

The Mesozoic-Cenozoic Coastal Batholith of Peru: intruded into both “new”
and “very old” continental crust

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The Mesozoic – Cenozoic Coastal Batholith of Peru extends some 2,000 km from the Ecuador border in the north to the Chile border in the south. It has been divided into 5 segments of which the two most southerly viz. Arequipa and Toquepala lie within the Precambrian Arequipa massif. Some 70% of the batholith lies within the immediately preceding Early Cretaceous marginal basin and its extension to the north and south is markedly attenuated. Atherton (1990) considered the tonalitic magmas of the Lima segment (to the north of the Precambrian massif) were produced by shallow partial melting of the basaltic rock at the bottom of the marginal basin on major crustal rifting. Crustal rifting and marked active subsidence also occurred in the southern two segments (Arequipa basin, Vicente et al. 1982) in parallel with the ‘rifted’ marginal or back arc basins seen to the south in Chile viz. Tarapaca, central Chile “aborted” marginal, Neuquen, Rio Mayo and Magellanes basins which all formed during the Late Triassic, Jurassic and Early Cretaceous with major subsidence in the Albian (Dalziel 1986). These basins suffered mid-Cretaceous inversion and basin collapse, after which, in Peru, most of the Coastal Batholith, apart from some plutons in the southernmost segment, was intruded.

Thickening of the crust in the southern segments appears to have occurred in the Tertiary, perhaps by underthrusting (Vicente et al. 1982) so it was much thinner in

the Mesozoic. The isotopic and chemical evidence from the plutons of this sector suggest the crust was stretched, thinned and possibly partially disrupted but less so than in central Peru (Boily et al 1989) and much of the evidence may have been obliterated by the strong post Cretaceous uplift, horizontal shortening and crustal thickening. The large volume of basic magma produced on thinning probably encountered Precambrian crust at shallow depth e.g. 5-10 km (Boily et al. 1989) and it was this underplate which was melted to produce the batholith magmas in an analogous manner to that in the central sector (Atherton 1990). In both cases hydrous basaltic underplate or basinal rocks were melted at shallow depth. The ultimate and main source of the batholith rocks in this southern segment was depleted mantle, however assimilation of Precambrian crust was in some cases substantial, in others small. Chemical and isotopic differences between these southern segments and the Lima segment relate to differences in the isotopically depleted mantle wedge above the subduction zone, as well as the input from the Precambrian crust at high levels in the Arequipa and Toquepala segments.

References

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