LATE CAINOZOIC GLACIATION
AND
MOUNTAIN GEOMORPHOLOGY
IN THE
CENTRAL HIGHLANDS OF TASMANIA.

by Kevin Kiernan
BA(Hons.)

Submitted in fulfilment of
the requirements for the degree of
Doctor of Philosophy

UNIVERSITY OF TASMANIA
HOBART
1985

(source unknown)

" Among all of nature's phenomena, not a single one seems to me to be more worthy of the interest and curiosity of the naturalist than glaciers."

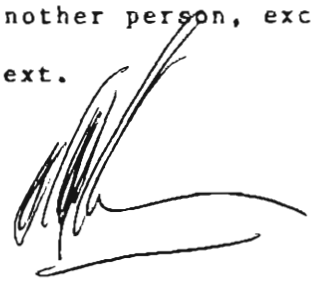
-L. Agassiz, 1840

Etudes sur Les Glaciers : 2.

TABLE OF CONTENTS

DECLARATION

This thesis contains no material which has been accepted for the award of any degree or diploma in any university and, to the best of my knowledge and belief, contains no copy or paraphrase of material previously published or written by another person, except where due reference is made in the text.



Kevin Kiernan

December 1985.

ACKNOWLEDGEMENTS

I acknowledge with considerable gratitude the the assistance of Dr. Eric Colhoun throughout the project. I am also deeply appreciative of the efforts of Dr. Les Wood. It is with gratitude that I remember too the encouragement and assistance I received from the late Dr. Joe Jennings, and also from Dr. Mike Macphail.

My thanks are extended to those who have helped me in the field at various times, including Peter Robertson, Barry Davey, Richard Cosgrove, Karen and Ellen Kiernan, Steve Harris, Norm Sanders and my benumbed companion in the "Rotten to the Core" expedition to drill the Gould Plateau tarn, Mick Iloski.

The Department of Geography, University of Tasmania, provided a base and some logistical support and also funded the radiocarbon dating. The study was undertaken while I was a recipient of an award from the Australian Department of Education under the Commonwealth Postgraduate Research Awards Scheme.

The National Parks & Wildlife Service (Tasmania) provided some accomodation at Lake St. Clair and I would like to thank Dick Dwyer, Steve Hepworth and Bob Tyson of the Service in particular. Kevin Ellis provided boat transport on Lake St Clair when needed.

Kate Charlesworth patiently and skilfully drafted figures 4.2, 5.3, 6.2, 10.2 and 12.2 and many of the other figures

are the better for her advice. I would also like to thank Nel Gill for typing the tables. Dr. A.R. Martin and Dr. J.I. Raine kindly allowed me to use unpublished data from the Mt. Kosciusko area. For help in other ways I should also like to thank Dennis Charlesworth, Therese Hughes, Jamie Kirkpatrick, Sib Corbett, Tom Errey, Professor Martin Williams and Lily Hughes. The assistance given by my wife Karen in proof reading and other tasks during the final preparation of this thesis was invaluable.

Perhaps the greatest debt of all is owed to the friends who encouraged me, and to Karen and Ellen who tolerated it all.

ABSTRACT

The broad topographic framework and erosion surface morphology of west central Tasmania predates the early Pleistocene. The valley systems, however, have been emphasised by glacial erosion which has played a major role in shaping the detailed geomorphology of the mountains.

Part of an extensive ice cap that developed in the Tasmanian Central Highlands during the late Cainozoic discharged southwards via a major outlet glacier that occupied the valley of the Derwent River.

The heart of the Central Tasmanian ice cap probably lay west of the Du Cane Range. When the ice cover was most extensive the Derwent Glacier was up to 500 metres thick. It may have extended to as low as 230 metres above sea level, 70 kilometres downstream from its source in the cirques of the Du Cane Range. Two diffluent lobes of this glacier spread eastwards to merge with other glaciers in the Nive Valley. Other diffluent lobes extended southwards into the upper Gordon Valley, and westwards into the upper Franklin and Alma valleys. At the maximum phase the Franklin and Alma glaciers were confluent around Mt. Alma, near the present junction of the Collingwood and Franklin rivers.

The more westerly glaciers displayed the highest rates of mass throughput hence glacial landforms are more abundant and better developed in the west.

Analysis of the post-depositional modification of the glacial landforms and sediments suggests that at least three glaciations took place. The first glaciation was probably early Pleistocene or late Pliocene in age while the most recent and smallest occurred during the late Last Glacial Stage.

Glaciation would have demanded colder temperatures and an increased solid precipitation budget, but no major shift in the direction of snow bearing winds is neccessitated. At no stage was the mean annual air temperature likely to have been more than 9^{o} C less than present.

The glaciations were probably broadly contemporaneous with those at similar southern latitudes in Andean Patagonia and South Island New Zealand. Like the glaciers of those areas the ice masses of west central Tasmania were mainly of temperate maritime character.

The glaciations were accompanied by periglacial activity beyond the limits of the ice. The development of rock glaciers suggests that localised areas of permafrost existed during the Last Glaciation.

The glacial oversteepening has greatly facilitated slope retreat in areas of high structural anisotropy, particularly under periglacial conditions. Interglacial weathering and erosion was comparatively innocuous, although the presence of a substantial vegetation cover seems to have been critical to the maintenance of slope stabilty, particularly

in steeper and more elevated terrain. The geomorphic evidence does not demand any climate deterioration during the Holocene. The most active geomorphological agent of the Holocene interglacial is humankind.

LIST OF FIGURES

LIST OF TABLES