

Source compositional variability beneath the Bicol arc, the Philippines

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Pliocene to Recent volcanic rocks from the Bulusan Volcanic Complex (BVC) in the southern part of the Bicol arc (Philippines) exhibit a wide compositional range (medium- to high-K basaltic-andesites, andesites and a dacite/rhyolite suite), but are characterised by LIL element enrichments and HFS element depletions typical of subduction-related rocks. They exhibit relatively low $87\text{Sr}/86\text{Sr}$ ratios (0.7036-0.7039) compared with most volcanics from the Philippine archipelago. Their Pb isotope ratios are also unlike those for other Philippine arc segments and typically plot within and below the data field for the Philippine Sea Basin, implying a pre-subduction mantle wedge similar to that sampled by the Palau Kyushu Ridge (PKR), east of the Philippine Trench. $^{143}\text{Nd}/^{144}\text{Nd}$ ratios are moderately variable (0.51285-0.51300), and samples with lower $^{143}\text{Nd}/^{144}\text{Nd}$ tend to have high Th/Nd, high Th/Nb and low Ce/Ce* ratios. Unlike some other arc segments in the Philippines (e.g. the Babuyan-Taiwan segment of the Luzon arc) there is little evidence for the involvement of subducted terrigenous sediment. Instead, the moderately low $^{143}\text{Nd}/^{144}\text{Nd}$ ratios in some of the Bicol volcanics appears to result from subduction of pelagic sediment (low Ce/Ce*, high Th/Nd and high Th/Nb) and its incorporation into the mantle wedge as a partial melt. Apart from one sample that exhibits recent Th enrichment, the U-series results indicate minimal recent subduction-related U enrichment ($^{230}\text{Th}/^{238}\text{U} = 0.96-0.99$). Two samples of historic lavas (1968 and 1984) from the Mayon volcano exhibit moderately high ($^{226}\text{Ra}/^{230}\text{Th}$) ratios indicating recent Ra enrichment and rapid transit of the magmas to the surface.