2

(A comment on the paper '**Geochemistry of Felsic Volcanics from Gurapratap Singh and Diri, Pali Dist., Rajasthan (Part I, Major Elements)**' by R. K. Srivastava *et al.* published in the Journal of Geological Society of India, Vol. 34, pp. 467-485).

The geological map (Fig. 2) which shows field dispositions of various rocks, appears to be drawn without the aid of chemical data. The authors should clearly discuss criteria to distinguish the rock types in the field.

A look at Table I indicates irregularity in sample numbers. The samples seem to have been regrouped at a subsequent stage on the basis of their chemical affinity. Sample location on the map would have greatly helped.

Despite the voluminous data, the authors have failed to convince readers about their classification scheme. For example, andesite (p. 477) is said to have K_2O equivalent of 5.5%. The only sample in Table I (no. D/27, sl. no. 3) shows a K_2O value of only 1.52%. Similarly, rhyodacite is said to have CaO content of more than 1.5%. From the Table I, however, it is clear that sample nos. G/91, G/100, and G/92 (sl. no. 21–23) do not satisfy this definition. The CaO content of these samples is 1.38%, 1.47% and 1.35% respectively. Another such case exists for rhyodacite with the statement (p. 477) that normative Ab is greater than normative Or in rhyodacite. Here, the samples that do not follow this equation are sample nos. G/81, G/34, G/60, G/28, G/47, and G/39 (sl. nos. 9, 11, 16–19). Normative equivalents of basalt and dolerite are missing.

Can statistics allow a conclusion based on extremely unbalanced populations, one end of which is extremely meagre. In my opinion, one sample population (of basalt, dolerite and andesite) should not have been used for petrogenesis against twenty-nine sample population (of rhyolite). Number of samples of dacite and ultra potassic rhyolite is also small. This all, added together, will not yield a meaningful conclusion.

Figure 3 of the authors is not clear. It is difficult to differentiate dacite (solid square) from ultra potassic rhyolite (diagonally crossed square). Another anomaly is in plotting of triangle where two different types of triangles are used against one such defined in the caption.

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Reply

We are thankful to Mr. Varshney for his comments but are unable to understand his specific objections to the paper and its conclusions. We don't know how Mr. Varshney has come to the conclusion that the map has been drawn without taking note of chemical data. The irregularity in sample Nos. in Table I does not mean that chemical data was not considered. It only means that the samples of the same rock type from different parts of the area were grouped together. The map has been prepared after detailed field mapping, hand specimen and thin section studies of more than 400 sections and chemical analyses of reasonably well-spaced

samples from over the entire area. The locations of the analysed samples were omitted from the map to maintain clarity.

The 5.5% K_2O content reported for the andesite on page 477 is a typographical error and is regretted, it should have been 1.5%. We thank Mr. Varshney for pointing it out but it should have been obvious to him from the data in Table I and the $K_2O - SiO_2$ diagram.

The discrepencies referred to by Mr. Varshney in the case of rhyodacites in no way invalidate the chemical characterisation of these rocks. On the contrary, they confirm that the rocks in question constitute a normal population with deviations on both the sides of the median value of 1.5% CaO. Possibly Mr. Varshney would not have objected if we had said that CaO is greater than 1.35 % and not 1.5%. What matters is not the threshold value of 1.5 or 1.35% CaO but the overall chemical characters of the rocks, besides the CaO and the norm we also mention about the LeMaitre discriminant function value which is less than 14 for these rocks and greater than 14 in rhyolites.

We have not subjected unbalanced population to statistical jugglery to derive some slipshod conclusions as Mr. Varshney has attempted to suggest in his last para. We would like to emphasise that we have not treated an unbalanced population. The number of samples of the different rock types are proportionate to their occurrence. The requirement of a multivariate statistical techniques is a normal population, which the present samples constitute. Moreover, the andesite sample in the present population is not very far from dacites in chemical composition. As such, its inclusion or exclusion does have little or no effect on the Principal Component Analysis. The mixing model calculations are not at all affected by the number of samples at either end of the mixing line. What matters in these calculations are the end member compositions which may be individual analysis or gross averages of different rocks. Basalt and dolerite samples have not been used in any of the statistical calculations as implied by Mr. Varshney's comments. Further, all our conclusions are on the basis of field, petrographic and detailed chemical studies and not merely based on statistics. The statistics has been used only to substantiate these findings.

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