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Bi-Plot Analysis to Explore Major Oxide Composition in basic Rocks from Filicudi (Aeolian Islands, Southern Italy): Comparison With Classical Harker Diagrams

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In 1897 Karl Pearson in a classical paper on spurious correlation pointed out dangers that may characterise the interpretation of relationships among variables of a compositional (or closed) data set. Although it is becoming increasingly recognised that standard statistical procedures usually lead to misinterpretation and doubtful inferences when applied to compositional data, the use of inappropriate methods is still widespread (Aitchison, 1982). The aim of this work is to show the usefulness of the statistical appropriate methods, now available, to investigate major oxide composition of basic magmatic rocks and to compare the results with those of the classical Harker diagrams (Aitchison, 1997) Filicudi volcano (Aeolian Arc, Southern Tyrrhenian Sea) has been chosen as a case study because of the availability of a wide set of data and the knowledge of the volcanological and geochemical evolution of this island. Filicudi represents the site of typical calcalkaline magmatism. Volcanic products were emitted through different cycles of activity during which several eruptive vents were active even simultaneously. Field, petrological and geochemical data indicate for this volcano a complex evolutionary history (Santo, 2000). Among different numerical methods to be used to explore data structure, bi-plot analysis has been applied as a tool to probe relationships. Following this path, the compositional data set is first corrected for the influence of spurious correlation and then investigated as a multivariate whole. In this context, sub-compositions are chosen only if their relationships are recognised as an inherited important feature of the complex original set (Aitchison, 1997) Results obtained for Filicudi basic rocks allow to conclude that the scatter characterising the Harker diagrams is partially related to the influence of numerical constraints due to closure. Once this effect is removed, the behaviour of several elements becomes more clear. This also applies to elemental ratios, such as Al/Ca which appears to remain constant through the entire volcanic suite. This method of data treatment opens a new way to volcanological and geochemical interpretation of data on Filicudi and of arc magmatism, in general. In particular, the effect of accessory phases, which are known to play an essential role in controlling trace elements distributions, has been recognised in magmatic system under investigation.

Aitchison J, *Proceedings of IAMG'97 (V. Pawlowsky-Glahn Ed.)*, 3-35, (1997).

Aitchison J, *J. R. Statistc. Soc. B*, **44**, 139-177, (1982).

Santo AP, *Jour. Volc. Geoth. Res., (Aeolian Islands, south Tyrrhenian sea, Italy)*, **96**, 79-101, (2000).