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Dyke Swarms Florianópolis: Petrologic and Structural Aspects Related to Rifting Supercontinent Gondwana and Formation South Atlantic in the Santa Catarina of Island, Brazil

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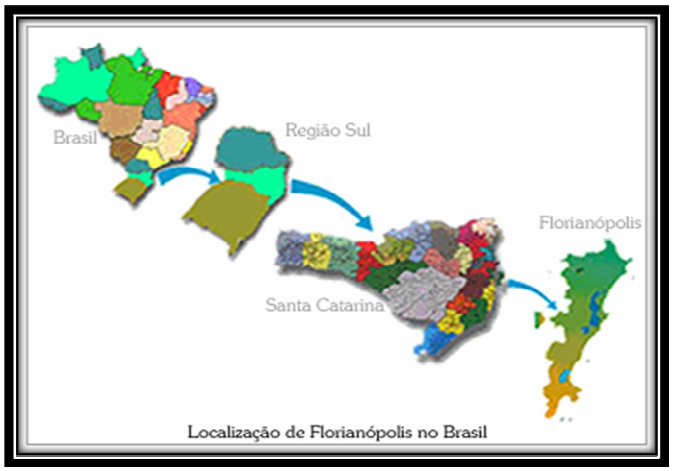
From a point of magmatic view, the rupturing Gondwana Supercontinent is registered on the South American shelf in continental flood basalts, mafic dyke swarms, basins rift and, to a lesser extent, by intrusions alkaline. Among those events, stands out in the south of Brazil intrusions of Dyke Swarms Florianópolis in the Santa Catarina of Island (SCI). The SCI (Fig.1), in namesake state, is located between parallels 27°10' and 27°50' south latitude and between meridians 48°25' and 48°35' west longitude, it presents elongated kilometers of extension toward northeast, as a result to structural configuration of rock masses, today interconnected by sedimentation areas Quaternary.

This rock masses are composed predominantly by Alkaline Granite course equigranular (Island Granite) as also by volcanic and plutonic rocks predominantly by saturated rocks in silica that composes the Volcanic and Plutonic Suite Cambirela (Zanini et al, 1997). The Island Granite is intrusive in Gneisses ad Migmatites of the Águas Mornas Complex, which occurs on continental area adjacent to the Island and, in the northeastern portion of Island. The're truncated by mafic dyke swarms that compose Florianópolis Dyke Swarms, Cretace Age (Raposo et al, 1998). On Quaternary deposits of coastal plain occurs among heave minerals, significant concentration of Fe and Ti Óxides (magnetite-ilmenite) from this dykes (Tomazzoli et al 2007).

The Florianópolis Dyke Swarms (FDS) is compose, predominantly, by diabase dykes, basaltic andesite and, subordinately, andesite, with thicknesses ranging from centimetric/metric to greater than 200 meters, and can be prolong, in some cases, continuously for several kilometers (Fig.2). The majority is oriented toward N10°-30°E e, a lesser extent, toward N20°-30°W and N-S. There is, in certain places, intersection relation between dykes, normally, with thinner dikes toward NW and E-W truncated older dykes that following the general direction.



Fig,1 Illustrative of the location of the Island of Santa Catarina in Brazil. Source: http://cartoriosilva.com.br/santo_antonio_lisboa.html. Accessed on April 6, 2016.

The Florianópolis Dyke Swarms integrate the Parana Magmatic Province (PMP) (Fig.3), correspondent Etendeka Magmatic Province to African Plate. Besides of FDS, the PMP comprises by extensive acidic and basic flood by Ponta Grossa Dyke Swarms, Serra do Mar dyke Swarms and rift basins basalts (Pelotas, Santos, Campos e Espírito Santo).

The FDS is compose predominantly by dike basalts and andesite basaltic. Also, occur intermediate dykes and dacite dykes.

Petrographically basic bodies show different textures, from aphanitic to pórfiras (rare), with the predominance of subofítica and thin intergranular plot. Its essential minerals are plagioclase, augite, pigeonite, iron-titanium oxides, with apatite as mineral more abundant accessory epidote and / sericite as secondary minerals.

The flood basaltic of PMP were divided into six different types of magmas, based primarily on the

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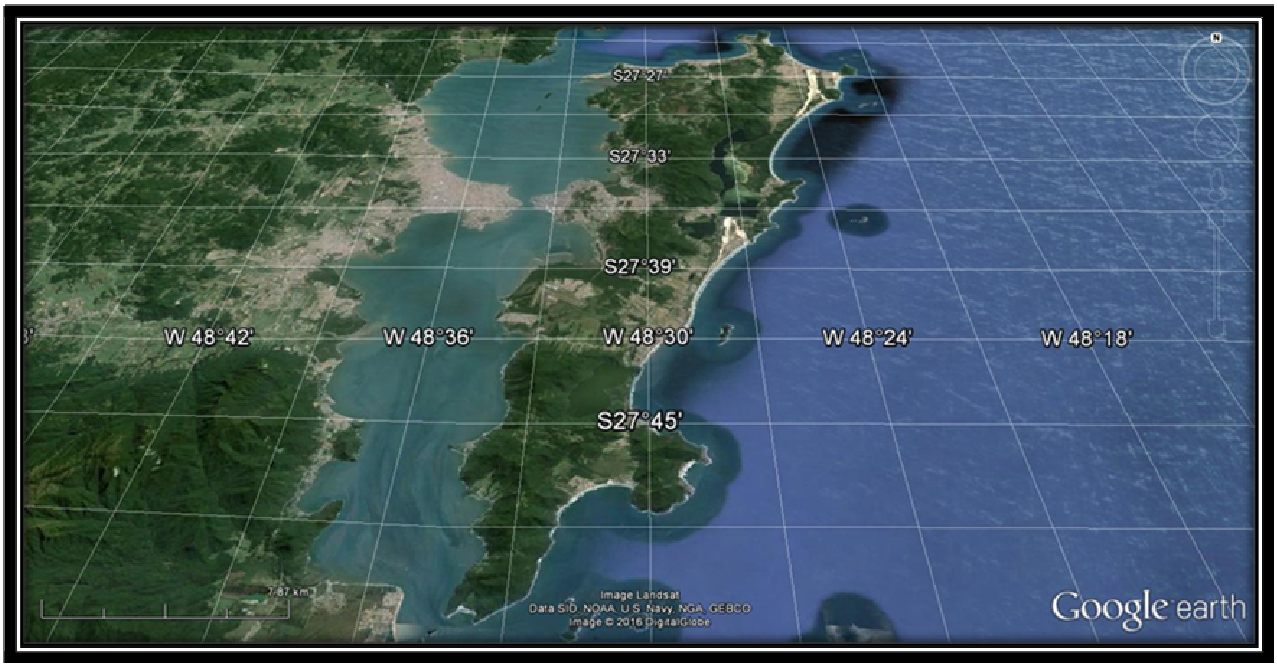

Fig.2 Map of the island of Santa Catarina. Source: Google Earth

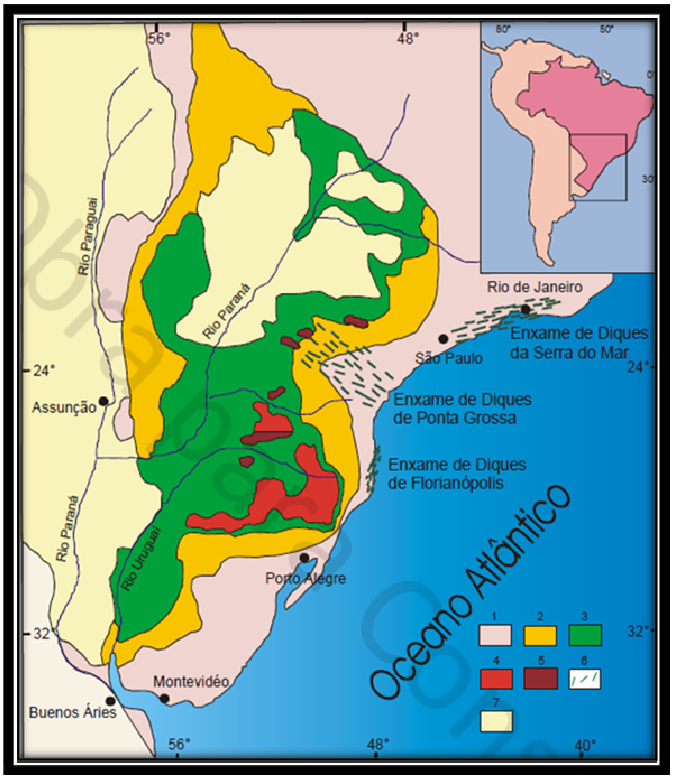

Fig.3 Simplified Geological Map of the Paraná Basin. Source: (Bellieni et al 1986; Nardy et al., 2001.) Highlighting the Paraná Magmatic-Etendeka Province in South America: 1. Crystalline Basement; 2- Sediment Pre-volcanic (mainly Paleozoic); 3- basic volcanic rocks to intermediate; 4- Acidic Rocks Palmas type; 5- Acidic Rocks type Chapecó; 6- Swarms dykes of Ponta Grossa Arch and the Serra do Mar; 7 Sediments Post volcanic (mainly the lower Cretaceous); (Modified from Marques and Ernesto, 2004.)

concentrations of Ti and incompatible elements (Sr, Y, Zr) under Peate et al. (1992.1999). In subprovince High Ti magmas type were defined like Urubici Pitanga, Paranapanema and Ribeira, with reasons Ti / Y> 310 north of the province. Already in Low Ti, magmas type are defined like Gramado and Esmeralda, with reasons Ti / Y <310 south of the province (Fig.4).

Recent petrological, geochemical and geochronological studies associated with structural geology studies have shown that the swarm of dykes Florianópolis is polyphasic nature, with at least three to four major episodes dykes injection at different times, in the range of 139.1 to 119.7 Ma.

Either located in Praia do Pastinho (Fig.5), in the southeastern portion of the island of Santa Catarina, the oldest dike classified as Gabbro and the youngest classified as Traquiandesito Basaltic have directions, structures and quite distinct geochemical signatures. The Gabbro, a large dam over 100m thick and direction N30 ° E, displays fine grain on the edge, and medium to thick in the center, and classification High Ti (type Pitanga). In its southwestern edge there magmatic enclaves of up to 0.3m dike being encompassed by the wall rock granite (Granite Island), showing the process of edge reflow heat the intrusive body. The basaltic Traquiandesito AltoTi (type Pitanga) has thickness 1.5 m, direction N50 ° E and has contact relations that indicate σ1 (horizontal) according to the direction N-S, and columnar joints perpendicular to the direction N35 ° E and trim 35 °.

These observations added the interpretation of structures presents in the dykes, contact relations and intrusion along

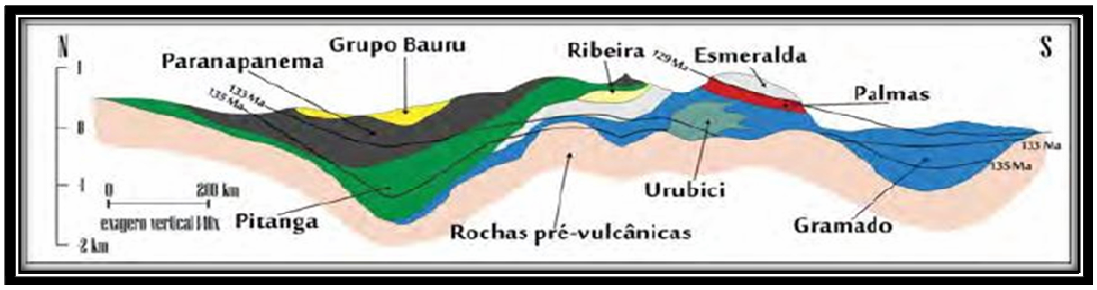

Fig.4 - Longitudinal profile N-S Magmatic Province Paraná. Source: Simplified Peate 1997 with geochemical data Peate et al 1992 and datings of Stewart et al 1996.

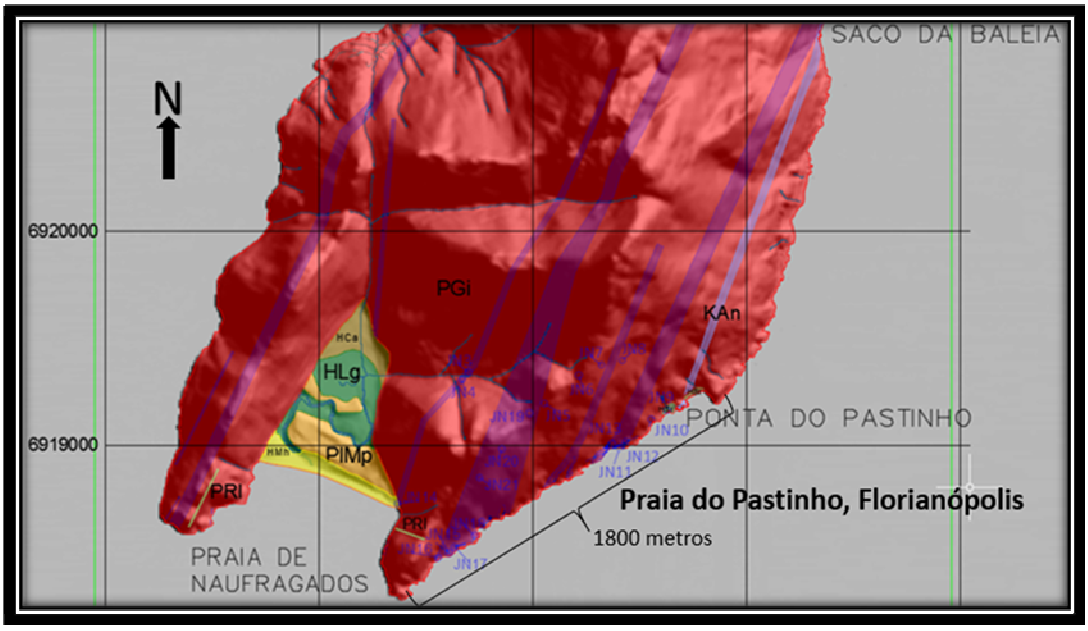

Fig.5 Map showing the location of Praia do Pastinho and distribution of dykes. Author's source

with the geochemistry of rocks are being analyzed will be fundamental to the advancement petro-structural studies on the continental margin of the Island of Santa Catarina, and assist determination of the main field tensions (*stress*) which were submitted to the crust South American Shelf during the extensional regime who acted during the opening Atlantic Ocean.

References

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