

**PERMIAN FELSIC DYKES IN THE NEO-PROTEROZOIC NAGAR PARKAR
IGNEOUS COMPLEX: EVIDENCE FROM IN SITU ZIRCON U–PB AGE BY LA-ICP-
MS**

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Abstract

We report a first discovery of the Permian felsic dykes in the Neo-Proterozoic Nagar Parkar Igneous Complex (NPIC). The complex is the oldest known magmatic rock suite exposed at the junction of the Thar Dessert and Rann of Kutch in the Sindh Province of Pakistan. The dominant lithological units are mainly granites of Neo-Proterozoic age (750 ~1000 Ma) that have been emplaced in the basement rocks (amphibolites). A number of mafic and felsic dykes intrude the basement as well as the granitic rocks. Granitic bodies in the area have been subdivided into two major varieties as riebeckite-aegirine gray granite and biotite-hornblende pink granites. Previous workers reported six major magmatic episodes of intrusive and extrusive activities as (1) basement rocks (amphibolites and related dykes), (2) riebeckite-aegirine gray granites, (3) biotite-hornblende pink granites, (4) acid dykes, (5) rhyolite plugs, and (6) basic dykes. The oldest basement forming lithologies are mafic to tonalitic rocks metamorphosed under epidote amphibolite- and greenschist facies conditions. Gray and pink granites are emplaced in the basement rocks, hence likely younger than the former rocks. Rehman et al. (2018; Gondwana Research in press) reported precise U–Pb zircon age data, determined by the LA-ICP-MS technique. Zircons in gray granites yielded U–Pb mean ages of 748 ± 9.5 Ma (MSWD = 0.23). In addition, zircons in pink granite yielded U–Pb mean age of 713 ± 32 Ma (MSWD = 1.5) with concordia intercepts at $726 \text{ Ma} \pm 41 \text{ Ma}$ (MSWD = 1.9). Mafic and felsic dykes intruding both varieties of granites were inferred to be of Cretaceous age based on their intrusive nature within the granites and correlation with the nearby mafic magmatism of the Deccan Traps. In this study, we report, for the first time, dyke intrusion in NPIC during the Permian (272 ± 5.4 Ma, MSWD = 0.53), evidenced from the in situ zircon U–Pb analysis from a dyke sample (NV90-09) using the LA-ICP-MS technique. Our newly obtained age data indicates the existence of magmatic activity in the NPIC possibly associated with the rifting of the Cimmerian microcontinent from the Gondwana during the Permian as evidenced by the alkaline magmatism ca. 315 ± 15 to 297 ± 4 Ma in Ambela area, Pakistan and the mafic Panjal Trap volcanism ca. 284 ± 4 to 262 ± 1 Ma.