

GLACIATION OF THE MT LA PEROUSE AREA

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ABSTRACT

Glacial ice has been dominant in sculpturing the landscape of the Mt La Perouse area. Glacial erosional features, moraines and periglacial and nivational deposits indicated that the geomorphology of the area can be accounted for by one period of glaciation accompanied by periglaciation and nivation.

INTRODUCTION

Mt La Perouse is situated fifty miles southwest of Hobart. Access to the area can be gained by an eight to ten mile walk from a point on a Forestry Department road two miles from the township of Lune River.

The accompanying map (Fig. 1) like most maps of other glaciated areas of Tasmania, was produced by interpretation of erosional features and by the morphology rather than the stratigraphy of the associated deposits. This approach generally results in reasonably accurate interpretation of the final phases of glaciation and imprecise visualisation of the maximum extent of glacial ice.

PREVIOUS LITERATURE

Montgomery (1894) mentioned that the La Perouse area had been glaciated and Nicholls (1898) briefly discussed the geology of the area. Lewis (1925) made the first detailed observations on the glaciation which he showed on several clear sketch maps accompanied by fairly detailed descriptions emphasizing the evolution of the gross morphology. Lewis and Murray (1935) found evidence for separate phases of glaciation near the headwaters of the D'Entrecasteaux River. There they described a '... peculiar button grass covered ... spur' which they interpreted as a moraine, the northern end of which they claim had been cut off and had had a later moraine deposited against it. However, Jennings and Banks (1958) disputed this and correctly described the feature as 'a series of structural benches carved from almost horizontal Permian rocks'. Derbyshire et al (1965) have presented the glacial features on a map of scale 1:250000. The accompanying text did not contain detailed description but indicated that erosion by glacial ice only, and not erosion by periglacial or nivational processes, was figured.

Comparison of Fig. 1 with the map of Derbyshire et al. indicates marked similarity, difference probably being due to scale differences, except for the inclusion of the Lune Cirque (the feature at the headwaters of the Lune River) in Fig. 1. Lewis' maps do not compare as closely and some of the probable reasons for this follow the description below of the Lune Cirque.

Lune Cirque

The contour lines on Fig. 1 indicate the headwall of the Lune River to be 300 metres high and almost vertical. The aerial photograph Pl. 1, Fig. 1 shows the wall to be locally plucked along joints in the sedimentary rocks (approximately azimuth 60° and 150°). In the floor of the valley is a series of seven end moraines which are arcuate, independent of the present drainage from the southeast, and with the shorter dimension and curvature of the ridges indicating an origin at the northern end of Moores Bridge.

Immediately west of the headwall was (and still is) a large area for the accumulation of snow. During the Pleistocene the prevailing westerly winds should have ensured adequate snow supply to the cirque for the accumulation of névé and this factor, coupled with the depth of the valley should have maintained glacial ice in the valley at least during the height of glaciation. The headwall has a north-easterly to south-easterly aspect and Davies (in Jennings and Mabbutt, 1967, pp. 9-10) demonstrated the latter aspect to be most favourable for ice accumulation. This point is exemplified by the presence of snow in a nivation hollow at the headwall's western extremity through the summer to March 1969.

Under the conditions outlined above the ice body would have had a wedge-shaped east-west cross section (thinning to the east as shown in Fig. 1). Glacial ice eroded the steep headwall while periglacial activity was responsible for the more gently sloping, frost shattered, fluvially cut south-eastern margin. Periglacial meltwater from the north-western side of Moonlight Ridge flowed down the eastern margin of the ice and then down the Lune River.

The plucking of the headwall and presence of moraines suggests that Lewis was correct in describing the above feature as a cirque.

Periglaciation

Lewis' lack of appreciation of the effect of periglacial processes accounts for the major discrepancies between his maps and that presented here. For example, Lewis said the tributaries of the D'Entrecasteaux River (near 680480 and 700493, Fig. 1) were in glaciated valleys. Both these valleys are 'V' shaped and have no signs of till on the floors. The valley walls are covered by a superficial layer of boulders derived from ice wedging while run-off of periglacial meltwater has resulted in deep incision of the valleys. Fig. 2 shows the slope development caused by ice wedging on various types of sedimentary rocks. The more thickly-bedded sandstones and conglomerates are more resistant and have low angles of

GLACIAL MAP OF THE MT. LA PEROUSE AREA

Contour Interval 100 metres

SCALE in METERS



LEGEND

ICE EROSION FEATURES

- Cirque
- Overridden Trough Wall
- Glacially Abraded Valley Step
- Rock Basin
- Ice Eroded Surfaces

ICE DEPOSITION FEATURES

- Moraine Ridge
- Ground Moraine - Undifferentiated
- LOCAL LIMITS OF ICE ACTION
- DIRECTION OF ICE MOVEMENT

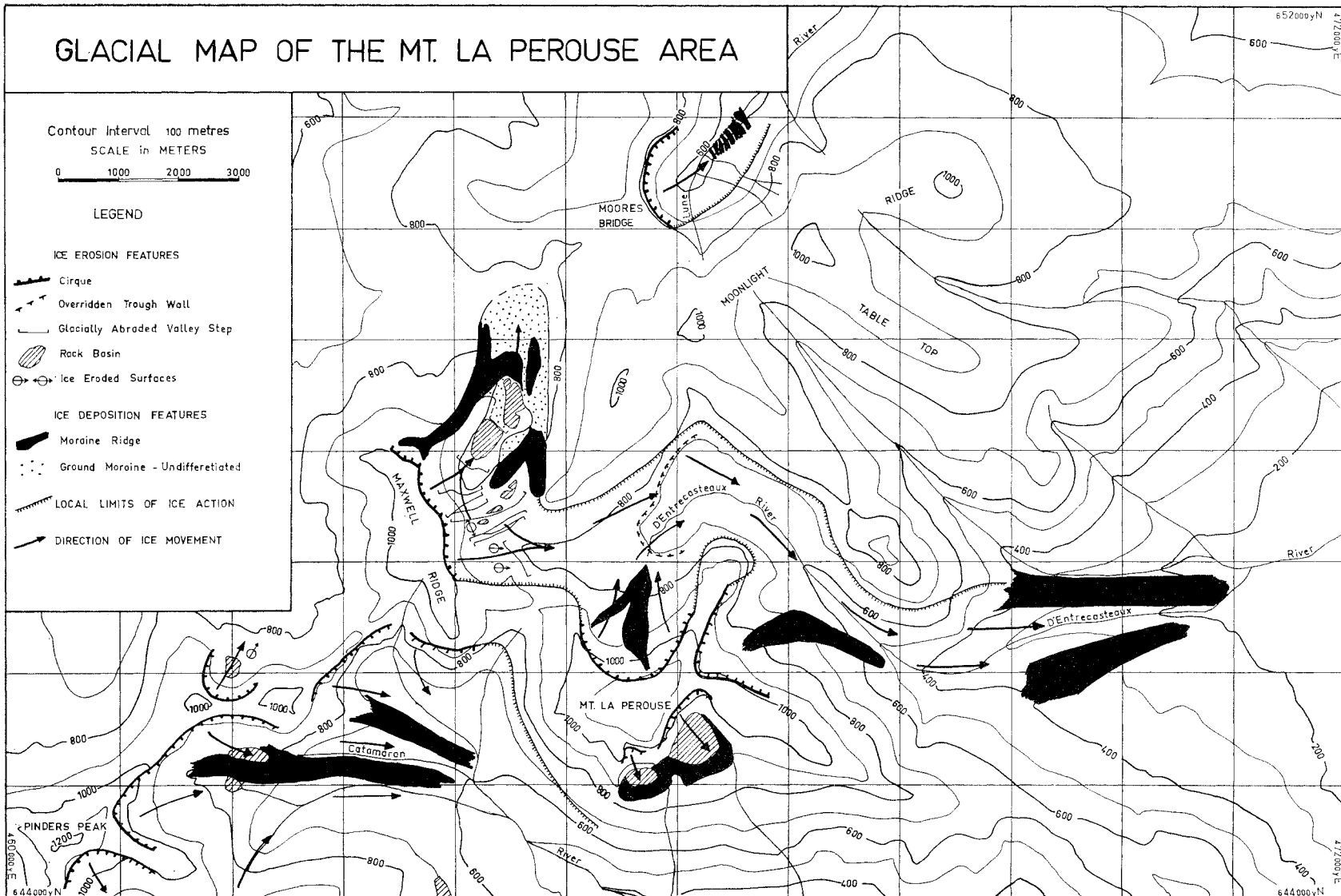


Fig. 1—Glacial Map of the Mt. La Perouse Area.

slope development which inhibits erosion of the underlying more thinly-bedded, softer sandstones and mudstones. If in fact these valleys did contain glacial ice, there has been very rapid incision by fluvial processes since ice retreat and with hard, massive sandstones and conglomerates in abundance, this interpretation seems unlikely.

It may be demonstrated that the area down to about the 400 metre contour line experienced periglacialiation at some stage, whether it be mostly peripheral to glacial ice at the height of glaciation or in glaciated areas during advance and retreat of ice. However, it is difficult to assess the difference between Pleistocene and Recent periglacial material. Groups of massive sandstone blocks up to four metres maximum diameter exhibit crude polygonal orientations on the ridge extending south-east from the summit of Mt La Perouse. This type of structure is considered to have resulted from Pleistocene periglacial activity as opposed to patterns developed with small siltstone fragments seen on the summit of Mt La Perouse (Pl. 1, Fig. 2) which are considered to be currently active.

Nivation

Five examples of erosion by movement of bodies of snow were observed. Four of these nivation depressions or hollows were situated in the uppermost part of the headwalls of past glaciers.

In all five examples, the writer found snow in the depression until March 1969. Lewis (1925, p. 39) noted the first recorded instance of erosion by nivation in Tasmania on a ledge just below and to the east of the summit of Mt La Perouse. He quoted evidence to show that the ledge commonly held a snow bank well into summer. Lewis said that 'This snow bank . . . moves a few yards down the gentle slope of the ledge. As it

passes over the corrugations of the various beds of strata of soft coal measures (Lower Triassic red beds—Davidson, 1969) it has scratched the rock with the fragments it has torn from the adjacent cliff face . . . apparently the scratching is repeated each winter'. Scratches on the rock surfaces of the ledge may be seen now and small fragments of red bed and siltstone are embedded in the snow in the gap between the snow and the headwall of the depression. Fragments of the same rock type are also embedded in the base of the body of snow and there can be little doubt that the scratches were caused by the embedded rock fragments as the snow moved slowly across the ledge.

Small rock fragments, soil, plants and plant debris have been pulled away from the rock surface at the headwall of the other depressions by bodies of snow. These depressions are located on the northern face of Mt La Perouse about 50 metres below the summit (654461), on the eastern face of Maxwell Ridge just below the summit (637476), at the head of the Lune Cirque as mentioned previously (657505) and a very large one about 200 metres long and 50 metres wide on the south-eastern side of Hill 4, Moonlight Ridge (657485). All five occurrences represent favourable areas for snow accumulation. Apart from the example on Moonlight Ridge, all are in the upper head-walls of past cirques. The Moonlight Ridge nival hollow is not in an ancient cirque because the area for snow accumulation was not sufficient to maintain a glacier even during the height of glaciation. However, the fact that this depression is the largest of the five depressions observed and is currently active suggests that it may be the only clear example in the La Perouse area, of a modern nivation hollow, the greater part of the hollow having formed as a result of Pleistocene nival activity.

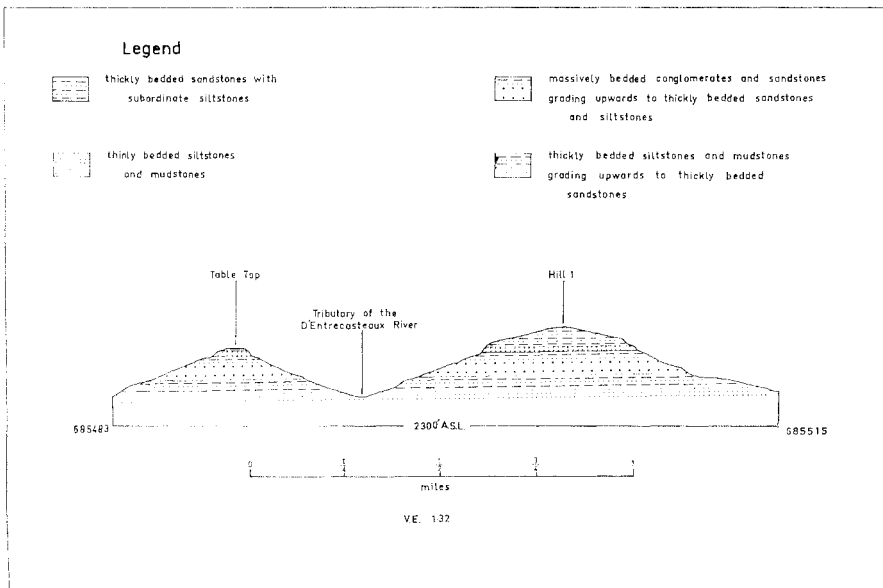


Fig. 2.—Section showing slopes developed on various rock types due to periglacialiation.

CONCLUSIONS

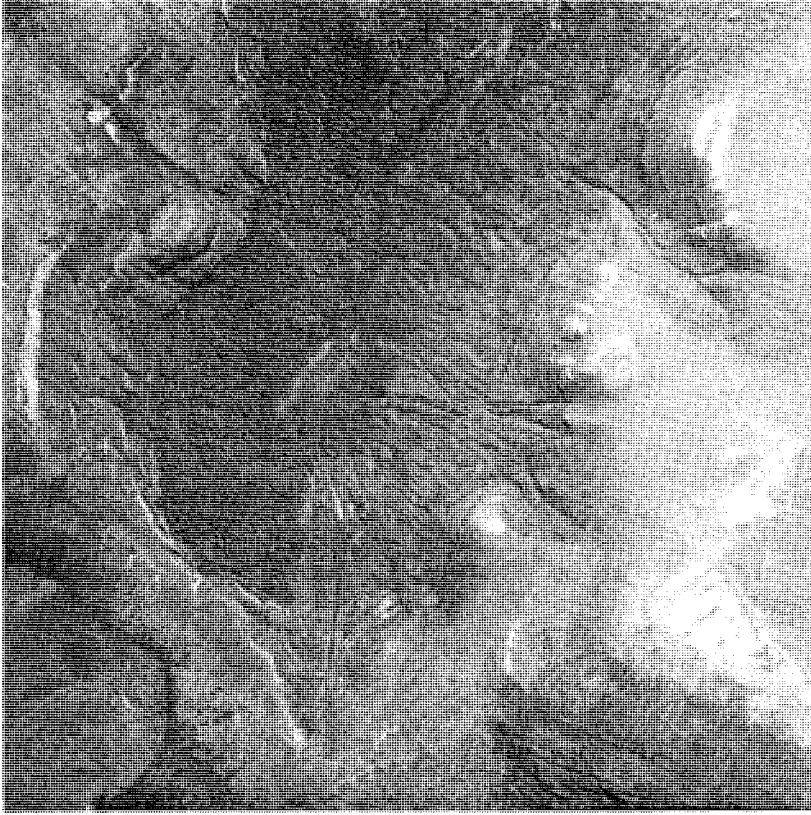
Considering the mapped areas of glacial ice action in Fig. 1 together with periglacial and nivational effects briefly discussed above, it becomes apparent that it is possible to account for all features in the landscape of the Mt La Perouse area with one period of glaciation and associated periods of periglaciation and nivation. It is recognised that evidence of two periods of glaciation exists in northern Tasmania and of four or more periods of glaciation in other parts of the world and this suggests it is highly probable that more than one period of glaciation occurred in the La Perouse area. It is considered that multiple glaciation is not required by the evidence of the erosional forms, although detailed work on the stratified deposits could demonstrate more than one period of glaciation.

ACKNOWLEDGMENTS

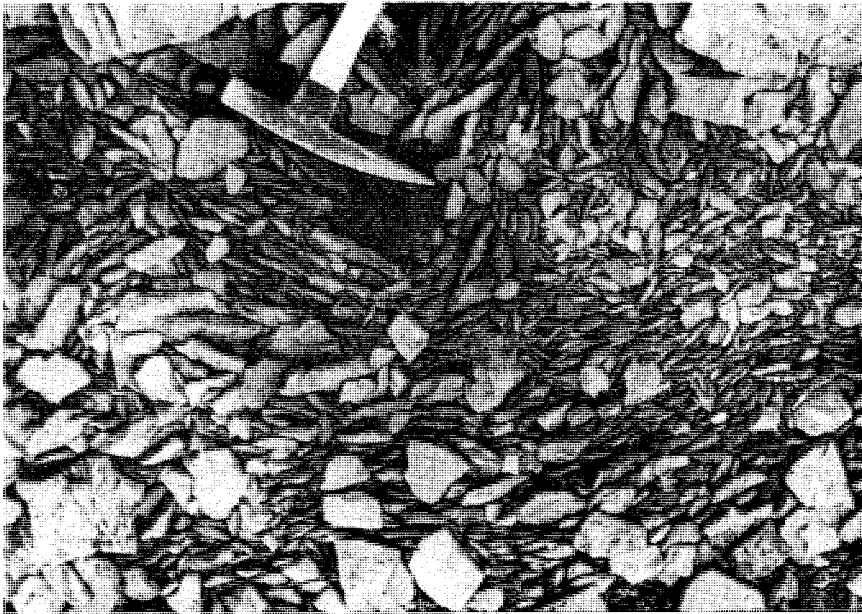
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PLATE 1.
Fig. 1.—Aerial photograph of the Lune Cirque. Scale 1" = $\frac{1}{2}$ mile.
Fig. 2.—Oriented siltstone fragments formed by present periglacial activity.

