GEOLOGICAL INFORMATION IN NEW ZEALAND

Elva Leaming
University of Auckland
Private Bag 92019
Auckland, New Zealand
e.leaming@auckland.ac.nz

Abstract: New Zealand consists of two large islands--some 270,000 square kilometers in area--straddling a major crustal plate boundary. The present landscape is the highest part of a submerged subcontinent that broke away from Gondwana some 80 million years ago. To the northeast the Pacific oceanic plate is subducting westward, and to the southwest the Tasman seafloor is subducting eastward beneath the Campbell Plateau. These two subduction zones are linked through the transcurrent Alpine Fault.

In the mid 19th Century two world-famous geologists contributed to the country's geological exploration. Hochstetter, from Austria, established a tradition of systematic geological mapping, and Hector, from Canada, founded the New Zealand Geological Survey.

New Zealand's national geological organization, now the Institute of Geological and Nuclear Sciences (IGNS), continues to publish a broad spectrum of geological literature and maps. Its library holds the largest collection of geological literature pertaining to New Zealand.

The six universities that teach geology and earth sciences each have library collections of a high standard. The University of Auckland Geology Collection is housed in the Science Library with an area that is a focal point for geological information and literature research.

INTRODUCTION

I have five points to discuss. I want to give a little general information about New Zealand before referring to its early geological literature. I'll then mention Hector and his establishment of the New Zealand Geological Survey. The range of literature today and the sources of geological information available stem from enthusiasm in these earlier years. Finally, I'll remark upon the University of Auckland Library and its "Geological Collection" which is my place of work and concern.

New Zealand: Physical Features

Situated in the South Pacific Ocean, New Zealand consists of three islands: the North (heaviest populated) and South Islands separated by Cook Strait, Stewart Island, and many smaller island groups. It also has jurisdiction over the Ross Dependency in Antarctica. The country has a temperate climate and country lies at latitudes between 33 and 53 degrees south and ranges from 162 degrees east to 173 degrees west longitude. It is some 270,000 square kilometers in area. That equates roughly with the size of Colorado or less than half the size of Texas.

The present landscape is the highest part of a submerged subcontinent that broke away from Gondwana some 80 million years ago. In fact New Zealand is the largest submerged continent in the world. Having broken away from Australia at such a time New Zealand is notable for its lack of land mammals but it does have one so called "living fossil," the Tuatara, a reptile, once common on the mainland, but now only surviving, protected by law, on small offshore islands.

New Zealand straddles a major crustal plate boundary. To the northeast the Pacific Oceanic plate is subducting westward, and to the southwest the Tasman seafloor is subducting eastward beneath the Campbell Plateau (Fig. 1). What this diagram doesn't show is the alpine chain which runs through both islands equating with the course of the plate boundary. This is particularly spectacular in the South Island. There is a diverse range of secondary landforms due to this subduction phenomena. As well as its mountainous backbone, the country has bubbling hotpools and geysers, geothermal areas and volcanoes.

Early geological literature of New Zealand

From the 1820s, many young scientists, having read accounts of such remote landforms, flowed into New Zealand. Geology was a new science and keen young men wanted their efforts published.

Darwin arrived in 1835 and saw it in terms of "splendid isolation"; no animal predators to endanger the population

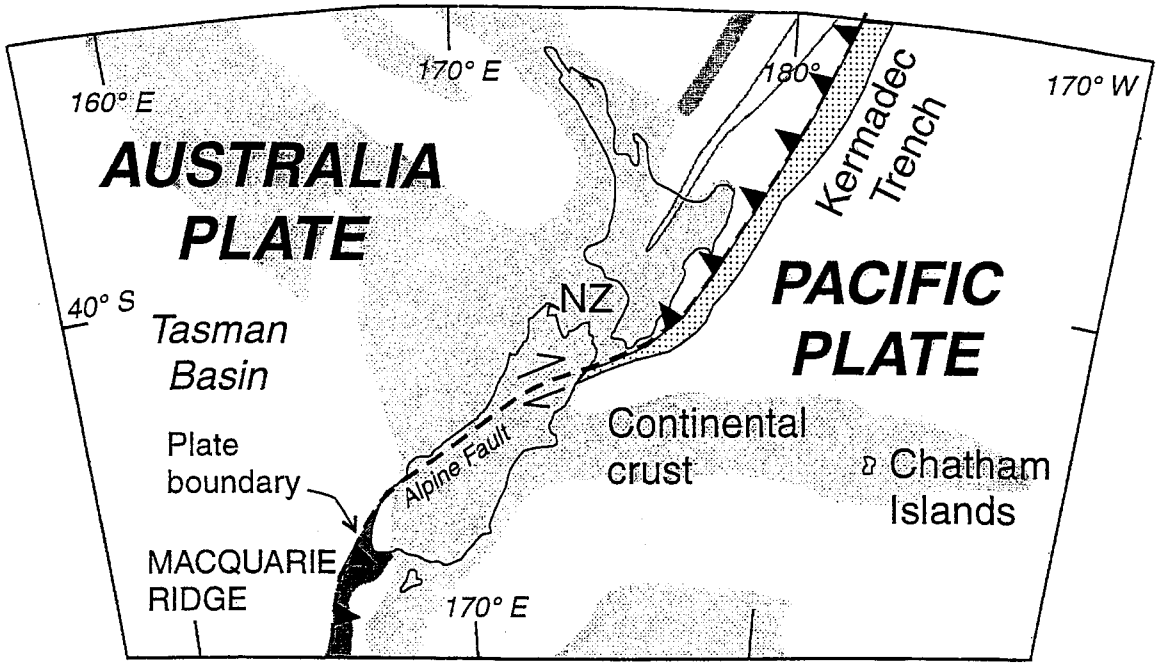

Figure 1: Map showing the tectonic plates in the New Zealand area.

of large flightless birds. He documented his journals with observations of natural affinities between New Zealand, South America and Tasmania. James Dana was part of the U.S. Exploration Expedition under Charles Wilkes, 1829-1842. He described the Bay of Islands volcanic region.

Dieffenbach, a German doctor and scientist, arrived in New Zealand on the *Tory* in 1839. He traveled through the North Island and wrote a book that was the first geological study of the thermal volcanic land of the North Island. He gained an understanding of the native Maori peopleand learned from their wide mineralogical vocabulary. He was able to pass such knowledge on to the settler geologists.

Ferdinand von Hochstetter, from the Austrian Geological Survey, came to New Zealand as Head Geologist on the *Novara* in 1858, sponsored by the Austrian Government. He soon met up with Julius Von Haast, a young German who was to accompany him on his explorations. Hochstetter's report on the Drury coalfields so impressed the Auckland government that he was persuaded to remain behind when the *Novara* sailed in order to make extended surveys at Government expense in Auckland and later in the Nelson Province.

Hochstetter published prolifically, his major work being *Geologie von Neu Seeland* (1864). In the six maps of his *Atlas* (1863) and its explanation volume (1864), he described and interpreted many places and features of the New Zealand landscape and these maps are still regarded as basic maps of the areas covered. Perhaps his greatest contribution to New Zealand and its geological literature was to establish a tradition of systematic mapping that persisted in later geological mapping of New Zealand.

Haast spent the rest of his life in Canterbury where his geological contributions, especially with glaciation work, and including a published text (1879) were many and he kept in close contact with other geologists in New Zealand. His classification of Canterbury rocks formed a basis for later work.

The New Zealand Geological Survey

Gold enticed geologists from various European countries. There was also a need for coal. Young geologists mocked the style of the British Geological Survey. It was seen as an employment opportunity; a means of escaping the poverty and boredom of a depressed homeland. There was also a strong German influence.

The New Zealand Geological Survey was established early (1865) as Geological Surveys go; earlier than the United States Geological Survey (1879). The Canadians amongst you will know of James Hector who founded it. He arrived in New Zealand in 1862, after four years as surgeon-geologist under Captain Palliser for the British government expedition through the Rock Mountains. Murchison, Director of the British Geological Survey, saw the placing of young geologists to Commonwealth positions as part of "integrating the empire." He had a big finger in the pie of getting Hector to New Zealand.

Hector's first years were spent in Otago where he worked on schists and predicted expansion of the goldfields. He also investigated coals and limestones. In 1865, the year in which New Zealand's government was transferred from Auckland to Wellington, he was commissioned to organize the New Zealand Industrial Exhibition, which marked the turning point in his career. It saw him in Wellington as Director of a New Zealand Geological Survey; a survey, very much modeled on the British Geological Survey. Hector's greatest contribution to geological progress in New Zealand was his ability to organize surveys in previously untraveled country; explorations in which he himself played no mean part. The results of major traverses were embodied in "Reports of Geological Explorations" (1864-1894). Each report contains a summary by Hector, completely objective in approach. There are still parts of New Zealand which are described only in these volumes.

Hector's mapping represents a summary of New Zealand geological knowledge during his 30 most active years. His major works were maps showing the geology of the whole country from as early as 1873. He became manager of the New Zealand Institute which later became the Royal Society of New Zealand when it was set up in 1867 and the transactions of that body were edited by him for the next 35 years. Hector managed his Geological Survey until his retirement in 1903.

What Happened to the New Zealand Geological Survey?

The 20th Century saw the NZGS as a strong body with strong leadership. The Department of Scientific and Industrial Research was established in 1926 so the NZGS came under a parent body, along with the Geophysics Division, Antarctic Division, Soil Bureau, etc. Then there were the war years, which caused it to take on a more economic slant. There was further search for coal and other minerals.

Privatization hit hard. The Labour Government in 1984 brought in a "user pays" philosophy. Until then, the Geological Survey had existed for the national good. Bulletins with coloured maps had been given free to the public; to schools and universities. Suddenly everything became client-focused. We began paying for the geologists' time, printing costs; a map became so expensive that it couldn't be bought. Public works became streamlined. Staff were shed. Offices closed throughout the country. Fancy names gave image to the process. The Geological Survey became DSIR Geology and Geophysics and now it is IGNS (Institute of Geological and Nuclear Sciences). The effect on libraries was distressing. Twenty years ago my Library would have held everything the Geological Survey published. Considered essential. Now we cannot afford to buy all that is produced.

A tourist comes into my Library wanting to know where in Auckland a geological map can be bought. There is only one small firm which sells them and if they haven't got the required map they will send to Wellington for it.

Yet, they're exploring the depths of Lake Taupo--"Cousteau style" exploration. The fish caught in a particular area are so big that they expect to find geothermal activity and the minerals associated with it. The Institute of Geological and Nuclear Sciences are doing it. Why? Great revenue! From those who will gain!

It wasn't only the Geological Survey. It happened to the Post Office. It happened to the Lands and Survey Department. They became DOSLI (Dept. of Survey and Land Information). As it became more financially crippled it became more streamlined. It divided into LINZ (Land Information New Zealand) which looks after the land records, and Terralink (the mapping part). Part of what was the Mines Department is in the Ministry of Commerce. Some of it is in the Ministry of Energy. The user pays way, seems to have led into digital mapping where maps are produced for a particular purpose.

Geological Information Today--Sources of Information

To keep up to date with geological information in New Zealand, increasingly one has to be aware of what publications exist even if the Library can't afford them.

The Royal Society of New Zealand produces bulletins, a journal and a weekly electronic newsletter, "Science Alert." It is responsible for publishing our major journal for research papers, *New Zealand Journal of Geology and Geophysics.*

The Ministry of Commerce has produced our mining statistics but since the 1st July 1998 this has been transferred to the Department of Statistics.

Councils and Regional Authorities publish from their findings such items as volcanic hazard maps, landslide materials, and water resources publications.

Universities produce theses and supply thesis lists to update the *Bibliography of New Zealand Earth Science Theses.*

IGNS produces some excellent publications. They have 19 databases, national in scope and continually updated. Databases like the Bibliography of New Zealand Geology are invaluable. Their most recent database is the Digital Geology Database. This is a quarter million mapping program which will update New Zealand's 1:250,000 mapping series with 21 digitally produced maps. Previously published maps at this scale date back to the 1960s. Data is derived from numerous sources such as company reports, petroleum exploration reports, theses and unpublished fieldwork. To date, three maps have been published and a further three to four are awaiting publication. The aim is to make the database accessible over the Internet.

The Geological Society of New Zealand produces Guidebooks, a Newsletter, and Miscellaneous Publications such as Claren Kidd's *Union list of archival, manuscript, and theses geological maps of New Zealand.* Claren spent many months traveling New Zealand, visiting libraries and museums to discover unrecorded maps, browsing university theses, meeting librarians and indexing such archival materials on her laptop computer. Many maps had lain under stacks--19th Century ones, rolled up, cracked and torn--all for the want of time, priority, and money. They were given numbers and assigned to our National Archives. A warm thank-you Claren, from the geologists and information specialists of New Zealand.

The University of Auckland Geology Collection

The University of Auckland Library has recently acquired a new head librarian, become accustomed to an academic semester system, installed the Windows-based Voyager system, developed LEARN (Library Electronic Academic Resources Network) which provides access to electronic information collected and organized for the user, started an Electronic Campus Desk to assist students in connecting to the University's electronic campus from home, undergone reviews throughout its various subject departments and is promoting a subject librarian approach. So much has been happening of late.

The Geology Collection has been part of the Science Library since 1990. Before that it existed within the Geology Department premises. As well as serving the Geology Department, there is also the Geothermal Institute which is privately funded.

A serials cancellation program has been undertaken this year. The Science Group of libraries has had to shed NZ$700,000 in serial subscriptions. The geology share was NZ$80,000 (US$40,000). The increasing cost of scientific publishing is affecting you all, I know, but in New Zealand our dollar is down.

There are two research areas in the Science Library. Geology has its own area where databases, maps, theses, air photos, bibliographies, reference books, and rare books may be consulted, without the researcher having to battle to find a seat, which I'm afraid, are limited in number. Anyone can use the Geology Research area, which is close to my office and within bounds of all material which can be used there.

CONCLUSION

I've discussed these 5 topics. New Zealand is a young country with a diverse range of geological types. The literary input of early scientists is still very much relied upon and I am very aware that this material should be preserved. The *Bibliography and Index of Geology* and lately GeoRef have freed us from isolation and made the tracing of international and much New Zealand geological literature more evident. Finally, it is conferences like this one that make literary access easier. I believe it is still people and communication that give geological information in New Zealand its impetus.

References Cited

Burton, Peggy, 1965, The New Zealand Geological Survey: DSIR Information Series 52.

Dana, J. D., 1839-1842, U.S. Exploration Expedition. v. 10.

Darwin, C. R., 1901, Journal of researches into the natural history and geology the countries visited during the voyage round the world of the H.M.S. *Beagle* under command of Captain Fitzroy, R.N.; new edition: London, Murray.

Dieffenbach, E., 1839-41, Travels in New Zealand. 2 v.

Fleming, C. A., 1979, The geological history of New Zealand and its life: Auckland, University Press.

Gage, Maxwell, 1980, Legends in the rocks: Christchurch, Whitcoulls.

Geological Survey of New Zealand, 1866-1892, Reports of geological explorations: Wellington, Government Printer.

Haast, Julius von, 1879, Geology of the provinces of Canterbury and Westland, New Zealand: Christchurch, Times Office.

Hochstetter, F. A., 1864, Geologie von Neu Seeland, Novara expedition: v. 1, section 1.

Hochstetter, F. A.; Peterman, 1864, A geological and topographical atlas of New Zealand; Six maps of the provinces of Auckland and Nelson: Auckland, Delattre.

Lillie, A. A., 1980, Strata and structure in New Zealand: Auckland, Tohunga.

Stevens, G. R., 1980, New Zealand adrift: Wellington, Reed.

Stevens, G. R., 1983, Our wandering islands: Nelson, Stiles and Co.

Taylor, 1855, "Te Ika a Maui" or, New Zealand and its inhabitants: London, Wertheim and Macintosh.