(7) Co/Ni ratios average 0.4, 1.0 and 0.4 for the three groups, compared with 1.3 for the dacites.

GEOCHEMICAL FEATURES OF THE MIXED SEQUENCE DACITES

Some general features of the dacites may be summarised as follows:

(1) Silica values between 68 and 80%, averaging 74% SiO_2.

(2) TiO_2 values between 0.27 and 0.4%. Sample P202 with 0.62% is probably an andesite, as discussed previously.

(3) Alumina values between 13 and 20% (average 15.5%).

(4) Soda and potash values highly variable (averages 2.1% and 3.3% respectively), with Na_2O/K_2O ratios generally less than 1.

(5) Ti/Zr ratios around 9-12 (the average value of 13 on Table 1 is influenced by the two high values for P202 and P220, which are probably andesites, as discussed previously).

(6) Chrome values around 40-80 ppm (average 72 ppm Cr), and Cr/Y ratios around 2-4.

(7) Co/Ni ratios between 1 and 2 (average 1.3).

THE SOCK CREEK LAVAS

The two Sock Creek lavas differ somewhat from one another in their chemistry, and also show some differences from the mixed sequence dacites. They plot near the low-K to medium-K boundary on the K_2O-SiO_2 diagram (fig. 10), and their K_2O contents (1.84 and 0.94%) are markedly lower than those of the mixed sequence dacites (average 3.32%). By contrast, their soda values (6.0 and 7.34% Na_2O) are much higher than those of the mixed sequence dacites (average 2.1%), and again suggests that there has been considerable Na_2O depletion associated with hydrothermal alteration in the latter rocks.

Both of the Sock Creek samples plot with the general andesite group, rather than with the dacites, on the Ti-Zr diagram (fig. 9), reflecting their relatively high TiO_2 contents (0.61 and 0.62%) by comparison with the dacites (average 0.34%). On the Zr/TiO_2-Nb/Y discrimination diagram (fig. 11), one of the samples (P186) plots within the rhyolite field (a consequence of the very high Zr content - 750 ppm), and the other (P209) in the andesite field (because of its relatively low Zr content - 135 ppm). Both samples have relatively low Cr values, and their Cr/Y and Co/Ni ratios are similar to the dacites.

Felsic intrusives

The felsic intrusives analysed comprise three spherulitic quartz porphyries (P221, MR435, P201), one quartz-feldspar porphyry from near Sock Creek (P210), and the probably-intrusive quartz-feldspar porphyry body from drill hole MCH-2A (MC2A/D). The strong chemical similarity of MC2A/D with the porphyry from Sock Creek (except for Na_2O - depletion in the former), and their close correlation on the diagrams (particularly fig. 9, 10), supports the conclusion that the drill hole sample belongs with the Cambrian intrusives.

The five samples plot either within or close to the rhyolite field on the discrimination diagram (fig. 11), indicating that they are more differentiated than the other groups. They are medium-K to high-K rocks according to Figure 10, with 2.5-5% K_2O. Their TiO_2 values are lower than for most of the dacites, with the spherulitic quartz porphyries (average 0.14%) being lower than the quartz-feldspar porphyries (0.25%). Soda values are generally low, and distinctly lower than K_2O values, except in the case of P210 from Sock Creek, which has 4.18% Na_2O. A parallel may be seen with the Na_2O-rich Sock Creek lavas.

Ti/Zr ratios for the five samples range from 1 to 9 (average 5), somewhat lower than those for the dacites (average 13). Cr/Y ratios average 3, identical with those of the dacites.

Devonian(?) dolerites and Tertiary basalt

Samples of dolerite were collected by Komyshan from each of the four bodies mapped as Devonian(?) dolerite. It is clear from the chemical data, however, that sample P219 is quite distinct from the other three samples. P219 is from a low hill of outcrop 3 km WNW of Hellyer mine, abutting the Tertiary basalt plateau. Examination of a thin section sample collected from this area indicates that the outcrop is part of the Tertiary basalt sequence, and this explains its distinct geochemical features.

On the Ti-Zr diagram (fig. 9), the three dolerites plot within or close to the calc-alkaline basalt field, whereas the Tertiary basalt sample plots on a tholeiite trend in the ocean-floor basalt field. The inset on Figure 9 shows the Pearce and Cann (1973) fields from the Ti/100-Zr-Y×3 triangular plot, with the three dolerites plotting within the calc-alkaline basalt field and the Tertiary basalt plotting within the within-plate basalt field. The clear distinction is also evident on the Zr/TiO_2-Nb/Y diagram (fig. 11), where the three dolerites plot in the sub-alkaline andesite to andesite/basalt fields, and the Tertiary sample on the boundary of the alkali basalt field at a much lower differentiation level. Other differences evident from the analyses include less Na_2O in the dolerites (average 1.91% versus 3.36% for the Tertiary sample), more K_2O (1.04 versus 0.62%), lower Nb values (5 ppm versus 11 ppm) and Zr values (78 ppm versus 115 ppm), higher Cr values (588 ppm versus 390 ppm) and Y values (250 ppm versus 195 ppm), lower Ti/Zr ratios (38 versus 80) and higher Cr/Y ratios (44 versus 23).

The three dolerite samples plot within the general grouping defined by the basalts and andesites of the Que-Hellyer Volcanics in all three diagrams (fig. 9, 10, 11). General similarities with the Que-Hellyer rocks are evident from Table 1 in Al_2O_3 values, Na_2O/K_2O ratios, Rb and Sr values, the high Cr contents (average 588 ppm in the dolerites), the high Ti/Zr ratios (average 38 for the dolerites), high Cr/Y ratios, and Co/Ni ratios around 0.3. These initial data suggest that there may be a genetic relationship between the dolerites and the Que-Hellyer basalts and andesites. The dolerites show chlorite-epidote-actinolite-carbonate alteration typical of other Cambrian rocks in the area, suggesting that they were affected by the Devonian deformation and metamorphism. The K-Ar mineral age of 396±10 Ma recorded from the dolerite at Mt Charter (A. M. Hespe, pers. comm.) is a minimum age only, and could well record the Devonian re-setting of an earlier Cambrian age. Such re-setting is common in western Tasmania (Adams, *et. al.* 1985).

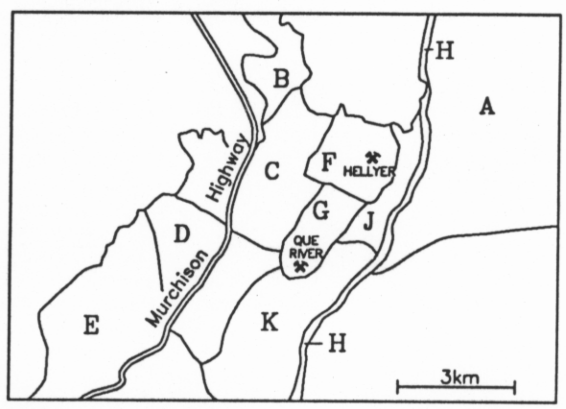

Figure 12. Structural sub-areas.

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