GEOLOGY AND MAGNETOSTRATIGRAPHY OF MIOCENE BASALTS OF THE OKANAGAN HIGHLANDS, BRITISH COLUMBIA
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Several outliers of Miocene basalt have been delineated by recent mapping in the Okanagan Highlands south and southeast of Vernon. The total area, underlain by lavas and breccia, is about 200 square kilometres (Fig. 11). Locally these volcanic rocks, which range in age from 14.9 to 20.4 Ma, were deposited on placer-bearing gravels. Generally they cover a rolling terrane of crystalline basement rocks. The basalt formation, divided locally into three members by interbedded volcaniclastic rocks, has a maximum thickness of about 340 metres comprising more than 15 individual flows (Fig. 12).

The basalts range from vitrophyric to sugary-textured varieties, the latter having greatest magnetic susceptibility. A few lava flows are characterized by large bladed phenocrysts of plagioclase or, less commonly, lherzolite xenoliths. Chemical analysis show that most of the rocks are normal olivine basalts (Table 1), although a few samples are slightly enriched in alumina and alkalis.

Preliminary magnetostratigraphic studies using a fluxgate magnetometer indicate that the placer gravels are associated with 'reversed' basalts of the lowest member. Younger basalts in the succession have 'normal' polarity, however, magnetic vectors show a marked range in azimuth and angle of plunge (Fig. 13). Success in the magnetic determinations was dependent in large measure on the near horizontal bedding of the basalts which did not require arbitrary rotation of magnetic vectors or other manipulation of the data to restore bedding attitudes. Corrections for azimuth measurements from sun bearings at sample stations were applied according to the computer program in Table 2.

TABLE 2. COMPUTER PROGRAM FOR SIGHT REDUCTION CALCULATION OF SUN AZIMUTHS

```
  5  SELECT D
 10  SELECT PRINT 211(156)
 20  PRINT 'SIGHT REDUCTION CALCULATION FOR SUN AZIMUTH
 30  INPUT 'DAY OF YEAR,' C
 40  INPUT 'TIME IN HOURS DECIMALS,' A
 50  INPUT 'LONGITUDE IN DECIMAL DEGREES,' B
 60  INPUT 'LATITUDE IN DECIMAL DEGREES,' L
 70  H = 15*(A-12) + (120-B)
 80  D = -23.5*COS(0.025*C+C)
 90  T = ARCSIN((SIN(D)*SIN(L)+COS(D)*COS(L)*COS(H)))
100  X = ARCCOS((SIN(D)-SIN(L)*SIN(T))/(COS(L)*COS(T)))
110  IF H<0 THEN 130
120  IF H>=0 THEN 140
130  Z = X: PRINT Z
135  END
140  Z = 360-X: PRINT Z: GOTO 135
```
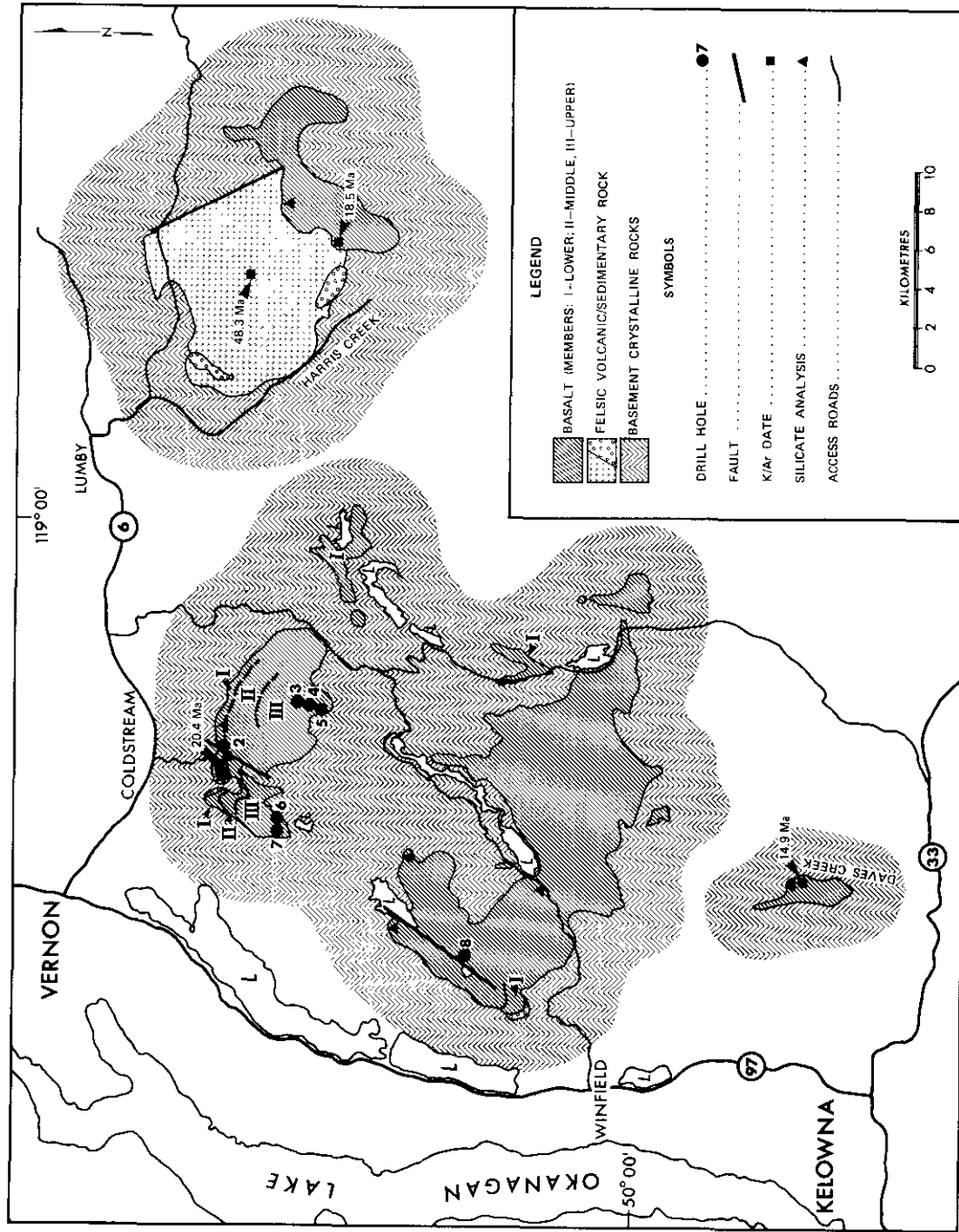
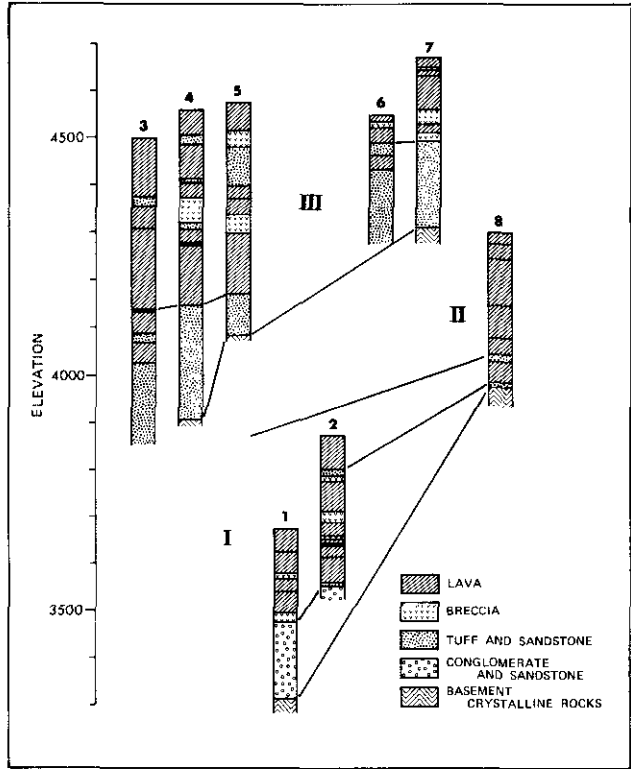Figure 11. Basalts of the Okanagan Highlands.

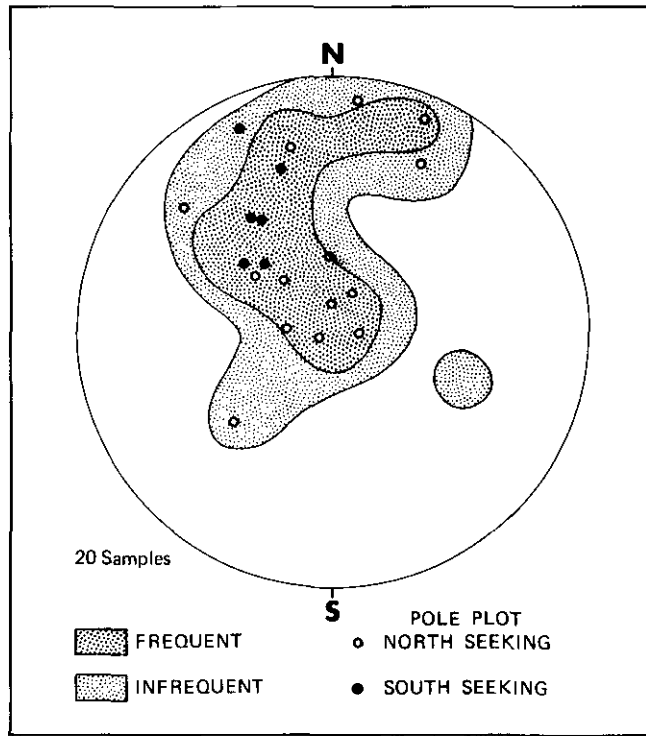Figure 12. Drill hole sections of basalt and channel deposits.

Figure 13. Magnetic vectors in basalt lavas.

Mining exploration is focused on gold and uranium-bearing stream channel deposits below the basalt. The King Edward placer (latitude 50 degrees, 11.3 minutes; longitude 119 degrees, 11.2 minutes) south of Coldwater is a typical example. The placer gold occurs in loose sand, pebbles, and cobbles weathered from a Miocene conglomerate channel underlying the basalt bluff overlooking King Edward Creek. The channel deposit, which has a maximum thickness of about 160 metres, has been prospected along strike for about 2 kilometres, and is currently worked on a small scale by Harry Arnold of Vernon. In the late 1970's the same channel was the target of a uranium diamond-drill program.

Winfield placers are near the base of the basalt bluff northeast of Winfield (latitude 50 degrees, 3.5 minutes; longitude 119 degrees, 19.7 minutes). A buried fluvial deposit is the source of the placers. It consists of light-coloured sandstones with conglomerate beds with abundant quartz clasts. According to Jones (1959), more than 2 300 grams of gold were obtained between 1933 and 1945 from a series of small adits.

The exact age of some of the channel deposits is controversial. Two deposits of polymictic conglomerate, shale, and sandstone in the Harris Creek area are associated with an Eocene rhyolite complex dated at 48.3 Ma. Adjacent and overlying Miocene basalt lavas have 'normal' polarization, unlike the lower basalts in the Winfield and Coldstream area. Placer potential in such Eocene channel deposits is thought to be low. They probably form part of the Eocene highland terrane upon which the Miocene basalts were deposited.

REFERENCES

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