Yuat North Batholith display very high Ba contents (of the order of 1000 p.p.m.) and are shoshonitic in their affinities. The different calc-alkaline suites can also be distinguished with varying degrees of clarity on plots of Nb, (La+Ce+Y), and Sr against K_2O.

Fig. 3 emphasises the regional increase in K_2O across the Mobile Belt. From Harker-type variations diagrams of K_2O versus SiO_2 (cf. Fig. 2), K_2O has been determined at the 65% SiO_2 level for the different calc-alkaline suites, and has been plotted against distance along the line AB in Fig. 1. At the 65% SiO_2 level, K_2O increases from 1% in the south to 3.3% in the north.

The geochemical data presented above could have important **palaeotectonic implications.** The development of the New Guinea Mobile Belt can be envisaged in either of two contrasting tectonic settings. Either it developed as a continental margin feature, or it developed as an island arc complex somewhat removed from the Australian continental margin. Dow (1973) has supported the former idea. The data presented here, however, would appear to support the latter proposition. If interpreted in terms of plate tectonics theory, the geochemical polarity northwards across the intrusive rocks of the Mobile Belt implies development of the Belt as an island arc complex above a north-dipping Benioff Zone, necessarily removed from the continental margin. This tectonic regime would have ceased in Oligocene-early Miocene times consequent upon the collision of this arc complex with the Australian continental block. Intervening oceanic (or marginal basin) crust not involved in subduction processes could have been emplaced as Alpine-type ultrmafic bodies (April Ultramafics of Dow *et al.*), or metamorphosed to fault-bounded blocks of glaucophane schist and eclogite (Gufug Gneiss) that occur in this region.

The present expression of the proposed Benioff Zone on the southern margin of the New Guinea Mobile Belt is considered to be the Lagaip Fault Zone. It is a well-defined structural break between the Mobile Belt and the continental shelf-type sediments to the south. It is also the southerly limit of Alpine-type ultramafic bodies, high-pressure metamorphic rocks, and Miocene intrusive complexes.

Regional mapping in the Western Highlands (B.M.R., 1972) has defined the more complex nature of the Lagaip Fault Zone toward the east where the edge of the Australian continental block bends southward. It is suggested that the proposed Benioff Zone differed in this region, as there are no Alpine-type ultramafic bodies or high-pressure metamorphic rocks, and the Miocene volcanic rocks are geochemically different from those in the western part of the New Guinea Mobile Belt (cf. Mackenzie, this volume).

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HIGH-POTASH ISLAND ARC VOLCANICS OF THE FINISTERRE AND ADELBERT RANGES AND THEIR TECTONIC SIGNIFICANCE

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The Finisterre and Adelbert Ranges consist of Cainozoic sedimentary and volcanic rocks which are exposed as a series of north-tilted fault blocks with northwesterly trend. The sequence consists of basal Eocene argillite conformably overlain by Oligocene to early Miocene volcanics (Finisterre Volcanics) which are unconformably overlain by Neogene clastic sediments and limestone. The province is distinct from the adjacent Central Highlands where upper Mesozoic to earliest Tertiary metamorphics are capped by Tertiary limestone and are overthrust by ophiolite slabs. The two provinces are separated by the Ramu-Markham Fault Zone, a major sinistral transcurrent fault.

A high proportion of the Finisterre Volcanics are volcaniclastic (autoclastic, pyroclastic, hydroclastic and epiclastic) and the overall sequence is lithologically similar to that found in island arc assemblages. The lavas are dominantly basalt and low silica andesite (48-56% SiO_2) and are highly porphyritic in clinopyroxene, plagioclase and olivine, and to a lesser extent in hornblende and pleochroic orthopyroxene. They are potash-rich, with K_2O content ranging from 1.5-6.5%, and have low TiO_2 content typical of lavas from circum-oceanic areas. Two main groups can be recognized: one shoshonitic (absarokite, shoshonite, rare leucite trachyte) which is the more abundant, and the other, high-K, high-Al basalt (with some high-K, low-Si andesite).

The Finisterre Volcanics are chemically similar to high-K lavas described from island arcs elsewhere in the southwest Pacific and in the Mediterranean. However, unlike many other island arcs there is no evidence of a three stage evolution from arc tholeiite to shoshonite.

It is envisaged that the volcanic sequence formed as an island arc on the oceanic crust of the Pacific plate north of a north-dipping subduction zone as a result of early Tertiary plate interaction. Consumption of intervening lithosphere led to a continent-island arc collision. The island arc is now being welded onto the continental margin and present day plate interaction is concentrated north of the Finisterre and Adelbert Ranges.

PLATE MODEL FOR LATE CAINOZOIC VOLCANISM AT THE SOUTHERN MARGIN OF THE BISMARCK SEA, PAPUA NEW GUINEA

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Two Late Cainozoic volcanic arcs can be recognised at the southern margin of the Bismarck Sea, Papua New Guinea. Both arcs provide striking examples of the geodynamic complexity to be expected in regions characterised by small plates whose instantaneous poles of rotation are nearby (cf. Krause, 1973).

A western arc is associated with the boundary between the South Bismarck and Indo-Australian plates. The rocks are