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BOMBOLAI CONTINENTAL PILLOW LAVAS (NEOPROTEROZOIC) FROM TRANS-ARAVALLI REGION, PALI DISTRICT, RAJASTHAN AND THEIR TECTONIC SIGNIFICANCE by M. Shamim Khan, M. Raza and M. Safdar-E-Azam. Jour Geol. Soc. India, 2004, v 64, no.6, pp 803-812.

(1)

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After going through the paper it is felt that there are serious shortcomings in the publication as given below

1 The earlier workers Singh (1983), Shyam Narain (1988) and Chore and Mohanty (1998) use the name "Bambholai" for the locality but present authors have changed it to "Bombolai" without giving any reason for this

2 The authors have claimed (p 803) that geochemical data on Sindreth Group and Punagarh Group was first time presented by Chore and Mohanty (1982) It seems that the authors have not scrutinized the literature properly The geochemical data on Sindreth volcanic rocks was first presented by Coulson (1933) and on Punagarh

rocks (Bambolai volcanics) by Shyam Narain (1988).

3. There is a strange omission of the reference Shyam Narain (1988) in the paper which first time presented chemistry of the Bambholai volcanics. Chore and Mohanty (1998) also used his data to interpret the evolution of Bambholai rocks and referred in the paper.
4. The legent of Fig. 1a does not match with the map. The quartzite is not present in the map. Similarly the big and small dark dot symbols is not mentioned in the legend.
5. Figure 1a, which is shown as, simplified geological map of Punagarh area is presenting misleading facts. It is not mentioned in the figure that whether authors themselves prepared this map or they have modified some earlier published map. Chore and Mohanty (1998) described felsic volcanics, dacite and basic volcanics as significant units in the geological map of the Punagarh area. The attempt made by the authors is giving a wrong impression about the geology of the area.
6. The authors are presenting altogether reverse statement in the text about the stratigraphic position of the Bambholai volcanism. On page 804, column 2, it is described that Bambholai pillow lavas are younger than Erinpura Granite (850-750 Ma) and older than Malani Rhyolites (750-730 Ma). When Erinpura Granite and Malani Rhyolite both are giving an age of 750 Ma, it is difficult to say older or younger relative to each other.
7. Similarly in paragraph two on same page it is described that in this region, Malani volcanics also directly overlie the Erinpura Granite suggesting that Bambholai volcanism may be a coeval event to the initial states (stage) of Malani volcanism. This clearly indicates that the Bambholai volcanism is part of Malani volcanism and both the events are coeval to each other.
8. The authors have described presence of quartzite and siliceous marble between the layers of pillow lavas. The quartzite and siliceous marble are metamorphic rocks. The authors have not described the effect of metamorphism on pillow lavas.
9. The authors make a wrong statement in p.810, on the geochronological data for Bambholai volcanics. They have mentioned: The geochronological data gives an age range of 850-750 Ma for Bambolai volcanics (Chaudary et al. 1984) and 758-732 Ma for Malani volcanics. The geochronological work made by Chaudary et al. (1984) is most quoted one on the geology of Rajasthan. They presented Rb-Sr ages of the granites from Rajasthan and not for the Bambolai volcanics. So far no one has dated the Bambholai volcanics.
10. Shyam Narain (1988) and Chore and Mohanty (1998) described felsic component from the Bambholai region. Before arriving at any conclusion on the tectonic/ geochemical evolution of the area, the geochemistry of the felsic component must be included. In such a circumstance, the comments made on the tectonic evolution of the Bambholai volcanics are incomplete.

M. Shamim Khan, M. Raza and **M. Safdar-E-Azam,** Dept. of Geology, Aligarh Muslim University, Aligarh – 202 003. ***Email:*** mahshar@indiatimes.com, reply:

The authors are extremely grateful to Dr. K.K. Sharma for his valuable comments on our paper. We are submitting below our pointswise reply to his comments:

1. The local people living around Bombolai Hills call the village as Bombolai not Bambholai as referred by Banerjee and Singh (1978), later adopted by Chore and Mohanty (1998). There is no other intention.
2. The comment of Dr. Sharma that Coulson (1933) was first to present geochemical data on Sindreth volcanics is not correct. In fact Coulson (1933) described the volcanic and plutonic rocks around Sirohi and Racult (1933) first time published chemical analysis of rhyolites from Sirohi area.
3. Shyam Narain (1988) is not quoted because it is an unpublished GSI report, not available in literature.
4. Dr. Sharma is correct in pointing the mismatch between the legend of Fig. 1a and its drawing. In fact the legend for quartzite should also have big filled circles along with small dots. The authors are sorry for this cartographic mistake. The map is simplified version of the map prepared by Chore and Mohanty (1998) duly referred in the caption. No modification has been done in that map as we have only tried to show occurrence of Bombolai volcanics in the study area.
5. In addition to our discussion given in our paper, it is to be mentioned that other authors such as Roy and Jakhar (2002) have also included the Punagarh Volcanics into Malani Group. The main objective of our paper was to present and utilize the geochemical data on Bombolai Volcanics and to draw petrogentic and tectonic interpretation. As far as the age is concerned, our discussion on the present status of their age and correlation is based on data available in literature which suggest that Bombolai volcanism

occurred just prior/coeval to the onset of Malani volcanism

6 The effect of post magmatic alteration, if any, has been evaluated in detail which suggest (p 805) that the chemistry of Bombolai volcanics is near primary Nevertheless, we have used immobile trace elements for tectonic and petrogenetic interpretations

7 Dr Sharma is correct in pointing out a typographical mistake on p 810, that is regretted In fact the age range 850-750 Ma is for Erinpura granite (Chaudhary et al 1984)

8 Although felsic components are not found in association with Bombolai lavas The occurrence of the mafic-felsic assemblage in overlying Formations of Khamal and Sowania further strengthen our idea to suggest a close similarity of Punagarh lavas and that of lower part of Malani volcanic succession

9 The plutonic and volcanic rock occurring around Sirohi were described by Coulson (1933) and the chemical analysis of rhyolites from Sirohi area by Recult (1933) Chore and Mohanty (1998) have presented only major element analyses of four samples of Punagarh mafic volcanics and felsic rocks respectively

(2)

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I have the following comments to offer on the paper by Shamim Khan and others on the Bombolai Pillow lavas

1 The paper describes that the Bombolai lavas (i) occur in very small volume (approximately in 10 km2 as per their Geological map, Fig 1) in a restricted area in Trans-Aravalli region, (ii) characterised as largely identical in their mineralogical, major, trace and REE compositions, (iii) classified them as subalkaline and low Ti continental tholeiites, (iv) Chaudhary et al (1984) provided the geochronological data for the representatives of Precambrian granites of Rajasthan including the granites of Pali, not from Bombolai volcanics as quoted by the authors

Based on these data they have reported that the Bombolai volcanics as a percursor event to the large magmatic activity of the Malani Igneous Suite (MIS)

2 It is well documented in literatures that MIS occurs in a vast area in northern Peninsular India including Kirana Hills of Pakistan (approx 55,000 km2) and represents the largest acid anorogenic magmatism in India and perhaps second in the world MIS comprises large varieties of acid to basic volcanic and plutonic rocks MIS rocks are characterised as A-type, alkaline, anorogenic and rare metal-bearing

Based on this discussion, it is suggested that (i) a comparision between contrasting nature of rocks suites, geological events, space & time should be avoided, (ii) an attempt to use the data generated with specific reference to detailed petrogenetic modeling, could better serve the purpose intended, (iii) caution should be exercised while studying this type of small, restricted, mafic rocks exposures in the Archaean-Proterozoic terrains

M. Shamim Khan, M. Raza and **M. Safdar-E-Azam** reply

We are thankful to Dr Vallinagayam for his comments on our paper Clarifications on the points raised by him are as follows

1 Dr Vallinagayam is correct in pointing that Chaudhary et al (1984) have not dated Bombalai volcanics Their reference in this regard on p 810, para 3, line 9 is an inadvertent error However, on page 804, line 14, Chaudhary et al (1984) have been correctly referred

2 The authors do not agree with the observations of Dr Vallinagayam that Bombolai volcanism cannot be a precursor event to Malani magmatism simply because of their apparently small aerial exposure and contrasting nature (1) The true extent of Bombolai volcanism cannot be ascertained by its exposed outcrops because vast area around Bombolai hills are covered by soil (2) It has been suggested (Bose, 1989) that volcanosedimentary belts hosted within Erinpura Granite terrain viz Sindreth and Punagarh possibly span the time gap between Aravalli-Delhi orogenic cycle and felsic magmatism of Malani Igneous Province (3) Although by and large the Malani magmatism is subaerial in nature, there is definite evidence of subaqueous volcanism indicatec by the presence of interbedded conglomerate beds within rhyolite flows at Siwana (La Touche, 1902) and presence of mega ripple marks at Jasol (Gathania et al 1984) Ripple marks have also been observed in ash flow tuff near Kankani and Lava (Bhushan, 2000) (4) Chore and Mohanty (1998) have reported the occurrence of bimodal volcanism in Sowania and Khamal Formations similar to first phase of Malani volcanism (Bhushan, 2000)

3 Thus, there is close similarity in the eruption style of

Punagarh volcanism and initial phase of Malani volcanism However, the Punagarh volcanism took place in a reactivated rift (Pali lineament) probably at the periphery of plume and did not last long On the other hand, a parallel rift generated on the head of the sample plume was long lived in which outpouring of vast quantities of lavas took place (Malani magmatism)

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SEISMOGEOLOGY OF KUTCH AND ADJOINING REGION WITH SPECIAL REFERENCE TO 26th JANUARY 2001 EARTHQUAKE IN THE VICINITY OF BACHAU, GUJARAT by K.S Misra, R. Bhutani and R. Sonp Jour Geol Soc India, Aug 2004, v 64, pp.153-164

(I)

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Lineaments, indeed, have great significance in interpreting various geological features and problems Remote sensing through satellite imagery as well as topographic sheet is considered as a convenient method of mapping lineaments formed on account of traces of bedding, master joints, faults, dykes and other geological structures The lineaments traced, however, have to be confirmed by the ground reality In the paper under discussion Misra et al have traced several '*major*' faults *'remotely sensed data particularly using IRS images on 1 250 000 and 1 50 000 scale'* (p 163) Several ENE-WSW, NE-SW, E-W, NW-SE *'major active'* faults have been traced in western India particularly in the region of Kachchh (Figs 2, 4 and 6 of Misra et al 2004) Using this data, seismology of Kachchh and adjoining region has been interpreted by the authors Especially NW-SE and curvilinear ENE-WSW faults dominate in the region of Kachchh according to the authors (Fig 2, *op cit*) The NW-SE, NE-SW major faults have been traced in to the Great Indian (Thar) Desert in the northern region These faults conveniently cut across the geomorphic divide, Nagar Parkar ridge, which incidentally is, suppose to be the northern limit of the Kachchh rift According to the authors the Kachchh Mainland Fault along which five devastating earthquake epicenters have been located, extends from Lakhpat through Bhachau-Lakadya to southeastward and terminates near Morbi (Fig 4)