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Geochemistry and petrogenesis of the Oligocene Volcaniclastic Rocks from the Chagai Arc, West Pakistan
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The Oligocene volcaniclastic rocks are found in an east-west trending subduction related magmatic belt known as the Chagai arc in the western part of Pakistan. The volcanism in this arc was initiated during the Late Cretaceous, which intermittently continued up to the Quaternary period. The volcanism up to Paleocene is tholeiitic whereas Eocene onwards it is calc-alkaline.

The petrological studies of rock samples collected from these volcaniclastic rocks reveal that there are mainly andesitic tuffs (56.62-60.11 wt% SiO2). The petrochemical studies show that these rocks belong to high K (2.04-3.56 wt % K2O) calc-alkaline series. The low Mg # (47-57) and high FeO (total/MgO (1.35 - 2.02) ratios indicate the fractionated nature of the parent magma.

The primordial mantle normalized trace element patterns exhibit negative Nb anomalies with spikes generally on K, Sr and Rb which strongly confirm their island arc signatures. The LREE enriched chondrite-normalized REE patterns with negative Eu anomalies are consistent with high K-calc-alkaline series and suggests plagioclase fractionation during differentiation. Plots in various tectonomagmatic discrimination diagrams depict that these rocks were erupted in a continental margin type (Andean-type) arc environment. The Z versus Zr/Y and Cr versus Y studies suggest that parent magma of these rock suites was generated by the partial melting of about 15-25 % enriched sub-arc mantle source. A comparison of average trace element chemistry of Oligocene volcaniclastic rocks from the Chagai arc with other analogous of the said arc show relatively more enrichment of LILE and LREE in the Oligocene and Miocene volcanics. This suggests that during aforementioned period, which was the time of emplacement of several porphyry copper deposits in the Chagai arc; relatively higher quantity of subduction related fluids were added to the sub-arc mantle source from the subducting slab.

キーワード: Chagai arc, Petrogenesis, Volcaniclastics, Andean-type, high-K calc-alkaline
Keywords: Chagai arc, Petrogenesis, Volcaniclastics, Andean-type, high-K calc-alkaline

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奄美大島に分布する中生代付加体の砕屑性ジルコン年代から見た後背地の変遷
Temporal Change of Provenance detected by detrital zircon chronology for the basement complex in Amami-Oshima Island, Ry

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Basement geology of Amami-Oshima Island is composed of Yuwan Complex and Naon Complex of Southern Chichibu Terrane as Late Jurassic to earliest Cretaceous accretionary prism, Shinkogachi Unit, Yakugachi Unit and Naze Unit of Shimanto Terrane as Early Cretaceous accretionary complex, and Wano Formation as Paleogene fore-arc cover. Detrital zircon U-Pb chronology by LA-ICP-MS reveals the temporal change of their provenance. Age populations of detrital zircon from each of the above units are summarized as bellows.

Yuwan Complex shows the predominant age clusters at around 185 Ma, 250 Ma, 1890 Ma and 2300 Ma with the youngest age cluster around 160 Ma. Naon Complex shows the predominant age clusters at around 175 Ma, 220 Ma, and subordinate cluster at around 140 Ma, 420 Ma, 1850 Ma, and 2200-2300 Ma. Shinkogachi Unit shows the predominant age cluster at around 100 Ma, 175 Ma, and 190 Ma with subordinate cluster at around 370 Ma and 1850-2300 Ma. Yakugachi Unit shows the predominant age clusters at around 120 Ma and 165 Ma, and subordinate clusters around 95 Ma, 270 Ma and 1605-1900 Ma. Naze Unit shows the predominant age cluster at around 65 Ma, 120 Ma, 170 Ma, and 215 Ma, and subordinate cluster of 1630-1950 Ma. Wano Formation shows predominant age clusters at around 55 Ma, 75 Ma, 185 Ma and 255 Ma, and subordinate clusters around 220 Ma and 1850 Ma.

Appearance and absence of each age clusters are different with respect to each unit, while the all unites predominate the early to middle Jurassic age clusters. This shows that the provenance change was happened to occur during the period of their formation. As a wholly, clear appearance of early Proterozoic zircon and the absence of late Proterozoic zircon may show the provenance of North China craton. Combining with whole rock chemistry of sandstones reveals that their provenances changed from continental arc side for the Southern Chichibu Terrane to island arc side for the Shimanto Terrane, and then after back to the continental arc side again for the Naze Unit. The island arc can be postulated to form during Late Triassic time shown by the predominance of Ca. 220 Ma zircons in the Naon complex.

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