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PETROLOGY AND CHEMISTRY OF BASIC ROCKS FROM THE NORTH-CENTRAL REGION OF THE MANTIQUEIRA PROVINCE, BRAZIL

J.M.Correia Neves[1,2]
H.A.Horn[1,2]

Between the Coastal Belt and the São Francisco Craton basic melts intruded the basement (Fig. 1) related to different tectonic and thermo-tectonic events over geologic time. Available petrological, chemical and radiometric data on the basic rocks from the study area may be divided into the following distinct groups:

1. Basic rocks of alkaline affinity associated with ultrabasic rocks of the Espinhaço Supergroup. These rocks are characterized by high values of TiO_2 and Na_2O and low values of K_2O. Metamorphism is common and foliation is parallel to the regional structural trend.

2. Basic rocks of the southern and southeastern parts of the area (Quadrilátero Ferrífero). These highly metamorphosed rocks occur in Archean greenstone belts; their foliation is parallel to the regional trend.

3. Alkaline basic rocks (gabbros and basalts) with high contents of Na_2O, K_2O, TiO_2, P_2O_5 and BaO, exhibiting alkaline to calcalkaline differentiation trends. They are localized in the Coastal Mobile Belt and in the outcropping parts of the Paraíba do Sul Complex (HORN, 1986; WIEDEMANN et al., 1986).

4. Basic rocks in the undifferentiated basement between the Coastal Mobile Belt and the Espinhaço range (CORREIA NEVES & HORN, 1988), can be subdivided in to at least three subgroups:

a. Tholeiitic basic rocks with foliation and metasomatic alteration (oldest group).

[1]Centro de Pesquisa Prof. Manoel Teixeira da Costa, Instituto de Geociências, Universidade Federal de Minas Gerais, Caixa Postal 2608, Belo Horizonte, MG, Brazil.
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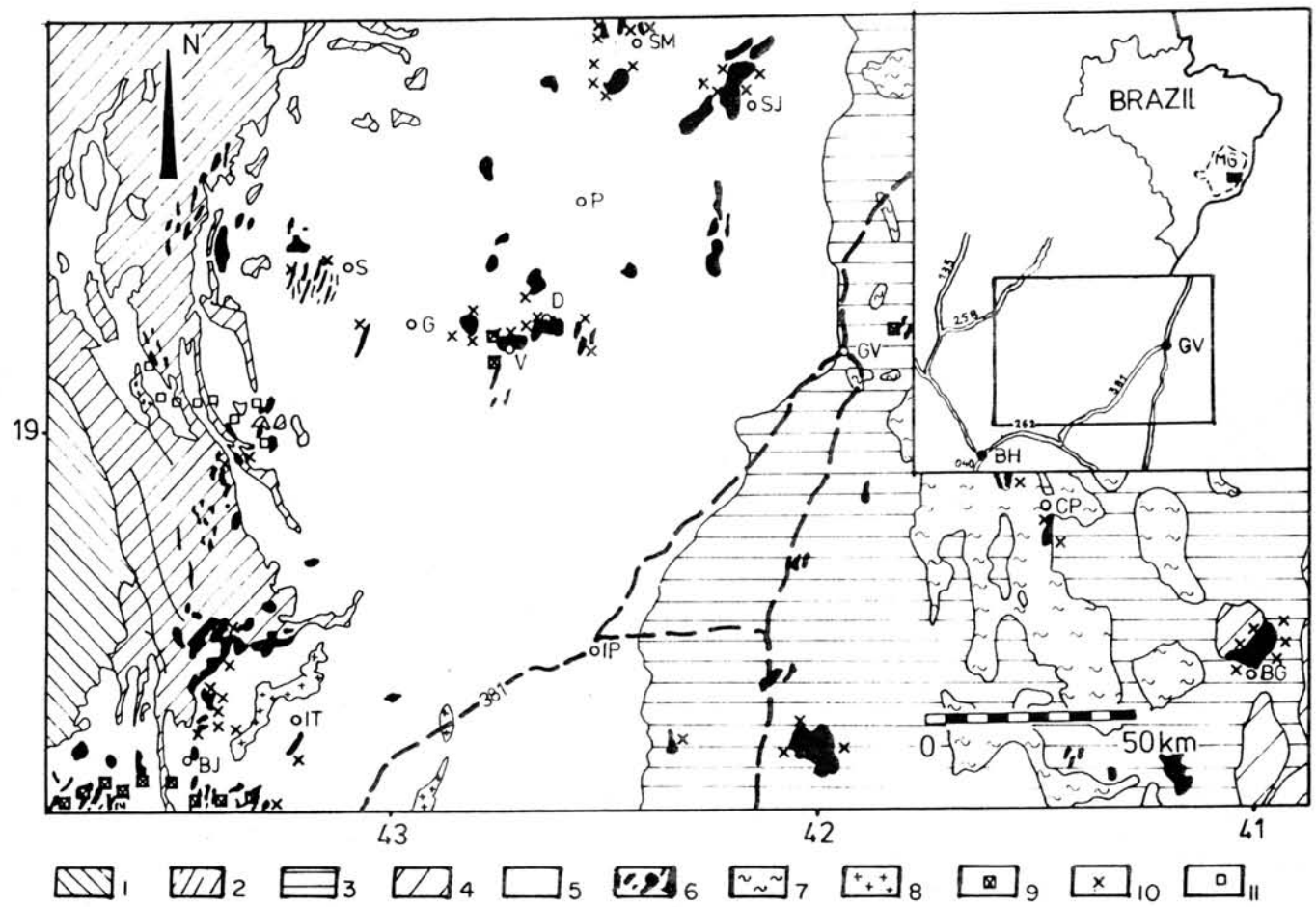

Figure 1 - Location map of the study area (1:50,000). Localities - Sm: S.Maria de Suaçuí; SJ: S.José de Safira; S: Sabinópolis; G: Guanhães; P: Peçanha; D: Divinópolis; V: Virginópolis; IT: Itabira; GV: Governador Valadares; CP: Conselheiro Pena; BG: Baixo Guandu: IP: Ipatinga; BJ: Bom Jesus do Amparo; BH: Belo Horizonte. Geologic information 1. São Francisco Supergroup; 2. Espinhaço Supergroup; 3. Coastal Mobile belt Complex; 4. Juiz de Fora Complex; Basement (undifferentiated Precambrian); 6. Basic rocks; 7. Brasiliano granitoids; 8. Brasiliano Granites; 9. Samples with chemical analyses and thin sections; 10. Samples with thin section; 11. Samples collected.

b. Tholeiitic basic rocks with flux foliation and low-grade metasomatism.

c. Coarser-grained basic rocks, with or without weak tectonic influence and metasomatism. They have high contents of TiO_2 and BaO and are normally calcalkaline with a slightly tholeiitic affinity, probably associated with the final phase of the Brasiliano event.

5. Tholeiitic (sensu lato) basic rocks, related to the evolution of the Atlantic Ocean in the Cretaceous. They are characterized by high iron content and low barium, alkali and titanium contents.

The chemical evolution of these groups of intrusive rocks shows clearly the modifications of the mantle during geologic time. Table 1 lists the main composition of the investigated dikes and stocks.

The SiO_2-Alkali-Harker-diagram (Fig. 2) shows the relation of the studied samples with the chemical mean-values of basic rocks from the Espinhaço range (BIONDI et al., 1978), the Coastal region (WIEDEMANN et al., 1984; HORN, 1986) and two groups of basic rocks from the Guanhães area (OLIVEIRA et al., 1984; our unpublished data).

Table 1 - Chemical analyses of the rock samples of Figure 1.

	1	2	3	4	5	6	7	8	9	10	11	12	13
SiO_2	48.9	48.0	39.4	53.5	55.8	49.9	49.9	46.8	47.2	49.74	58.5	53.3	55.8
Al_2O_3	11.0	12.5	1.8	13.0	13.5	13.6	13.6	12.5	13.4	14.8	15.1	15.5	14.4
Fe_2O_3	4.7	4.3	3.2	3.0	4.8	3.8	3.9	4.4	3.5	5.0	4.9	4.2	0.8
FeO	15.5	14.0	4.9	8.3	12.0	8.5	9.2	11.8	11.2	9.0	7.8	8.4	11.9
MgO	6.5	6.4	33.9	5.2	3.7	6.8	5.6	5.5	5.6	6.3	3.4	3.2	3.2
MnO	0.28	0.30	0.13	0.19	0.25	0.20	0.20	0.27	0.23	0.24	0.22	0.22	0.22
CaO	9.8	9.5	7.2	11.2	6.9	12.5	12.8	10.8	11.5	10.5	9.6	9.5	8.4
Na_2O	1.0	1.3	0.7	1.8	1.6	1.5	1.2	1.6	1.8	1.7	2.0	2.0	2.1
K_2O	0.6	0.2	0.1	0.6	1.2	0.5	0.5	0.8	0.5	0.5	1.2	1.3	1.4
TiO_2	2.5	2.3	0.3	1.1	2.2	1.6	1.7	3.5	3.5	2.1	1.6	1.6	1.3
P_2O_5	0.20	0.20	0.15	0.12	0.25	0.26	0.26	0.56	0.56	0.24	0.23	0.23	0.15
Sum	99.5	99.5	92.9	99.1	99.9	99.2	98.9	99.4	99.0	99.9	99.5	99.5	99.7
V	280	280	0	150	230	180	190	320	330	230	210	190	200
Cr	150	150	2030	100	70	270	210	140	140	150	60	50	50
Co	37	37	66	48	41	35	40	13	9	30	35	47	35
Ni	170	290	170	230	200	220	230	60	50	70	170	150	140
Cu	130	100	70	70	70	100	100	120	120	80	130	110	120
Zn	120	130	70	80	130	80	80	140	110	100	90	90	90
Rb	16	22	0	13	42	5	9	19	13	13	18	21	33
Sr	110	100	50	100	370	220	220	520	770	380	270	270	190
Y	39	39	25	31	27	26	26	21	18	25	28	29	32
Zr	160	150	90	160	200	150	160	240	250	190	160	200	170
Nb	22	25	0	70	43	6	13	52	50	31	8	12	8
Ba	140	140	200	200	420	280	240	540	470	320	410	370	330

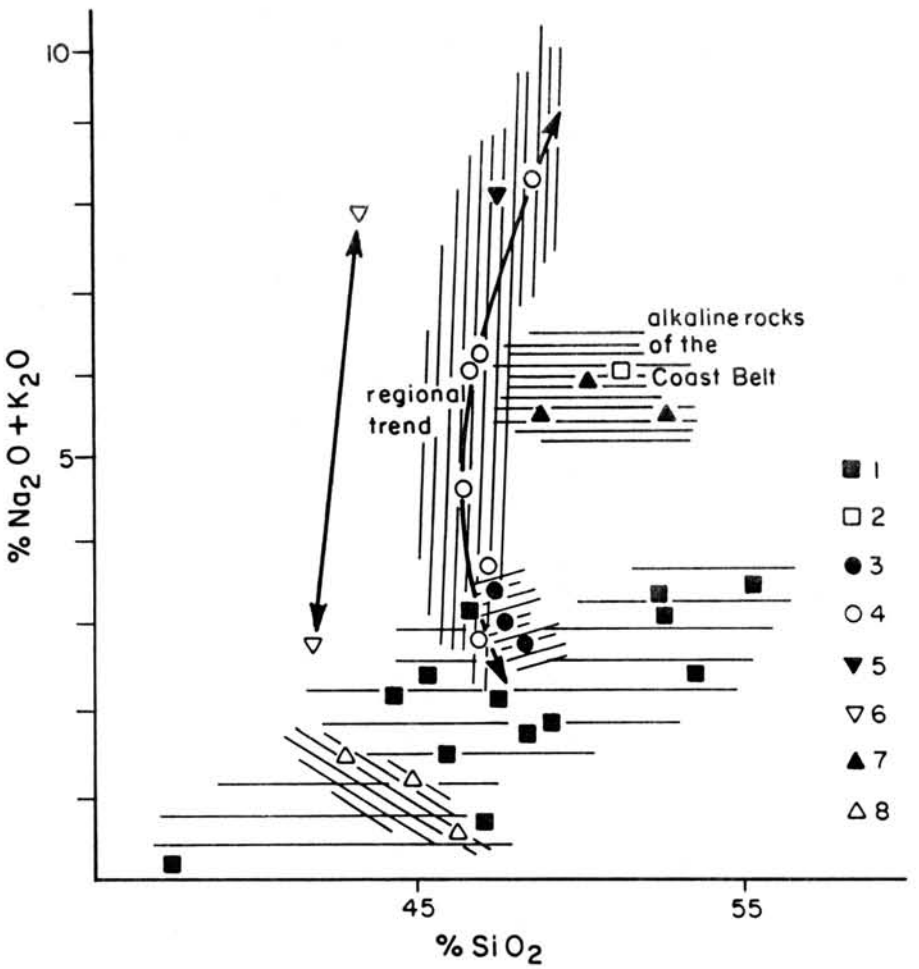

Figure 2 - SiO_2-Alkalies-diagram: Relation between the samples of Figure 2 and other basic rock groups. 1. Studied samples; 2. Basic dike of the Paraíba do Sul Complex; 3 - Dikes of the Sabinópolis-Virginópolis area (includes data of OLIVEIRA et al., 1984); 4. Means of samples from the Espinhaço range (after BIONDI et al., 1987); 5. Dikes of the Conceição de Muqui area; 6. Means of samples from Mimoso do Sul (WIEDEMANN et al., 1986); 7. Compositions of the Santa Angélica and the Castelo intrusions; 8. Composition of the Venda Nova body. The patterned areas show the fields defined for each group of analyses.

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