Trace element geochemistry of the Northland Ophiolite, northern New Zealand: new constraints on tectonic environment of formation

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The Northland Ophiolite of New Zealand is composed predominately of tholeiitic basalts with minor alkalic volcanics. Its formation has traditionally been ascribed to mid-ocean ridge magmatism. The (younger?) hornblende modal-alkalic basalts were thought to represent seamounts built on the older MORB crust, which were both subducted together, and subsequently thrust onto the Northland peninsula from the northeast, in the Late Oligocene. Recent trace element analyses, however, have shown a (subtle) supra-subduction modified component for the tholeiites, and a within-plate signature for the alkalic rocks. These newly discovered trace element signatures indicate that the tectonic environment in which the Northland Ophiolite formed is not simply that of a mid-ocean ridge. An alternative model posed is that the subduction modified component of the tholeiites may reflect the onset of subduction, at the beginning of island arc formation. The association of the alkalic basalts is somewhat more enigmatic, occuring not as discrete, geographically separated fault-bound sheets seen in other ophiolites, but as interdigitated "bodies" within the tholeiites. Portions of the dismembered ophiolite (the Northland Ophiolite consists of some 25 separate massifs) are geographically associated with the older, more basic stages of the Northland-Coromandel Arc Volcanics. The Northland Ophiolite may represent early arc basement for these arc volcanics.