COMMENT

Geochemistry and Petrogenesis of basic dykes of Agali area, Palghat District, Kerala

(A comment on the paper by S. Sinha-Roy and T. Radhakrishna, published in the Journal of the Geological Society of India, Vol. 24, No. 12, 1983, pp. 628-638).

Just because the basic dykes of Agali area are geochemically akin to one of the magmatic phases of Deccan Volcanics, the time of emplacement need not necessarily be related to Late Cretaceous-Early Tertiary. All the exercises attempted with the geochemical data only point out the similarity perhaps of the mantle source characteristics.

The plagioclases of the Deccan basalts and their intrusive phases are more calcic and are of the high T-type (Viswanathan *et al* 1971, p 1117). The micropegmatite component reported in the Agali dykes is rare or absent in the Deccan intrusives.

In fact, the Agali dykes are very similar to the well-known Pre-Kadapa Newer Dolerites such as the dyke swarm intersecting the Peninsular genesis of the Chittor-Vellore areas and hence, in my opinion, cannot be related to Deccan activity.

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AUTHOR'S REPLY

We thank Dr. Viswanathan for his comments. The geochemical data of the Agali basic dykes, as observed by Viswanathan, are essentially used to understand the mantle source characteristics and to compare them to the magmatic products of different tectonic settings.

The geochemical data of the Agali basic dykes along with that of Deccan basalts and the dykes of Chittor-Vellore area are given in Table I for comparison. The Chittor-Vellore dyke rocks are essentially enriched in SiO_2 and K_2O and are depleted in TiO_2, V, Ni and Co contents as compared to Agali dykes. However, the Agali dykes are closer to Deccan tholeiites in these elements and other geochemical characters (see Table I and original paper). A careful examination of the chemical data of the basic dykes (taking into account the variations of different elements against fractionation index) in these different areas suggests that crystal fractionation has played a minor role in their formation. The chemical differences between the Agali dykes and the Chittor-Vellore dykes cannot, therefore, be attributed to crystal fractionation. On the other hand, they reflect variations in primary magma compositions. In the Agali basic dykes, plagioclase composition varies from An_{53-57} in the phenocrysts and An_{60-67} in the groundmass. These values fall well within the ranges reported for the plagioclases in Deccan basalts (An_{53-74} in

TABLE I. Average Chemical Compositions of the Agali basic dykes, Deccan traps and dykes of Chittor-Vellore area.

	1	2	3	4	5	6
	Agali basic dykes	Deccan tholeiites		Chittor-Vellore dykes		
n	17	13	28	3	2	5
wt%						
SiO_2	48.22	49.65	49.77	53.04	52.50	53.62
TiO_2	2.25	1.98	2.70	1.17	0.72	0.85
Al_2O_3	14.31	14.91	13.38	13.38	12.26	14.43
Fe_2O_3	3.86	4.36		1.80	0.78	0.74
FeO	8.67	6.82	*13.78	9.75	9.37	9.50
Mgo	6.52	7.03	5.92	4.94	8.71	6.53
CaO	10.28	8.67	10.29	1.79	10.43	9.50
Na_2O	2.39	3.16	2.36	3.04	1.27	2.06
K_2O	0.52	0.38	0.34	0.90	1.05	0.96
P_2O_5	0.18	0.31	0.29	0.12	0.20	0.10
MnO	0.39	0.31		0.36	0.13	0.12
Co	62			45		
Cr	252		101	117		
Ni	113		91	41		
Cu	88			580		
V	402		432	56		
Sr	168		215			

1 & 2 Sinha-Roy and Radhakrishna (1983): 3 Mahoney *et al* (1982); 4 Geochemistry Group (1977); 5 & 6 Balakrishna and Venkatanarayana (1983). * total iron as FeO; n=number of analysis considered for average.

phenocrysts and An_{53-73} in groundmass, (Deshmukh *et al* 1977; An_{57-73} in phenocrysts and An_{44-70} in groundmass, Najafi *et al* 1981; An_{50-70} as the most common plagioclase, Subrahmanyam *et al* 1981). The micropegmatite is only reported in Agali basic dykes but, in our opinion, this may not be viewed seriously for comparison since its absence in Deccan Traps is not established.

Pertaining to the age of basic dyke activity in Kerala, very few radiometric dates are available. Subrahmaniam (1976) has dated the Idamalayar basic dyke at 75 m.y. Although older ages of 127 and 476 m.y. are reported by Sinha-Roy (1983), these older ages have been explained as due to assimilation and contamination in these rocks and incorporation of initial Ar into the K-Ar system. A best-fit line isochron was obtained at 59 m.y. (Furnes *et al* 1983). These basic dyke rocks are geochemically similar to the Deccan Volcanic (Sinha-Roy and Furnes, 1981, Furnes

et al 1983). In addition, the dykes trend mainly in ENE-WSW, WNW-ESE, NW-SE directions which are the possible orientations of fractures developed due to rifting of the Western continental margin of India. The basic dyke activity in Kerala, therefore, partly relates to the rifting of western continental margin of India during Late Cretaceous-Early Tertiary times. Although no radiometric data exist on the basic dykes of Agali, based on the available circumstantial evidences, *viz.*, their geochemical similarity to the Deccan tholeiites, orientation along one of the directions of rift related fractures (ENE-WSW), Early Tertiary ages for a few dykes of Kerala that are geochemically similar to Deccan tholeiites and also to Agali basic dykes, a view has been expressed that the Agali basic dykes could be related to the Late Cretaceous-Early Tertiary basic volcanic phase rather than to the dyke activity in Chittor-Vellore areas.

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