

# GEOLOGICAL SOCIETY OF NEW ZEALAND (Inc)

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## Whither the Anthropocene.

Take away the “h” in “whither” and you have a curse not a question. It was in the questioning sense that twenty members of the Stratigraphy Commission of the Geological Society of London discussed a proposal to erect a new geological age in the recent February issue of *GSA Today*. The worthy commissioners proposed that “*since the start of the Industrial Revolution Earth has endured changes sufficient to leave a global stratigraphic signature distinct from that of the Holocene or of previous Pleistocene interglacial stages*” Now too that evolution has become aware of itself, are we as a result living in the Anthropocene?

Whether you believe in human-induced climate change or not, one has to believe in our power induce global warming, and too that we humans are, right now, leaving a stratigraphic signal on the Earth. If for instance, all bears died out unpreserved in swamp or flood muck no one would suspect their existence, but for some scars on a few deer-bone fossils, but you cannot say the same about we humans. Whither our weather or whether we wither and another intelligent species spontaneously arise on the Earth—those of the future will see the imprint of our current stewardship of the planet. (My bet to parent any replacement would be the American grey squirrel. They are smart, assertive, arboreal as our ancestors, and apparently more vigorous than their red Eurasian cousins. They seem moreover, already to consider us losers from the way they give the ‘raspberry’ to those passing underneath.)

After spending half the article listing some of our actual and potential impacts on future strata all heavily laced with global warming propaganda the commissioners then ponder the question of how and where to mark the start of the Anthropocene. Stratigraphers they write, are working on base makers to be called a Global Stratigraphic Section and Points (GSSP) for each of the planetary epochs, ages and stages. Whither thus the “golden spike” to base and signpost the new age? The commissioners suggest the base of this new time span could consist of some isotopic, elemental or molecular marker in the polar ice, or the sediment of some swampy lake. Another possibility is a date (say 1800) visible on a wall chart, but otherwise existing, probably appropriately, only in the minds of the anthropological species. Perhaps however, for our own Anthropocene we humans should wait for a marker more monumental.

Why should the Age of Aquarius be marked by something as elitist as isotopes in ephemeral ice cores? If the Anthropocene turns out instead to be the age of fools then the arrival of Roman lead on the Arctic Ice would be a more appropriate marker since the same lead poisoned their leading classes. The isotopic signature from past atomic testing and perhaps a future nuclear war will be similarly appropriate. Should the boundary be marked by the loss of the remaining wild megafauna (apes and whales as well as moas and mammoths)? And what of the coming radiation of new forms (some capable of space travel) from genetic engineering? The huge population increase will unlikely leave a proportionate fossil imprint. Cemeteries dug into the anthropocene unconformity will be eroded away with the continuing order of magnitude sedimentation increase accompanying agriculture and industry. Perhaps in the end the world-wide inundation of port cities like Miami will provide the most monumental trace fossil markers, appropriately too if they become encrusted with the carbonate that sank them.

Interestingly the commissioners do not seem phased by the increasing shortness of geological epochs. If the Anthropocene is to have any longevity, we will need to learn to make love, not merely to produce more us, but with everything. Knowledge is only the beginning.

# JAFfA – Just Another Fault for Auckland

## *ONGOING INVESTIGATION OF FAULTING IN AUCKLAND*

**Jill Kenny, Auckland** [jill.kenny@xtra.co.nz](mailto:jill.kenny@xtra.co.nz)

### **Regional Setting**

The folded and faulted Mesozoic greywacke and argillite basement of Auckland outcrop east of a line from Tiritiri Matangi Island in the north, to Papakura in the south. They are also known to be at depth west of this line, at 340m below sea level, from a borehole at northern Awhitu Peninsula (Waterhouse 1989).

The Early Miocene Waitemata Group sediments accumulated on an irregular basement topography within a subsiding basin (Ballance 1974, Isaac *et al.* 1994). During this time the Northland Allochthon was emplaced, and subseafloor failures at the toe of this slide severely deformed the semi-lithified sedimentary pile in the north of the study area in the middle to late Otaian (Hayward 1993). In the south of the study area, block faulting formed a series of horst and graben features in both the basement and in Waitemata Group sediments. ENE trends are usually truncated by N to NNW trends (High 1975, 1977, Berry 1986, Omerod 1989, Petch *et al.* 1991). Plio-Pleistocene sediments were laid down in depressions formed by the block faulting. Late Quaternary volcanism dominates the landscape of Auckland.

### **Recognised Faulting**

The Auckland QMAP (Edbrooke 2001) shows recognised and inferred regional block faulting in the Hunua Ranges and Maraetai hills in the east, in the Franklin District to the south, and in the Waitakere Ranges to the west. Offshore to the west the QMAP also shows seismic evidence of large scale fault splays trending approximately ENE. These faults are not extrapolated eastwards on to land. Borehole data and geophysical measurements across the Manukau Lowlands and Awhitu Peninsula have established block faulting beneath Plio-Pleistocene sediments, with the Waitemata Group sediments offset by NE-trending horst and graben structures, cut by NNW-trending faults (High 1975, 1977, Berry 1986, Omerod 1989, Petch *et al.* 1991). To the north, in the Albany area faults have been inferred to be associated with thrusting and sliding southwards of the Northland Allochthon (Hayward 1982, 1993).

Although many small-scale faults have been recognised in the cliffs bordering the Waitemata and northern Manukau Harbours (Chappell 1963, High 1975, Kermodé 1992), no large-scale faulting has been mapped crossing Auckland itself, except under Auckland Harbour Bridge (Cornwell & High 1975, Hayward 1982). Auckland maps are in fact noticeably devoid of faults (Figure 1). This anomaly has been ignored in the past, partly because there are no convenient marker horizons within the Waitemata Group that can be followed sufficiently far to establish fault offsets, and partly because geophysical measurements are affected by the Quaternary ash from the Auckland Volcanic Field and by the shallowness of much of the Waitemata and Manukau Harbours (Bryan Davy, pers. comm. 2007). However, in a small study Affleck *et al.* (2001) used borehole and detailed gravity data to determine the pre-volcanic topography beneath Mt Eden–Epsom, but no faults were discerned.

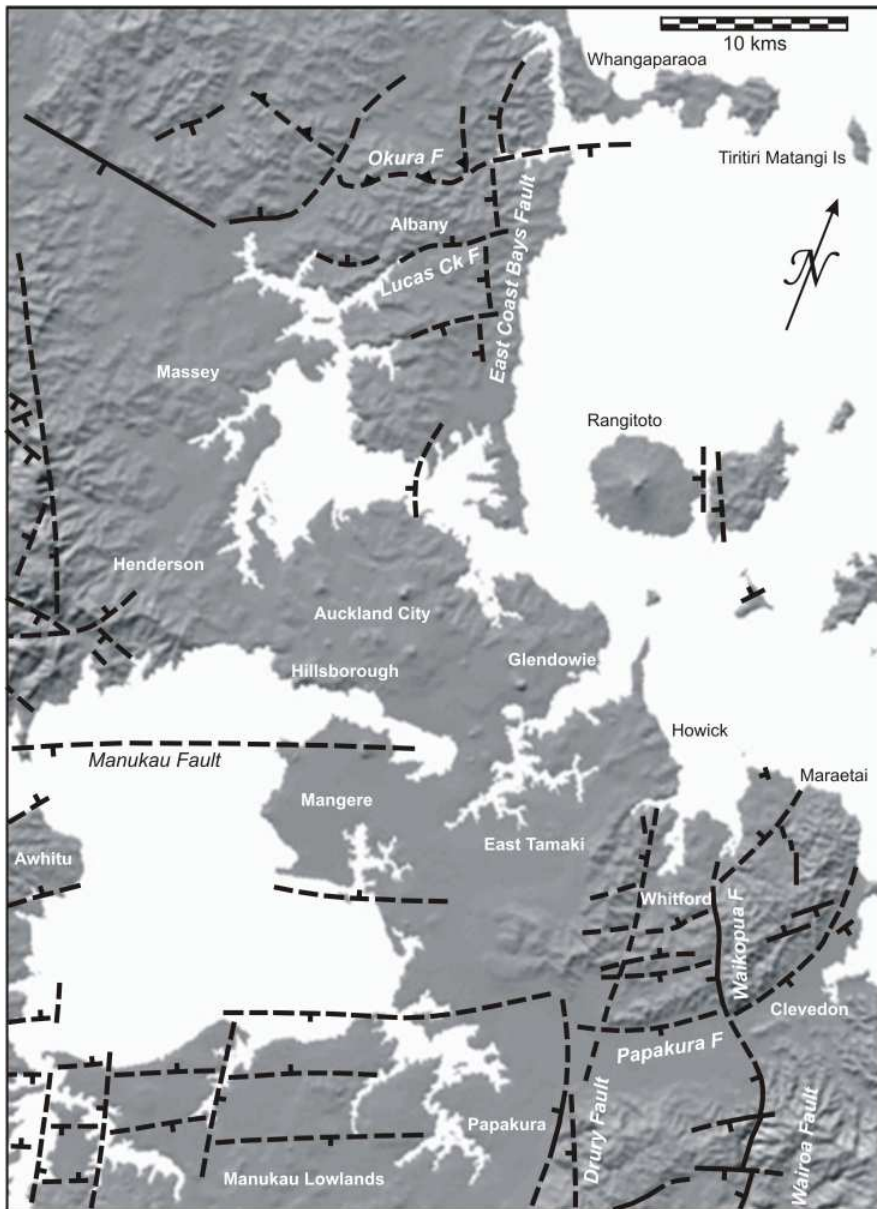


Figure 1: Faults previously recognised in the Auckland region (see text for the many references). Ticks on downthrown side of faults. Triangles on hanging wall of thrusts.

### Inferred Block Faulting

The occurrence of block faulting within Auckland has recently been inferred by Kenny (2007). One marker horizon can actually be followed – the “Late Miocene” eroded Waitemata surface (Kermode 1992). This peneplain is very obvious as near-horizontal ridges across Auckland, along which many of Auckland’s main arterial roads are constructed (Calliope Road, Bayswater Ave, Queen Street in Northcote, Jervois/Ponsonby Roads, Karangahape/Great North Roads, Mt Albert Road, New Windsor Road, Te Atatu Road, much of Remuera Road, Victoria Ave, Coates Ave/Kupe St/eastern Kapa Road, much of St Heliers Bay Road/Long Drive, West Tamaki Road, and Cook St in Howick). However, the peneplain no longer exists at a constant height above sea level (Figure 2).

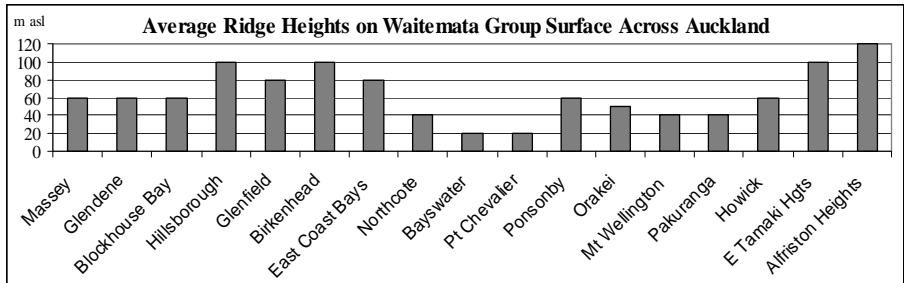


Figure 2: Average ridge heights on the peneplain across Auckland are not concordant (from Kenny 2007).

Hundreds of lineaments have been mapped using photogrammetric techniques on 1960s aerial photographs, but they are too numerous to depict on a map for this publication. In some cases they are obviously due to erosion of strata. Other lineaments may represent erosion along joint planes. Some have offset topography and are believed to be planes of weakness representing faults separating these regions of different heights. Where the peneplain is hidden by more recent ash and sediments, limited borehole data has been used (Kermode & Searle 1966, B. Hegan pers. comm. 2007). Preliminary results show block faulting has occurred across Auckland (Figure 3). Some of these faults may be an eastward extension of the splay faults from offshore west coast (Edbrooke 2001), similar in character to the horst and graben block faulting of the Manukau Lowlands mentioned above. Others seem to correspond to trends of the Hunua, Wairoa and Waikopua Faults, which are parallel to the NNW-trending Hauraki rift zone to the east of Auckland (Hochstein & Nixon 1979).

Some interesting features arise from Figure 3. West of Maraetai and east of Rangitoto (Figure 1), faults trending NNW could be northern extensions of the Waikopua and Wairoa Faults (labelled on Figure 1). Faults north and south of the East Tamaki area could be northern extensions of the Drury Fault. Conversely, the Drury Fault may exist further west, as represented by faults sketched through eastern Auckland City isthmus.

Most NNW-trending faults are downthrown to the west. Hayward (1982, 1993) recognised this when attempting to position the East Coast Bays Fault, which does not form a lineament along most of its length. Instead there exists a vague NNW-SSE demarcation within Waitemata Group sediments (Schofield 1989). West of the fault exposed sediments are higher in the sequence, with pockets of allochthon-related deformation common. Sediments to the east are lower in the sequence and unaffected by this deformation. This trend is not so clear further south, but basal Waitemata Group deposits only outcrop in the far east of the region (Hayward & Brook 1984), reinforcing the notion of regional stepping down to the west along NNW-trending faults.

It seems logical to reinstate the Manukau Fault (Ballance 1968, Searle & Mayhill 1981). It is drawn in Figure 3 following High (1977), but it may actually occur further north, just off the Hillsborough coastline, where Searle (1959) reports a borehole encountered 'shattered' Waitemata Group sediments in a sudden drop off only 250m offshore. It separates a Waitemata peneplain tens of metres above sea level to the north from a peneplain probably many metres below sea level to the south – it separates the Auckland isthmus from the Manukau Harbour and lowlands further east and south.

On the North Shore, the fault under the Harbour Bridge (Cornwell & High 1975, Hayward 1982) has been redrawn to trend possibly northwestwards, rather than linking with the East Coast Bays Fault. The latter may instead trend SSE and, with some imagination, link up with the Drury Fault. The Lucas Creek Fault drawn by Schofield (1989) through Albany has been extended in both directions and is suspected to be more of a thrust fault in keeping with Schofield's Okura Fault a few kilometres to the north. It is certainly downthrown to the south. It is one of a number of the E- to NE-trending faults in the north and west of greater Auckland that are down-thrown to the south. Some are vaguely arc-shaped. Faults are also strangely curved in central Auckland.

Block faulting in west Auckland has formed a depression in the upper Waitemata Harbour region. A seismic study (Hicks & Kibblewhite 1976) shows that the Waitemata Group surface in that area is more than 30m below sea level – deeper than the outlet of the present harbour to the east. It is conceivable that a lake once existed here, ponding the Taupo-derived pumiceous clays now forming much of the lowland surrounding the upper harbour (Kermode 1992).

### **New Hypothesis – Allochthon-Related Imbricate Thrusting**

The concept of block faulting (Kenny 2007) was well-received at the last Geological Society of New Zealand Conference. However, since then my ideas have evolved further, and I am now assaulting you with another concept to Auckland's faulting history. While drawing cross-sections of the Okura and Lucas Creek Faults as thrust faults, it became apparent that the NE-SW-trending faults a few kilometres further south, in valleys with steep south-facing slopes and gentle north-facing slopes, may also be thrust faults. This concept was then tested over the rest of Auckland. It was found that most of the E- to NE-trending faults, from Whangaparaoa to Henderson to Glendowie, including the arc-shaped faults, can be better explained if they are thrusts. Even the unusual configuration in the upraised Howick block, with its strong parallel ridges perpendicular to local average strike, can be understood if the ridges are considered to be the hanging walls of thrust faults. This was *déjà vu* for me, having already recognised a pattern of thrust faulting and décollement slices in eastern Raukumara

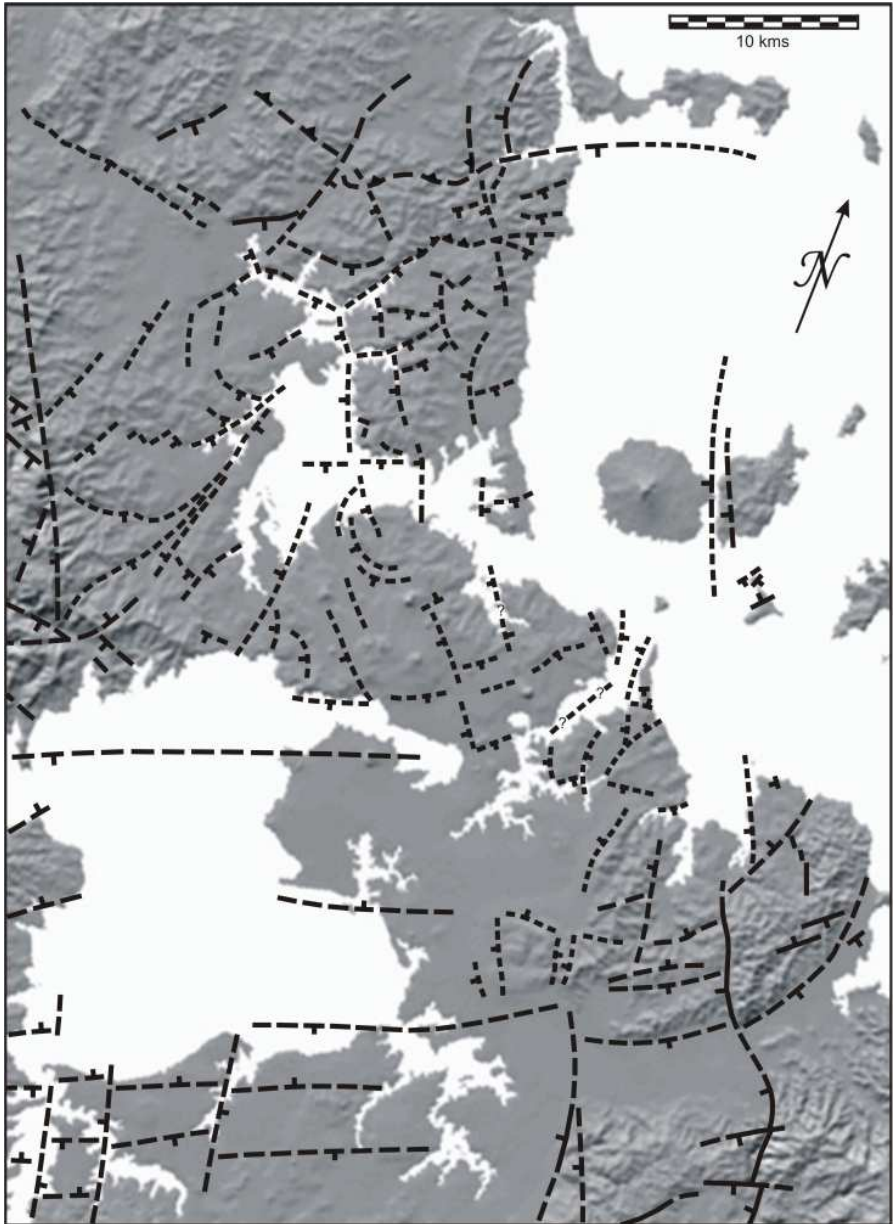


Figure 3: Block faulting in Auckland (from Kenny 2007).

Peninsula (East Coast Allochthon) (Kenny 1980, 1984, 1986). I feel embarrassed for not recognising this feature in Auckland earlier.

The map revised from Figure 3 is easier to interpret (Figure 4). Imbricate slices of dislocated Waitemata Group sediments appear to have fanned out more than 30km from the accepted toe of the Northland Allochthon in the Albany area, towards the west to SSE quadrant. The allochthon affected the mid Waitemata Group sedimentary pile in the mid to late Otaian (Hayward 1993). They have been fragmented by later NNW faults.

Western faults merge with faults mapped in the Waitakere Ranges (Hayward 1983). South of Howick, Waitemata Group sediments are down-dropped and covered by younger sediments of the Manukau Lowlands, along an E-W-trending fault which may be an extension of the Manukau Fault. Southeast of Howick, the sediments are the lowest strata of the Waitemata Group (Hayward & Brook 1984), which were both too deep and too far away to have been affected by thrust-related deformation. Faults from Awhitu to Clevedon are subparallel to those affected by the Allochthon, but they are inferred here to be the eastern extension of the “post-Early Miocene” (Edbrooke 2001, p. 51) splay faults from offshore west coast.

NNW faults are thought to be northern extensions of the Drury, Wairoa and Waikopua Faults, which are inferred to be of Middle to Late Miocene age (Spörl 1989, Edbrooke 2001). A period of uplift and erosion to form the “Late Miocene” eroded Waitemata surface (Kermode 1992) is crucial before these faults became active. Therefore it becomes necessary to modify timing of inferred fault movement so that it post-dates peneplain formation. This is possible with uplift and block faulting continuing into the Pliocene, as suggested by Ballance (1968).

In the Pleistocene oscillating sea levels reached considerably higher than present day (Ballance 1968, Searle & Mayhill 1981). They contributed to a series of terraces, but I consider it unlikely that erosion as recent as the Pleistocene formed the peneplain because there has been insufficient time since then for the inferred amount of fault offsets to have occurred.

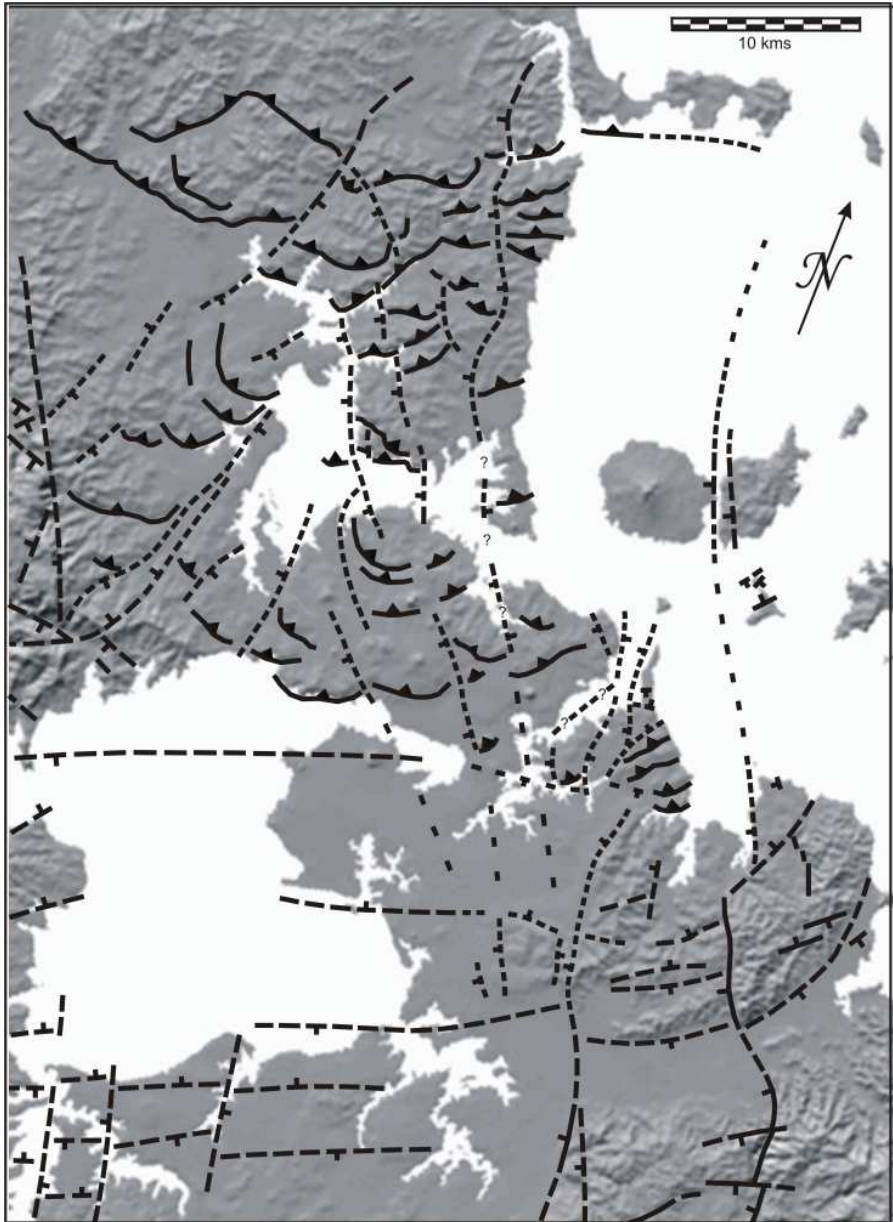
Uplift and peneplain offset may still be occurring. Displacements, buckling and tilting have affected Pliocene and Pleistocene sediments, and seismic activity is still recorded (Hull *et al.* 1995).

Feedback from readers would be appreciated. A more detailed, coloured map showing imbricated thrust slices cut by NNW-SSE-trending faults will appear in the Geocene 3 (Auckland GeoClub magazine, in press, [www.gsnz.org.nz](http://www.gsnz.org.nz)). A detailed journal article is planned, once seismic profile results from the Waitemata Harbour, and borehole data from the Auckland isthmus and from northern Manukau City have been received.

### **Acknowledgements**

I would like to thank Bruce Hayward for reading manuscripts and for bouncing off ideas, Hugh Grenfell for helping with computer maps, Bernard Hegan for supplying Vector tunnel borehole maps, and Barry Waterhouse, Graham Mansergh, Bryan Davy and Murray Gregory for many hours of helpful discussions.





*Figure 4: Imbricate thrust slices spreading outwards from the Albany area, truncated by NNW-SSE-trending faults.*

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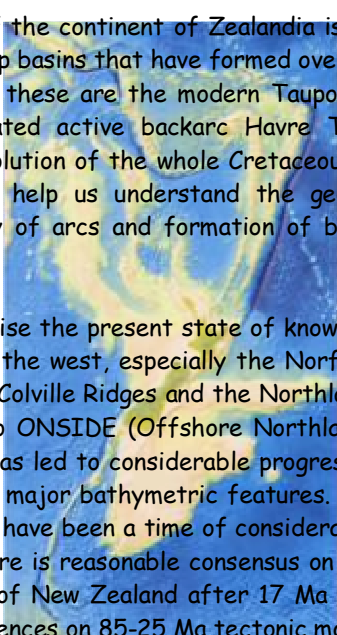
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# A Bluffers Guide to Cenozoic Volcanic Arcs and Basins of the SW Pacific

### PRESIDENT'S TOUR, 2008

The new President, Nick Mortimer will be touring the branches in the first half of 2008. The purpose of the tour, early in the term of office, is to promote better communication within the Society, particularly between the National Committee and the branches. Some non-branch centres have been included too.

*Nick will visit Auckland, Waikato, Taranaki and Otago in March; Taupo, Manawatu and Wellington in April; Canterbury, Nelson and probably Masterton in June. Nick will be delivering a review talk with the above title on the tour.*



The northern half of the continent of Zealandia is bordered by an array of volcanic arcs and deep basins that have formed over the last 85 million years. The best studied of these are the modern Taupo-Kermadec-Tonga volcanic arc and the associated active backarc Havre Trough and Lau Basin. A knowledge of the evolution of the whole Cretaceous-Recent SW Pacific arc-backarc system can help us understand the geotectonic processes that control the longevity of arcs and formation of backarc basins around the world.

This talk will summarise the present state of knowledge of the lesser-known ridges and basins to the west, especially the Norfolk and South Fiji Basins, the Three Kings and Colville Ridges and the Northland Plateau. In the last 10 years, data from two ONSIDE (Offshore Northland Seismic and Dredging Expedition) cruises has led to considerable progress in our understanding of the geology of these major bathymetric features. The interval 17-25 million years ago appears to have been a time of considerable tectonic change north of New Zealand. There is reasonable consensus on the tectonic development of the region north of New Zealand after 17 Ma and major (but ultimately very testable) differences on 85-25 Ma tectonic models.

At the beginning of the talk, Nick will introduce himself and say a few words about the Geological Society.

# **Planning Guidelines, A Start to Filling the Gap in Landslide Hazard Management**

**Wendy Saunders**, *GNS Science, Lower Hutt*

**Phil Glassey**, *GNS Science, Dunedin*

With funding from the Foundation of Research, Science and Technology ‘Geological Hazards and Society’ programme, GNS Science has produced and released ‘Guidelines for assessing planning policy and consent requirements for landslide prone land’. The guidelines were drafted over a three year period with input from the Earthquake Commission, Ministry for the Environment, Ministry of Civil Defence and Emergency Management, New Zealand Geotechnical Society, Canterbury University, and local and consultant planners.

These guidelines are aimed primarily for land use planners and go part-way to filling a significant gap in guidance for assessing and managing landslide hazards. It is hoped that in future the New Zealand Geotechnical Society will produce complementary guidelines for the geotechnical profession.

As the guidelines are for land use planners, they provide basic information on landslides and their processes so that planners can gain a better understanding of the technical information they may read. This information includes definitions of the various types of landslides (shown in Figure 1), how landslides are classified, and rates of movement. Landslide processes and causes are also discussed and a number of illustrative examples are included (Figure 2).

Within the guidelines are a number of information boxes which provide key concepts and information. Included in these is a box on the landslide specialist, which explains ‘who does what’, as there is often confusion on what the various (but similar) position titles mean (i.e. geologists, engineering geologists, geotechnical engineers, geomorphologists).

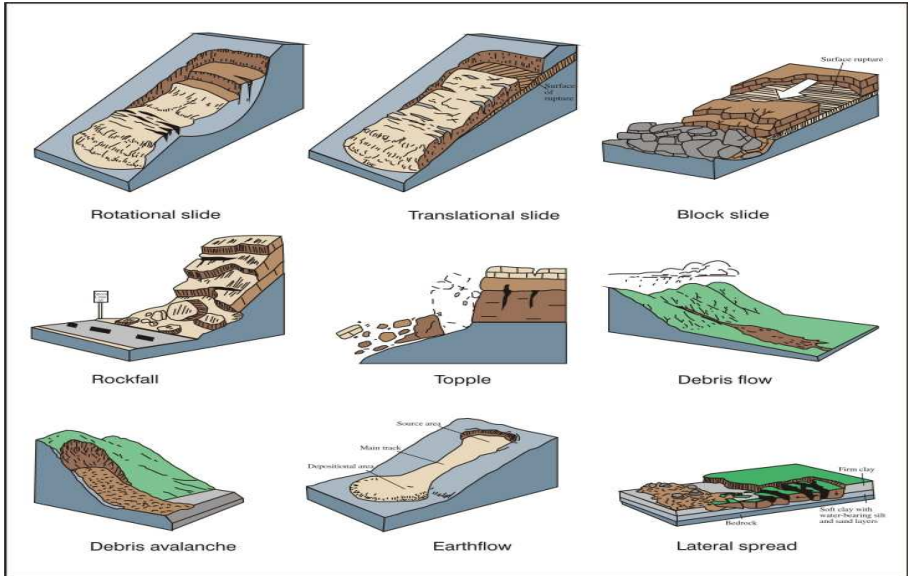


Figure 1: *Types of landslides (Modified from Highland, 2004).*



Figure 2: *Deep-seated rotational slide in mudstone (left) and slow-moving earthflow in the toe area (right), which occurred at Hunterville during the July 2006 rainstorms, causing the temporary evacuation of four houses. Photo: G.T. Hancox, July 2007.*

A section on landslide and hazard maps discusses the various types of maps that are used to depict landslide form and hazard (inventory, susceptibility, hazard, and risk maps), and gives examples of basic symbols commonly used to depict landslide features (see Figure 3). The benefits of using aerial photography to ascertain landslide history are described, with an example of the Abbotsford landslide, showing the area in 1942, 1970, 1979 (when the event occurred), and 1985, when the landslide had been regraded and landscaped.

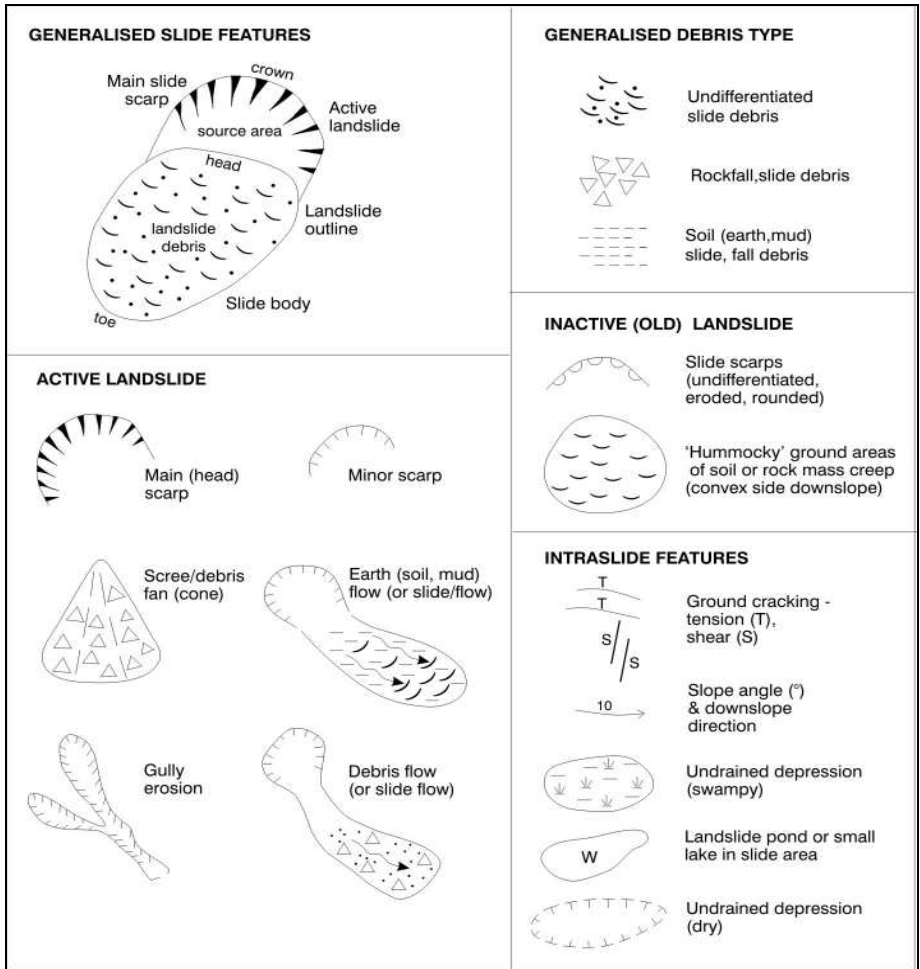


Figure 3: Symbols commonly used for mapping landslides (Saunders & Glassey, 2007)

It is important to distinguish between the types of maps that are commonly produced. These are defined by Chacón et al, 2006. A landslide inventory map depicts the locations and outlines of landslides. Small-scale inventory maps tend to show only landslide locations, whereas large-scale maps may distinguish landslide sources from deposits, classify different kinds of landslide and show other pertinent data.

A landslide susceptibility map ranks the slope stability of an area in categories that range from stable to unstable and is an attempt to depict where landslides may occur. A landslide hazard map includes zones showing annual probability (likelihood) of landslide occurring. An ideal landslide hazard map not only depicts the chances that a landslide may form at a particular place, but also the chances that a landslide from farther upslope may strike that place.

A landslide risk map shows the expected annual cost of landslide damage throughout the affected area and combines the probability information from a landslide hazard map with an analysis of all possible consequences (property damage, casualties and loss of service).

Landslide hazard analysis techniques and maps are explained, and summarised in a table (Figure 4). Heuristic or qualitative methods use expert interpretation of geological and historical information on landslides to estimate the susceptibility of areas to landslide events. A combination of qualitative and quantitative information forms the basis of relative hazard that can be classified into landslide susceptibility classes (e.g. high, medium, low).

Statistical hazard analysis methods use landslides, geological, topographic and vegetation information to calculate the susceptibility to landsliding or the probability of landslide events. By strict definition, determining landslide hazard requires determining the magnitude and frequency of landslide events. Determining the spatial and temporal extent of landslide hazard involves identifying areas which are, or could be, affected by a landslide and assessing the probability of similar landsliding occurring within a specified time period. Specifying a timeframe for the future occurrence of a landslide is difficult and often not possible. Landslide hazard maps, depicting the annual probability of a landslide occurring within an area are not common in New Zealand.



Type of Analysis	Technique	Characteristics	Scale Recommended		
			Regional 100K	Medium 25K	Large 10K
Inventory	Landslide distribution analysis	Analyse distribution and classification of landslides	Yes	Yes	Yes
	Landslide activity analysis	Analyse temporal changes in landslide pattern	No	Yes	Yes
	Landslide density analysis	Calculate landslide density in terrain units or as isopleth map	Yes	No	No
Heuristic	Geomorphologic analysis	Use in-field expert opinion in zonation	Yes	Yes	Yes
	Qualitative map combination	Use expert-based weight values of parameter maps	Yes	Yes	No
	Bi-variate statistical analysis	Calculate importance of contributing factor combination	No	Yes	No
Statistical	Multivariate statistical analysis	Calculate prediction formula from data matrix	No	Yes	No
	Probabilistic (Magnitude/Frequency)	Calculate prediction from inventory and time period using power law	Yes	Yes	No
Deterministic	Safety factor analysis	Apply hydrological and slope stability models	No	No	Yes

Figure 4: hazard analys in relation to mapping scales (after Soeters & Van Westen, 1996).

The frequency of landslide occurrence can be estimated from analysis of the landslide record and in particular the form of existing landslide features and their relationship to other landform features of known age. Given that determining the magnitude and frequency of landsliding is difficult, landslide hazard is often represented by landslide susceptibility, where only the predisposing and preparatory landslide factors are considered. Similar to concepts used for flood-prone areas, landslide susceptibility identifies general areas likely to be affected by landslides, but does not identify a timeframe within which a landslide might occur.

Deterministic methods use limit equilibrium (factor of safety analysis) applied to specific hydrological and slope models and are better utilised for site specific analysis.

Four over-arching principles guide the planning approach for identifying and assessing landslide risk, being:

1. Gather accurate landslide hazard information;
2. Plan to avoid landslide hazards before development and subdivision occurs;
3. Take a risk-based approach in areas already developed or subdivided; and
4. Communicate risk of landslides in built-up areas.

The risk-based approach which the guidelines promote is shown in Figure 5, and is based on the AS/NZS Risk Management Standard 4360:2004.

When assessing risk, the design life of the building, infrastructure or development must be taken into account. To quantify this, the guidelines refer to the S/NZS Loading Standards 1170.0:2002, which considers the expected lifetimes of various classes of importance for buildings. These range from Building Important Category (BIC) 1 (i.e. farm buildings, fences, structures with a total floor area less than 30m<sup>2</sup>) to BIC 5 (i.e. large dams). Timber framed houses fall into BIC 2, and high occupancy/ critical facilities have a BIC of 4. From this classification, a risk estimation and classification can be undertaken.

The second part of the guidelines concentrates on the planning processes that are available to manage the landslide hazard via policies, rules, and resource consent assessment criteria. This is supplemented by an appendix, which presents a table for assessing resource consent status depending on the AEP or qualitative acceptability of risk, and the BIC. Three consent status options are provided, being non-compliant, discretionary, and permitted. The other options

(controlled and restricted-discretionary) may also be used. It must be noted that the table can only be used as a guide if sufficient information on the AEP is available.

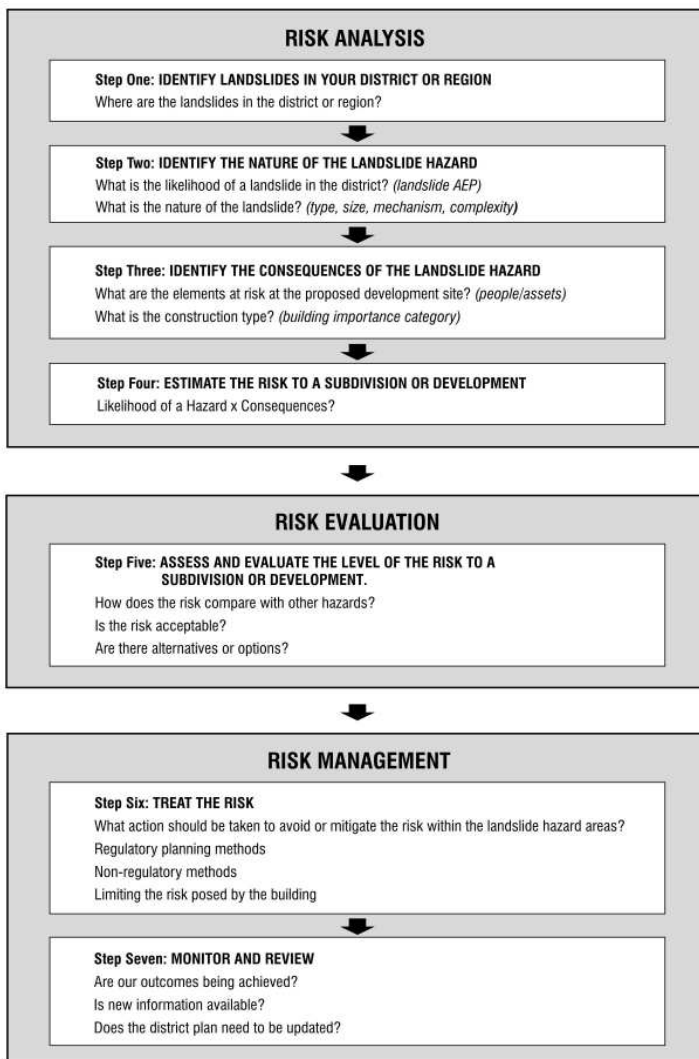


Figure 5: The risk-based approach promoted for the landslide hazard (Saunders & Glassey 2007).

Other appendices include a review of landslide terms used in legislation; a summary of how earthquake induced slope susceptibility was mapped for the Wellington region; the Australian Geotechnical Society method of qualitative landslide risk assessment; how slope instability and landslides can be mapped in structure plans and district plans; and a suggested checklist for slope stability assessments.

The guidelines are expected to be reviewed and updated as knowledge, technical standards and practices evolve, and as legislative changes occur. The guidelines are available to download at: <http://www.gns.cri.nz/services/hazardsplanning/downloads.html>.

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What is happening in Antarctic Research? Are there any interesting new mineral explorations programs in NZ? What is happening with coal bed methane? What is happening in Geothermal? Anything? What of the world of tectonics in the past 30 years here in NZ? What of the world of fossils? Is anyone studying the geology of carbon sequestration? Who is doing what in the marine realm? And when are the taxpayers going to find out something of interest for their funding? Be a Galileo or Copernicus and challenge the consensus (especially if you have retired or live overseas), government funding is pitifully small anyway. You may find more reward elsewhere, to do so you will need to write.

# TRACE ELEMENT CHARACTERISATION QUATERNARY SILICIC TEPHRAS FROM ODP SITE 1123: CHRONOSTRATIGRAPHIC AND PETROGENETIC IMPLICATIONS

*HASTIE AWARD RESEARCH*

Aidan Allan<sup>1</sup>, Joel Baker<sup>1</sup>, Lionel Carter<sup>2</sup> & Richard Wysoczanski<sup>1,2</sup> *School of Geography, Environment and Earth Sci. and Antarctic Research Centre, Victoria University*

Ocean Drilling Program Site 1123, situated *ca.* 1000 km east of New Zealand, recovered a near complete history of large-volume rhyolitic eruptions sourced from the Taupo Volcanic Zone (TVZ). Tephtras preserved in well dated sediments from Site 1123 can potentially be correlated to onland deposits and also pre-date the exposed volcanic record in the TVZ, allowing a more complete history of large-volume, explosive, silicic volcanism to be reconstructed and linked to high resolution climatic records. Chronostratigraphic correlations of widely dispersed tephtras are typically made using major element chemistry, but such correlations are hindered by a lack of major element variability in many silicic magmas, meaning that unequivocal correlations can be difficult to establish. However, trace element concentrations in silicic magmas can vary greatly as a result of varying degrees of crustal assimilation and fractional crystallisation, and offer greater potential for unambiguous correlations to be made. Microanalytical techniques such as wavelength-dispersive electron microprobe analysis and laser ablation inductively coupled plasma mass spectrometry applied to individual glass shards as small as 40  $\mu\text{m}$  in size allow a full range of major and trace element data to be obtained on multiple shards from individual tephtras. These data can be used for both chronostratigraphic purposes and also to examine the heterogeneity of magmas erupted during single and related eruptive events in order to elucidate the processes responsible for silicic magma generation.

Here, we present preliminary major and trace element data for Quaternary tephtra deposits at Site 1123. Results show that the geochemical fingerprints of individual tephtras can be used to critically evaluate the stratigraphy of the Site 1123 composite core. Incompatible trace element ratios (e.g., Sr/Y, Zr/Th) and chondrite-normalised REE diagrams are powerful discriminators of tephtras, even for tephtras that exhibit similar major element chemistry. The trace element record shows that some individual tephtras have previously been included in the composite record more than once. In particular, where the composite benthic oxygen isotope curve for Site 1123 shows a poor correlation between *ca.* 1.2 to 1.4 Ma with other Southern Hemisphere records, the trace element chemistry of several tephtras indicate that this is due to a previously unrecognised repeated section of  $\sim 4$  m in the 1123A and 1123C cores. The petrogenetic origin of TVZ rhyolites is still a matter of debate, with fractional crystallisation from a mafic parent and partial melting of meta-sedimentary crustal rocks being the end-member models. Strong negative correlations between fractionation indices such as Rb/Sr and compatible trace elements observed in some individual tephtras illustrate the dominance of crystal fractionation processes during magma evolution. However, many tephtras exhibit strong positive correlations between compatible and incompatible trace elements (e.g. Sr vs Pb) which cannot be generated solely by fractional crystallisation and require mixing between two or more discrete batches of magma that have experienced differing amounts of crustal assimilation and/or a crustal melt.

# TRILOBITE ROCK REVISITED SIXTY YEARS ON

**Bruce Hayward, Hugh Grenfell, *GeoMarine Research, Auckland***

Malcolm Simpson revisited Trilobite Rock with GSNZ's Auckland Branch in Nov 2007 - the first time he had been back since his momentous discovery nearly 60 years ago in Jan 1948. GSNZ's Wellman Fossil Prize in 1998 recognised the importance of Malcolm's find 50 years before.

As a 15 year old Nelson schoolboy, Malcolm was mad keen on geology and accompanied Prof Benson, Eric Heine and Jerry Meredith on a trip up the Cobb River to look at the asbestos deposit and graptolites (Mason and Watters, 1999). As they rested on a large rock at the head of Lake Halley, the predecessor of Cobb Reservoir then under construction, Malcolm whacked off a lump and thought he could see a fossil in it. Prof Benson thought it might be a bivalve, and relieved Malcolm of his specimen. Three months later, Prof Benson phoned Malcolm with the significant news that his fossils had been identified by Stubblefield in the UK as mid Cambrian trilobites - New Zealand's oldest fossil and rock.

When Malcolm left school he was persuaded not to pursue a career in geology and instead became an accountant. He is a keen botanist and has been a member of GSNZ Auckland Branch's Geology Club since the mid 1990s. It was on their recent 6 day trip to North West Nelson that Malcolm had the opportunity to renew acquaintances with his famous rock. It was a moving occasion for those of us on the trip to hear Malcolm recall the event.



*Malcolm Simpson stands on Trilobite Rock and reminisces to a group of Auckland Branch members about his chance discovery of it 60 years ago in Jan 1948.*

Reference:

Mason, A.P. and Watters, W.A. 1999: The discovery of the New Zealand Cambrian. GSNZ Newsletter 118: 15-20.

# Protecting New Zealand's Earth Science Heritage : ---- Natural Arches

**Bruce W. Hayward**, *Geomarine Research, Auckland*

I have taken a rather liberal definition of arches to include any natural opening through rock that has a roof over it and through which you can see light on the other side. Thus I have excluded cave systems that have more than one entrance. Natural arches or bridges are relatively uncommon earth science features both in New Zealand and overseas. Even more than their scientific and educational values are their scenic and aesthetic values much cherished by the general public. As a result most natural arches in New Zealand are in reserves and are under less threat from modification or loss than many features with less public appeal. Most of our best known natural arches are listed in the NZ Geopreservation Inventory (Fig. 1), but I am sure there are other excellent examples that should also be identified, so that they may be protected from the adverse effects of any future unforeseen developments.

## **NATURAL ARCHES, BRIDGES AND TUNNELS CURRENTLY LISTED IN THE NZ GEOPRESERVATION INVENTORY**

Assessment of significance. A = International, B = National, C = Regional.

### **Northland:**

- Piercy Island sea arch, Bay of Islands. Tunnel through greywacke. In Reserve, C.
- Poor Knights Islands sea arches and caves. Tunnels through Miocene ignimbrite. In Nature Reserve and Marine Reserve, B.
- Three Kings Islands sea arches and caves. Tunnels through Cretaceous spilites on Archway and SW Islands. Nature Reserve, C.
- Titoki natural bridge, Whangarei. 5 m high tunnel through basalt flow. In private land, B.

### **Auckland:**

- Keyhole Rock, Anawhata. Hole eroded through sea stack of Miocene volcanics. In Regional Park, C.
- Kotau Pt sea caves, Te Henga. Two caves pass through volcanic conglomerate. In Regional Park, C.
- Maori Bay sea cave, Muriwai. Sea cave that passes through point composed of sandstone. In Regional Park, C.
- Mercer Bay chimney and sea cave, Karekare. Sea arch opening into 80 m high skylighted chimney. In Regional Park, B.
- South Kakeno stack and sea arch, Rotoroa Island. Small tunnel through greywacke. In private land and crown foreshore, C.
- Taitomo Island sea tunnel and Kaiwhare Blowhole, South Piha. Narrow sea tunnels through Miocene volcanics. In Regional Park and private land, B.

### **Waikato:**

- Cathedral Cove, Hahei. High sea arch through ignimbrite. In Scenic Reserve and Marine Reserve, C.

Mangapohue natural bridge, Waitomo. 50 m high tunnel through Oligocene limestone. In Scenic Reserve, B.  
Ruakuri natural bridge, Waitomo. 50 m long, 30 m high tunnel through Oligocene limestone. In Scenic Reserve, C.  
Whiritoa sea arch and blowhole. Small sea arch through Miocene dacite. In Scenic Reserve, C.

**Taranaki:**

Tongaporutu sea stacks and arches. Through Miocene strata, B.

**East Coast:**

Cooks Cove hole-in-the-wall, Tolaga Bay. Sea arch through Tertiary sandstone ridge, C.

**Marlborough:**

Spy Glass sea arch, Haumuri Bluff. Sea arch through Cretaceous limestone. Private land and crown foreshore, C.

**Nelson:**

Goulard Downs karst and natural arches, Heaphy Track. Through Oligocene limestone. In Kahurangi National Park, C.  
Tarakohe limestone arch, NW Nelson. High natural sea arch created by tilting of one limestone pinnacle during 1928 Murchison Earthquake through Oligocene limestone. Arch slightly modified for road passage. In private ownership, C.  
Wharariki Beach sea arches, NW Nelson. Numerous tunnels of various sizes through Cretaceous conglomerate. In Scenic Reserve, B.

**West Coast:**

Honeycomb Hill Arch, Oparara River. 50 m wide, 50 m high tunnel through Oligocene limestone. In Kahurangi National Park, C.  
Moria Gate, Oparara River. Tunnel through Oligocene limestone. In Kahurangi Nat. Park, C  
Oparara Arch, Oparara River. 200 m long, 40 m wide, 50 m high tunnel through Oligocene limestone. In Kahurangi National Park, B.

**Otago:**

Jacks Bay sea arch & blowhole, Catlins Coast. High sea arch through greywackes. In Scenic Reserve, C.  
Lovers' Leap sea arch, Otago Peninsula. Sea arch through Miocene volcanics. In Scenic Reserve, C.

**Southland:**

Green Islets sea caves and arches. In Fiordland National Park. B

**Status**

Because most natural arches in the inventory are in reserves or other form of public land they are generally well protected. Two in the inventory that might need greater protection are Tarakohe limestone arch in North West Nelson and Titoki natural bridge in Northland. In recent years the view of Tarakohe arch from the road has been encroached upon by fishing gear and boats on the reclaimed land between the arch and the boat harbour. This view could



be considerably more degraded if larger boats or even buildings were placed in the line of view. Maybe this view shaft needs to be protected in the District Scheme, just like the view shafts to some of Auckland's volcanoes. Only last year the local Council chipped away at the inside of the arch to slightly widen the road. The feature clearly needs to be scheduled for greater protection in the District Scheme.

Titoki natural bridge is possibly the only arch through a lava flow in the country. It is on private land, with a farm road running over the top. Dairy cows graze the paddocks on the surface of the flow, with the small stream that flows under the bridge deeply incised into the flow forming a narrow vegetated "gorge". Throughout Northland, small streams are being dammed to form lakes to supply water for dairy farms. This is one potential threat to the natural bridge. Several options exist for the long-term survival of, and greater public access to, Titoki natural bridge. The vegetated gorge would provide a natural route for a short walking track to the bridge from the road, and the land could be either purchased for reserve or be protected with a QEII Open Space Covenant. Either way there would be no impact on the current farming activities.

### **Request for information**

As you can see the number of natural arches listed in the inventory (and consequently in District Schemes) is relatively small. If you know of any additional examples that you consider are worthy of inclusion please send information about them to me at [b.hayward@geomarine.org.nz](mailto:b.hayward@geomarine.org.nz).

The "**5th Argentinian Symposium of the Upper Paleozoic**" will take place from April 21st to 23rd, in the *Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"*, Ciudad Autónoma de Buenos Aires, Argentina.

All the information concerning this event, the first circular and the online registration form could be found in the website of the Symposium <http://www.vsaps.com.ar/index2.html>

The deadline for Abstract Submission is February 15th.

We are looking forward to your participation.

"5th Argentinian Symposium of the Upper Paleozoic" Organising Committee



### Oil and Gas Round-up Oct2007-Feb 2008

Don Haw, Wellington

#### Pohokura and Beyond

The Pohokura gasfield in Taranaki, discovered by Fletcher Challenge in Feb 2000, came on stream in August 2006 and is now producing. It is now operated by Shell (48%), within a joint venture with OMV (26%) and Todd (26%) and is New Zealand's second largest gasfield. It is now considered to contain 900 petajoules of gas and 43 million bbls of condensate, although this figure is probably now revised. (Note - one petajoule is approx 1 bcf) The field is being developed from a single unmanned offshore platform (six wells to be drilled) with, in addition, three deviated wells from an onshore location, which have already been completed. Production started in Sept 2006 from the onshore wells and some of the offshore wells must also now be producing.

This gasfield has had a remarkable gestation from its early recognition (by numerous geologists) that some attractive major structure probably existed offshore from Manganahewa in the early

nineties, but which was not committed for drilling until Fletchers took up the challenge (!) in 2000 to do so. The resulting discovery was essentially a gift to Shell, who bought out FCE and took over a few years later. Remarkable !! Based on the prognosed paleogeography it really didn't need too much imagination to evaluate the Eocene Kapuni sandstone formation (the reservoir) would improve northwestwards, a hypothesis on the minds of several of us.

The other interesting development this year is the decision by Todd to market its own oil production from Pohokura by shipping to market its share, using the chartered vessel the "Savannah" (at about 150,000 bbls per trip) Talk about going it alone. Shell must have been peeved.

Another remarkable facet of Pohokura was the Todd project in early 2007 (as sole licensee now of the adjacent onshore permit) in the drilling of the onshore Manganahewa 3 well to

#### *Membership of the Special Interest Group on Oil and Gas.*

*The GSNZ needs members. It also needs new members who actively involved in industry of all age groups and disciplines. I hope this new Special Interest Group will appeal to the many "oilmen" (and women !) out there who enjoy getting together to share their knowledge and ideas. It should also bring the Industry people closer to the other earth science disciplines, which in the past has not been the case. We encourage you to belong to the GSNZ (see membership application -front cover) and also join this special interest group (no cost). If you are interested in this SIG do make contact with me.*

[dhaw@orcon.net.nz](mailto:dhaw@orcon.net.nz)

establish whether or not the northern Mangahewa “field” is linked to the offshore Pohokura field. If so, might this add another 250 billion cu ft gas reserves to Pohokura. Precise results are not known but it is clear the well was very successful and Todd have openly said Mangahewa is now its major asset. Mangahewa 4 is planned for this year. Consider this also - - Todd bought the Mangahewa field (licence) , with McKee, from Shell in 2002. Did Shell not appreciate its value. ??

### Karewa

This small (?) offshore gasfield, 50 kms west of Kawhia, is now operated by Todd (100%), and is our most northerly gas discovery. Todd have intimated they might produce Karewa and channel some 250 billion cu ft of it for CNG which would be shipped to New Plymouth to enter the pipeline system. For a one well ‘field’ they seem remarkably confident. Production would be via sub sea completions, using a floating buoy system. Currently the reserve is unknown and might be much more significant than hinted at, because of the attractive submarine fan reservoir sands in the Upper Miocene/Lower Pliocene. Detailed 2D and 3D seismic has been completed, and a second well is planned to be drilled by the Ensco 107 jack up rig this year.

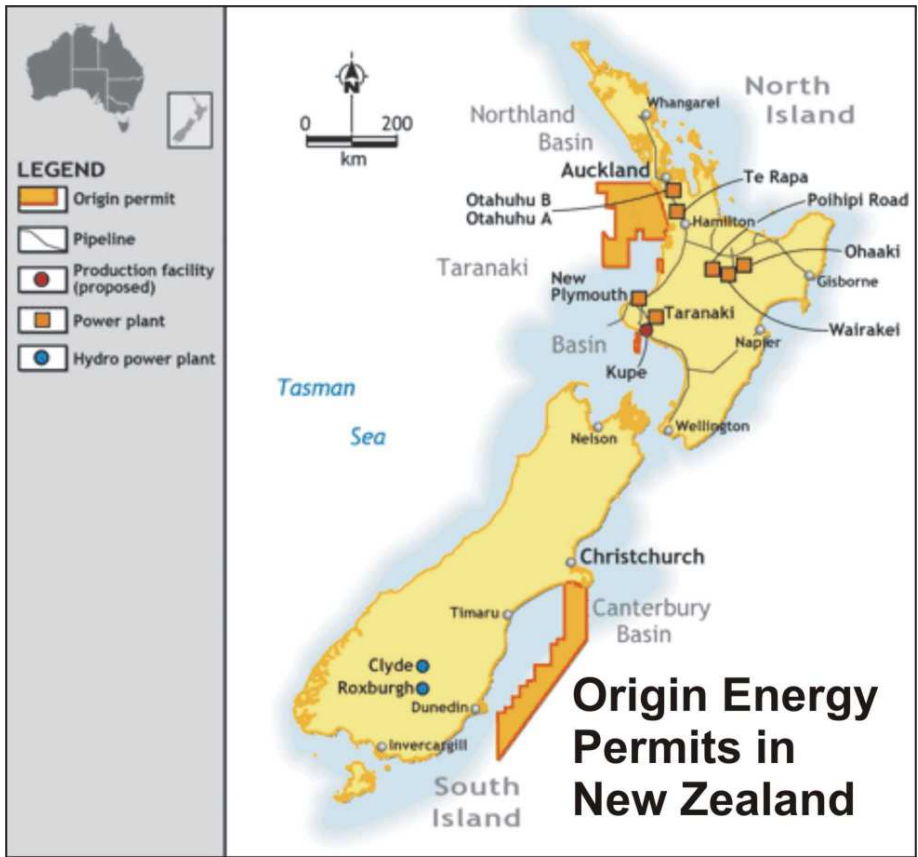
### Origin Energy (see adjacent map)

It is noticeable how active Origin Energy, a major integrated Australian Oil Company is becoming in New Zealand. No doubt necessary of course because of their gas sales commitments. Their exploration work programme merits following closely and three permits they are exploring seem particularly interesting. All this is in addition to their major commitment at Kupe.

a) With OMV they are exploring the offshore Northland Basin in PPL 38618 and 38619, a huge area north and west of the Todd Discovery at Karewa, which has been already well covered seismically by Conoco (and Todd) in their major exploration programme in this basin the mid nineties. The OMV/Origin JV completed approximately 3500 kms of new 2D seismic and some 250 sq.kms of 3D last year, fulfilling their first year work commitment. Now they have to decide whether to drill or drop, prior to the end of April 2008. Potential targets could include paralic late Cretaceous sandstones, Palaeogene fluvial and marine sands, and Miocene submarine turbiditic fan sands. Considering the size and scope of this “opportunity” this outcome will be watched closely by the industry.

b) With OMV and Todd they are exploring offshore northern Taranaki in PPL 38484 in which Moana-1 was drilled in November 2007 with no commercial success although I am sure some vital geology was revealed about the mid Miocene submarine fan sands which were probably the target.

c) They are evaluating the large shelf edge permits PPL 38262 and 38264 in offshore Canterbury, which are clearly a follow up to the tantalising Cretaceous leads found some years ago on the continental shelf further north west.



### OMV

OMV (Austria's Multinational Oil Company) and a relative newcomer to NZ, is now a major player here in wide ranging series of operations. Although they entered the NZ scene with a 10% share of Maui in 2002, their expanding role was predictable with the acquisition of Germany's Preussag, which had, through an earlier deal with Fletchers a 26% stake in Pohokura. Another Fletcher gift it seems ? Now this company is the third largest producer in NZ. and with Pohokura on stream it is achieving 12,000 boe per day, from both fields. Their exploration activity comprises twelve exploration licences and they are Operator in seven of these. This company means business.

### The Great South Basin

Seismic surveys started in December for both Exxon/Todd, and OMV. 'State of the art' seismic vessels, the Western Trident (for Exxon) and Discoverer 2 (for OMV) are acquiring 2D and 3D seismic in their permits, which cover practically the whole basin. Some Southland companies are already no doubt reaping the benefits.

TransOrient Petroleum

TransOrient a newcomer to the NZ scene is causing excitement in the northern onshore East Coast basin. Dave Bennett (their CEO) and an experienced explorer (of NZOG fame) is reporting on a venture in the structurally complex terrain NW of Gisborne. The Company is hoping to find commercial oil (?) within shallow sandstones, overlying the fractured Whangai-Waipawa Formation which is known, as well, to be a likely source rock. He admits the the play is unconventional and high risk. We wonder what the configuration of the trap is going to be. Because of the oil seeps the area has been a tempting playground (!) for many years.



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## Geoeducation Group

Jenny Pollock, Nelson [jenny.pollock@xtra.co.nz](mailto:jenny.pollock@xtra.co.nz)

In 2006, at the GSNZ conference at Massey University, I was asked to take over from Daphne Lee and coordinate the Geoeducation group. I am a secondary school teacher; one of a rather rare breed that actually teaches Geology or Earth Science right up to Year 13 (7<sup>th</sup> form). I am lucky to have been involved in the new curriculum, especially in helping revise the “Planet Earth and Beyond” strand, which contains Earth Science. I am also the current President of the New Zealand Association of Science Educators (NZASE), and so hopefully that role will help make sure that Earth Science, as well as the rest of the curriculum, is well resourced.

Advice from Daphne and others, plus the submission from GSNZ, largely helped shaped the PEB strand in the new curriculum. We realized that the direction needed to change towards a more Earth Systems Science approach, and I signaled this new direction at the 2006 conference. In Tauranga in 2007 I showed the delegates the direction that we had gone in and the rationale behind those changes. We were concerned that very little Earth Science was taught as part of the Science curriculum and I was especially worried that New Zealand students could leave high school knowing very little about how their planet worked.

The next stage is implementing these changes. We have a large geoeducational group and I have asked them to help design or source resources that teachers could draw on. ***To this end we are planning to have a website to centralize such resources and that teachers can go to. We are in the process of deciding where this website will be sited. When this is set up we will signal the link via the GSNZ, RSNZ, NZASE and MoE data bases and websites.***

At the moment I am only doing work for schools. I would welcome any input as to how we can help the tertiary sector as well.

# ANOTHER GEOMAP PROJECT

**David Kear, *Whakatane***

Enthusiasts in the Forest of Dean have a geomap project well under construction. Their part of England, between the Rivers Severn & Wye, stands steeply above the surrounding region. It was the site of the earliest iron mining at the dawn of Britain's civilisation. The high-grade hematite ore was found as a thick deposit on the walls of limestone caves, easily and cheaply prised off, without explosives or rock breaking, using only something like a geologist's hammer. It was shipped by Phoenician (or subsequent) traders to eastern Mediterranean iron masters. That was at the time of Egyptian Pharaohs, when the Iron Age was superseding the Bronze Age, and allowing first Greece, and then Rome, to become supreme. Subsequently, the "Forest" became a significant coal mining region too.

Not surprisingly there are many parallels between the people there and those of NZ's West Coast – they are fairly religious in the normal use of that word, commonly chapel-goers; they are proud of their origins; they are fiercely independent (they have run their own mining industry without any interference from Westminster's laws, since the time of Edward I); they are as rugged as their topography; they have always had a Labour MP; and their real religion combines "Pubs" and "Rugby" – Union of course.

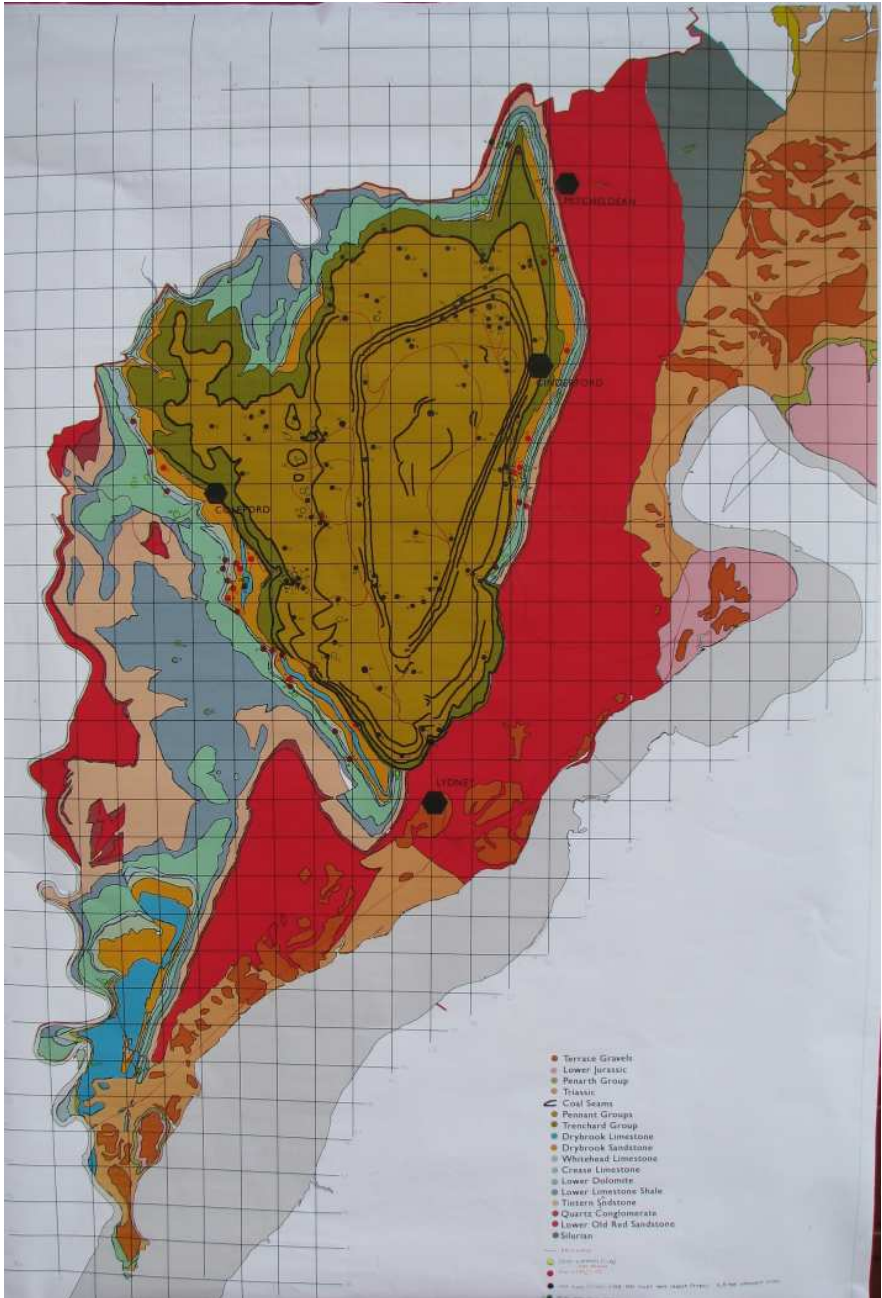
Because iron was so important for the army, and great stands of oak have always been available for the Navy (Nelson's flagship HMS *Victory* was made from "Forest" Oak), the Forest of Dean was acknowledged as the industrial heartland of Britain, up until the time when the Industrial Revolution was demanding more room than was available in the restricted area of the "Forest". It is said that the first order in the list for the Spanish Armada, should they have got ashore, was to go and occupy the Forest of Dean.

Clearly geology is important in an area like this, and indeed one of William Smith's earliest geological maps was of the "Forest". An enthusiastic Group have decided to construct a geological map, as a permanent outdoors feature, that is actually made of the appropriate formational rocks represented. They have an equally enthusiastic sculptor to make pieces that fit (with a minimum of sculptural licence!). The photograph shows the project under construction, and being assembled inside, before its future transfer outdoors. Britain has the advantage that dips, even in Paleozoic formations, are typically low, so that three-dimensional models like this are so much easier to construct than they would be in NZ (but perhaps they are not impossible in chosen areas and sequences here?).

The Forest of Dean Local History Society has been awarded a grant of £107,200 to make the 900 square foot rock map that "will be flat and polished, but not to the extent that the public cannot walk on it". It will be sited appropriately on an area opposite the "Miners Memorial" – a future tourist attraction which is due to be finished in March 2008.







## **GEOLOGICAL RESERVES SUBCOMMITTEE 2006-2007**

**Bruce Hayward**, *Auckland*

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*Subcommittee: Bruce Hayward (Convenor), Fred Brook (Northland), Hamish Campbell (Wellington), Dave Crow (Dunedin), Tony Edwards (Wellington), Roger Fagg (Timaru), Hugh Grenfell (Auckland), Mike Johnston (Nelson), David Johnston (Waikato), Jill Kenny (Auckland) and Alan Palmer (Manawatu)*

During the year, the Subcommittee kept its usual watching brief for threats to or management issues involving our country's important earth science sites. Among the issues demanding attention have been:

1. Submission in support of Proposed Auckland City District Scheme, Hauraki Gulf Islands section, particularly the scheduling of the best parts of Stony Batter for protection as heritage areas. This follows several letters from us over the last 12 years concerning damage to the field through boulder clearance to create vineyards.
2. Enquiries to Environment Canterbury and Hurunui District Council re removal of saurian-bearing boulders from Waipara River bed.
3. Submission opposing consent request to build multistorey housing on crest of Orakei Basin tuff ring, Auckland and subsequent consultation follow-up.
4. Letter to NZ Herald mourning the impending private sale or subdivision and loss of opportunity for the protection of Pukaki Lagoon crater, Mangere Airport (see later).
5. Letter to Manukau City Council advocating protection for or purchase of last three remaining more intact volcanoes in Auckland Field – Pukaki Lagoon Explosion Crater (see below), Puketutu Island (see below), and Crater Hill.
6. Submission on Auckland Manukau Eastern Transport Initiative to avoid further damage to Mt Wellington, Panmure Basin, Orakei Basin and site of Purchas Hill.
7. Letter to Water Care Services in support of their impending agreement with Kelliher Trust to restore Puketutu Island Volcano, Manukau Harbour and donate as regional park, and subsequent follow-up meeting.
8. Letter to Manukau City on damage done to Waiouru Tuff cone and application of 1915 Act to these earthworks.
9. Letter to Franklin District Council expressing concern at continued quarrying of shell ridges of Miranda Chenier Plain. Follow up discussions on how to improve protection.
10. Letter to Rotorua District Council advocating better protection for Mamaku tors. No response.
11. On-site consultation with Auckland City Council officials over future of Purchas Hill site, Mt Wellington; and damage to Mt Robertson, Otahuhu..
12. Letter to Minister of Conservation expressing disappointment that Rotorua geothermal fields were dropped off at the last minute from the tentative list of World Heritage areas.

### **Good news stories**

1. Auckland City purchased more private land near the top of Mt St John to further protect this volcanic cone.
2. News that Auckland City had purchased 1 ha of private land (formerly crown reserve that had been sold off many decades ago) to protect the pond in Grotto St, Onehunga. The pond is an enigmatic, vertical-sided depression within a One Tree Hill lava flow that was mapped and commented upon by Hochstetter in the 1859. Geologists cannot agree on its origin – it contains diatomite sediment and so has been in existence for thousands of years and may have been formed as a roof collapse over actively flowing lava which carried away the debris.
3. Opening of extension to Rotary Walk at Pakuranga with bridge to protect St Kentigerns cliffs site with noticeboard explanation of its geological importance.
4. Late in the year it was announced that the inside slopes of Pukaki Lagoon explosion crater had been purchased for a public park for over \$6 million by Manukau City Council.
5. Auckland's Water Care announced proposals to purchase Puketutu Island volcano from the Kelliher Trust, progressively donate it to Auckland Regional Council for a regional park, and over the next 30 years restore some of its former volcano shape by using it for disposal of waste solids from Auckland's sewage treatment plant nearby (a proposal suggested by GSNZ 10 years ago).

### **World Heritage proposals**

Last year the government solicited suggestions for sites that New Zealand might put forward for World Heritage status. GSNZ supported DoC suggestions of Kahurangi National Park and Oamaru and added Rotorua geyser fields, White Island and Auckland Volcanic field. An independent advisory group prepared a list of 14 for government to announce, which included all those we proposed or supported except Oamaru. At the last minute Cabinet revised the list to those they thought would be simplest and least contentious to nominate. Whakarewarewa and Waimangu-Waiotapu were dropped, and Auckland and Kermadec Islands-seamounts-White Island were placed near the bottom of the priority list. Kahurangi National Park, including Farewell Spit, Pupu Springs and Canaan karst area are the highest priority of the natural history sites. Thus over the next 10-20 years we can expect a number of additional New Zealand sites with high earth science values being nominated for consideration by the world body.

### **Geopreservation Inventory**

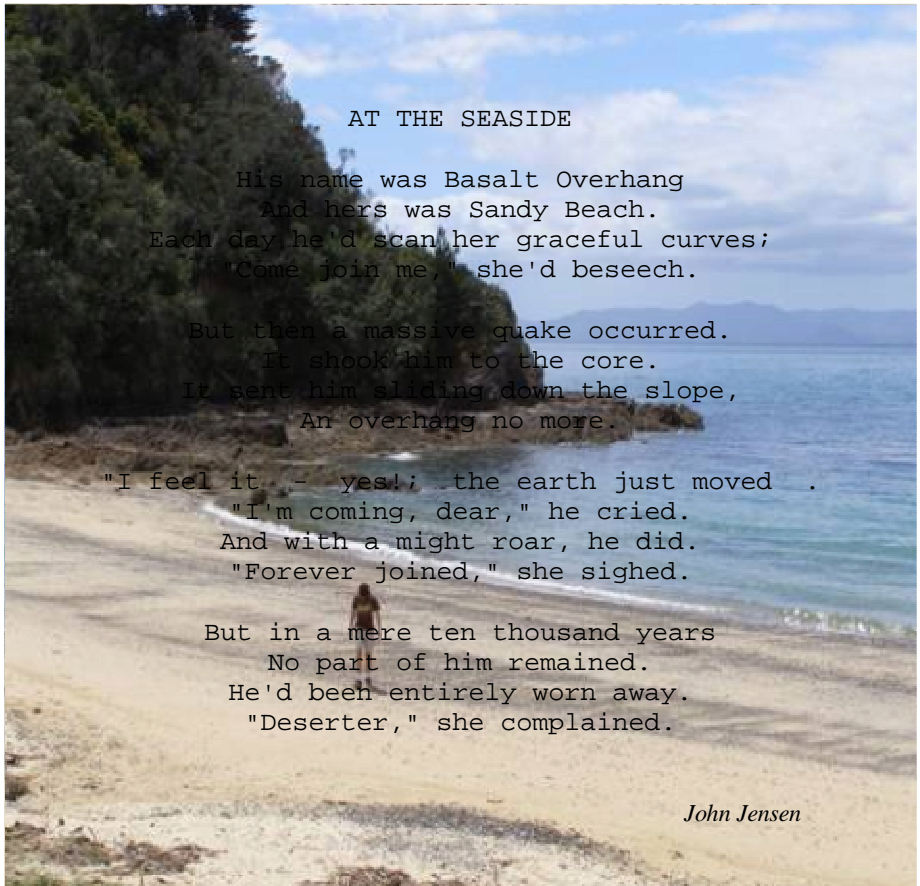
We continue to receive requests from local authorities, consultants and individuals for information from the Geopreservation Inventory.

Forty-five sites have been added to the Inventory during the year: Auckland: Cochranes Gap accretionary lapilli; Grotto St pond; Hamlins Hill rhyolitic tuff; Hamlins Hill sandstone cliff; Kidds Beach Pliocene conglomerate; Kidds Beach shell spits; Little Rangitoto lava flow; Little Rangitoto rootless lava flows; Musick Pt cannon-ball concretions; NW motorway lava flow (Western Springs); Oakley Creek waterfall; Okahu Bay bay-head fill; Okura River estuary shell spit; Ponui Island pillow lava; Puka Street grotto; Rangitoto pillow lava lobes; Tahuna Torea cusped foreland and shell spit; Watchman Island. Marlborough: Pelorus Bridge river gorge; Tory Channel East Head; Whangarae Bay estuary and sand spits, Croiselles Harbour; Waikato: Kellyville crater diatomite; Kellyville crater tuff; Puketoka conglomerate; Waipapa Rd columnar-jointed ignimbrite; Wairepapa South ignimbrite tors; Wellington:

Battery gravel barrier; Kerosene Bluff black shale; Kourarau freshwater fossils; South Waiohine fault bulge; Tinui taipo; Uruti Pt Miocene flysch; Westland: Heaphy River estuary; Canterbury: Denny Stream alluvial fans; Diamond Slip bipyramidal quartz; Double Hill roche moutonnee, Hinds River Tertiary strata; Lake Heron glacial valley; Mt Sugarloaf roche moutonnee; Mt Sunday island; Pudding Valley mouth terraces and ice-sculptured terrain; Redcliffs Stream Tertiary sequence; Stour River West Branch U-shaped glacial valley; The Brothers volcanic plug; Waterton coastal dongas.

The number of geological sites and landforms in the inventory now stands at 2700 (2655 in 2006). We thank Murray Baker, Alistair Jameson, Kerry Stanaway, Patricia Riddolls and all those who have nominated and supplied information about these added sites.

## POETS CORNER



### AT THE SEASIDE

His name was Basalt Overhang  
And hers was Sandy Beach.  
Each day he'd scan her graceful curves;  
"Come join me," she'd beseech.  
But then a massive quake occurred.  
It shook him to the core.  
It sent him sliding down the slope,  
An overhang no more.  
"I feel it - yes!; the earth just moved .  
"I'm coming, dear," he cried.  
And with a might roar, he did.  
"Forever joined," she sighed.  
But in a mere ten thousand years  
No part of him remained.  
He'd been entirely worn away.  
"Deserter," she complained.

*John Jensen*

## **Our New President**



Nick was born in Luton, England in 1959 and grew up in Northampton and Watford. His interest in geology started at age 8 when his father pulled an ammonite out of a clay bank on a family Sunday drive. Over the years, the fossil, rock and mineral collection grew through annual family holidays to Norfolk, the Isle of Wight and Cornwall. Another inspiration was the bow-tied Germanic Professor of Engineering Heinz Wolff of Brunel University, who, in the 1970s was engaging in science outreach for the British Association, long before the concept became fashionable.

Watford has been described by a Lonely Planet editor as "the sort of place that makes you want to travel". In 1976 Nick spent a month at the Summer Science School at the Weizmann Institute of Science, Israel. Scrambling around the Dead Sea Rift did no harm whatsoever to a future career in geology. After graduating from Imperial College London in 1980, Nick went to Stanford University where he did a PhD under Bob Coleman (of ophiolite renown) on the structure and metamorphism of part of the Klamath Mountains, California. Nick is one of the few graduate students to have had his PhD thesis translated into jive ("transistalarian cherts", "clunker honky codes" etc). He moved along strike to the University of British Columbia for a two year postdoc with the geochronologist Dick Armstrong. Nick finally made it to New Zealand in 1986, taking up a three year postdoc at the NZ Geological Survey's Dunedin office. Before this, Nick has already met a few Kiwi geologists including Rick Sibson, Doug Coombs, John Bradshaw, Chuck Landis, Graham Bishop and Kate Pound.

Nick's postdoc work on structure and terranes of the Otago Schist was the launching pad for his subsequent New Zealand career. He got a permanent job with NZGS in 1989 where he

worked alongside Bill Watters and Alva Challis. Being a petrologist in Lower Hutt exposed him to a broad range of geological problems and it was there that he began his research associations with Andy Tulloch in the Median Tectonic Zone, Hamish Campbell in the greywackes and Rick Herzer in offshore regions. In his 21 years with GNS Science and its predecessors, Nick has used petrology in a wide range of work, having been to Antarctica twice, participated in three cruises, been involved in QMAPs Murihiku, Rotorua and Hawkes Bay, the UNCLOS EEZ programme, Second Manapouri Tunnel Project, and various client work for oil and mining companies. With his GNS Science colleagues, Nick has developed of the concepts of the Median Batholith and Zealandia. He is the Curator of the National Petrology Reference Collection and has overseen the creation of the PETLAB database. He has been a member of the Geological Society of New Zealand since 1986 and has served on the National Committee since 2002.

## The 2008 GSNZ Committee



*From left to right Rochelle Hansen, Kate Wilson, Kari Bassett, Janet Simes, Keith Lewis, Jan Lindsay, Nick Mortimer, Scott Nodder, David Skinner. Inset: Alan Palmer, Kerry Stanaway.*

# Douglas Windsor Lewis (14.10.1937–14 2.2008)

## David Smale

At the funeral of Doug Lewis on Monday 18th February, his wife Jo provided the following as background to the eulogies of friends, relatives, and colleagues.

Doug was born in Rio de Janeiro, Brazil, in 1937. He was the only child of Windsor and Veora Lewis from Pennsylvania and Up-State New York. He spent only his first three months in Brazil, as the family moved to London, England, to remain there until the outbreak of World War II in September 1939. The family were lucky to be passengers on the last passenger ship out of Europe, the S.S. “Normandie”, which was impounded on reaching New York City.



The family home until 1945 was in White Plains, Bronxville, on the outskirts of New York City, as Doug’s father’s Westinghouse office was in central New York City.

During the five years living there Doug started kindergarten school; in fact only his primary and tertiary education was in North America, the rest was in London and Paris.

In 1945, immediately after the War, Doug and his mother were the first civilian mother and child to go from the USA to England, the pair flying aboard Prime Minister of England Winston Churchill’s “sea-plane” using his private cabin suite, which had berths for sleeping. Doug’s father had previously returned to London. Schooling was as a boarder at a private preparatory school for boys in London, and an unhappy experience all round: the only American, and boys will be boys. Severe food rationing was in place also.

In 1949 the family was transferred to Paris, where Doug attended the American School through his high school years, completing the final two years together. He liked to tell how forever he remained confused between Shakespeare’s “Hamlet” and “Macbeth”, as he studied them together, one per class. The Paris years were extraordinary ones for a teenager. Their home was a chateau near Versailles, which had been Brigade Headquarters to the German army, an orphanage, and then the Lewis home. Over the succeeding years the family resurrected both the chateau and the 26 acres of grounds. As Doug’s father was a cog in the industrial rebuilding of Western Europe, many very influential and important people flowed in and out of the Lewis family home and life, Doug as a bystander absorbing the experience. There was also much travel in Europe, which at that time was a ravaged post-War region.

In 1955 the family returned to USA, Windsor to work again in “the salt mines” (as he called



New York City), Veora to establish their Connecticut home, and Doug to commence his undergraduate course at Cornell University. The first year followed his father's course through Electrical Engineering, but thereafter he majored in Geology. His Master's degree was taken at the University of Houston, Texas, with his thesis area the deserts of New Mexico, where he spent the summer working alone with summer heat, snakes, and other wildlife as companions.

It was during his final year in Houston that a "blind date" meeting resulted in a change in his studies from his hoped-for oceanography to sedimentology. The reason was that his to-be wife Jo was a New Zealander who was working as a Physical Therapist in Houston, Texas, but who was restricted to where she could work in the USA and certainly not in California at that time (La Jolla Oceanographic Institute). So, after their marriage at the Lewis Connecticut home in 1961, they went to Montreal, Canada, where Doug studied for and graduated with his Ph.D majoring in Geology in early 1965.

During 1964 there was the happy event of the birth of their daughter Ruth Hope in Sharon, Connecticut.

In May 1965 the small family moved to Christchurch, New Zealand, where Doug gained a lectureship at the Canterbury University College as it then was, pre becoming a full University entity. The intent was a 3- year stint as the university paid for the full move to Christchurch. The actuality was that the geological knowledge of New Zealand had barely been scratched and was a haven for an aspiring geologist, so Doug remained at the university until retirement in 1998. He became a Reader (the terminology of the day) in 1981 - synonymous with Professor at a later date.

In 1966 their second daughter, Myfanwy (Myffie) Iona was born, which completed the family.

During his career Doug was awarded the McKay Hammer which entitled him to a 6-week survey of geologic features and mines in Western and Northern Australia. For approximately 5 years in the early-mid 1980s he was Head of the Geology Department at the University of Canterbury. He attended and presented papers at international conferences, participated in field trips associated with said conferences, and led some field trips to new Zealand. He wrote three text books on Sedimentology, the last two partnered by an ex-student. After retirement another ex-student established the 'D.W. Lewis Award' in the Geology Department at Canterbury University, a surprising and very much appreciated gesture. Overall a most satisfying career taking him and his family to many most interesting places both in new Zealand and internationally as part of study leave and his own research projects. His main focus was the limestone formations and trace fossils for which he was well renowned.

His retirement years were spent enjoying his family, especially his two grand-daughters, international travel, and his home in Wanaka and (more recently) Nelson.

## REVIEWS

### Geosciences 07

*Geological Society of New Zealand and New Zealand Geophysical Society joint annual conference - launching International Year of Planet Earth 26-29th November 2007, Baycourt Community and Arts Centre, Tauranga*      *Observations and thoughts -*

David Smale, *Nelson*

#### The Venue

Holding the conference in Tauranga was a popular idea, and led to the greater number of registrants (250?) than expected (around 200). A GSNZ conference has not been held there before, nor has a NZGS conference, and members responded enthusiastically, with field trips to Bay of Plenty and Okataina hazards, White Island, and Mayor Island. Unfortunately two field trips attracted limited numbers and were cancelled (I had booked for one of them). For our society the field trips are an integral part of the conference experience.

Baycourt in central Tauranga served very satisfactorily as the venue. It was pleasant, with good facilities, and with adequate space for the number of delegates. The Centennial Theatre was large, and the sound system and the Power Point presentation facilities seemed to be without problems (other than which buttons for the speaker to press to get things under way). I wonder, however, who decides on the spacing between the rows of seats; it must be someone with very short legs (perhaps the same person employed for the purpose by many airlines - and the Taupo venue, I seem to remember). The Terrace Room was considerably smaller, but once the sound system was brought in it was quite adequate. The lower part of the screen was difficult to see for all but those in the front row in the middle, but this could sometimes be overcome by a little judicious shifting of chairs.

#### Conference Symposia.

The Gamble Symposium, to honour John Gamble on his 60th birthday, was on Arc Volcanism at SW Pacific Convergent Margins. We were privileged that he came all the way from Ireland, though perhaps there was an element of mutuality. This was the main focus of the first day of the conference, which also included Paleoclimate and Paleontology.

Geohazards was the main topic for the second day, which also included Geoeducation and General, and Tectonics.

TVZ rifting was the topic of the final day, with rounding off of Tectonics, Sedimentology, and Gas Hydrates and Basins.

The more general sessions on Geoeducation and Paleoclimate were well attended. In part this reflects growing concern about the teaching of science in schools. The bad press and low status science sometimes has must be putting off good students from a science career, and something to redress the balance is important. I recently heard as part of a public display a woman telling her son of about 9 years how scientists were people who built bigger and bigger bombs to kill more and more people.

Concern about climate change caused quite an influx to the Paleoclimate papers, and it is good to see some of the research being done in the field. For me a high point was to hear Helen Neil talk of her investigation into the record of severe storms over the last millenium. It was good science, well presented, and of considerable relevance at a time when every natural catastrophe seems to have been caused by mankind burning too much fossil fuel. Her study of oxygen isotopes in speleothems and corals showed convincing correlation with historical storms and subtropical gyre circulation respectively, and thus allowed extrapolation to prehistoric events. Interestingly the biggest storms were more common and the subtropical gyre more intense in periods prior to the 19th and 20th centuries. This carries a warning that the last century of instrumental records often underestimate the frequency and magnitude of catastrophic events and may not be appropriate records on which to model change and risk.

### **Posters - a dedicated session?**

Posters are a worthy complement to the oral papers. The judges of the best student posters made a general comment that the posters tended to contain too much text. Posters are essentially graphic, and there should be little more text than that necessary to explain the graphics. There was no dedicated poster session for delegates to look at the posters; this had to be done at morning and afternoon tea or lunchtime. Authors may have made a point of standing by their posters, but it obviously could not be guaranteed. It is valuable to have a time when the authors are known to be present that is not time for general conversation or catching up with colleagues. The lack of a dedicated session tends to devalue the posters.

### **The 15-minute time slot**

The large number of papers offered clearly presented a problem for the organisers, and necessitated choosing between (presumably) three options: having a third set of concurrent sessions; reducing the time for each paper; culling papers offered. The option chosen for this conference was to reduce the time from the traditional 20 minutes to 15 minutes. Culling papers is rather arbitrary, and probably undesirable, when the organisers cannot be in a position to make such a value judgement.

A 15-minute time-slot emphasises the difference between the good presentation and the not-so-good. The good presenters adapted their style to get across the salient points without rushing, and a shorter time slot allows the audience to take in more of the average paper. Any who tried to get through the same amount of material they would have in a 20-minute slot just lost their audience in the process. One wonders what some authors think is the purpose of presenting a paper at the conference. Just to get the information out there and let the audience make what they can of it is almost useless; few people will bother with it. Proceedings are not published, so the presentation is the only opportunity to make any impact.

The third set of concurrent sessions may be a useful option, provided that the delegates can choose the most appropriate from the titles and abstracts. Often it means one has to miss out on two thirds of the papers that might be of interest, instead of only half as with two concurrent sessions. After all, even with the best management not every paper one attends will turn out to be of interest

## **Public functions**

There were two functions that involved the public. The first was on Tuesday evening, and was the final local “Cafe Scientifique” for the year, held in “The Palms Restaurant and Bar”. Lionel Carter and Hamish Campbell were the panellists for an evening entitled “Planet Earth in our Hands”, and after a brief introduction by each, expertly fielded widely varying questions. It was as interesting to hear the questions as it was to hear the discussion by the panellists; climate change figured largely, but so did Hamish’s concept of the total submergence of the New Zealand area in the Oligocene.

A brief description of the Cafes Scientifiques is warranted, as I for one had never heard of them. The idea is that for the price of whatever interested members of the public wish to buy from the venue (coffee, wine, a meal, nibbles....), they can listen to and question experts. This has a delighttully classical ring to it (one can imagine Socrates in that sort of environment); but would there be noisy patrons, or would they be cooperative? That proved no problem; the organisers - Kathrin Otrell-Cass and her husband as Masters of Ceremonies had it down to a fine art. I understand Kathrin, Alison Campbell, and Penny Cooke (all at the time on the staff at Waikato University) started the idea a year or two ago, and it has been catching on with enthusiasm. Those involved deserve much credit. It is the sort of concept that could help significantly in bringing science in general and geology in particular to a wider public. And there is no doubt that there are members of the public who are not only interested, but willing to use a bit of grey matter.

Lionel Carter gave a public lecture at lunch time on the Wednesday on “Understanding and Dealing with a Warmer World”. It is something of a relief to hear a scientist of Lionel’s standing bring his erudition and clarity to a topic too often devoid of them. For some reason there were far fewer members of the public present than we have seen at other venues such as Whangarei and Taupo. Was it lack of publicity, or the lunch time slot? Surely the topic is a popular one, and stirs much discussion, if not in questions after the talk, then certainly in small groups later in the day. Although few seem prepared to stand up and question the data or conclusions, I detect a sense of unease, not so much with the prospect of the warmer world, as with the inevitably short-time-frame science behind it.

## **AGM**

The 52nd (50-second?? No No!) AGM took place between the final afternoon sessions on the Tuesday, and the buses departing for the barbecue. As it turned out there was little in the AGM but the formalities, and not even a proposal to raise subscriptions. Nick Mortimer is the new president, taking over from Keith Lewis, and Jan Lindsay is the new vice-president. David Skinner continues his many years as treasurer (an essential role he performs admirably). It was all over in 25 minutes, and there was nothing more to do but sit in the sun or under the trees and wait for the buses.

## **Social functions**

The Ice-breaker is a good event - the opportunity to greet one’s colleagues usually not seen since last year (or earlier). Finger food and two drinks seemed about right for the occasion (though I and many others wanted to go on to the Cafe Scientifique afterwards, and wonderd if it might have to serve as a meal).

The barbecue was held at the Mount Maunganui Lifeguard Centre, at the beach edge right under The Mount. Conditions in the dusk were pretty idyllic. People did avail themselves of beach ball or swimming, but not many. It seemed most preferred to talk. There didn't seem to be any organised walk up The Mount, so I took off on my own, wondering if there would be any food left by the time I got back. I need not have worried, The caterers took it as a challenge not to run out of food, and even after I helped myself to seconds when most were having dessert, there was still more of the main course arriving - deliciously tender chicken, though the skin on the sausages (otherwise admirable) was a little tough. Always the noise level goes up immensely later in the evening. Was it really necessary to add to it with dance music? I don't think anyone danced, and it simply became impossible to hold a conversation. Such complaints aside, it was nevertheless a highly enjoyable evening. (Can it be anything else, associating with geological colleagues?)

I didn't attend the dinner; it was held at Mills Reef Winery, and reports were all good. The restaurant was normally geared to smaller numbers, but I didn't hear any complaints about lack of space. Annual awards were presented by Keith Lewis, and details are given elsewhere.

### **Conference Closing and Presentation of Awards**

The conference concluded after the early afternoon session on the Thursday. The student awards for papers and posters were presented by the Geophysical Society and the Geological Society. Details of the latter are given elsewhere. The early conclusion was presumably to allow planes to be caught or field trips to depart. Could more papers have been included if the conference conclusion had been later? Could it have been a way of accommodating the large number offered, without cutting presentation time?

### **Some concluding thoughts**

I always enjoy the annual conference. The fact that so many members keep coming back year after year indicates that they feel the same.

Conferences combined with the New Zealand Geophysical Society have proved popular in the past, and are presumably the reason for the format of Geosciences 07. Indeed, the melding was so seamless that it was difficult to detect if there were some papers that were geophysical rather than geological and vice versa. It would seem that there is good justification for the combination to be routine. Surely it must reduce the burden on the organisers.

I quite like the 15 minute time slot, especially when the keynote speakers are able to break the routine with 20 minute slots. But perhaps the presenters may have other ideas.

Perhaps a 1-day or half-day intra-conference field trip should be a routine inclusion. I found myself in a position of having all my eggs in one basket with a field trip that was cancelled, so I saw little or no local geology. This was a pity, especially in an unfamiliar area. Perhaps it is a time thing - can only retired delegates afford the time these days? That doesn't seem defensible - or it shouldn't be defensible.

For some years now there has been professional help in running the conference, but this is the first year that the region whose turn it was to be the host said it could not provide anyone to volunteer. In the current environment this could well become the norm. It means an extra burden on the national committee and on our administrator Janet Simes, but once actual

responsibility is removed local help may be forthcoming, as it certainly was in Tauranga, and the running all seemed trouble-free and smooth. There will always be problems (A dedicated poster session or not? Paper presentation time? Number of concurrent sessions? The absence of a list of delegates was a pity - but fortunately not a policy, so we can expect it to resume next year), but with an experienced professional organiser the day-to-day details can be made to appear effortless.

Roll on the next conference, to be hosted by Wellington, but with the venue not yet decided.

## **Mettle and Mines: the life and times of a colonial geologist, Edward Heydelbach Davis** by Mike Johnston Nikau Press, 288 pages.

Reviewed by **Simon Nathan**, *Wellington*

Nineteenth century geologist Edward David generally gets no more than a footnote in historical accounts. He worked for the New Zealand Geological Survey for less than a year in 1870-71, and had the misfortune to be drowned while crossing a swollen river on the West Coast. Over a century later, he is mainly remembered as the only member of the Geological Survey to die while undertaking fieldwork.

Locally Davis is important because he wrote one of the earliest reports on the Nelson mineral belt and the mining potential of the surrounding area. As a mining geologist, with experience from several different mining regions, he had more insight into mining and mineral prospects than most other nineteenth century geologists. Mike Johnston has long been interested in Davis, and has undertaken some fascinating research to piece together his life as well as giving a picture of those involved in geological investigations about 1870.

Edward Davis was born in the Furness district of west Cumbria in 1845. His father had moved the family there because of his interest in local haematite mines and smelters which he managed. Recently I was lucky to be able to visit one of the last haematite mines in Cumbria, now kept open as a tourist attraction. The countryside is riddled with gopher-like excavations where there are local iron-ore pods in the Devonian limestone.

When the mining venture failed in 1864, the Davis family moved back to London. Edward Davis, then ready to earn his living, attended some classes at the Royal School of Mines, although he never graduated. His father arranged for him to visit iron ore mines in Portugal in which the family had an interest, and he subsequently was appointed chemist to the Mariquita Mining Company in Columbia. Newly married, he and his bride set off for Columbia, but the trip was a disaster – the mine was a dud, and Edward was afflicted with tropical diseases. He was lucky to survive, and returned to England in poor health.

Two of his brothers had already emigrated to New Zealand, and sent home accounts of the huge ironsand deposits near New Plymouth. It was arranged that Edward and his wife Lucy should travel to New Zealand, so that Edward could regain his health as well as evaluating the ironsands for his father.

Although the Taranaki ironsands seemed promising, it was to be almost another century before they were successfully smelted. With so much iron ore available, it should have been so simple. Mike Johnston gives an interesting account of the endless problems, including intriguing characters such as Decimus Atkinson and Ironsand Smith. It became clear to Edward Davis that he was not going to make a living from ironsands, at least until the technical problems were overcome.

By good luck there was a vacancy in the recently established Geological Survey as F.W. Hutton has recently resigned. James Hector was looking for a replacement, and Davis was appeared at the right time.

In his first job in Coromandel, Davis returned with 433 samples – its mind-boggling to think of the labour of collecting and transporting them back to the Colonial Museum, let alone cataloguing and labelling the whole collection. But he made a competent report on the geology and mineralization.

The major project that Davis undertook in late 1870 was an examination of Dun Mountain and the surrounding part of the mineral belt. This is an area that Mike Johnston has mapped in detail, and he clearly explains the issues that Davis had to tussle with. This was no academic problem. There was ongoing debate about the extent of copper and chromite mineralization, and Davis had to evaluate the mining potential of the area and explain his results to angry shareholders who realised that their money was lost. Davis was clearly a talented young geologist, and had quickly come to terms with an unusual type of geology that he would not have seen before.

His final field trip was intended to be examination of parts of the Grey coalfield around the Brunner mine. On 10 February 1871 Davis attempted to cross a flooded creek on his horse, and was washed away. His body was recovered a few hours later, and he is buried in the Bolton Street cemetery in Wellington.

The life of Edward Davis by itself may seem to be unpromising material for a biography. Mike Johnson has done an amazing reconstruction from all sorts of evidence, including visits to Cumbria, London and Portugal. It is a shame that we have no photograph of Edward Davis. I'm sure that Mike has searched very diligently, so it is challenge to other science historians to see if a photograph is tucked away somewhere. But the real value of this volume lies in the account of geological life in New Zealand around 1870, and the sorts of problems that Hector and others were discussing and debating.

Nikau Press has done an excellent job producing this book. It is well illustrated by a variety of colour and black and white illustrations. Anyone interested in the history of New Zealand geology must read it.

## In Search of Ancient New Zealand

By Hamish Campbell and Gerard Hutching. Penguin Books and GNS Science, 2007. Soft cover, 240 pages, \$49.95.

Reviewed by **John Rhodes**

The Chatham Islands are so far from the plate boundary through New Zealand that they're almost as tectonically quiescent as the rest of our continent once was. This makes them a good place to seek out stories in the rocks, and they feature prominently in *Discovering Ancient New Zealand*. One of many stories in the book is that during Oligocene time New Zealand may have been entirely inundated by the sea; a case which is unproven (and un-provable) but interesting, especially for biologists.

Hamish Campbell has a deserved reputation as a science communicator. He's an Earth Sciences Renaissance man, boyishly fascinated with the crust of the earth. He wrote most of the text, while his collaborator Gerard Hutching wrote some of it and edited the lot (a task which, sadly, received too little care).

The design of *Discovering Ancient New Zealand* is compellingly attractive. The illustrations are widely sourced, well chosen and crisply reproduced. Many, like Lloyd Homer's photograph of erupting Mt Ruapehu, are magnificent. Ticks in the outer page margins represent spans of geological time, adding to the book's geological feel.

One difficulty in writing for non-geologists is that before getting down to business, the authors must deliver a crash course in geology. Campbell and Hutchings do this well, using local examples to avoid a vacuum of general principle. Another challenge is to position the style between impenetrability ('steeply inclined north limb of the Southland Syncline' – huh?) and gratuitous gee-whizzery ('But wait! There's more'). While dipping its toe in both waters, *Discovering Ancient New Zealand* mainly steers a middle course, with a style so relaxed and conversational that one can imagine Campbell thinking the book aloud into a tape recorder. He lives and breathes earth science in a sort of geological total immersion, and his easy style and the book's lack of references suggest that its rich contents came off the top of his head. Campbell's enthusiasm, while keeping key ideas in focus, sweeps the reader along and makes the book admirably accessible. I found here the best introductory accounts I've read of faulting in New Zealand and of the meteorite impact that ended the Cretaceous Period.

Simply to tell scientific fact can be superficial, while to explain what's behind it can become a swamp. Campbell and Hutchings resolve this by skimming the factual surface, with occasional pauses to burrow into the research. And they keep us happily tuned in to reality. After learning about the extraction of zircon grains for radiometric dating we meet geochronologist Chris Adams in his laboratory, which makes us feel that we understand what's going on (which patently we don't, or we'd all be geochronologists). On the same page, a 1911 photograph of moustached physicists reminds us that our understanding of matter has roots way back (one of many things I like about *Discovering Ancient New Zealand* is the way it gives credit to the



researchers). And after discussing the 4.53 billion year age of the universe, the authors jump to Brenda Archer, interrupted in her Saturday morning porridge-making by a meteorite broaching the ceiling of her Ellerslie living-room.

For me the book has a bit much porridge, in its laborious cataloguing of localities, rocks and fossils. Instead I'd like more detective stories, particularly about the sedimentary origin of New Zealand's greywacke and its metamorphism into schist. Un-defined terms will be difficult for non-geological readers, who need a glossary.

But instead of complaining about what it isn't, let's celebrate what *Discovering Ancient New Zealand* is: a wonderfully-executed showcase of much that's interesting and remarkable about the continent whose above sea-level part we inhabit.

## **In Search of Ancient New Zealand**

By Hamish Campbell and Gerard Hutching. Penguin Books and GNS Science, 2007. Soft cover, 240 pages, \$49.95.

Reviewed by **David Smale**, *Nelson*

Books about New Zealand geology are mainstream material for members of the Geological Society. But perhaps not every member has bought a copy of "In Search of Ancient New Zealand", and might wonder if they should.

After the success of "Awesome Forces" it seems logical that another in similar vein should follow. This one reflects the fact that advances in the state of knowledge about geology in New Zealand now enable those with a flair for it to summarise the geological history of the New Zealand in a way that is more informed and interesting than it could have been 20 years ago.

Geological histories have traditionally been divided into Precambrian, Palaeozoic, Mesozoic and Cenozoic; one tends not to give the matter a thought. All credit to these authors for choosing instead divisions that are of greater relevance to New Zealand. They support their history on four main coathooks - 505Ma (oldest rocks in New Zealand), 83Ma (separation of Zealandia from Gondwanaland), 23Ma (start of separation of the New Zealand landmass from Australia, and a time of greatest submergence of the New Zealand area), and 5Ma (when the Southern Alps started to rise, and the consequent deposition of huge thicknesses of Pliocene-Pleistocene sediments). Thus is emphasised one of the interesting aspects of New Zealand geology - we are far away from the rest of the world, and can shed light on parts of geological history for which evidence is thin elsewhere.

Of course a timescale is presented, showing the Geomagnetic Polarity Timescale, the Global Geochronological Scale and the New Zealand Scale, so the information is all there to relate these points to the classical divisions. The latter are used regularly in the text anyway, so it all flows pretty naturally for readers used to thinking in those terms.

The fifteen chapters are divided into four groups relating to the above coathooks. A curious measurement of these chapters is provided down the margin, very evident when the book is closed. It took me some time to work out what it was; I thought it might be some sort of time measure. But in fact it seems to relate simply to the number of pages in each chapter - a sort of thumb index without the thumbholes. Distinctive, though I am not sure how helpful it is; it is actually no help in finding where to open the different chapters. Perhaps it could have been more helpful if the bars indicating each part were wider for that part than for the others.

Great use is made of everyday analogies and appropriate simplifications that help to get the picture across. Continental crust is thought of as cream, and oceanic crust as milk, each tectonic plate carrying a variable cargo. The terrane concept is as clearly explained as I have ever seen it, and it is fascinating that terranes can be characterised simply on the basis of their strontium content. Inevitably simplifications must leave out parts that other opinions might have included. When it comes to Triassic palaeontology there does seem to be quite a bit more detail. But that was Hamish Campbell's special field; one can scarcely complain.

One of the most gripping bits of the book is about the discovery and significance of Zealandian dinosaurs. It would be hard not to be gripped by the (now well known) story of Joan and Pont Wiffen's endless dedication to the extraction of saurian bones from Mangahouanga Creek. Not just a trip into the bush, but day after day, year after year (nearly 30, in fact) of painstaking rock-smashing, using everything from explosives to dentist's probes. What singleness of purpose! It deserved the dramatic outcome of their dinosaur find, vividly explained here.

The sinking of New Zealand around 29 to 23Ma has been something of a focal point for reports of this book. We shouldn't reject the possibility of complete submergence, but if so, where did the biota come from to repopulate the area? Clearly it did come, as the authors are quick to point out. But whether it was from ephemeral islands or a more distant landmass seems to me to be a not terribly important point. It depends on your view of what is important.

The emergence of the area, the movement on the Alpine Fault, and the development of the Southern Alps fit in to the picture as a final tour de force.

The authors have managed to take the results of many years of geological research in New Zealand and distil it into a fascinating and coherent story of the history of the New Zealand area. It is the fruit of much work on what might have seemed a mass of large and small details, and the authors have managed to point out the general significance of these in an overall scheme - convincing and fascinating. They have also, incidentally, pictured those who have been responsible for this work, adding a personal touch of great value, both from a historical point of view, and as an aid to holding the reader's attention. However, don't look for references to this work; it is not that sort of book.

An interesting aspect is the emphasis placed on the Chatham Islands. These are so small and far away that they don't often have much influence in a book like this. But the authors will have none of that. The Chathams are in fact the only stable part of the New Zealand area, and have much to tell us as a consequence. HJC is almost an honorary Chatham Islander himself

(he has been a regular and long-term visitor since his adolescent days), and we can be grateful that someone such as he can write a book like this.

In case you think too much text is boring, or conversely that it is only what the text says that is important, you need to know that this book is full of pictures, and there is no doubt that they are both informative and attention-holding. Lots may be well known - e.g Tarawera fissure (Chap 3 /Fig 7), Banks Peninsula and Southern Alps (14/6), raised beaches at Cape Turakirae (10/ 5), but many others show much rarer (or even surprising) aspects of New Zealand - to pick some fairly random samples: Red Hills (3/1), Hokonui Hills in Southland (8/21), NW Nelson plateau (12/6), sinkholes in limestone inland from Timaru (12/3). One must enjoy the view of paleontologists collecting on Chatham Is looking like seals on a shore platform (11/2)!

It is naturally the selection of good photos that is important, so the authors deserve credit for it, but it turns out that almost all the notable ones are by Lloyd Homer, reflecting not only his wide-ranging coverage, but also his high standard. He has left a rich legacy in the GNS collection from his time in DSIR when people could be employed simply because of what they had to offer.

Clearly to get across details of scientific research to readers not expected to know any technicalities it takes a rare type of communication skill. The authors have it, and we should be very grateful - both those for whom the book is written, and the whole of the geological fraternity, because without that general interest and acceptance of what that fraternity does, there will be little funding available for it. But some things inevitably have to be simplified, and it can be a moot point how far the simplification can go. Most of the time it isn't too much of a problem, but from my standpoint problems do arise, and that makes me wonder if there are others.

The authors describe the types of crust on the Earth, oceanic and continental, and explain that oceanic crust is basaltic, and continental crust granitic. But drawing an analogy with the moon raises difficulty. It does appear that the two types of crust may also be there. But to say that the granitic crust is of a type called anorthosite is confusing, if not plain wrong. In classical igneous petrology anorthosite is not granitic; it is of basic or even ultrabasic affinity, being associated with gabbro and coarse-grained rocks of basaltic composition. OK, it is coarse-grained, even pale coloured and with little ferromagnesian material, but it is silica-poor, usually with calcic feldspar, and really no more granitic than basalt is. My first reaction was to wonder if anorthosite was a small part of the continental crust on the moon as it is on Earth - just the odd bit here and there. But it appears that almost all the samples brought back from the moon's continental areas are anorthosite. How much do we actually know, anyway, from such random sampling as has been able to be done?

What is the point of the story (p.30) of David Christoffel in 1970 being laughed off the stage for his "discovery" that the displacement on the Alpine Fault was 480km? I thought Wellman's concept was accepted when I left university in 1962. The authors describe it later in the book anyway.

Perhaps it shows that new ideas take time to be established in the world of geologists. We read that Charles Lyell recognised the connexion between faults and earthquakes "as recently as the 1850s". Quite so. But Newsletter readers (GSNZ Newsletter 137) will be well aware

that as recently as the 1960s arguments were still taking place in court between those who recognised the connexion, and those who maintained that the phase changes they thought caused earthquakes would cause randomly positioned ruptures.

The Southern Alps are due to a “clean” collision. Why is it clean? One of the reasons given is that the rock at the Alpine Fault is slippery, with much in the way of “flat” minerals (e.g. mica). But why aren’t all collision areas similar? I thought the mica resulted from the collision. Obviously it is there now, and the collision is still going on, so clearly the statement is true, but there is some circular reasoning somewhere.

There is a statement that orbicular granite has not been found in situ; but in the New Zealand Geopreservation Inventory it is described as occurring in Breaker Bay.

Typographical errors are virtually absent. Just be aware that the Louisville Ridge is actually north and east of the Chatham Islands, not south and east.

But these glitches do not detract from the value of the book. Any such book that does not have glitches somewhere is saying nothing at all, and this book has much to say.

So should Geological Society members get this book? It is not written for them, it is written for those without specialised knowledge. But will those with specialised knowledge learn something from it? You bet (if you are anything like me), and there will be few specialists who don’t benefit at least from a little more clarity of understanding. The New Zealand story is picked out from the mass of research data with great flair. Parts may be something of a personal opinion when it comes down to it, but it is one worth having.

**Australian Earth Sciences Convention 2008**  
**Perth Convention Exhibition Centre, Perth, Australia**  
**Sunday 20<sup>th</sup> to Thursday 24<sup>th</sup> July 2008**

The conference theme “New Generation Advances in Geoscience” reflects the growing need to engage others in this critical work. The AESC typically attracts over 1000 delegates from across Australia and overseas, and provides a wonderful opportunity to make new contacts and network with others in the geological sector.

If you would like to register your interest to either attend, sponsor or exhibit at this event, kindly use the Convention website [www.iceaustralia.com/aesc2008](http://www.iceaustralia.com/aesc2008). You will receive regular updates on the convention as they become available. For queries please do not hesitate to contact the convention secretariat at [aesc2008@iceaustralia.com](mailto:aesc2008@iceaustralia.com)

# NOTICES

## NEW BOOK

**Mettle & Mines: the Life and Times of a Colonial Geologist,  
Edward Heydelbach Davis  
by Mike Johnston**

Edward Davis was the third geologist to be appointed to the NZ Geological Survey, the other two being James Hector and F.W. Hutton. This thoroughly researched and well illustrated book of 288 pages is, however, more than just a biography of one of New Zealand's early, but until now largely overlooked, geologists. *Mettle & Mines* delves into the commercial and political reasons as to why Davis undertook geological surveys of Coromandel, Dun Mountain, the Nelson goldfields and the Grey Coalfield. The book also chronicles his childhood in Cumbria, and sojourns in Portugal and Colombia. Davis died tragically while still a young man on the West Coast.

In recognition of a contribution made by the Geological Society towards the printing of this book, which was published in December 2007, Nikau Press is offering it to Society members at \$35.00 (incl GST), a discount of 12.5%, and with no charge for postage/courier. ***Print and fill in the form below and send it along with your NZ\$ cheque:***

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To: Nikau Press, PO Box 602, Nelson.

Please send .... copy/copies of Mettle & Mines @ \$35.00/copy \$  
.....

Name:

Address:

Phone No.:

Email:

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## Geosciences '08

### Joint Geological, Geophysical and Geochemical and Mineralogical Societies Conference, 2008.

This year's Annual conference will be held in Wellington from Tuesday 25<sup>th</sup> – Thursday 27<sup>th</sup> November. Registration and an icebreaker will be held on the Monday night and pre- and post-conference fieldtrips will be offered.

*The first and only circular will appear in the July Newsletter. Further details will be posted on the GSNZ website as they come to hand.*

**For more information or suggestions please contact:**

**Richard Wysoczanski (convenor):**

**[Richard.Wysoczanski@vuw.ac.nz](mailto:Richard.Wysoczanski@vuw.ac.nz)**

**Joel Baker (symposia): [Joel.Baker@vuw.ac.nz](mailto:Joel.Baker@vuw.ac.nz)**

**Tim Little (fieldtrips): [Tim.Little@vuw.ac.nz](mailto:Tim.Little@vuw.ac.nz)**



## Call for Donations

### New Pullar and Vucetich award fund

In April 2007, Colin Vucetich (1918-2007) passed away. His obituary was reported in Newsletter 143 (Froggatt et al. 2007) and an extended obituary was published in a tephra-based volume of *Quaternary International* (Lowe et al. 2007). With the endorsement of family members, the Society (at the Tauranga AGM) re-named the current “WA Pullar Prize” as the “Pullar and Vucetich Prize” to commemorate the achievements and lives of both men who worked together on tephra studies in New Zealand for 25 years. The purposes and rules of the re-named award remain as before and can be seen on the Society’s website.

The Society is now calling for donations to be made to the re-named award fund from friends, family and colleagues of Colin Vucetich. (Further donations on behalf of the late Alan Pullar, for whom the fund was initially established, are also welcome.) Donations by cheque (payable to ‘Geological Society of NZ’) should be sent to

Hon. Treasurer (Dr David Skinner)  
Geological Society of New Zealand  
P.O. Box 38-951  
Wellington Mail Centre

***A covering note stating that the donation is for the Pullar and Vucetich award fund should be included. Receipts are available on request and donations are tax deductible.***

Froggatt, P.C.; Tonkin, P.J.; Palmer, A.S. 2007. Obituary: Colin George Vucetich 1918-25 April 2007. *Geological Society of New Zealand Newsletter* 143, 23-25.

Lowe, D.J.; Tonkin, P.J.; Neall, V.E.; Palmer, A.S.; Alloway, B.V.; Froggatt, P.C. 2007. Colin George Vucetich (1918-2007) – pioneering New Zealand tephrochronologist. *Quaternary International* (in press, online 25 July, 2007).

#### **David J. Lowe**

Department of Earth and Ocean Sciences University of Waikato, Hamilton 3240  
[d.lowe@waikato.ac.nz](mailto:d.lowe@waikato.ac.nz)

### Principal sponsor



### Major sponsors



### Call for Papers

To examine all aspects of the minerals and mining industry in New Zealand, especially financing exploration and mining – the corporate side.

Papers are welcome on topics both within and outside New Zealand (with impacts on New Zealand), particularly on:

- Geosciences, exploration potential, and case histories
- Mining—gold, coal, iron, base metals and industrial minerals
- Finance and corporate and government relations for our mining industry
- Geotechnical, geophysical and related aspects
- Environmental management
- Legal and commercial issues

Abstracts (up to 300 words,) by 30 April, 2008.

Final papers due 17 July, 2008. Abstracts and papers will be published in hard copy and CD versions. Student papers are very welcome.

Abstracts (by 30 April, 2008) to [roger.gregg@ihug.co.nz](mailto:roger.gregg@ihug.co.nz)

Enquiries to: Roger Gregg email as above  
phone +64 21 181 4843,  
Tony Christie ([t.christie@qns.cri.nz](mailto:t.christie@qns.cri.nz))  
phone +64 4 5704 682

Watch <http://www.ausimm.co.nz> for developments.



## 2007 GSNZ AWARD CITATIONS

**Nick Mortimer**

The Geological Society of New Zealand announced its awards for 2007 at the Conference Dinner in Tauranga, and at the Conference Closing Ceremony.

### **McKay Hammer – Alan Beu**



*To commemorate the outstanding ability and contributions to New Zealand geology of Alexander McKay, and to recognise meritorious contemporary work, the Society's most prestigious award is the McKay Hammer Award and is given to the author of the most meritorious New Zealand contribution to geology published in the previous three years.*

This year, Alan Beu of GNS Science is awarded the 2007 McKay Hammer for his two-part, encyclopedic paper "Marine Mollusca of oxygen isotope stages of the last 2 million years in New Zealand", published in the Journal of the Royal Society of New Zealand in 2004 and 2006. This publication has been key to establishing the Wanganui and East Coast basins as global reference records for Quaternary sea-level and climate change. Alan has worked alongside sequence stratigraphers and geochronologists to tie all the key fossiliferous horizons, and molluscan bioevents to every stage of the marine oxygen isotope record for the last 2 million years. The result is a globally-unique record of the ecological/ environmental responses to Quaternary sea-level change, and a remarkable record of shallow-marine biodiversity.

This work represents to the full Alan's ability to use molluscan paleontology to contribute to much wider and larger geological problems, in this case the cyclicity,

subdivision and correlation of New Zealand's remarkable marine Plio-Pleistocene stratigraphic record.

Alan Beu is without doubt one of the world's leading molluscan systematists and palaeontologists and is recognised for his work on taxonomy, evolution, biostratigraphy and the application of fossils to problems of ecological and environmental analysis. During a distinguished career his work has been characterised by the attention to detail that is shared by all first class taxonomists. In addition to the single-authored two-part RSNZ paper Alan, was the senior- or co-author on six other papers published in 2004-2006. The award of the McKay Hammer exemplifies Alan's sustained output of high-quality research.

### **Alan Beu – publications, 2004 - 2006**

- 1. BEU, A.G.**, 2004. Marine Mollusca of oxygen isotope stages of the last 2 million years in New Zealand. Part 1: Revised generic positions and recognition of warm-water and cool-water migrants. *Journal of the Royal Society of New Zealand*, 34(2), pp. 111-265.
- 2. BEU, A.G.**, 2005. Neogene fossil tonnoidean gastropods of Indonesia. *Scripta Geologica*, (130), pp. 1-186.
- 3. BEU, A.G.**, 2006. Marine Mollusca of oxygen isotope stages of the last 2 million years in New Zealand. Part 2. Biostratigraphically useful and new Pliocene to recent bivalves. *Journal of the Royal Society of New Zealand*, 36(4), pp. 151-338.
- 4. BEU, A.G.**, ALLOWAY, B.V., COOPER, R.A., CRUNDWELL, M.P., KAMP, P.J.J., MILDENHALL, D.C., NAISH, T.R., SCOTT, G.H., WILSON, G.S. 2004. Chapter 13, Pliocene, Pleistocene, Holocene (Wanganui Series) in COOPER, R.A., 2004. *The New Zealand geological timescale*. Institute of Geological and Nuclear Sciences Monograph, (22), pp. 1-284.
- 5. COOPER, R.A.**, MAXWELL, P.A., CRAMPTON, J.S., **BEU, A.G.**, JONES, C.M. and MARSHALL, B.A., 2006. Completeness of the fossil record: Estimating losses due to small body size. *Geology*, 34(4), pp. 241-244.
- 6. CRAMPTON, J.S.**, FOOTE, M., **BEU, A.G.**, COOPER, R.A., MATCHAM, I., JONES, C.M., MAXWELL, P.A. and MARSHALL, B.A., 2006. Second-order sequence stratigraphic controls on the quality of the fossil record at an active margin: New Zealand Eocene to recent shelf molluscs. *Palaaios*, 21(1), pp. 86-105.
- 7. CRAMPTON, J.S.**, FOOTE, M., **BEU, A.G.**, MAXWELL, P.A., COOPER, R.A., MATCHAM, I., MARSHALL, B.A. and JONES, C.M., 2006. The ark was full! Constant to declining Cenozoic shallow marine biodiversity on an isolated midlatitude continent. *Paleobiology*, 32(4), pp. 509-532.
- 8. MCSAVENEY, M.J.**, GRAHAM, I.J., BEGG, J.G., **BEU, A.G.**, HULL, A.G., KIM, K. and ZONDERVAN, A., 2006. Late Holocene uplift of beach ridges at Turakirae Head, south Wellington coast, New Zealand. *New Zealand Journal of Geology and Geophysics*, 49(3), pp. 337-358.

## **Hochstetter Lecturer – Vern Manville**



*The Hochstetter Lecture commemorates the pioneering and wide-ranging contributions to New Zealand geology of Ferdinand von Hochstetter, and is intended to inform research scientists and students of developments in New Zealand earth science.*

The 2008 Hochstetter Lecturer is Vern Manville of GNS Science. His topic will be the March 2007 Ruapehu Crater Lake breakout lahar.

Vern is in the throes of undertaking a major study of the generation and properties of the lahar that represents a world-class piece of work. Because the lahar was expected, produced an instrumental record, and was well observed, publications reporting the results will provide groundbreaking information for interpretation of lahars, and development of lahar risk models, worldwide. The topic should be of interest to both a professional and amateur audience. Vern is an excellent speaker, has an excellent and timely story to tell, uses superb presentation material, and is enthusiastic to take his story around the country.

## **Kingma Award – Roger Tremain**

*The Kingma Award recognises the important contribution made by technicians in the earth sciences in New Zealand who have shown marked ability in their field of employment and who have made a notable contribution to the work of their institution.*

The outstanding New Zealand earth science technician of 2007 is Roger Tremain of GNS Science. Roger has worked in the palynological laboratory processing pollen samples for the last 20 years. He has developed a variety of systems and techniques

that have helped efficiency and safety of processing and extraction of pollen from very small samples (e.g. under fingernails) and very large samples (e.g. plywood sheets). The scientists are now dependent on Roger's technical experience as to what techniques should be used on the vast range of materials pollen can now be extracted from.

Roger regularly works long hours in responding to oil company and forensic work. Roger has also been involved in other aspects of paleontology as his inclusion as author in foraminiferal biostratigraphic studies of petroleum exploration wells will attest to. He also undertakes carbon extraction from radiocarbon samples, particularly for those projects involving the dating of different carbon and carbonate extracts.

## **SJ Hastie Scholarships**

*The late S.J. Hastie left a bequest to the Geological Society of New Zealand to set up a fund to provide educational scholarships in New Zealand geology. Scholarships may be awarded to New Zealand residents to pursue research in New Zealand geology. One award shall be given to an earth sciences student at each of the six main universities who, in the opinion of staff at the university, is most deserving of the distinction, taking into account proven academic and research ability.*

The 2007 awards are as follows:

### **Auckland**

Helen Cocker: "Mineralogy and geochemistry of vein samples from the Broken Hills gold-silver mine, Coromandel Peninsula". Helen will be undertaking a research MSc next year.

### **Waikato**

Bradley Hopcroft: "Sedimentological analysis of the Late Eocene - Oligocene Succession in Taranaki Basin and development of an outcrop analogue". Bradley is an MSc candidate.

### **Massey**

Clare Robertson: "Moraine-dammed lake processes in Aoraki-Mount Cook National Park". Clare is conducting her PhD.

### **Victoria**

Daniel Bassett: “Crustal structure of the East Cape-Ruakumara Basin transition from onshore-offshore seismic data”. Daniel is the top 400 level student in 2007. He is starting MSc part 2.

### **Canterbury**

Marian Islay Laird: “Mingling mixing and magmatism - the relationship between Boat Harbour Diorite and Pahia Gabbro, Southland”. Marian will be working for her Honours in Geology.

### **Otago**

Campbell Ryland: “The geology of Bald Hill, South Westland”. Cam has performed very creditably in his 400-level exam, just completed, and has already done some field work towards his MSc.

## **Harold Wellman Prize**

*Is awarded in recognition of Harold Wellman, an outstanding discoverer of New Zealand fossils and who appreciated the important role of fossil evidence in the resolution of New Zealand geology. The Prize is awarded to the discoverer of recently found, important fossil material within New Zealand. The fossil discovery must have been recorded in the New Zealand Fossil Record File. An account of the discovery and its significance is to appear in the Newsletter.*

Robert Holmes of Chatham Island for his discovery of a Mid Pleistocene marine fauna raised 200m above sea level and covered by 100m of volcanic debris. The find has profound implications for the Late Pleistocene tectonic and volcanic history of the Chatham Islands area.

## **Wellman Research Award**

*This commemorates the contribution to New Zealand geology by Harold Wellman. The award assists quality New Zealand research in geology and geophysics, especially by younger scientists. Applications can be to undertake research on any geological or geophysical topic. The winner is decided by the President of the Geological Society of New Zealand. The recipient of a Research Award will be expected to publish the results in an appropriate scientific journal, and to publish a summary of the research findings in the Newsletter of the Geological Society of New Zealand.*

This year's winner is Deborah Crowley of Massey University. She is doing a field based PhD project on the Late Miocene-Pliocene Rangiauria Breccia of Pitt and

Mangere Islands, Chathams Island. The study aims to understand the causes of Neogene uplift, deformation and volcanicity of the Chatham Island shelf.

## **Student Conference Awards**

### **Best talks**

Winner: Thomas Whittaker, University of Waikato “Speleothems and the climate record”. Merit: Aidan Allan, VUW “Silicic tephra from ODP 1123” and Anya Mueller, U Canterbury “Round Top rock avalanche”.

### **Best posters**

Winner: Lisa Pearson, University of Waikato “Sediments of Lake Rotorua”. Merit: Jesse Robertson, U Otago “Alpine Fault mylonites” and Martin Schiller, VUW “ $^{26}\text{Al}$ - $^{26}\text{Mg}$  isotopic dating”.

## **Moreover...**

In November 2007, Brad Pillans was made an Honorary Fellow of the Royal Society of New Zealand (GSNZ co-nominated Brad), and another GSNZ member, Tim Stern was made an FRSNZ. Well done to all our 2007 award winners.

## **WELLINGTON ANNUAL BRANCH REPORT**

The Wellington Branch of the Geological Society of New Zealand & Geology Section of the Royal Society of New Zealand hosted regular monthly seminars that covered the full spectrum of geological research in NZ and abroad. Perhaps reflecting modern times, climate change featured in two key talks, but the range of speakers and topics also embraced wider themes of environmental change and new geological discoveries. The talk schedule included the annual Hochstetter Lecture by Prof. Paul Williams and the annual Presidential Address by Dr Keith Lewis. The high quality of the speakers for 2007 resulted in the generally healthy levels of attendance and active question time at the completion of the talks.

The Wellington Branch of the Geological Society of NZ awarded two prizes at the annual NIWA Wellington Science Fair. The high quality and effort put into the exhibits was noted by the Wellington Geological Society judges (Dr's Gavin Dunbar & Cliff Atkins, VUW).

The Beanland-Thornley Student Prize night is scheduled for October, and entries to date for VUW students from the School of Geography Environment and Earth Sciences, and the Institute of Geophysics promise another successful evening.

### **Summary of seminars and Society activities for 2007**

- 1 March: "What is happening to the planet? - the impacts of climate change on the ocean and its users", Prof. Lionel Carter, VUW.
- 4 April: "Lifting the veils: a few examples from marine geology of how we glimpse more", Dr Keith Lewis, President of the Geological Society of NZ.
- 3 May: "Mt. Ruapehu glaciers and the recent lahar: a photographic journey", Dr Andrew Mackintosh, VUW.
- 7 June: "Worms, clams and donuts: new methane seeps along the active East Coast margin of New Zealand", Dr Alan Orpin, NIWA.
- 10 July: The Hochstetter Lecture 2007 – "Environmental change: a view from downunder", Prof. Paul Williams, University of Auckland.
- 2 August: "Mud, Bugs and Marshes", Prof. Clark Alexander, Director of the Applied Coastal Research Laboratory, Skidaway Institute of Oceanography, Savannah, Georgia, USA
- 25 August: NIWA Wellington Science Fair. Wellington Branch of the Geological Society of NZ top prize went to Ashleigh Cornish (Year 8) from Evans Bay Intermediate for "A Reef at Lyall Bay Beach" - a very insightful dynamic sedimentation model for a coastal reef setting. Second prize went to Lydia Easter & Jessica Williams (Year 8) from Chilton Saint James for their entry "Ash-plosion".
- 6 September: "The dynamics of lava flows", Dr Aaron Lyman, Geophysical Fluid Dynamics Group, Australian National University.
- October 4: Beanland-Thornley Student Prize Night.

*Chairperson: Alan Orpin; Treasurer: Ursula Cochran; Committee: Cliff Atkins, Warren Dickinson, Gavin Dunbar, Susanne Grigull, Liz Kennedy, Arne Pallentin, Kate Wilson.*



**CONFERENCE DINNER (with a marine theme) 2007**



Admiral Nelson, a mermaid a jellyfish, assorted buccaneers and not a few beach bums bunnies and beachcombers plus stand-ins for a couple of awardees showed up at our Tauranga Annual Talkfest dinner late November.