

## Old wine in new bottle: Reinterpretation of the geochemistry of Wadhrai granitoid in Nagar Parkar Igneous Complex, southeastern Pakistan

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### Abstract

The Nagar Parkar Igneous Complex (NPIC) is considered as an extension of the Late Proterozoic Malani Igneous suite (MIS) of western Rajasthan. The NPIC comprises dykes, bosses and stocks of granitoids emplaced in a foundation of mafic to tonalitic rocks. The Wadhrai body, which covers more than 10 km<sup>2</sup> area, occurs some 12 km north of Nagar Parkar town (28° 28' 22" N, 70° 45' 40" E). It is occupied by petrographically uniform granite composed of perthite, sodic plagioclase, quartz, and small quantities of biotite, opaque oxide and titanite. The rocks are sparingly porphyritic and contain dykes and veins of microgranite, aplite, and quartz; pegmatites are rare and simple. In the southern part, the granite is invaded by parallel sheets and swarms of mafic dykes, and in the western part by rhyolite dykes. The mafic rocks are porphyritic to aphyric and consist of calcic plagioclase, clinopyroxene ± olivine or hornblende amphibole, ilmenite, titanite, and a range of secondary minerals. Many of these dykes are altered, some strongly, and a few beyond recognition. The rhyolite sheets are banded, sparsely porphyritic, and composed of perthite, quartz, albite, sodic amphibole, aegirine-augite, opaque oxide and titanite. The main rhyolite sheet extends for more than 2 km and attains a thickness of 30 m.

Major, trace and rare earth element analyses of the granitic rocks have been published by [1-3]. These authors used a variety of discrimination diagrams, notably the Rb vs. Y+Nb and Nb vs. Y of [4] and Nb vs. Ga/Al and Zr vs. Ga/Al of [5], and suggested that 1) the rocks are A2-type anorogenic, and 2) they were produced in continental extensional environment. These opinions are in conformity with the prevalent views regarding the MIS [cf., 6]. Strict reliance on a few geochemical discrimination diagrams, however, may not be enough to discard the possibility of other tectonic locales. This study of the ten analyses suggests that the geochemical data can be interpreted differently also. Mantle normalized trace element spidergram of the analyses is presented in Figure 1.

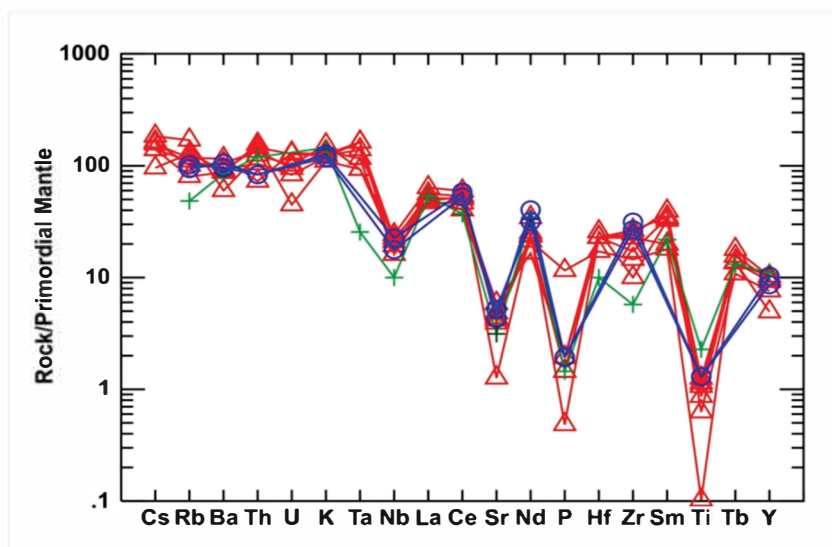


Fig. 1. Normalized trace elements in Wadhrai granite. Normalizing values are from [7]. Triangles: [1]; Circles: [2]; Cross: [3].

The trace and rare earth elements show strong commonalities with the Mt. Abu granitoids in MIS, considered by [8] to have developed in an arc environment. This, similarity with a typical dacite from the Andes [9], and the Th/Yb vs. Ta/Yb relations lead to proposed that the Wadhrai granite may, instead, have developed in an arc set up, more likely an active continental margin arc like the Andean batholith. Petrographic and geochronologic analogues of the MIS have been reported from northern Madagascar, Seychelles, south India, and Sri Lanka.

## References

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