

Preliminary Rb/Sr geochronology of calc-alkaline dykes from the Tandilia system, Buenos Aires Province, Argentina.

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Many mafic and some felsic dykes have been recognized since years ago within the Sierras Septentrionales in the province of Buenos Aires (SSBA), also known as Sistema de Tandilia. The dykes are hosted by an igneous-metamorphic basement which belongs to the Transamazonian cycle (2200 Ma).

Teruggi et al.¹ published the first chemical data and radiometric ages (K/Ar) corresponding to dykes of diabasic composition. Kilmurray et al.² characterized petrographical features of diabase dykes in the Azul Hills.

In the highland areas of Tandil, Fernández & Echeveste³ established, after petrographic and geochemical studies, four lithological types, : diabases, andesites, rhyolites and basalts. The diabase dykes have been probably emplaced at around 1700 Ma⁴ during an extensional regime already recognized by Ramos et al.⁵ and Dalla Salda et al.⁶ This cycle would be succeeded the Transamazonian orogeny during which the crystalline crust was formed. Such an extensional regime (probably an aborted rift setting) is contemporaneous with both the emplacement of leucogranites⁷ in the area and a dyke swarm that intruded the northern part of the Río de La Plata Craton⁸.

The main purpose of this paper is to present the new isotopic data (Rb/Sr and K/Ar) obtained in andesitic as well as rhyolitic dykes which are here separated from the diabase dykes considering petrotectonic and geochronologic analysis.

The sampling performed up to now, in the Azul Hills and Tandil Hills, let identify andesitic and rhyolitic dykes only within the Tandil region. The best and more abundants outcrops of this rocks are in the Albi6n hillock, Tandileufú and Sierra del Tigre. The absence of good exposures of field relationships between diabases, andesites and rhyolites have prevented to define the relative age of emplacement.

From a general point of view the diabase dikes as well as the andesitic and rhyolitic ones are hosted by high to medium grade metamorphic rocks (gneisses and migmatites) and also by granitic rocks. The dyke swarm have frequently undergone a milonitization process of variable intensity and have a predominant E-W strike, sometimes NW-SE, dipping from vertical to 45° S. The dykes swarm shows shallow emplacement conditions given by sharp contacts with the host rock, in good agreement with the previous tectonic stability of the continental crust. In addition, several dykes have trends parallel to major W-E shear zones that affected part of the crystalline basement.

Chemical analyses of major, minor and some traces elements were carried out (XRF) on 75 dike samples. The chemical results allowed to differentiate the types mentioned above. The AFM diagram (Fig. 1) shows clearly that samples are grouped within two fields, diabases lay out in the tholeiitic field, the andesites and rhyolites in the calcalkaline. The last two lithological types, together with dioritic and gabbroic rocks which crop out in the area⁹, could belong to the same evolutionary trend.

The geochronological studies were performed by Rb/Sr (whole rock) and K-Ar (minerals) methods. Six samples were selected to build up the isocrone, three of them are andesites, two rhyolites and one a diorite. Figure 2 shows the $^{87}\text{Sr}/^{86}\text{Sr}$ vs. $^{87}\text{Rb}/^{86}\text{Rb}$ giving an age of 2155.4 ± 45.5 Ma (MSWD = 0.9912). A similar age of 2082.2 ± 49 Ma was obtained on an amphibole from the diorite sample included in the isocrone, using K/Ar method.

These geochronological results are consistent with those of Varela et al.⁷ (1971 and 2154 Ma) for granites belonging to the so called Northern Belt, defined by them.

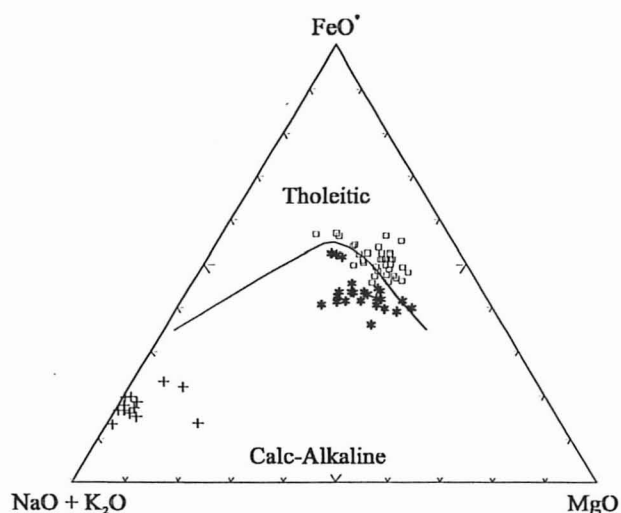


Fig.1. AFM triangle show the calc-alkaline (Andesites = * and: Riolites = +) and tholeiitic (Diabases = □) trends.

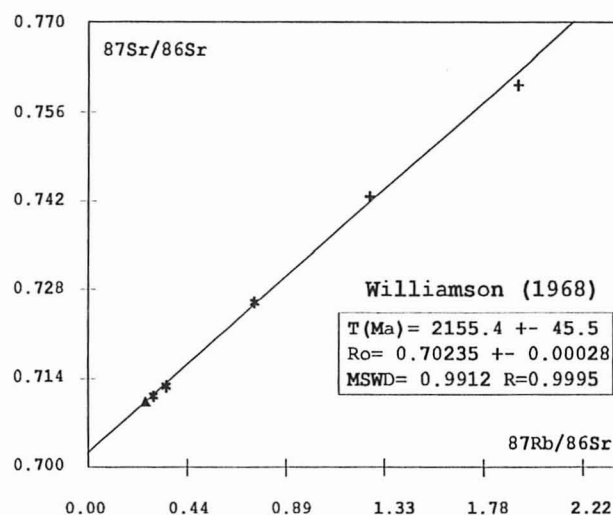


Fig.2. Whole rock isochron of calc-alkaline dykes. Diorite = ▲.

As a concluding remark, the dykes which crop out in the Tandil Hills could indicate one stage of the complex and long genetic history of this portion of the crystalline basement. Both the calcalkaline and the tholeiitic rocks could represent the two important tectonic events, previously established by Varela et al.⁷:

1- A calcalkaline suite intrusion with an age of 2150 Ma, represented by the gabbros, diorites, granites, andesites and rhyolites. This event suggests the presence of an active plate margin related to a magmatic arc represented by calcalkaline rocks of mantle source. The initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratio is 0.70235 ± 0.00028 which is in good agreement with the values obtained by Varela et al. for granites. A subsequent collisional period is supposed^{5,6}.

2- An extensional stage (a probable aborted rift) with the diabases intrusion around 1700 Ma.

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