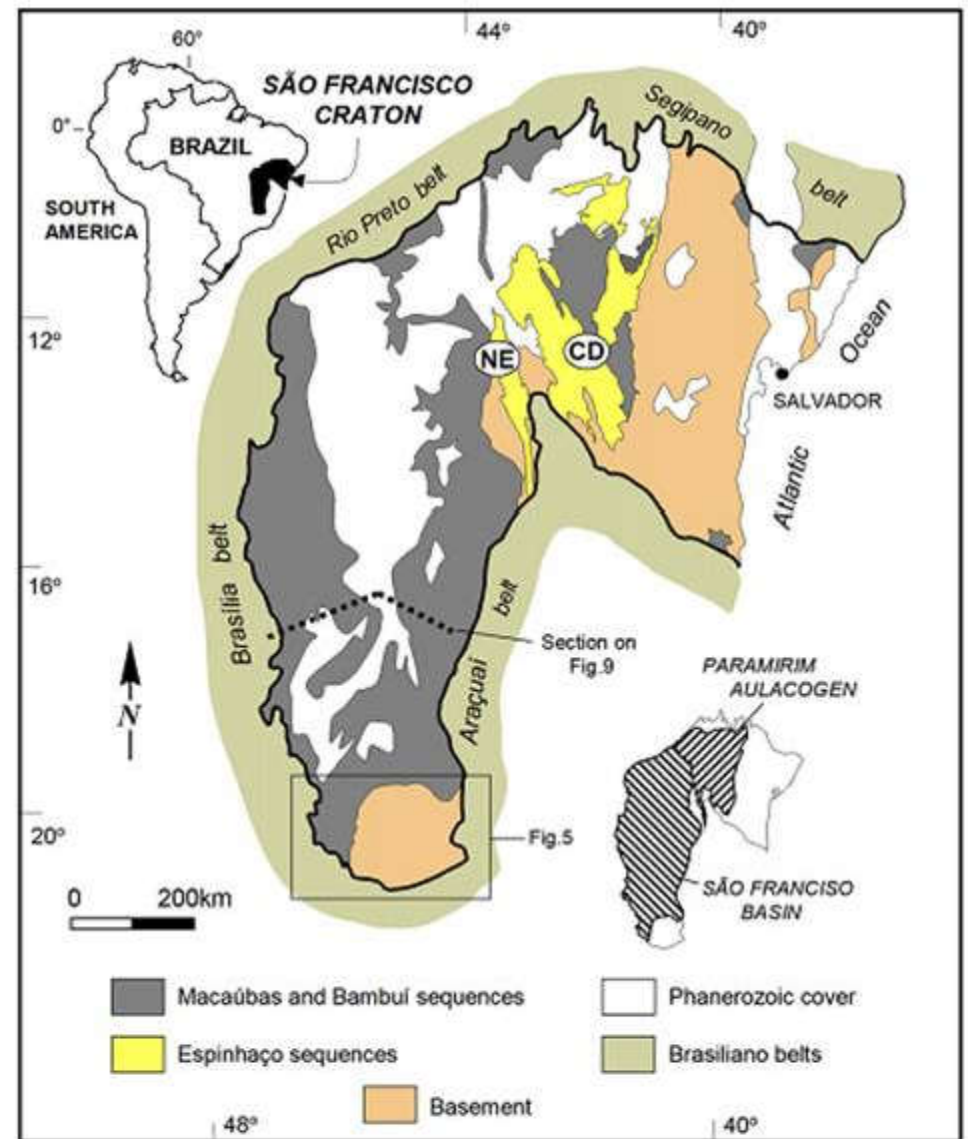
# Arco Magmático de Goiás



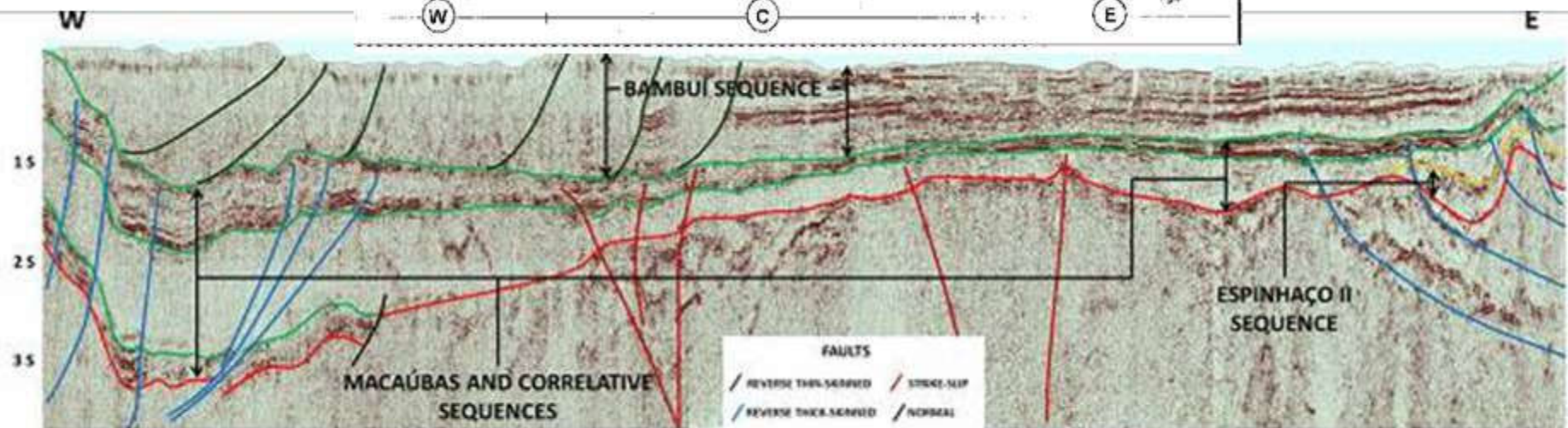
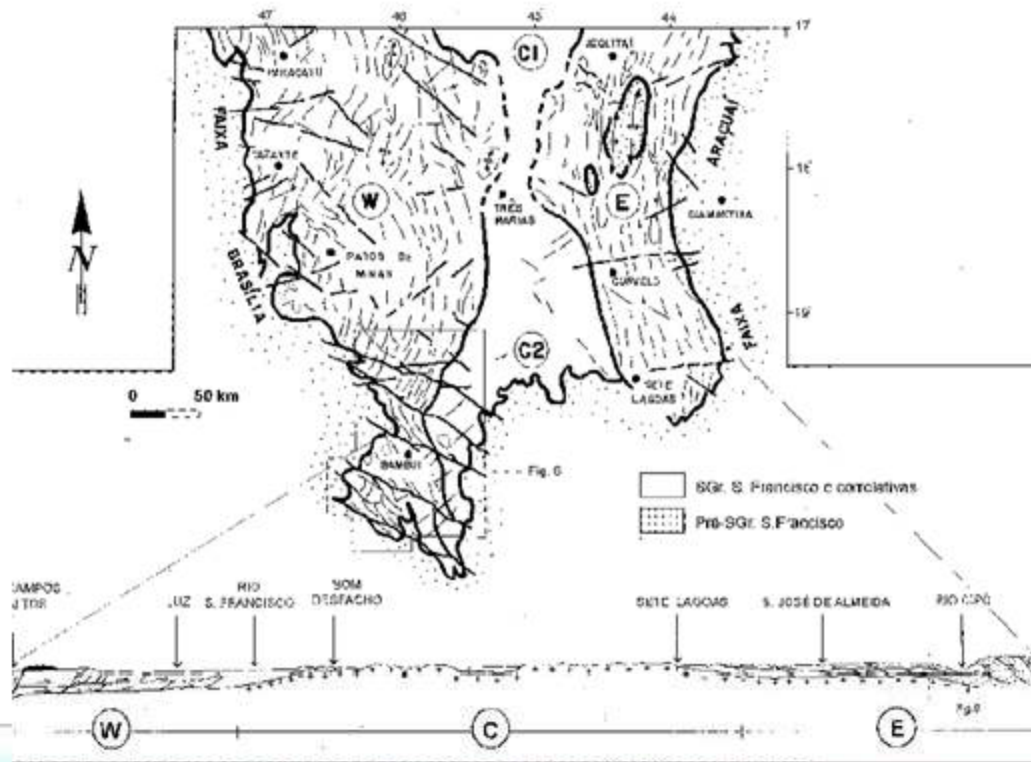
Pimentel, 2016

# A COBERTURA NEOPROTEROZÓICA NO ANTEPAÍS

## Bacia do São Francisco



Alkmim & Martins Neto, 2012,  
Marine and Petroleum Geology v 33.



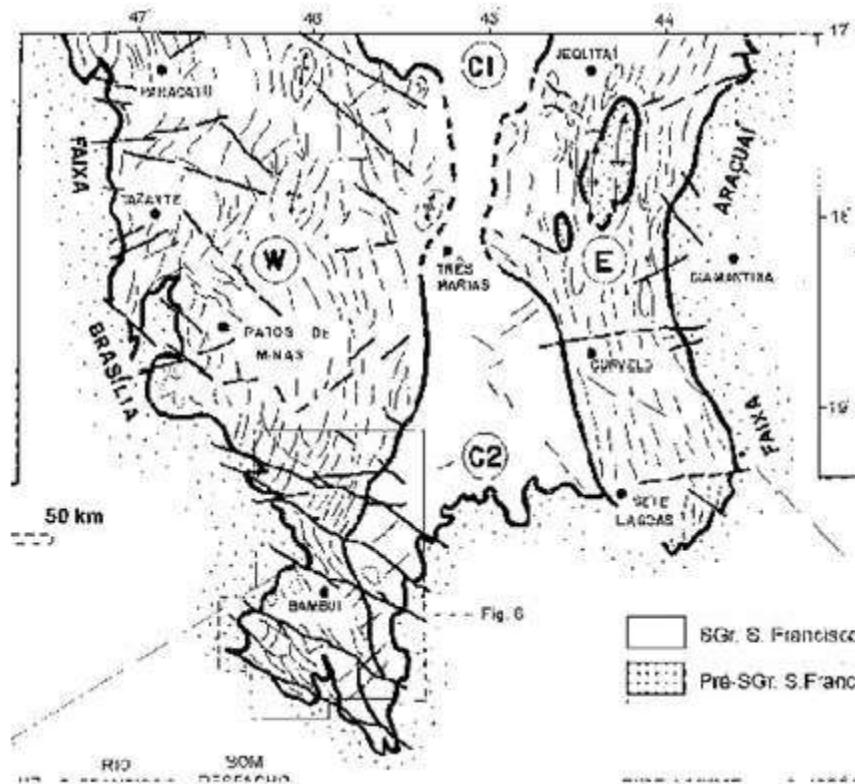
Alkmim & Martins Neto, 2012, Marine and Petroleum Geology v 33.

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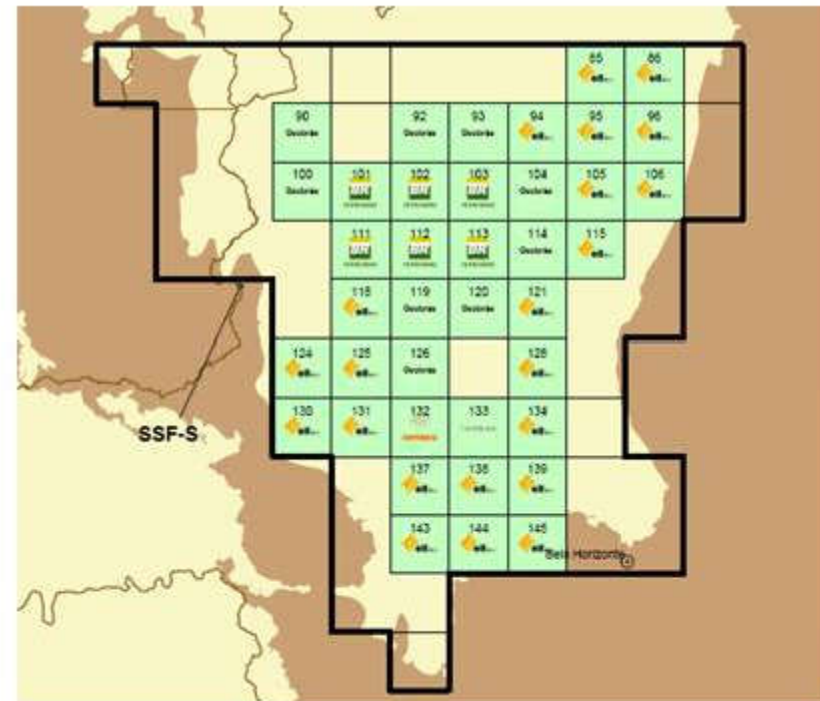


# EXPLORAÇÃO ATIVA DE ÓLEO-GAS

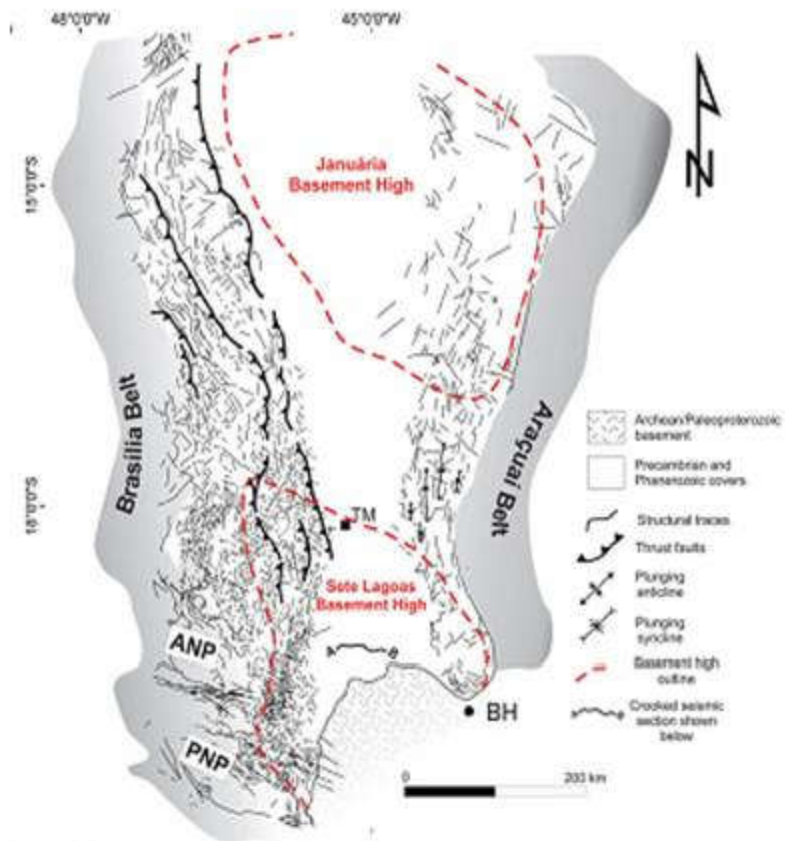
## ONSHORE, E EM AMBIENTE COMPRESSIVO!



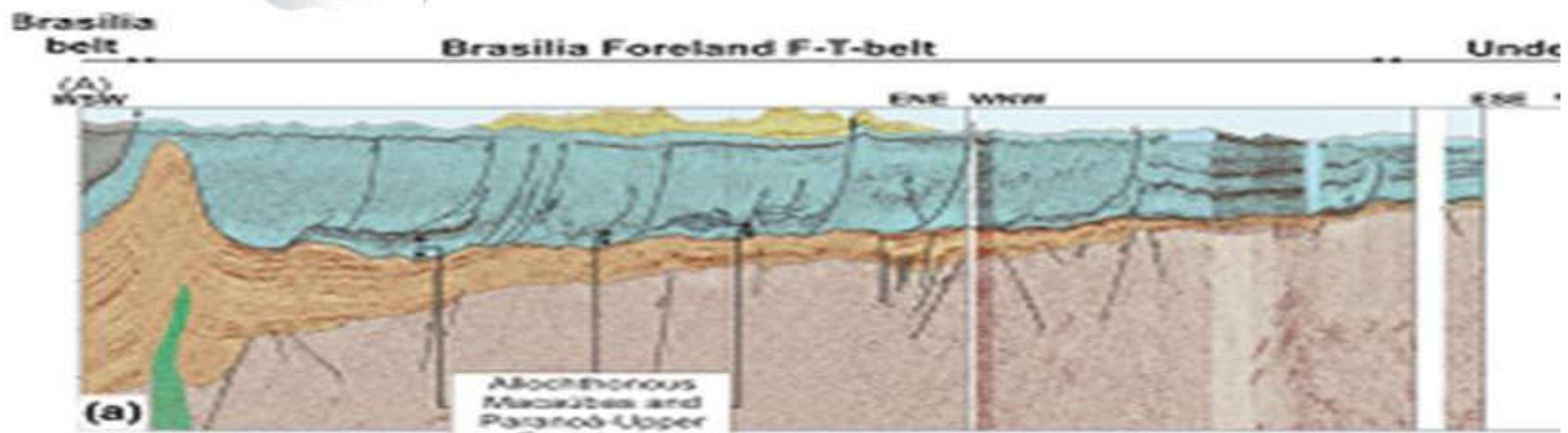
Alkmim et alli 1993



ANP 7ª rodada, 2007

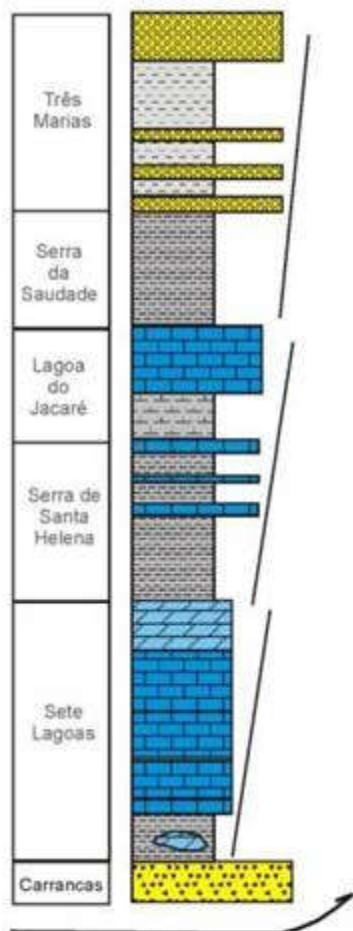


Reis et alli 2017



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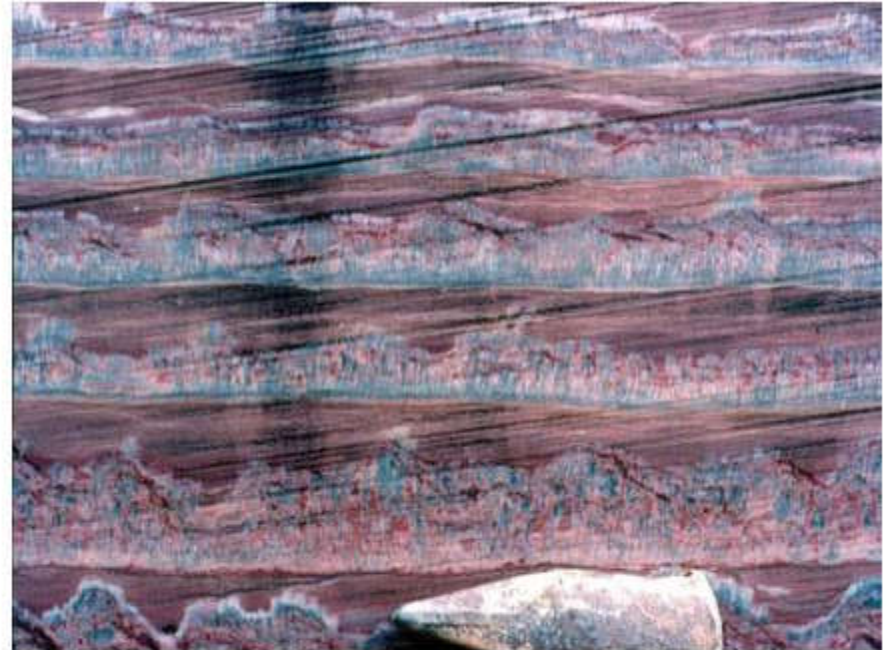
# GRUPO BAMBUÍ:



Litho-stratigraphic Unit	U-Pb detrital zircon ages		Sm-Nd model age $T_{dm}$ (Ga) (n)*	Reference
	Youngest zircon/xenotime (Ma)	Main modes (Ga)		
<b>BAMBUÍ GROUP</b>				
<u>Três Marias Fm</u>			1.53 to 1.81 (5)	Pimentel et al. (2001)
	616	0.56 – 0.63 – 0.68 – 0.78 – 1.15 – 1.55 – 1.70 – 2.60		Rodrigues (2008)
<u>S. da Saudade, L. do Jacaré and Serra Sta. Helena Fms</u>	612	0.61 – 0.66 – 0.79 – 1.06 – 1.30 – 1.56 – 1.78 – 2.17 – 2.58 – 2.70	1.42 to 1.87 (17)	Pimentel et al. (2001); Rodrigues (2008)
<u>Sete Lagoas Fm</u>	537±4 505±7	0.54 - 0.56 – 0.58 – 0.63 – 0.66 – 0.87 – 0.93 - 0.97 – 1.07 – 1.27 – 1.94	1.80 to 2.00 (3)	Santos (2012)
	610	0.65 – 0.79	1.60 to 2.19 (11)	Pimentel et al. (2001); Rodrigues (2008)
<u>Jequitai Fm</u>	880	1.23 – 1.54 – 1.72 – 2.12 – 2.27 – 2.75 – 2.86 – 3.01		Rodrigues (2008)

\*- (n) = number of Sm-Nd samples

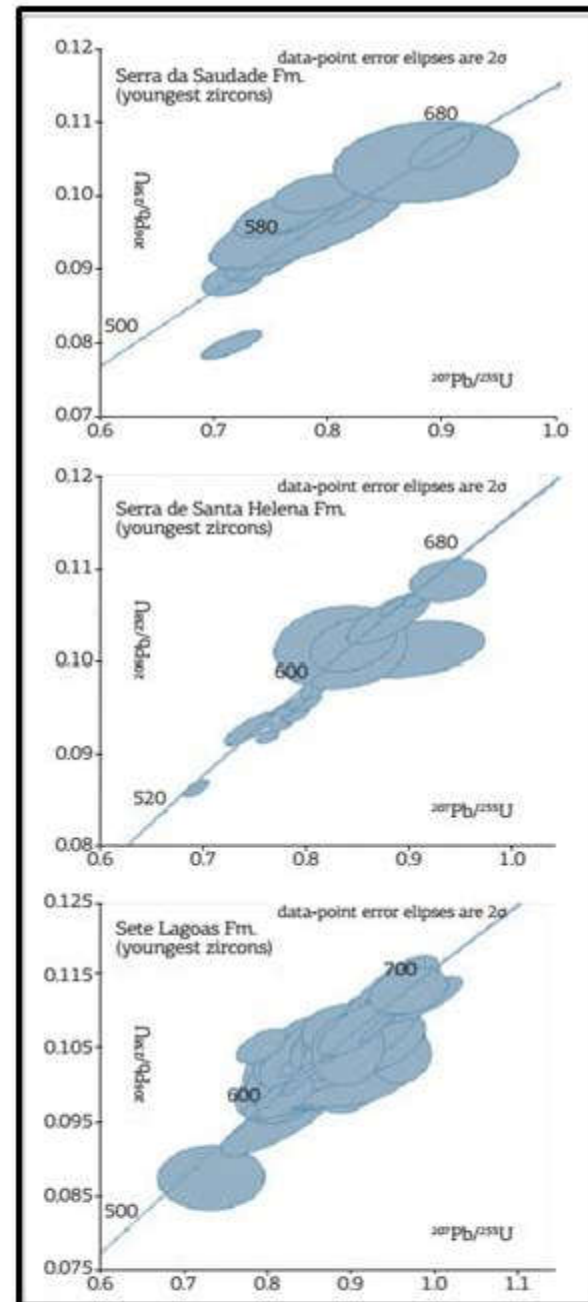
## GRUPO BAMBUÍ:



# GRUPO BAMBUÍ

Zircões detríticos mais jovens

Pimentel (2016)

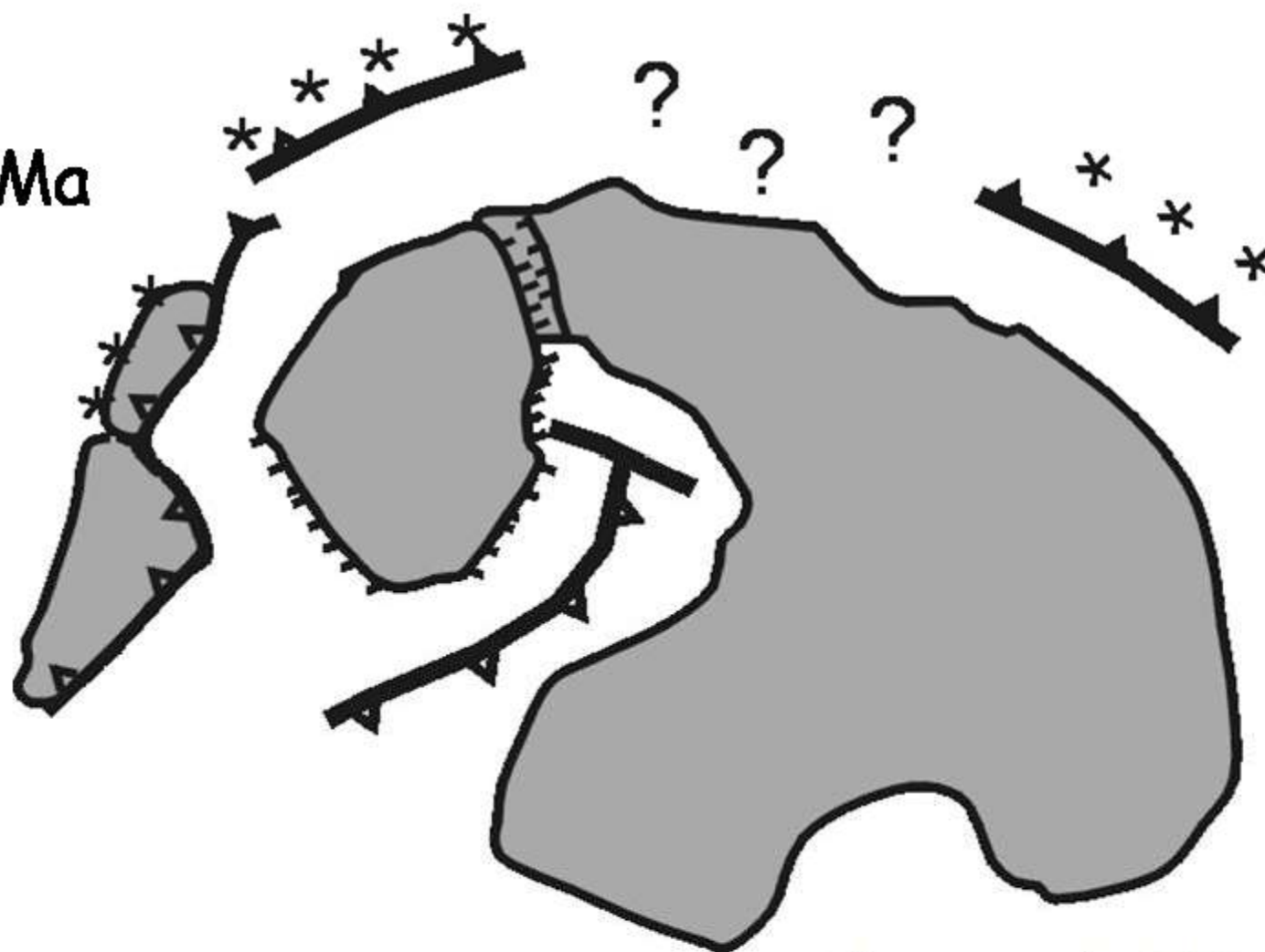




### **3- Evolução tectônica**

**NO CONTEXTO DA AGLUTINAÇÃO  
DE GONDWANA...**

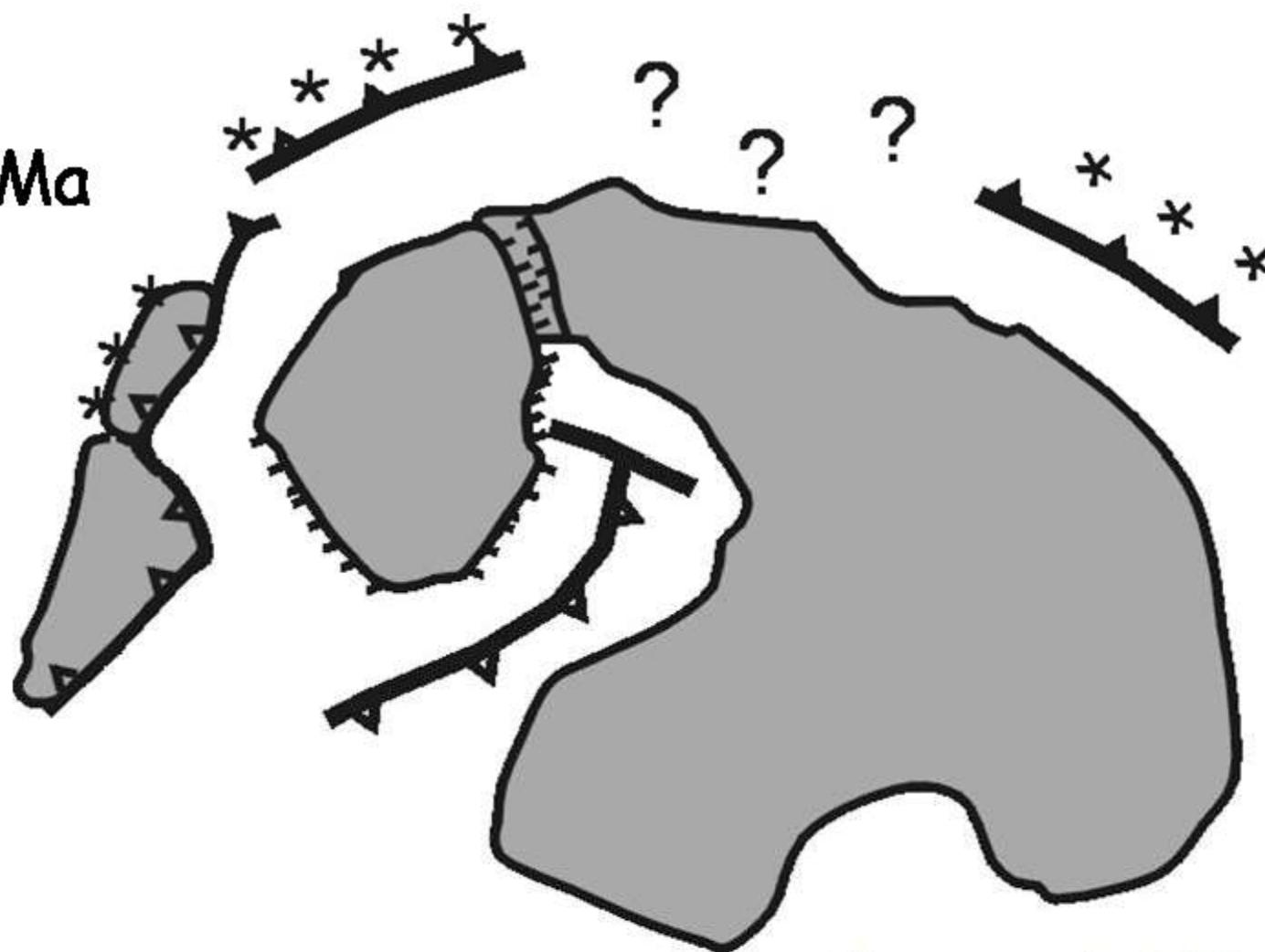
**1000-700 Ma**



*Valeriano et al., 2008*

# NO CONTEXTO DA AGLUTINAÇÃO DE GONDWANA...

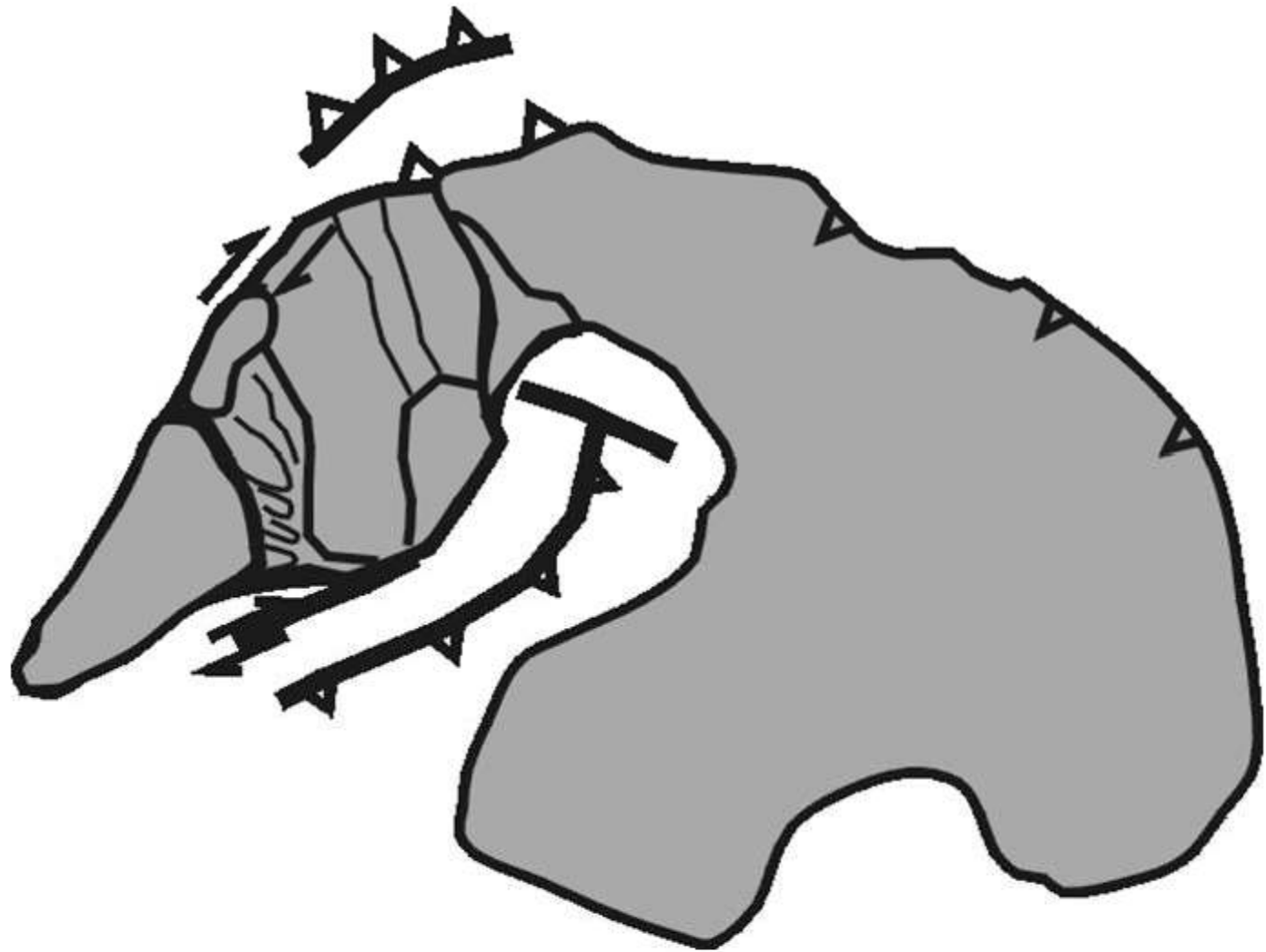
1000-700 Ma



*Valeriano et al., 2008*



650-610 Ma



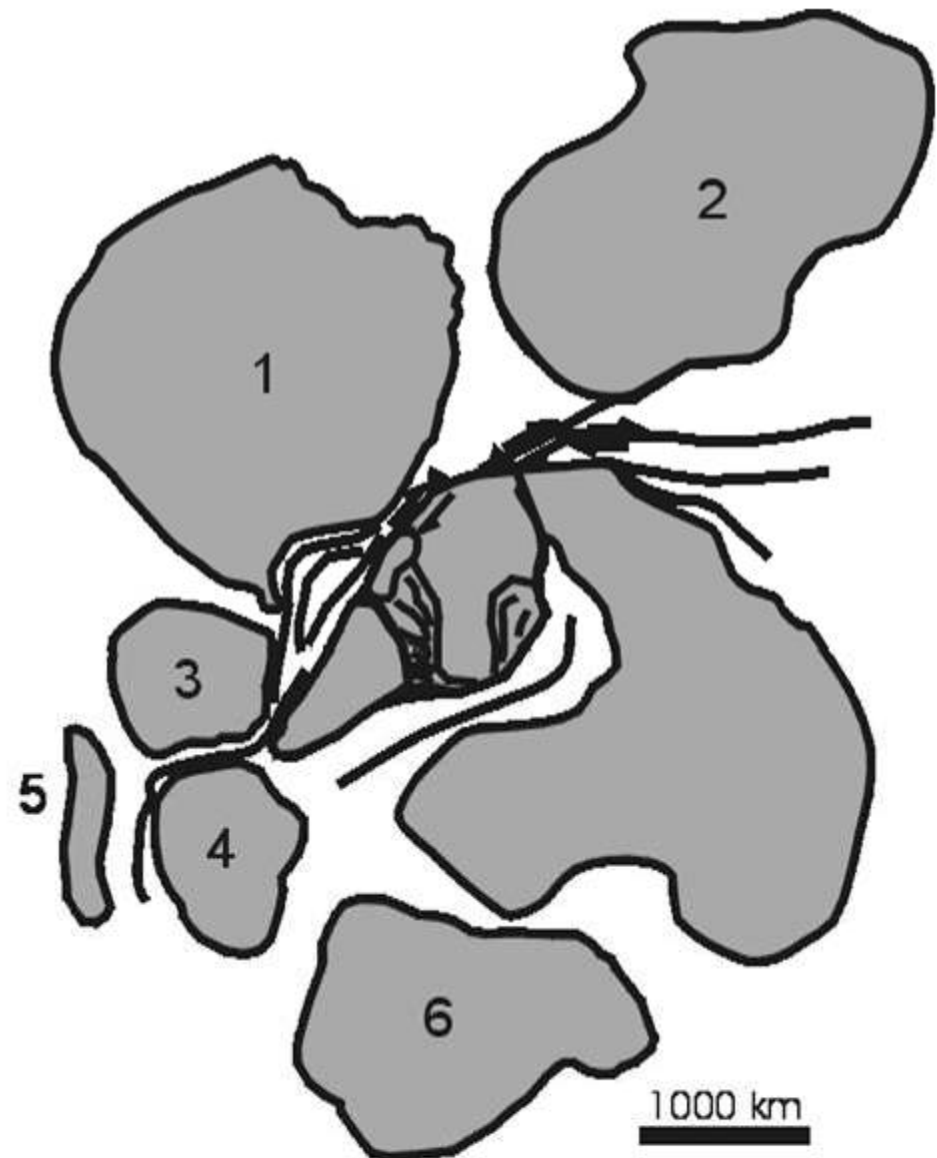
*Valeriano et al., 2008*

*Claudio Valeriano 2017 - Faixa Brasília – 15o. Simpósio de Geologia do Centro Oeste*

## Colisões continentais posteriores,

580 Ma  
540 Ma  
520 Ma

- 1-Amazônia
- 2-São Luiz-Oeste África
- 3-Rio Apa
- 4-Rio de la Plata
- 5-Pampa
- 6-Kalahari



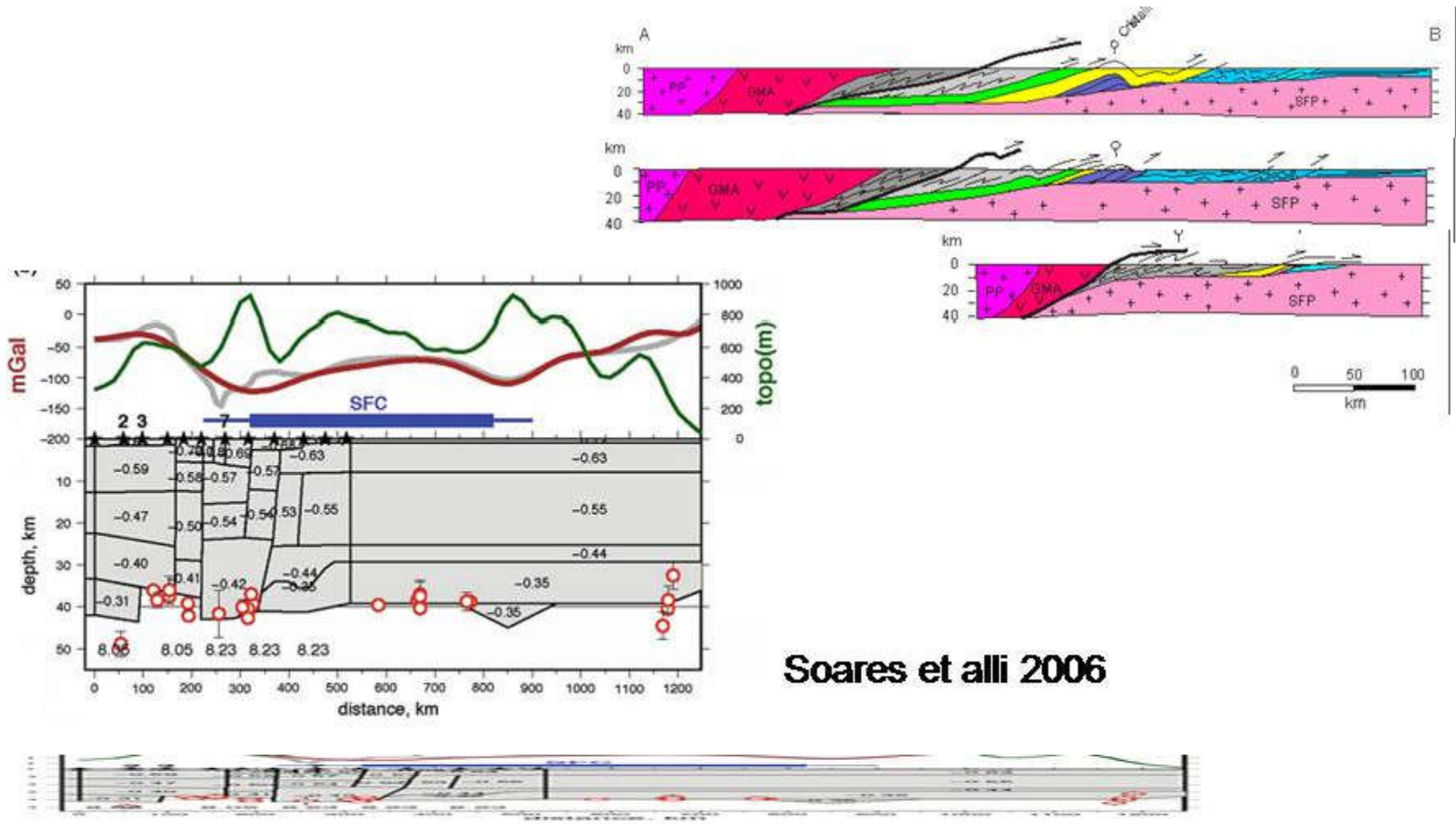
*Valeriano et al., 2008*



## 4- Questões em aberto

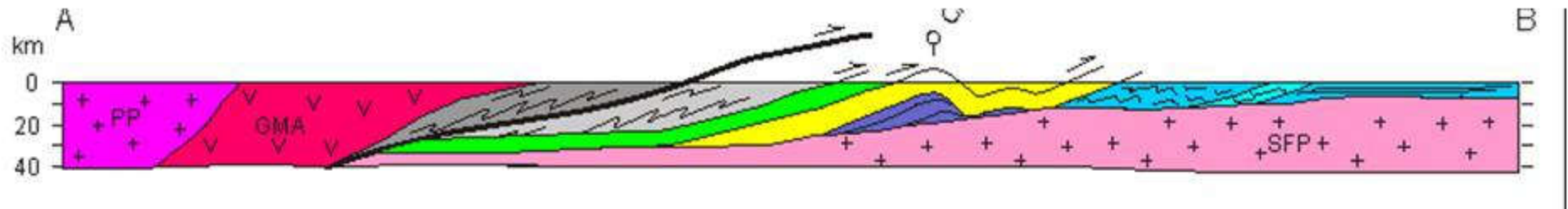
Qual é a geometria do orógeno em seções de escala crustal e litosférica?

Como era a geometria da margem passiva?



Soares et alli 2006

**Grupos Ibiá e Araxá, com zircões detríticos provenientes do cráton, e do arco magmático?**



**Zircões mais jovens que 650 Ma nos grupos Ibiá e Araxá são todos detríticos (provenientes do arco) ou metamórficos?**

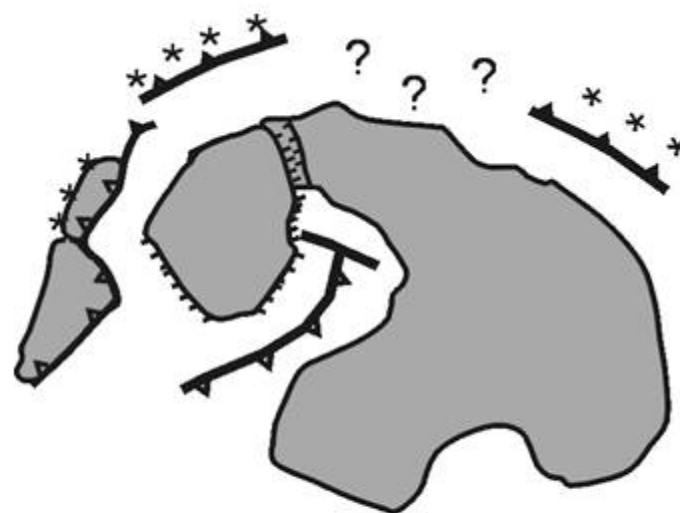
A exumação de nappes metamórficas, com centenas de quilômetros de extensão horizontal,:

colisão de

Microcontinente (Maço de) Goiás-Arco+ Magmático de Goiás?

do Bloco Paranapanema?

Ou tudo isso junto, previamente amalgamado?



*Obrigado!*



*Claudio Valeriano 2017 - Faixa Brasília – 15o. Simpósio de Geologia do Centro Oeste*