

36. ABSTRACT: CHEMICAL AND SR-ISOTOPE COMPOSITION OF IGNEOUS ROCKS FROM DEEP SEA DRILLING PROJECT LEGS 59 AND 60^{1,2}

Richard Lee Armstrong and Graham T. Nixon, Department of Geological Sciences,
The University of British Columbia, Vancouver, B.C., Canada V6T 1W5

ABSTRACT

The igneous rocks of Holes 447A, 448, 448A, 458, and 459B are ocean-ridge type basalt, arc tholeiite, tholeiitic basalt, magnesian andesite (similar to boninite), and basaltic andesite (that is, transitional between tholeiitic and calc-alkaline types), respectively. The magnesian andesites are notable for their low Na₂O (~1.7 wt. %) and TiO₂ (0.25 wt. %) and high Mg/(Mg + Fe²⁺) (0.65 and 0.64 wt. %) and for their degree of SiO₂ enrichment (51.11 and 56.00 wt. %).

Compared with ocean-ridge basalt, arc and remnant-arc volcanic rocks are markedly enriched in Rb, Sr, and Ba, and depleted in Cr and Ni. Vanadium is variable—high in two remnant-arc (Site 448) samples (~400 ppm) and very low (~160 ppm) in the magnesian andesites. Zirconium shows only a slight decrease from ocean-ridge to arc rocks. The magnesian andesites are depleted in Sr, Zr, and Y, and more enriched in Cr and Ni, than other arc rocks. Highest K/Rb ratios (790) occur in Site 448 remnant-arc samples. For all sites the immobile elements Ti, Y, Zr, and Nb fall in the range characteristic of subalkaline basalts.

Initial ⁸⁷Sr/⁸⁶Sr isotopic ratios are low for the ridge-type basalts of Hole 447A (0.70261), just as these ratios are for other MORB. Mariana arc samples (Holes 458 and 459B) average 0.70381 and 0.70364, distinctly more radiogenic than MORB, and thus are like other volcanic-arc samples from the circum-Pacific region. The remnant-arc samples (Holes 448 and 448A) are slightly less radiogenic (0.70356 and 0.70333) than those from the Mariana arc but still much more radiogenic than MORB. The ⁸⁷Sr/⁸⁶Sr ratio for samples from Holes 448 and 448A appears to increase slightly as the rocks become younger and more differentiated.

¹ *Initial Reports of the Deep Sea Drilling Project*, Volume 60.

² The full text of this article is published in L. Kroenke, R. Scott, et al. (1980), *Initial Reports of the Deep Sea Drilling Project*, Volume 59, Washington (U.S. Government Printing Office).