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Geoscience Society  
of  
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A member body of the Royal Society of New Zealand  
Mailing address: P.O. Box 7003 Newtown, Wellington, 6242

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## GEOSCIENCE SOCIETY OF NEW ZEALAND BRANCHES (with contacts)

Auckland:	Jennifer Eccles <a href="mailto:j.eccles@auckland.ac.nz">j.eccles@auckland.ac.nz</a>
GeoClub:	Bruce Hayward <a href="mailto:b.hayward@geomarine.org.nz">b.hayward@geomarine.org.nz</a>
Geocene:	Jill Kenny (ed) <a href="mailto:jill.kenny@xtra.co.nz">jill.kenny@xtra.co.nz</a>
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Manawatu:	Julie Palmer <a href="mailto:j.a.palmer@massey.ac.nz">j.a.palmer@massey.ac.nz</a>
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Talks:	Jack Williams <a href="mailto:jack.williams@otago.ac.nz">jack.williams@otago.ac.nz</a>

## SUBCOMMITTEES AND SPECIAL INTEREST GROUPS (with convenors)

Awards:	Kat Holt <a href="mailto:k.holt@massey.ac.nz">k.holt@massey.ac.nz</a>
Early Career Researchers:	Shannen Mills <a href="mailto:ecr@gsnz.org.nz">ecr@gsnz.org.nz</a>
Fossil Record File:	Chris Clowes <a href="mailto:c.clowes@gns.cri.nz">c.clowes@gns.cri.nz</a>
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Paleontology:	Daniel Thomas <a href="mailto:paleontology@gsnz.org.nz">paleontology@gsnz.org.nz</a>
Sedimentology:	Mark Lawrence <a href="mailto:sedimentology@gsnz.org.nz">sedimentology@gsnz.org.nz</a>
LAVA NZ:	Adrian Pittari <a href="mailto:apittari@waikato.ac.nz">apittari@waikato.ac.nz</a>

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# CONTENTS

PRESIDENT'S LETTER	10
EDITOR'S NOTICES	13

## ARTICLES

GEOLOGICAL ORIGINS OF TWO TAINUI ANCHOR STONES/PUNGA-O-TAINUI Bruce Hayward	14
IAS ISC 2026 AND OTHER 3 AND 4 LETTER ACRONYMS Mark Lawrence	18
WAITAKI WHITESTONE GEOPARK ENDORSED AS NEW ZEALAND'S FIRST UNESCO GLOBAL GEOPARK Lisa Heinz	21
"FREE TO PUBLISH AND FREE TO READ!" Jack Williams, Ery Hughes, Kiran K. Thingbaijam, Suzanne Bull & Oliver Lamb	22

## AWARDS

GSNZ AWARDS 2023 CALL FOR NOMINATIONS AND APPLICATIONS Awards Team	26
SJ HASTIE AWARD REPORT Liam Bramwell	28

## TRIPS AND TRAILS

FIELD TRIP: TĀKAKA Jessie Henwood	31
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## GEOSCIENCE BRAIN TEASERS

GEO-CRYPTIC CROSSWORD #7 Cryptonite	32
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Beach processes at Young Nicks Station, Muriwai, Gisborne.

Photo: Murry Cave

# CONTENTS

## EVENTS, NOTICES, REVIEWS

<b>GSNZ ANNUAL CONFERENCE 2023</b>	<b>34</b>
Conference Local Organising Committee	
<b>VOLCANO ASSEMBLY GATHERED WORLD'S EXPERTS IN ROTORUA</b>	<b>36</b>
Tourism New Zealand	
<b>GEOBAKE 2023 WINNER</b>	<b>39</b>
Events Team	
<b>BOOK REVIEW: MOUNTAINS, VOLCANOES, COASTS AND CAVES</b>	<b>40</b>
Julian Vearcombe	
<b>BOOK REVIEW: AORERE GOLD</b>	<b>42</b>
Simon Nathan	
<b>BOOK REVIEW: ROCKS, FOSSILS AND FORMATIONS</b>	<b>43</b>
Jenny Stein	

## GEOSCIENTIST AOTEAROA

<b>DEADLINES AND GUIDELINES</b>	<b>45</b>
Editor	
<b>FORMATTING AND SPECIFICATIONS</b>	<b>46</b>
Editor	



Puhipuhi Syncline

Photo: Bruce Hayward



**Kat Holt**  
President

Tēnā koe,

There is only one thing that I want to discuss in my President's column: my deep concern over the ever-worsening situation in our tertiary education system and the impact that it will have on the future of the geosciences in Aotearoa. As many of you would have seen, on 15 June the Society put out a public statement calling attention to the risks cuts to geoscience programmes pose to our nation's ability to meet our needs in the areas of, among other things, research and teaching on natural hazards and climate change. At the time of writing, both the University of Otago and Victoria University of Wellington have proposed major cuts to staff numbers and course offerings. At Victoria, senior management has indicated that specialisations in physical geography, geographic information systems and geophysics will be closed to new enrolments from next year. Eighteen staff positions will need to go from across the geoscience disciplines, chemistry and physics at VUW. Details for Otago are not yet as clear as at VUW, but members in the department there have confirmed that they have been told that as many as a third of their geoscience staff may be cut. This comes on top of rationalisation in Earth science offerings and positions at both the University of Waikato and Massey University in recent years. Massey is nowhere near out of the woods yet, with the university's senior leadership recently announcing proposed changes to their "low and no enrolments" policy, which, among other things, would allow for courses and programmes with low numbers to be cut within a much shorter (6 month) timeframe, instead of the original 3 year window for the process. This puts traditionally small, yet nevertheless important, specialisations including

Earth science, at risk of imminent discontinuation. Furthermore, staff were recently informed that targeted "enhanced voluntary cessation" and proposals for change will soon be announced. Collectively, these actions will leave Earth sciences hanging on the knife edge at Massey.

I feel like I'd probably be preaching to the choir if I were to labour the importance of geosciences to humanity. So I won't. These sentiments are captured in the public statement, and letters sent to the Prime Minister and Ministers for Education and Finance (which you can read on our website). Instead, I'm just going to rant and rave, and hopefully raise a few points which you may find valuable if and when you are trying to convince friends, colleagues, your local MP, etc., to have a voice on this matter too.

In these proposed cuts, the universities are employing a purely financial approach. To a certain extent they have been forced into this through the funding landscape. The costs of delivering education and conducting research have been increasing, just like the costs of living. But the funding to universities has hardly changed at all in recent years. Costs cannot be passed onto students (nor should they), as universities are limited in how much they can increase student fees. But they are still expected to deliver quality learning, achieve Tertiary Education Commission-sanctioned pass rates, and make a 3% operating surplus. Universities have had no choice but to look to cutting costs internally to meet these targets. We are now at the point where serious damage is about to be done to not only our geoscience capacity, but our tertiary education capacity in general.

I am really disappointed and frustrated with the apparent general disinterest that the current government is taking in this matter. Calls for intervention from the Minister of Science and the Minister of Finance via letters sent to their offices have simply been batted on to the office of the Minister for Education, claiming that concerns about the funding situation and the risk to sciences in NZ does not fall under their portfolios. This IS a cross-ministry issue, particularly as far as science is concerned. Professor Nicola Gaston made an excellent observation in her article for 'The Conversation' recently, where she highlighted the Te Ara Paerangi Future Pathways proposal for Poneke to be a 'Science City', where staff from CRIs and VUW would be co-located to enable stronger collaboration on, among other things, climate change and natural hazards. Losing science capacity at VUW is pulling in the exact opposite direction of this proposal! So surely, the Minister for Science should be paying much closer attention to what is about to happen at VUW.

The Minister of Education, Jan Tinetti seems to be rather disinterested in the matter as well, saying on RNZ the other day (23 June) that it is up to the universities on how they balance their books and that they need to "adapt to changing realities". Yes, the independence of universities is enshrined in the legislation, but the government ignores the crucial service they provide to our nation at their (and our) peril. Imagine if the other universities that offer education degrees suddenly announced that they were cutting them because they were no longer financially viable?? Would the government allow that to happen because of some apparent need for financial autonomy, ignoring the fact that NZ would no longer be able to produce a teaching workforce?? Pardon me if I'm taking things to the extreme here, but this is essentially the same situation we are heading towards with the cuts to nationally important programmes proposed for our major universities.

We can't just import our way out of a lack of locally trained graduates with geoscience expertise. While it's arguable that geoscience training at undergraduate level may be similar across the globe, and, at the same time, bringing in academics and researchers trained overseas adds diversity in

knowledge and experience, Aotearoa has a unique natural and social setting which those trained overseas are not exposed to. A knowledge of our unique climatic and tectonic setting is crucial for graduates going on to work in councils, industry, consultancies, etc. Likewise, an understanding of our unique social setting where a partnership with Tangata Whenua underpins everything we do is something that those coming from overseas may struggle to appreciate and address. While we are still some way away from embedding appropriate cultural awareness across our science training in Aotearoa, graduates today are arguably much better placed to support their future workplaces in meeting their obligations under Te Tiriti o Waitangi than most people coming from overseas would be.

Some might say part of the problem is that we are "over-capitalised", in that we don't actually need to have the same subjects taught and researched across all major tertiary institutes in Aotearoa. For example, maybe we don't actually need six different geoscience programs in our relatively small country? There may be some merit in this concept. But slashing capacity in geosciences willy-nilly (or any discipline for that matter) at the whim of university senior leadership is not the way to achieve this sort of efficiency. As many of you will appreciate, the programs offered in geosciences are not cookie-cutter replicas of each other. Each department has its own strengths in research and teaching, and collectively give Aotearoa a diverse, comprehensive capacity across the geosciences. Any sort of rationalisation, if necessary, should be done strategically and collaboratively in a cross-university discussion in partnership with the government. Otherwise, we risk losing many experienced and world-renowned researchers from NZ and the discipline altogether, as they are cut or choose to leave to seek other opportunities.

I hope to see the tertiary education funding situation become an issue for the 2023 election. The nation is perhaps rightfully preoccupied by other issues including the cost-of-living crisis, the crisis in the health system, the seemingly never-ending climate events, resulting in flooding, landslides, coastal erosion, sea level rise... etc. and sooner or later there will surely be another earthquake, or volcanic eruption... (you can see

where I'm going here). But this issue needs attention before it gets any worse. We've seen other aspects of our public services reach crisis point. We can't let it happen to the universities as well.

To our members who are staring down the barrel of "reduced academic footprints" and "proposals for change", euphemisms for cutting courses and job losses, respectively, I am thinking of you every day. I am sure that the rest of the membership are too. We are arguably facing the most serious threat to the capacity for geosciences research and education in Aotearoa, at least since the cuts to the

DSIR in the 1990s. I implore each and every one of you to take whatever action you can to increase the volume of opposition to these cuts and make this an election issue. Please consider writing to your local MPs, as well as the Prime Minister and relevant Ministers (Science, Education, Finance, and others). If you are an alumnus of an affected university, letters to the Vice Chancellor will also carry weight. If you struggle for what to write, please feel free to draw on the public statement and letter to the PM, available on our [website](#).

In solidarity,  
Kat Holt

## GEOSCIENTIST AOTEAROA:

### SUBMISSION DEADLINES:

- 1ST FEBRUARY (FOR MARCH ISSUE)
- 1ST JUNE (FOR JULY ISSUE)
- 1ST OCTOBER (FOR NOVEMBER ISSUE)

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It is with great sadness that we have had to farewell our *Geoscientist Aotearoa* editor, Janis Russell, who has had to resign due to family commitments. While members of the National Committee have been temporarily filling in, **we are on the hunt for a new Editor (or Editors) for *Geoscientist Aotearoa*!**

Email GSNZ President, Kat Holt  
[president@gsnz.org.nz](mailto:president@gsnz.org.nz)

**to apply to be  
our next newsletter  
EDITOR!**

## EDITOR'S NOTICE:

### A REMINDER FOR CONTRIBUTORS

We welcome a range of contributions to *Geoscientist Aotearoa*, including articles, trip reports, reviews, notices, advertisements, letters, memorials and more. However, please remember that contributions for the should adhere to the guidelines set out in the *Geoscientist Aotearoa* section inside the back cover of each issue.

In particular, all images (figures, tables, photos etc) must be supplied separately and not just embedded in a Word document. Pre-formatted (grouped or annotated) images are undesirable as this may hinder page formatting. Similarly please check legibility of text when used as a label on a figure that may need to be reduced in size to fit an A5 format.

It is the responsibility of the submitter to ensure that these requirements are followed. This is especially so when forwarding articles on behalf of others.

Please email any questions and contributions to [editor@gsnz.org.nz](mailto:editor@gsnz.org.nz).

# GEOLOGICAL ORIGINS OF TWO TAINUI ANCHOR STONES/ PUNGA-O-TAINUI

Bruce Hayward

The **Tainui waka/canoe** is one of the best known of the original canoes to bring early Māori colonisers from Polynesia to New Zealand and many Māori today are of Tainui descent. The Tainui waka first landed in New Zealand at Whangaparāoia, just inside Cape Runaway, eastern Bay of Plenty. Later it crossed the Bay of Plenty and sailed around Coromandel Peninsula to Auckland, where it was transported from the east to west coasts over the Otahuhu portage from the Waitemata Harbour to Manukau Harbour. From there it made its way down the west coast with its final resting place said to be beside Kawhia Harbour (Jones and Biggs, 2004).

Not surprisingly there are a number of different versions of the exact route and stopping places of this waka. Some histories relate that after arriving at Kawhia, the Tainui waka was taken a little further south to Mōkau where the punga/anchor stone was left behind. Some histories say this anchor stone was hidden in a sea cave on the north side of the Mōkau River mouth where it was found by a European who took it away to Waitara, but soon returned it when it brought him bad luck and the local Tainui people objected (Godber, 1937). Other histories say it lay in the bed of the Mōkau River or on the beach near its mouth for many centuries. It was uplifted by local iwi in 1926 (NZ Herald, 1926) and set in concrete in the shape of a small canoe and placed in the urupa/cemetery at Maniaroa Marae, Mōkau for safe keeping (Godber, 1934) (Figs. 1-2).

Several years ago, I was asked by a colleague of Tainui descent whether I would look at the composition of the Tainui anchor stone in Mōkau, north Taranaki and maybe determine what options there were for its source. I had not searched for photos of it on-line, so was not sure what to expect. I guess I hoped it would be a distinctive igneous rock either from the Pacific islands or the Bay of Plenty-Auckland area. If I had

done some google searching, I would have discovered that it was described as “a peculiarly shaped, grooved and polished rock, something like an hour-glass in outline and about 4 feet in length” (Cowan, 1910, p.68) and I would have found the photograph of it set in concrete, taken by A.P. Godber in 1934 that confirmed this description.

As soon as I saw it my heart dropped, it was definitely not made of igneous rock but of cemented, coarse sandstone. It was clearly a double spherical concretion where two spheres had grown and joined together within the host rock (Fig. 3). Each is 70-80 cm in diameter with a total length of about 130-140 cm. The only sign of possible human working of the rock is a shallow groove at one end of one of the concretions (Fig. 3). This groove could have been made to help tie a rope around the stone, but seems unnecessary as the natural waist in the middle of the rock would have sufficed. Other possible origins of the groove are that it is an eroded-out section of a softer, less-cemented rock layer, as it is parallel to the original layering of the host strata, or that it could have been damage sustained while it was being moved up from the beach. Otherwise, the stone's surface looks perfectly natural with a few, small irregular pock marks from erosion. It has not been deeply buried and is clearly of Late Cretaceous or Cenozoic age. It has clearly eroded out of its host rock with none of the uncemented sediment still remaining.

This rock type rules out any possibility it could have been brought from any of the Polynesian islands to New Zealand. Spherical concretions of this size occur in a few places around New Zealand, but none occur along the coast of the Bay of Plenty, Coromandel Peninsula or west coast between Kawhia and Manukau harbours. These concretions are larger than the few spherical concretions I know within the

Waitemata Sandstones around Auckland. Thus, if the Tainui waka did not travel elsewhere around the coast of New Zealand, it only leaves the coast of North Taranaki, near Mōkau, as the likely possible source. Sure enough there are indeed several places along the coast in this vicinity that have spherical sandstone concretions of this size eroding out of the late Miocene sedimentary rocks that form the cliffs, with free concretions lying half buried in the beach sand (Fig. 4).

Several years ago, I photographed a very similar double spherical concretion, of similar size to the anchor stone, partly exposed in the eroding face of a sea stack just south of the mouth of the Mohakatino River (Fig. 5), 4 km south of the mouth of the Mōkau River. I have not walked the coast at low tide at the Mōkau River mouth but it is more or less along strike and relatively flat-lying so I strongly suspect similar horizons of scattered concretions occur in the cliffs around the Mōkau River mouth. The amazing similarity of the Tainui anchor stone in the Mōkau urupa with that in my photograph and the single spheres on the nearby beaches lead me to conclude that the anchor stone is of local origin, possibly from the cliffs at the Mōkau River mouth or close by. The size and weight of the anchor stone would have required many people to lift it, a fact that some have used to argue that the Tainui waka must have been a double-hulled canoe to have had such a large anchor stone. Additionally the hour-glass shape of this Punga-o-Tainui is quite different from all other known authentic Māori and Polynesian anchor stones. However, none of this evidence can confirm the stone was not used as an anchor.

It is quite understandable that people seeing this extremely rare and unusual, hour-glass shaped rock on the beach at Mōkau would have thought it must have been shaped by humans and would fit the traditional history of the lost Tainui anchor stone. I discovered in my searching that way back in the early 20th century when the stone was hauled up from the tide, some people expressed doubts that this was the Tainui anchor stone as they realised it resembled local concretions.

Ngāi Tai ki Tāmaki oral tradition of the voyage of the Tainui waka from Whangaparāoia to Kawhia tell of the canoe calling in at Tūranga Estuary, Whitford, just south of Auckland and being moored or tethered to a



Figure 1. Anchor stone at Maniaroa Marae, Mōkau.



Figure 2. Maniaroa Marae anchor stone plaque.



Figure 3. The anchor stone is a double spherical concretion.





Figure 4. Free concretions lying half buried in the beach sand near Mōkau.

large rock “in the shape of a man” giving the name Tūranga to the place, some meanings of which are standing place or anchorage (Ngāi Tai ki Tāmaki, 2015, p. 16). The coast of this estuary is composed of low, weathering cliffs of relatively soft Waitemata Sandstone and low-lying Quaternary sediments (Kermode, 1992). On the shoreline today there is only one large hard rock (Fig. 6) that could possibly fit the traditional description of the mooring stone and



Figure 5. Double spherical concretion partly exposed in the eroding face of a sea stack near Mohakato River mouth.

survived here for many centuries. It is composed of hydrothermally altered and silicified andesite breccia (Fig. 7) that cannot be derived from anywhere nearby and is identical to similar rock types seen around Coromandel township on the other side of the Firth of Thames, 50 km away to the east (Hayward and Mauk, 2011).

The huge size and weight of this large boulder make it unlikely to have been transported here by canoe. Searching around at the back of the beach near the boulder, we found cobbles of rounded andesite, jasper, silicified wood and more hydrothermally-altered andesite (Hayward and Mauk, 2012). It would seem that these are the eroded-out erosion-resistant remnants of a Pliocene conglomerate that had been transported down a west-flowing river from the Coromandel before the Hauraki Rift subsided (Battey, 1949). A similar assemblage of rocks occurs in conglomerate of the Puketoka Formation s.s. near Maramarua (40 km south of Whitford) and includes a 2 m diameter boulder of silicified breccia. For this and the Whitford boulder to have been transported across from the Coromandel Volcanic Arc in the Pliocene possibly required a transport mechanism like debris flows.

## Conclusion

Field examination of two punga-o-Tainui or “anchor stones” from the oral traditional accounts of the Aotearoa/New Zealand voyage of the Tainui canoe, together with their local geological setting, indicates that the Mōkau anchor stone was sourced from the local beach having eroded out of the sea cliffs. It has no features that suggest any human modification and possibly was never used as an anchor stone. Similar examination of the Turanga tether stone suggests that it was naturally transported to its present location from its Coromandel source during the Pliocene and is the only large boulder in the vicinity that is hard enough to have existed here for 700 years or more and to have been used to tether a large canoe, such as the Tainui during its historic voyage. ■

*I thank Malcolm Patterson, Dan Hikuroa, Greg Browne and Cam Nelson for helpful advice in preparing this note.*

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Figure 6. Possible mooring stone in Tūranga Estuary.



Figure 7. The possible mooring stone is composed of hydrothermally altered and silicified andesite breccia.

# IAS ISC 2026 AND OTHER 3 AND 4 LETTER ACRONYMS

Mark Lawrence: GNS Science

*This article is the first in an irregular series of updates on progress towards the International Association of Sedimentologists (IAS - <https://www.sedimentologists.org/>) International Sedimentological Congress (ISC) to be held in Aotearoa New Zealand in 2026.*

## Background to Hosting the Conference

The IAS was founded on 11 September 1952, to promote the study of Sedimentology. It currently has about 2000 members in about 100 countries and publishes the journals *Sedimentology* (primary publication) and *The Depositional Record* (open access journal), plus the *Journal of Petroleum Geology and Basin Research* in partnership with other organisations. It also produces special publications on various aspects of sedimentology and provides grants worldwide to support all kinds of sedimentological research. Every four years the IAS holds the International Sedimentological Congress. The most recent of these was in Beijing from 22-26 August 2022. This 21st ISC had about 1400 registrants, however, Covid-19 resulted in the congress being a completely virtual event; field trips and workshop included. Despite the Covid-19 restrictions, the congress was successful.

In the middle of 2019, the General Secretary of the IAS emailed Mark Lawrence (GNS Science) and Karoly Nemeth (Massey University, Palmerston North; Senior Researcher at the Institute of Earth Physics and Space Science, Sopron, Hungary; Research Scientist at the Saudi Geological Survey, Jeddah, Kingdom of Saudi Arabia) stating that the ISC had never been held in



**WELLINGTON, NEW ZEALAND**  
**25-30 JANUARY 2026**

Aotearoa New Zealand, and asking would we like to host it. Mark and Karoly were approached because Karoly was the IAS representative for New Zealand (he has since handed that role to Mark), and Mark coordinates the Sedimentology Special Interest Group (SSIG) for the Geoscience Society of New Zealand (GSNZ). Following a quick survey of the SSIG whose responses broadly supported the idea, and which resulted in buy-in from the GSNZ national committee, a local organising committee (LOC) was assembled that Karoly and Mark now co-chair. The other committee members comprise Cliff Atkins (Victoria University, Wellington), Kari Bassett (University of Canterbury, Christchurch), Andrew La Croix (University of Waikato, Hamilton), Scott Nodder (NIWA, Wellington), Christian Ohneiser (University of Otago, Dunedin), and Lorna Strachan (University of Auckland, Auckland). The next step was to submit a proposal to the IAS Bureau to host the event. That proposal was approved unanimously, although it was subsequently discovered that it was the only proposal the IAS received.

## Progress to Date

The Aotearoa New Zealand conference will be the 22nd ISC and an over-riding theme will be "Sedimentation on active plate margins through time and space", although papers covering all aspects of sedimentology will be considered. The conference will be held in Te Whanganui a Tara Wellington during 25-30 January 2026, at Tākina, the new conference and exhibition centre just across the road from the Museum of New Zealand - Te Papa Tongarewa. Tākina officially opened on Wednesday 31 May 2023, with the first official event scheduled shortly thereafter for June.

Within the main conference theme, the committee has developed a broad suite of sub-themes covering modern to ancient sedimentary systems that include:

- Tectonic geomorphology and sedimentation,
- Volcano-sedimentary processes and deposits,
- Seismic and volcanic influences on lacustrine sedimentation,
- Seismicity and the relationship to submarine landslides/turbidites/mass transport deposits (MTDs) – modern and ancient,
- Interaction of tectonic and eustatic processes in the sedimentary record,
- Glacio-fluvial sedimentation,
- Māori and Pasifika (Polynesian cultures of the SW Pacific) view of sediments and sedimentary processes.

In order to attract attendance from those who live and/or work on more passive margins, other sub-themes being considered include:

- Downslope and along slope deep marine processes,
- Carbonate deposition and diagenesis,
- Modern sedimentary processes and deposits: analogues for the rock record,
- Sediments, plants, and animals: fossils, trace fossils, paleoecology, and evolution,
- Sustainable sedimentary resources: aggregates, critical minerals, and the energy transition,
- Sedimentology and society: Societal impacts on sedimentary systems, shallow marine processes and hazards, sea level change.

A range of field trips, workshops, outreach, and social events are being planned.

A digital booth with assorted promotional videos advertised the New Zealand conference at the Beijing ISC, where significant interest was generated. We have launched the conference website (<https://confer.co.nz/isc2026/>) and designed a conference logo that hopefully reflects our maritime status. However, none of this could have been achieved without the assistance of two key organisations:

## GEOCRYPTIC CROSSWORD ANSWERS (FROM PAGE 32):

Down  
1. lithyosaur, 2. neutron, 3. spiegel, 4. chironomid, 5. stratified, 6. glaucophane, 9. abandoned, 17. meander, 20. Ozark, 21. dune, 22. plane, 23. iron

Across  
1. igneous, 4. casing, 7. PA, 8. tsunam, 10. IGRF, 11. yardang, 12. postdoc, 13. nodal, 14. 10, 15. flap, 16. ignimbrite, 18. Na, 19. Gondwana, 24. ria, 25. sedimentary, 26. Nukumarua, 27. belt

Tourism New Zealand (TNZ) with Michael Stokoe as our point of contact, and our friends at Conferences and Events Ltd led by Amy Abel and Janet Matheson.

### What Next?

We are now well on the road to 2026 and the countdown to the 22nd ISC has begun. An organisational timeline is being constructed and the LOC has increased in size. Organisational responsibilities allocated for the moment are:

*Conference Manager:* Amy Abel

*Convenors:* Mark Lawrence, Karoly Nemeth

*Technical Programme:* Kari Bassett, Andrew La Croix

*Field Trip Programme:* Cliff Atkins, Lorna Strachan

*Workshop Programme:* Mark Lawrence

*Publications:* Catherine Chagué

*Early Career:* Szabolcs Kosik

*Student Affairs:* Matthew Ryan

*Social Programme:* Scott Nodder

*IAS Board Representative:* Karoly Nemeth

*Sponsorship:* Mark Lawrence

Now it is time for the wider Sedimentology Special Interest Group (SSIG), or anyone sedimentologically

inclined, to be included. We need more people to assist with the responsibilities. Also, if you wish to convene a theme, chair a sub-theme session (which includes vetting abstracts), help identify keynote speakers, or propose to lead a field trip, we would like to know. At the moment we are particularly interested in assistance with the Māori and Pasifika Earth view theme. Calls for assistance with and ideas for any part of the programme will start going out shortly, or you can contact any member of the LOC below:

Mark Lawrence	<a href="mailto:m.lawrence@gns.cri.nz">m.lawrence@gns.cri.nz</a>
Andrew La Croix	<a href="mailto:alacroix@waikato.ac.nz">alacroix@waikato.ac.nz</a>
Catherine Chague	<a href="mailto:c.chague@unsw.edu.au">c.chague@unsw.edu.au</a>
Christian Ohneiser	<a href="mailto:christian.ohneiser@otago.ac.nz">christian.ohneiser@otago.ac.nz</a>
Cliff Atkins	<a href="mailto:cliff.atkins@vuw.ac.nz">cliff.atkins@vuw.ac.nz</a>
Kari Bassett	<a href="mailto:kari.bassett@canterbury.ac.nz">kari.bassett@canterbury.ac.nz</a>
Karoly Nemeth	<a href="mailto:knemeth69@gmail.com">knemeth69@gmail.com</a>
Gabor Kereszturi	<a href="mailto:g.kereszturi@massey.ac.nz">g.kereszturi@massey.ac.nz</a>
Lorna Strachan	<a href="mailto:lstrachan@auckland.ac.nz">lstrachan@auckland.ac.nz</a>
Matthew Ryan	<a href="mailto:matt.thomas.ryan@gmail.com">matt.thomas.ryan@gmail.com</a>
Scott Nodder	<a href="mailto:s.nodder@niwa.co.nz">s.nodder@niwa.co.nz</a>
Szabolcs Kosik	<a href="mailto:szabolcs.kosik@gmail.com">szabolcs.kosik@gmail.com</a>
Warren Dickinson	<a href="mailto:warren.dickinson@vuw.ac.nz">warren.dickinson@vuw.ac.nz</a>
Callum Rees	<a href="mailto:c.rees@massey.ac.nz">c.rees@massey.ac.nz</a>



SSIG ichnology workshop field trip to Pukemuri Stream, Wairarapa coast (Photos: Marianna Terezow; from Sedimentology Special Interest Group (SSIG) Annual Report 2016-17).

# WAITAKI WHITESTONE GEOPARK

ENDORSED AS NEW ZEALAND'S FIRST UNESCO GLOBAL GEOPARK

Lisa Heinz: Waitaki Whitestone Geopark

In May 2023, the UNESCO Executive board announced that the Waitaki Whitestone Geopark (WWG) was granted status as a UNESCO Global Geopark. WWG now joins the Global Geopark Network of 195 other geopark members across 48 countries. Geoparks within this network are focused on the conservation and education of the natural and cultural heritage within their boundaries. Being part of this group means that WWG is recognized as meeting quality standards set by the network. Each

geopark is reassessed in person every four years to ensure this quality is being maintained and any recommendations that were made by the geopark evaluators have been addressed.

To mark this huge achievement WWG are planning a celebration event later in the year – more details to come. To keep up to date with our events please sign up for our newsletter at <https://www.whitestonegeopark.nz/newsletter> and follow us on Facebook. ■



Elephant Rocks

Photo: Jenny Stein

### Waitaki Whitestone Geopark

Incredible forces formed our Geopark under an ancient sea. Volcanoes, mountains, rivers, glaciers, and people then further shaped this region. Written in the stone and in our land is the story of the Waitaki – a geological wonderland, steeped in Kāi Tahu Whānui histories and culture waiting to be explored.

### What is a Geopark?

Our Geopark covers the entire Waitaki District and tells the story of our whenua (land) and how the landscapes have shaped the lives of its people, animals, and plants. The Waitaki Whitestone Geopark is New Zealand's first UNESCO Global Geopark - a recognised area of international geological significance. Geoparks connect the geological heritage of a region with its cultural, social and natural heritage.

# “FREE TO PUBLISH AND FREE TO READ!”

## INTRODUCING COMMUNITY-LED DIAMOND OPEN ACCESS JOURNALS FOR GEOSCIENTISTS IN AOTEAROA

Jack Williams: University of Otago (Associate Editor, Tektonika)

Ery Hughes: GNS Science (Technical Editor, Volcanica)

Kiran K. Thingbaijam: GNS Science (Chair Fast Reports, Seismica)

Suzanne Bull: GNS Science (Executive Editor Sedimentologika)

Oliver Lamb: GNS Science (Topical Editor, Volcanica & Copy Editor, Seismica)

We are excited to highlight to GSNZ members the rapid development of *diamond* open access journals across the geosciences, and in particular, four new journals that we collectively represent: *Volcanica*, *Tektonika*, *Seismica*, and *Sedimentologika*. Although each journal is distinct, they all follow the same ethos: free-to-publish, free-to-read, and run by dedicated volunteers from the scientific community who are passionate about making scientific publishing accessible and equitable for all.

There are certainly no shortage of journals for GSNZ members to consider submitting to. So, what make these new journals different? Below, we discuss how scientific publishing is evolving, and why this presents a need for diamond open access journals.

### Background

Our model of exchanging new ideas and discoveries through scientific publishing has barely changed since the introduction of peer review in the 1750s. Worryingly, however, this model is increasingly dependent on a handful of large publishing companies (Larivière et al., 2015). In turn, these companies have created an especially lucrative business model, where scientists write and submit their articles at no cost to a journal, perform peer review for free, and then either personally or through their institutions, pay

subscription costs to access their articles. In 2017, universities in Aotearoa New Zealand spent \$65 million on subscription costs (Saunders, 2022).

More recently, there has been an increasing move towards open access publishing. Open access means anyone can read a scientific article without having to pay or be affiliated to an institution with a journal subscription. This demand is mainly driven by funding agencies and in particular the recognition that taxpayer-funded research should be openly accessible to the public. In the context of Aotearoa New Zealand, the Ministry of Business Innovation and Employment (MBIE) recently announced that all peer-reviewed research they fund must be open access (MBIE, 2022).

### All that glitters is not gold

There are broadly three types of open access article types: gold, green, and diamond (Figure 1). Gold open access describes fully accessible formatted articles, whilst green open access refers to unformatted articles that are only available on a separate repository (e.g. Earth ArXiv). For both gold and green open access, journals may cover their costs through an Article Processing Charge (APC) to the author, often via their institution. In total, universities in Aotearoa New Zealand spent \$2.1 million on APCs in 2017 (Saunders, 2022).

Increasing open access publishing is undoubtedly a

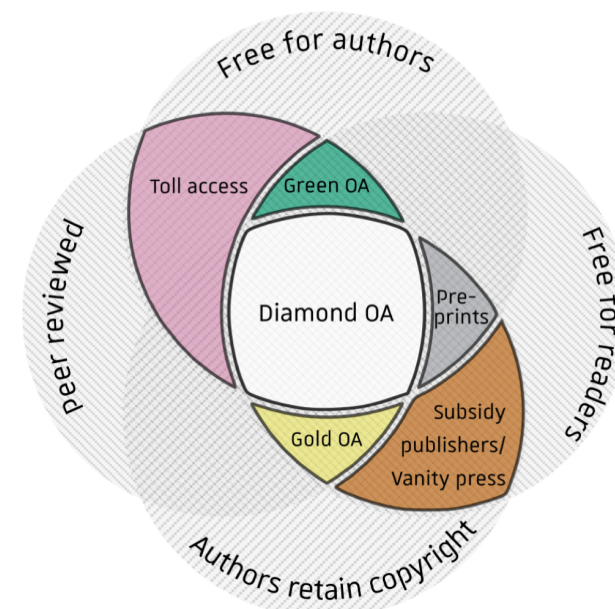


Figure 1: Visual explanation for the classification of different open access article types. Figure after Farquharson & Wadsworth (2018).

positive move for both scientists and the general public. However, for publishing companies all that has changed is that the cost of scientific publishing has shifted from the reader to the author through APCs. In the natural sciences, the average APC for a gold open access journal is \$~2955 NZD (Asai, 2022) and is \$~16,600 NZD for a high impact journal such as Nature. Moreover, APCs have been increasing at rates well above inflation even though, thanks to online publishing, the cost of publishing and disseminating open access articles has remained relatively stable at \$~320-640 NZD/article (Khoo, 2019; Grossman & Brembs, 2021).

We acknowledge that many journals are linked to scientific societies, and a portion of their APC profits are reinvested into the scientific community. Nevertheless, questions must be asked about whether the profit margins of some open-access publishing is justified; not least when APCs can reduce the research budget available to fund other costs (equipment, fieldwork etc.), and even prohibit scientists from publishing in some journals. This is where diamond open access journals come in.

### The Diamond Open Access movement

Diamond open access journals (DOAJ) are different from green and gold open access, as there are no APCs. They are free to publish in, and free to read. Within the geosciences, discipline specific DOAJ have been available for over 25 years (e.g., The Sedimentary Record, Palaeontologia Electronica). More recently, however, a new generation of community-led DOAJs that are independent of the traditional publishing companies have been launched (Figure 2). Volcanica ([www.jvolcanica.org](http://www.jvolcanica.org)) was the first of these to launch in 2018, and its success inspired other disciplines to follow their example. More recently, Tektonika ([www.tektonika.online](http://www.tektonika.online)), Seismica ([seismica.org](http://seismica.org)), and Sedimentologika ([sedimentologika.org](http://sedimentologika.org)), have opened for article submissions, whilst plans are well underway for launching Geomorphica ([geomorphica.org](http://geomorphica.org)) (Figure 2).

One obvious question is how do DOAJs cover their operating costs? We are fortunate that costs such as website maintenance are covered by universities



Figure 2. Logos for DOAJs in the geosciences that are or will soon be open for submission.

that have partnered with these journals (e.g., McGill University for Seismica). As community-led journals, DOAJs also rely on volunteers from the scientific community to fulfil roles that would normally be covered by professionals within a publishing company (e.g., typesetting and technical support).

#### How can I support the diamond open access movement?

We hope that our description of DOAJ has motivated you to support them. If so, here are a few suggestions:

- **Submit** your articles! This is the best way to support a DOAJ, as it shows there is a demand for these journals in the geosciences. Furthermore, compared to conventional journals, DOAJs are often more flexible in the scope of articles that they accept (e.g., fast reports, communication on methods, reports on field campaigns, instrument deployment, null results, and failed experiments).
- **Review:** we hope the novel way that DOAJs operate will motivate you to spend your limited capacity for performing peer-reviews with these journals. You can facilitate this by adding your name and expertise to reviewer databases for some DOAJs (e.g., <https://seismica.eu.pythonanywhere.com>)

- **Apply** for future opportunities to join a DOAJ in editorial or technical roles. These will be well-advertised through social media and mailing lists.

We do not expect every submission or review that you perform in future to be for a DOAJ. In particular, we recognise that some geoscience disciplines do not have a suitable DOAJ (Metamorphika anyone?) and that journals associated with scientific societies should continue to play a significant role. Nevertheless, we contend that DOAJs represent an important development in the geoscience publishing ecosystem as they offer us an alternative from the “pay or perish” policy, and help make scientific publishing more beneficial for scientists and public alike. We look forward to seeing many contributions to DOAJs from GSNZ members in future. ■

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## CALLING GEOSCIENCE LEADERS! BID FOR AN INTERNATIONAL CONFERENCE

CONFERENCE FUNDING AND SUPPORT AVAILABLE

Tourism New Zealand's business events team offers support for international conferences of more than 200 international delegates through its conference assistance programme. This includes supporting costs for a financial feasibility study of the conference, production of a professional conference bid document, funding bid travel requirements, and marketing and promotional support if the bid is successful.

For more information on bidding for an international conference visit: [businesssevents.newzealand.com](https://businesssevents.newzealand.com)



# GSNZ AWARDS 2023

CALL FOR NOMINATIONS AND APPLICATIONS

## Premier Geoscience-wide Awards:

- Hochstetter Lecturer** For a geoscientist with excellent public speaking skills to present new research to all branches of GSNZ. We welcome nominations of ALL members of the geoscience community for this award, from ECRs, through to senior geoscientists.
- McKay Hammer** For the author(s) of the most meritorious geoscience paper(s) from the previous 3 calendar years (2020-2022).
- GSNZ Honorary Member** Nominations are called for to recognise outstanding lifetime contributions to geoscience in New Zealand.
- Hayward Geocommunication Award** Awarded to a NZ-based geoscientist or geoscientists for the most meritorious contribution to geocommunication in the previous 3 calendar years (2020-2022).

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## Special Awards:

- New Zealand Geophysics Prize** For the most meritorious publication in NZ geophysics in the current and last 2 years (2021-2023).
- Harold Wellman Prize** Awarded for a recent discovery of important fossil material within New Zealand.
- Kingma Award** Awarded to the most outstanding Earth science technician in New Zealand.
- Alan Mason Historical Studies Fund** Up to \$500 awarded to assist research on the history of Earth science in New Zealand.

## Young Researcher/Student Awards:

- Hornibrook Award** For a postgraduate student undertaking a research project involving methods of stratigraphic correlation and of relevance to NZ and/or the southwest Pacific.
- Jim Ansell Geophysics Scholarship** Post-graduate scholarship for NZ's top up-and-coming geophysicist.
- John Beavan Geodetic Fieldwork Grant** Support for students involved with geodetic research to undertake or participate in associated fieldwork. Applications can be submitted at anytime.
- Wellman Research Award** A contribution of approximately \$3000 towards research in New Zealand. Contribution can cover field, travel, analytical expenses, etc (more details on website).
- Werner F. Gigenbach Prize for Geochemistry** For the most outstanding geochemistry publication in 2022 by a NZ-based young researcher.
- Young Researcher Travel Grant** A second round for 2023 is being held for the YRTG. The grant is to provide funding assistance for New Zealand early career Earth science researchers and PhD students to attend and present a talk or poster at their first international overseas conference.

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Please email your nominations/applications to the Awards Subcommittee Convenor, Sam McColl, at [vp@gsnz.org.nz](mailto:vp@gsnz.org.nz) by the **1st of September 2023** (unless otherwise stated).

For more details on individual awards and to download nomination templates please visit <http://gsnz.org.nz/awards>

# SJ HASTIE AWARD REPORT

## DRUMBEAT SEISMICITY AT MT RUAPEHU INVESTIGATED WITH GAS GEOCHEMISTRY AND TE WAI Ā-MOE CRATER LAKE TEMPERATURES

Liam Bramwell: MSc Research

Supervisors: Dr Finnigan Illsley-Kemp (Victoria University of Wellington)

and Dr Ery Hughes (GNS Science)

**Mt Ruapehu's** Volcanic Alert Level was raised to Level 2 early 2022 on 21 March following strong volcanic tremor, increases in gas plume emissions, and the initiation of a new heating phase at Te Wai ā-moe crater lake. This research examines seismic, gas flux, and lake temperature data during this period of unrest for trends in drumbeat seismicity, never before studied in New Zealand, and surface expressions of magmatic processes. Our aim is to determine an evolving source mechanism(s) for this unrest, map Ruapehu's magmatic system, and contribute towards future improvement of volcanic activity forecasting in New Zealand. Drumbeat earthquakes are repetitive, highly periodic forms of volcanic seismicity that have been observed around the world to, in many instances, herald the ascent of magma and precede a volcanic eruption. Generally, drumbeat signals have exceedingly similar low-frequency ( $\leq 5$  Hz) waveforms and consistent inter-event times (IETs) that suggest a similar, repeating, non-destructive source that can recharge at seconds- to minutes-long timescales. Proposed source mechanisms include the shearing of a solid magma plug against conduit margins, the brittle failure of cooled magma near conduit walls in the glass transition, and the injection and depressurisation of gas pulses into a resonating fracture network.

Mt Ruapehu exhibited an incredibly diverse set of drumbeat sequences from 14 March to 12 April during its 2022 unrest. The drumbeat sequences varied, both inter- and intra-sequence, in waveform similarity, periodicity, and onset/terminus characteristics. Consequently, initial data processing involved the sonification and

compression of seismic data that retained the original data's integrity to better understand the variability of Ruapehu's drumbeats. One of the characteristics this analysis revealed was rapid change in IETs at regular intervals, including IETs of  $<10$  seconds that merged drumbeats into continuous low-frequency tremor before differentiating back out to distinct drumbeats (Figure 1). This behaviour may suggest either a rapid alteration in source mechanism behaviour (i.e., rate of gas escape through a semi-permeable fracture network) or a coincidentally immediate change in source location. Ruapehu drumbeats also display intra-sequence acceleration and deceleration alongside days-long deceleration as the March-April drumbeat activity ended, potentially suggesting a decrease in magmatic degassing within the conduit that fueled, at least in part, drumbeat activity (Figure 2). Future directions for seismic data processing involve manual picking of drumbeat events for the March-April period, allowing us to analyse variations in waveform similarity, periodicity, and frequency content.

To further quantify the existence of a dynamic source mechanism, I will be integrating gas plume chemistry and Te Wai ā-moe crater lake temperature analyses over the March-April drumbeat period. Both data sets will be analysed in Python for any significant trends in cyclicity and Te Wai Ō-moe temperature data will be further assessed through energy and mass balance models to differentiate seasonal variations in lake temperature from magmatically-sourced changes.

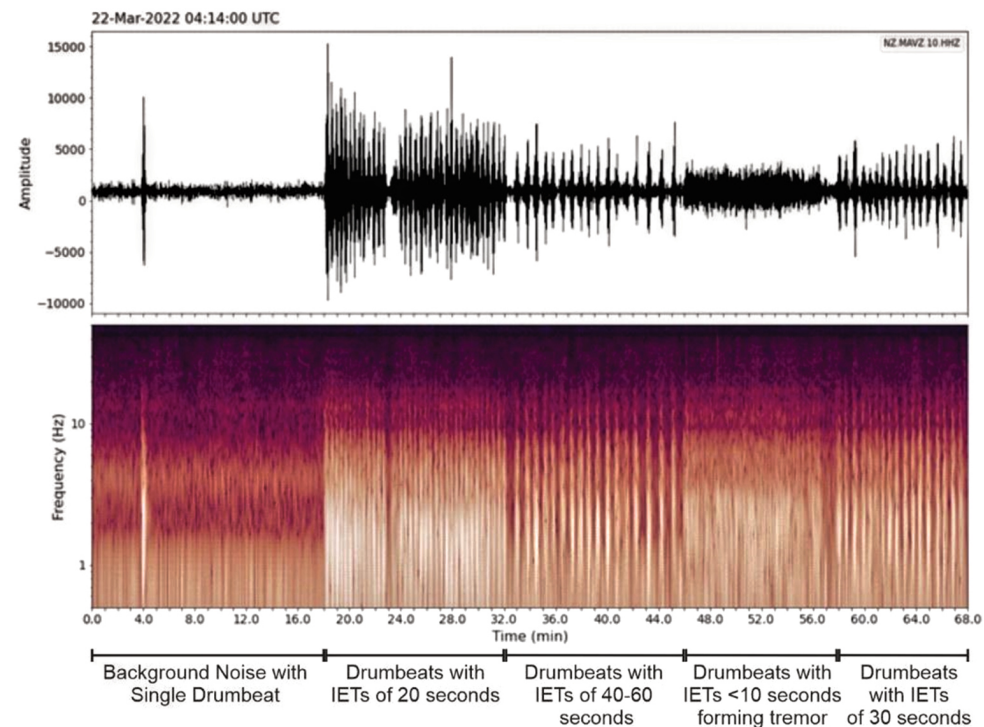


Figure 1. Example of Ruapehu's variability in drumbeat periodicity for a period on 22 March 2022 at GeoNet station MAVZ with waveforms (top) and corresponding frequency spectrogram (bottom). Drumbeat sequences often have dominant frequencies from 1-3 Hz, rapid onsets, and can exhibit a range of IETs from 10 seconds to 6 minutes. Here we have four different drumbeat sequences at 18-32, 32-46, 46-58, and 58-68 minutes that each display different periodicities, with the third sequence (46-58 minutes) displaying IETs  $<10$  seconds which merges drumbeats into tremor.

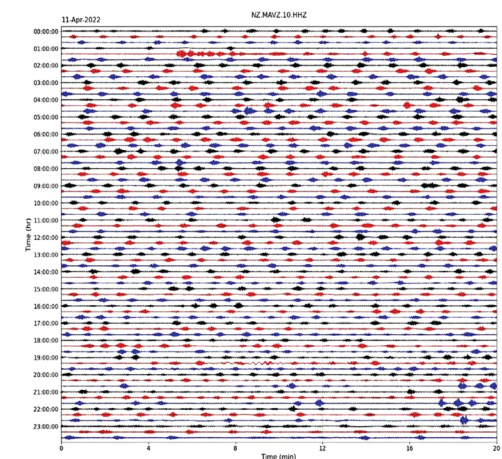


Figure 2. Waveform dayplot for 11 April 2022 at GeoNet station MAVZ displaying large-scale deceleration of drumbeats from IETs of approximately 40 seconds to upwards of 2 minutes. Broad drumbeat deceleration is believed to be the result of a decrease in the rate of magmatic degassing in the volcanic edifice. ■

# SJ HASTIE AWARD

SUPERVISOR'S SUPPORT LETTER: LIAM BRAMWELL



School of Geography, Environment and Earth Sciences  
Te Kura Tātai Aro Whenua  
VICTORIA UNIVERSITY OF WELLINGTON, PO Box 600, Wellington 6140, New Zealand  
Email [finnigan.illsleykemp@vuw.ac.nz](mailto:finnigan.illsleykemp@vuw.ac.nz) Web [people.wgtn.ac.nz/finnigan.illsleykemp](http://people.wgtn.ac.nz/finnigan.illsleykemp)

30<sup>th</sup> May 2023

To whom it may concern,

This letter is to confirm that myself and Dr Ery Hughes (Liam's co-supervisor) are very satisfied with Liam's progress with his MSc research project. Liam has been working hard and is already starting to get exciting results. We are both very confident that Liam will complete his thesis on time.

Your sincerely,

Finnigan Illsley-Kemp  
Research Fellow in Volcano Geodynamics

CAPITAL THINKING.  
GLOBALLY MINDED.  
MAI I TE IHO KI TE PAE

## GSNZ PHOTO COMPETITION!

Showcase your passion for geoscience and the beauty of Aotearoa New Zealand by submitting your best shots to the Geoscience Society of New Zealand (GSNZ) annual photography competition. Don't miss this opportunity to have your work recognised and celebrated by the local geoscience community.

Entries close  
31 July

**Great prizes to be won!**

For full competition and entry details visit:  
<https://gsnz.org.nz/gsnz-events/ViewEvent/229>



# FIELD TRIP: TĀKAKA

ROCKSOC - UNIVERSITY OF CANTERBURY GEOLOGY CLUB

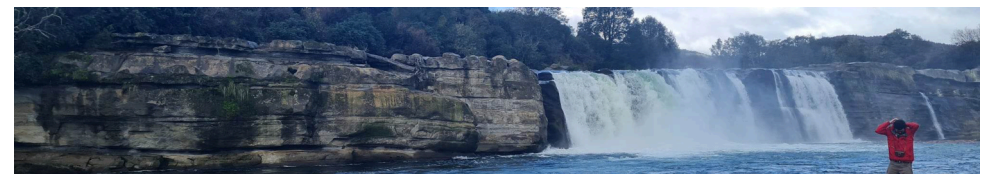
Jessie Henwood

**RockSoc**, the geology club from the University of Canterbury, ran a field trip to Tākaka in late June, which was an unforgettable experience for the 21 students from a range of year levels who participated. We embarked on an exciting journey, exploring the various geological wonders this region offers. Most of us had never been there before, at least with geology in mind, so it was great to see some new rocks. It was also a great learning experience for all of us as we saw lots of different outcrops on which we could practice our field skills. Some of the highlights from our trip included a visit to the Labyrinth Rocks, where we saw incredible karst morphology, and the enchanting Te Waikoropupū Springs, known for their crystal-clear waters. A river visit ensured we looked at some

interesting metamorphic rocks. We also delved into the depths of the Aorere Goldfield, discovering fascinating caves with magnificent stalactites and stalagmites. Fossil hunting at Fossil Point on Farewell Spit and exploring the stunning Wharariki Beach added to the experience. We even had the chance to marvel at the unique Split Apple Rock and got to find some fantastic zoned feldspars. This incredible trip wouldn't have been possible without the exceptional organisation skills of Jessie Henwood, who coordinated the journey with the assistance of the RockSoc Exec. We also want to thank our major sponsor Rio Tinto and minor sponsor GSNZ for their generous sponsorship of the trip and the School of Earth and Environment for supporting RockSoc throughout this adventure. ■



RockSoc field trip participants (left) exploring Aorere Goldfields caves (above) and Maruia Falls (below).





# GEOCRYPTIC CROSSWORD 07

by **Cryptonite**

**ACROSS**

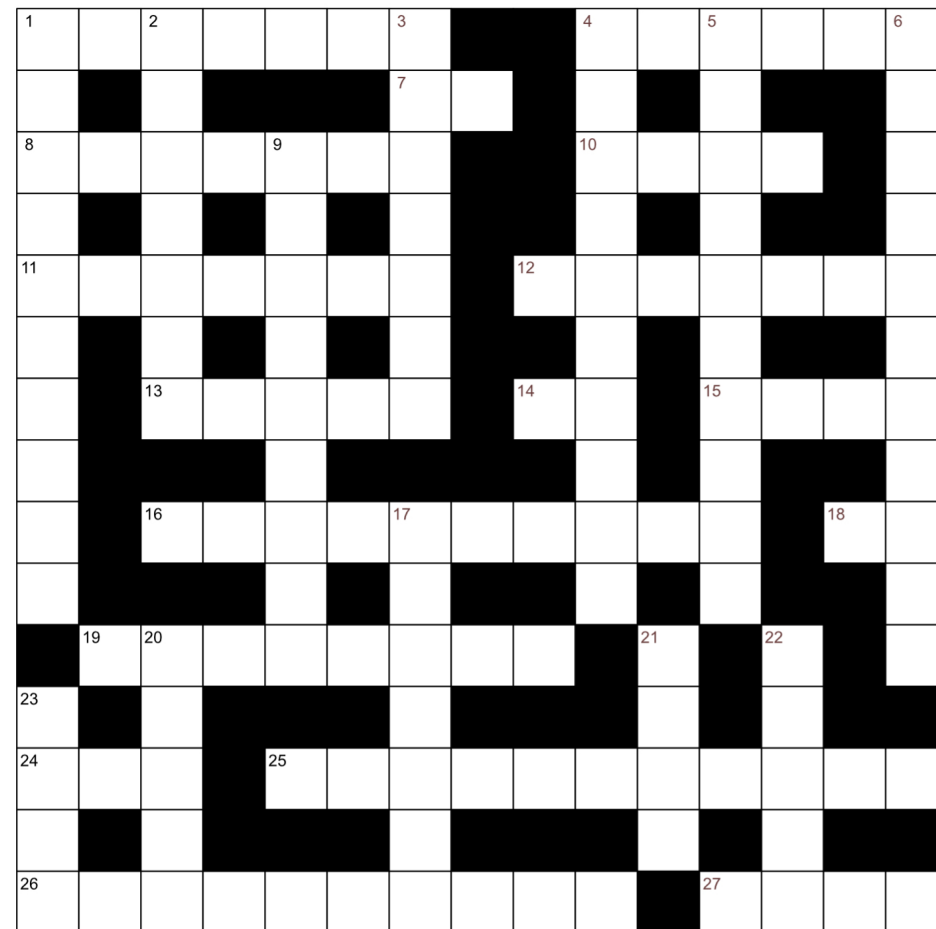
- 1. Song about Energy Use Intensity...and ex-molten rocks (7)
- 4. Scoping the joint to stabilise a well (6)
- 7. Pascal's Personal Assistant? (2)
- 8. I am stunned weird Ned fled great wave (7)
- 10. Tesla abandons peculiar grift to describe Earth's magnetic field, briefly (4)
- 11. Wind-carved feature of courtyard angel (7)
- 12. Send medic to higher training? (7)
- 13 & 22. An old panel fashioning a potential fault (5,5)
- 14. Orbiting Jupiter puts me in debt, I hear (2)

- 15. Collapsed beds in a state of agitation...? (4)
- 16. Product of Latin "fire stormcloud" (10)
- 18. In short, sodium says no, we hear (2)
- 19. Outcome of a break-up we've since broken up with (8)
- 24. Air returns to drowned valley (3)
- 25. I'm in no mood to move these rocks (11)
- 26. *Zygochlamys delicatula's* first appearance on stage (10)
- 27. Zone of rock that can hold up one's trousers? (4)

**DOWN**

- 1. Hairy scout swimming...swims no longer (10)
- 2. Deuterium has one, but hydrogen has none (7)
- 3. Pig cavorting with eels is a porky 23 rich in C and Mn (7)
- 4. Temperature proxy that doesn't suck (10)
- 5. Street authorised to have layers (10)
- 6. Ridiculously huge loan cap for blue amphibole (11)

- 9. What happens to the channel when 17 moves away (9)
- 17. Me and 'er are round the bend (7)
- 20. A TV drama that was not about these North American mountains (5)
- 21. Nude hiding from windswept sand (4)
- 22. (see 13)
- 23. Element found back in norite (4)



Answers on p.19



## GEOSCIENCE SOCIETY OF NEW ZEALAND ANNUAL CONFERENCE

### 13 - 16 NOVEMBER 2023

Te Herenga Waka | Victoria University of Wellington

In the spirit of our beautiful conference logo, we extend a warm invitation for you to join us in Te Whanganui-a-Tara Wellington for the 2023 Geoscience Society of New Zealand annual conference, running from 13-16th November 2023. The conference will be held on campus at Te Herenga Waka Victoria University of Wellington and will include oral and poster sessions, keynote speakers, workshops, a public lecture, and field trips. Our conference theme is based on the concept of "Where Plates and People Meet" so we will have a range of science and social opportunities for you to enjoy over the conference week.

#### Conference Themes

- I. Earth Systems: Learning from the past to understand the present (and predict the future)
- II. Geosciences for a Sustainable Future
- III. Aotearoa New Zealand's Active Plate Boundary: Landscapes, People and Processes
- IV. Diversity and Indigenous Voices in the Geosciences

The logo for this year's GSNZ Conference features the Te Whanganui a Tara Wellington landscape and harbour as viewed from Raukawa Cook Strait. This is underlain by the Pacific and Australian tectonic plates whose meeting and collision has created Aotearoa New Zealand as we know it today.

The logo also features imagery of two hands planting a raukura, a white feather, into the earth. This is symbolic of the planting of a real white feather in the grounds of Parliament following the cleansing of the site after the February 2022 occupation. That feather was planted by Te Ātiawa/Taranaki Whānui/NZ Parliament Kaumātua/Te Rūnanga nui o Te Ātiawa chair Kura Moeahu and Deputy Prime Minister Grant Roberston together, to symbolise the partnership of Māori and tauīwi (non-Māori) in cleansing past conflicts and striving toward a prosperous future through peace and mutual respect.

This imagery and its meaning were generously gifted to the GSNZ Conference 2023 by Matua Kelvin Tapuke (Te Ātiawa , Ngāti Tama, Ngāti Mutunga, Ngāi Tai, Ngāi Tai ki Tāmaki , Ngāti Porou, Te Whānau a Apānui, Te Aitanga-a-Māhaki, Ngāi Tuhoe, Te Whakatōhea, Ngāi Tahu, Ngāti Maniapoto, Ngāti Raukawa, Toa Rangatira) with approval from Kaumātua Kura Moeahu. He mihi atu ki a kōrua, Kura Moeahu, Kelvin Tapuke. Mei kore ko kōrua!

## Conference Programme

**Saturday 11 November** - Earth Science Festival (public open day)

**Sunday 12 November** - Rockin' Around Wellington Public Field Trip

**Monday 13 November** - Pre-Conference Workshops & Ice Breaker

**Tuesday 14 November** - Scientific Programme Day 1 & Social Dinner

**Wednesday 15 November** - Scientific Programme Day 2 & Gala Dinner

**Thursday 16 November** - Scientific Programme Day 3

**Friday 17 November** - Post-Conference Field Trips

## Submission Deadlines

**17 July 2023** - Abstract submission opens

**18 August 2023** - Deadline for abstract submission

**August 2023** - Registration opens

**15 September 2023** - Authors notified

**13 October 2023** - Early Bird Registrations close



Find out more at the conference website <https://confer.eventsair.com/gsnz2023/>

*We look forward to seeing you all in Te Whanganui-a-Tara Wellington in November this year!*



# VOLCANO ASSEMBLY

## GATHERED WORLD'S EXPERTS IN ROTORUA

Tourism New Zealand

**The International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)** Scientific Assembly 2023 brought the global volcanology community together in the iconic Rotorua caldera. Despite having been delayed for two years due to the global Covid pandemic, plus a significant weather event in Auckland just prior to the event, the conference attracted an impressive 894 delegates in person and 205 virtually, representing 44 countries.

"This was one of the first big conferences after New Zealand's border reopened and it was a very positive experience," says Dr Adrian Pittari, IAVCEI Convenor. "These meetings play a vital role in advancing volcanology and building the bridges we need to connect our global volcanologists."

Held 30 January - 3 February at the Rotorua Energy Events Centre, IAVCEI 2023 incorporated a range of plenary sessions, symposia, workshops and collaborative opportunities. Pre, post and mid-event field trips exploring some of the central North Island's most iconic volcanic and geothermal environments also helped attract international volcanologists.



IAVCEI 2023 Scientific Assembly group photo.

### Strategic Support

Pittari, Senior Lecturer in Volcanology at the University of Waikato, was integral to bidding for IAVCEI, with support from Destination Rotorua and Tourism New Zealand's Business Events team. The idea of bidding for the IAVCEI conference was first discussed at a special interest group meeting at the GSNZ annual conference in 2014, where Tourism New Zealand was also exhibiting. Important relationships were seeded at that time.

"I had lots of help from Tourism New Zealand, particularly at the beginning with the bid and supporting me with marketing the conferences at international events and that was great," Pittari says.

"I also had a really loyal team behind me on the organising committee. There were more than 20 people comprising representatives from GNS Science and six universities across New Zealand involved in volcanism (Auckland, Waikato, Massey, Victoria, Canterbury and Otago).

"It got the whole volcanic community working together and put the spotlight on New Zealand from an international perspective."

### World-Class Knowledge Sharing

"It was a great opportunity for international scientists to come and see a world-class volcanic region, both in the field and listening to sessions on the topics of New Zealand volcanology. It also allowed New Zealand's scientists to be exposed to cutting-edge research from around the world," Pittari adds.

The scientific committee of the Assembly accepted 82 symposia and received 1,265 abstracts, with 594 abstracts accepted for oral presentations and 606 for poster presentations. In total, nine parallel sessions ran over four days, as well as poster sessions.

The event also gave international visitors an introduction to the unique Māori perspectives of volcanology. Attendees were welcomed to the event with a traditional pōhiri, with Rotorua providing an ideal setting to introduce the inherent relationships that tangata whenua has with our environment.

### Early Career Focus

Another unique aspect at IAVCEI 2023 conference was the demographics of the delegation. More than 50% of attendees were early career researchers (ECR), both from New Zealand and internationally.

ECR initiatives at the event were managed by Rebecca Fitzgerald, GNS/Massey University, who recognised the significant need to nurture the next generation, with an eye to recruitment and retention. "They are the colleagues of our future," she says.



Networking at IAVCEI 2023.

Photo: Anna Cardno

For the first time at IAVCEI, four ECR plenary speakers ran alongside the four conventional plenary speakers. Efforts were made to include ECRs as symposia convenors and session chairs, there was an ECR social night and panel discussion, plus a fully booked ECR field trip. Pre-conference workshops focussed on career paths and navigating the publication process.

Pittari adds: "These ECRs got to meet their own peers, making the initial relationships with people that they will be working with in their future careers, as well as meeting people at the top of their game who can act as mentors or help with future job prospects. The discipline of volcanology has got a good future."

### VolcanoFest Public Outreach

Another significant new initiative at the conference was the addition of VolcanoFest, a range of public outreach activities. The brainchild of Professor Ben Kennedy, University of Canterbury, the festival aimed to inspire and connect participants and the public and grow tomorrow's science leaders.

Running in conjunction with the conference, VolcanoFest included meet-a-volcanologist panels, outreach booths, volcano games and experiments, art and photography displays, as well as a schoolteacher professional development workshop.

"Every time I walked in it was buzzing with people," Pittari says. "New Zealand is in the top five places in the world to study volcanology. It's a fascinating place



It got the whole volcanic community working together and put the spotlight on New Zealand from an international perspective.

— Adrian Pittari, University of Waikato





Taupō field trip.

Photo: Graham Leonard



VolcanoFest outreach event.

Photo: Ben Kennedy

to work. There's plenty of scope for teaching about volcanoes and New Zealand's strength in this discipline, plus getting different people enthused in science. It's important to show we're not just scientists behind closed doors talking about technical stuff."

#### A Catalyst For Collaboration

Ten pre-conference and five post-conference workshops were organised around IAVCEI 2023, incorporating focussed meetings on various scientific and technological developments in volcanology. The World Meteorological Organisation also teamed up with IAVCEI and held their 8th International Workshop on Volcanic Ash after the Assembly on 4-5 February.

Aside from these formal sessions, Pittari says a number of international scientists stayed on for further meetings, study tours and engagements. "We hope these bear fruit and lead to future collaboration between New Zealand and international scientists."

Tourism New Zealand's General Manager NZ & Business Events Bjoern Spreitzer adds: "IAVCEI 2023 was a great example of the positive effects of an international conference. The attendees explored New Zealand, delivering economic value to our tourism sector. They also explored research and collaboration possibilities, which will have long-term benefits for our geoscience sector."

**Interested in bringing an international geoscience conference here? Tourism New Zealand's Business Events team offers funding and support. Learn more at <https://businessevents.newzealand.com>**

#### A Case For Why

Pittari concludes: "For someone who sticks their hand up and says 'Yes, I'm going to organise a conference,' there will be curveballs and challenges, but in the end, you get a lot of benefits from it. You get to interact with a lot of influential people, and it does assist with leadership - both in terms of building your own profile and lifting the profile of New Zealand geoscience. If you do a good job, you get the respect." ■

“

IAVCEI 2023 was a great example of the positive effects of an international conference. The attendees explored New Zealand, delivering economic value to our tourism sector.

— Bjoern Spreitzer, Tourism New Zealand

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## GEOBAKE 2023 WINNER

Thank you to everyone who took part in the Geobake across the country and sent in their entries to be judged. We received more entries this year, and as you'll see the standard was very high, and the decision was a close call.

**Congratulations to the winner of the Geobake 2023: Inge Smythe, with her wonderful Braided rivers & the Southern Alps creation!**

Thanks to all those who took the time to shake out their aprons, roll up their sleeves and enter the competition. We loved looking at your bakes, and picking a winner was not an easy decision! Spot prizes have also been awarded to the entries that were close runners-up.

A collage of other entries is shown below. To view all the entries, head to the GSNZ website: <https://gsnz.org.nz/news-and-events/newsflashes-and-other-news/geobake-2023-winner-announced/> ■



Winning entry "Braided rivers & the Southern Alps" by Inge Smythe.



# REVIEW: MOUNTAINS, VOLCANOES, COASTS AND CAVES

By Bruce Hayward

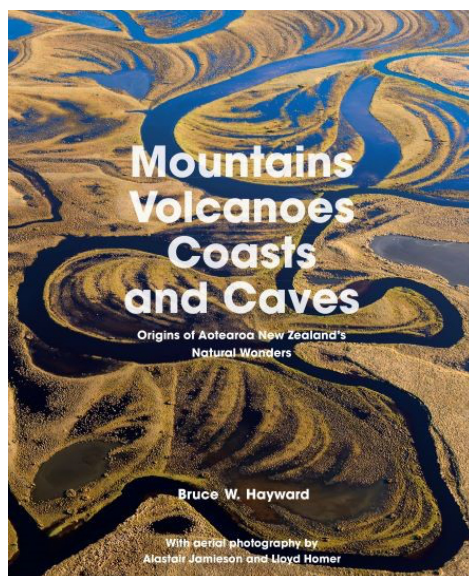
*Auckland University Press, 2022. 384 p.*

Review by: Julian Vearcombe

**Most developed countries** have a roadside geology book or book series, a notable exception being New Zealand. Given New Zealand roads perhaps potential authors were cautious fearing accusations of encouraging population control. (The late Peter Ballance wrote a roadside geology in the early 2000s but it was not published. Bruce Hayward and Jill Kenny converted Peter's work into a free e-book downloadable from GSNZ.) In his new book Bruce ducks the road-side problem, being expansive in describing vistas for their geology and landscape. The subtitle of the book "Origins of the natural wonders of New Zealand" is what the book is about. The book focuses on one hundred sub-terrains (plus 38 also-rans) explaining what you see from lookouts, the car window, on a short walk and in a couple of cases from the sky. (There is a section about off-limits White Island.)

Bruce is the lead in the Auckland Geoclub. For years he has been marketing living geology to a significant audience of enthusiastic amateurs. His communication skills are displayed throughout the book. There is no need to understand isotopes, P or S waves or D events. Basic geology is illustrated in simple clear text for the amateur, yet factual for the professional geologist. For instance, explaining the Waipounamu Erosion Surface the text reads "by about 23 Myr ago (end Oligocene) most of Zealandia was under the sea".

No-one will read Mountains, Volcanoes, Coasts and Caves from page 1 to 384 in page order. The chapter "A brief history of New Zealand" that is surely the logical starting point for most is in the appendix



sensibly. You will dive to the place(s) you know or are about to visit. I hit the book close to family's holiday baches at the dyke intruding Taurikura Bay (Whangerei Heads) and then the mylonite with superposed cataclasite along the Pacific–Australian plate boundary at Gaunt Creek (West Coast).

Saving the need to research academic papers there are summaries of processes, hot springs, caves, glaciers, and the evolving landscape. The illustrations are simple yet brilliant in their clarity, accompanied by quality aerial photographs. As a career Archaeologist geologist ingrained with reasonable errors of millions

of years, I especially enjoyed the author's ability to precisely time one geology event as "just after midnight" accompanied with a photograph of a farmhouse near Kaikoura beneath which there is two metres of normal fault displacement.

The book illustrates New Zealand is a country defined by active geology: earthquakes, volcanoes, landslips, and weathering processes. (Recently, I visited with a cyclone, flooding, landslip events, a 6.2 earthquake and beautiful South Island summer weather: snow and sun.) There will be an occasional visitor to New Zealand guided by Mountains, Volcanoes, Coasts and Caves who will choose to travel on a one hundred tour. But you don't have to. Most of the one hundred sub-terrains you find when simply travelling around the country.

This is perhaps the best up-to-date book on NZ geology and geomorphology. The book reflects the modern era, Bruce cycles between New Zealand, Aotearoa and Aotearoa New Zealand for the country name and Zealandia as the planet's eighth continent. The book has rare one sentence references to gold despite gold being central to the nation's early development. There are no real references to coal and on-going extractive operations get no mention. A photograph of four female - presume students - in sandals each holding a can of beer whilst pretending to look for trilobites shows that the author and publishers have not lost their sense of fun. (For this figure, Bruce assures me the facts are more prosaic.)

NZ border control may soon require all overseas visitors to have a copy of this book explaining the best scenery in the world. ■



A damaged house along the Kekerengu Fault.

Photo: Nicola Litchfield and Bruce Hayward

# REVIEW: AORERE GOLD

THE HISTORY OF GOLDEN BAY  
GOLDFIELDS, 1856-1863

By Mike Johnston

*Nikau Press, 2023. 480 p.*

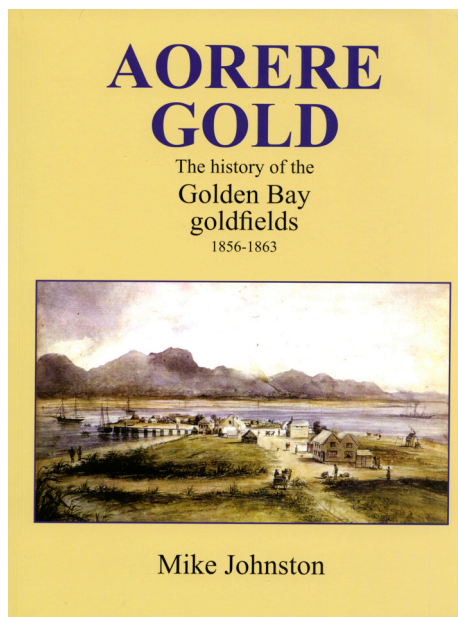
Review by: Simon Nathan

**Mike Johnston** has been researching the story of gold mining in the Nelson region for many years, and is now able to publish the results. This volume, the first of a trilogy, records the early days of the goldfields and their impact on the community. The discovery of a payable gold deposit in a remote part of the Aorere valley in 1857 led to New Zealand's first gold rush. It had major implications for the young colony of New Zealand, not the least being the development of legislation to manage gold mining.

Before the discovery of gold a number of minerals had been found near Nelson, including copper, chromite and coal, leading to the perception that the future of the region was in mining. This was confirmed by the gold rush which led to an influx of up to 1500 miners hoping to make their fortunes. Local Māori were readily accepted into the mining fraternity, and later took their skills to other goldfields.

This volume covers the first seven years of the Nelson goldfields before the first generation of miners left for the much richer discoveries in Otago and the West Coast in the early 1860s. But mining continued in the Nelson region, and the next volume will continue the story until the end of provincial government in 1876.

This is a massive volume, giving a comprehensive account of the beginning of gold mining in a remote part of New Zealand. It is an excellent account of local history, but it is important to a wider audience illustrating the changes that took place in one region with the discovery of gold. The author has made full use of newspaper accounts and letters to illustrate the feelings of the day and the excitement of gold fever.



One of the particularly appealing features of this volume is the abundance of illustrations, including maps, sketches and paintings and contemporary photographs as well as a selection of recent oblique aerial photographs of the landscape.

One interesting aspect of gold prospecting was the discovery of a rich trove of moa bones in caves near the diggings. Investigation of the caves by geologists Ferdinand von Hochstetter and Julius von Haast resulted in excavation of some of the first complete moa skeletons. Hochstetter's arrival was well timed as his written account of the developing goldfields is a valuable source of information.

The depth and breadth of research Mike Johnston has undertaken means that this is the definitive account of the West Nelson goldfields, and we await the appearance of the following volumes with anticipation. ■

# REVIEW: ROCKS, FOSSILS AND FORMATIONS

DISCOVERIES THROUGH TIME

By Thomas R.H. Woolrych, with illustrations by Anna Madeleine Raupach

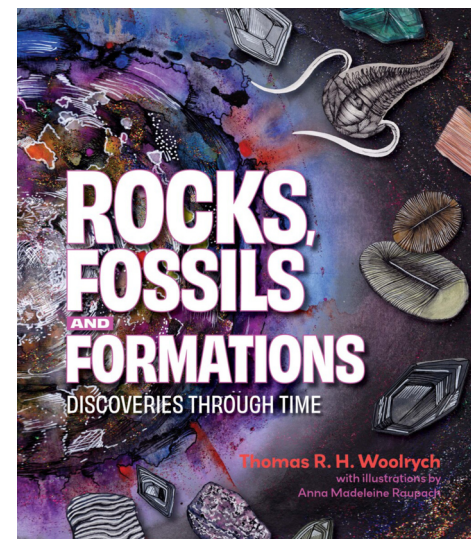
*CSIRO Publishing, 2023. 120 p.*

Review by: Jenny Stein

Thomas Woolrych is a science communicator and exploration geoscientist with a passion for discovering the secrets of the Earth. Anna Raupach is a multidisciplinary artist who explores expressive interpretations of scientific concepts. They have teamed up to produce this beautiful book presenting the history of the Earth—and a plethora of Earth science concepts and processes therein—in a unique and visually engaging way that is linguistically accessible to anyone high school age and up.

Presented as a time-machine assisted journey back to the formation of the Earth and eon/era-hopping through to the present day, this book covers—at appropriate points—numerous fundamental concepts in geoscience, the development of different minerals, rocks and formations, and key stages in the evolution life.

Unlike most books of this sort, it has absolutely no photos—not a single one. Instead, it relies purely on the vivid pictures painted by its simple words, accompanied by Anna's engaging illustrations. Thomas' approach is playful but faithful to the science. Key concepts and terms are engagingly explained, and the book carefully structured so that the reader never gets lost or overwhelmed (something that is apparent to a fellow science communicator's critical eye), presenting a smooth and engaging journey to any young student of Earth science. I particularly enjoyed Thomas' apology to the reader that, after having just gained an understanding of the principles of sedimentary geology, "you won't be able to just simply enjoy the view on holidays anymore. You'll be too busy reading the landscape!".



The one equally fantastic and unfortunate thing about this book (at least as far as New Zealand readers are concerned) is its Australian framing. The book is clearly written for an Australian audience and contains numerous references to well-known Australian rock formations, regions and places that provides wonderful local context and relevance for Australia-based readers. While New Zealand does get a mention once or twice (we were once part of Gondwana after all!), and New Zealand readers will still come away with a thorough and thoroughly enjoyable introduction to Earth science...the one thing I found myself thinking over and over again as I read this wonderful book was: when and who is going to write the New Zealand equivalent?! ■

The Geoscience Society of New Zealand gratefully accepts donations and bequests. These can be applied to specific funds or awards (see full list at <http://gsnz.org.nz>) or can go into the growing Legacy Fund, interest from which is used for general purposes. All donations and bequests will be acknowledged and a receipt sent.

#### DONATIONS

Donations enable those 'extra' things to be achieved. They are always gratefully received and can be sent upon membership renewals online at [www.gsnz.org.nz](http://www.gsnz.org.nz). Donations of more than NZ\$5 can qualify for a 33% tax credit from Inland Revenue (you will need to keep the receipt you get from us and fill in an IRD tax credit claim form at the end of the tax year). See the IRD website for more details.

#### BEQUESTS

The Society is committed to supporting the geosciences. We are especially keen to encourage young people to pursue a career in the earth sciences and enable them to take advantage of learning opportunities.

Many of our awards and prizes have been made possible by the generosity of family members or friends to commemorate a loved one. We are extremely grateful for their thoughtfulness to assist future generations.

#### A GIFT IN YOUR WILL

Bequests are a wonderful way to extend your giving and continue to be part of the Society far into the future. Once you have made provision for your loved ones, a gift in your will can be the perfect way to support students, geoeducation and research for generations to come.

All gifts, whether modest or significant, are highly valued. We strongly recommend you discuss your wishes with your loved ones and consult a legal adviser when making provision for a gift to the Society.

#### SUGGESTED WORDING FOR A BEQUEST:

I give and bequeath to the Geoscience Society of New Zealand (Incorporated) the residue of my estate

OR \_\_\_\_\_% of my residuary estate

OR the sum of \_\_\_\_\_

as an untied gift

OR for the principal purpose of: \_\_\_\_\_

for which a receipt from the Secretary, Treasurer or Administrator of the Geoscience Society of New Zealand (Incorporated) shall be a full and sufficient discharge to my trustees. If you are considering a gift in your will please get in touch. We would welcome the chance to speak with you about your gift plans and how you can truly make a difference to the geoscience community. Contact [President@gsnz.org.nz](mailto:President@gsnz.org.nz) in complete confidence.

The Geoscience Society of New Zealand is a registered charity (CC41125)p

EDITOR: (TBA)

c/o Geoscience Society of New Zealand  
PO Box 7003, Newtown, Wellington 6242  
[editor@gsnz.org.nz](mailto:editor@gsnz.org.nz)

DEADLINES:	MARCH ISSUE	FEBRUARY 1
	JULY ISSUE	JUNE 1
	NOVEMBER ISSUE	OCTOBER 1

GSNZ members can choose to receive Geoscientist Aotearoa in electronic form or posted as a hard copy. Electronic form has the advantage of full colour and hyperlinking. Should you wish to change the method by which you receive your copy of Geoscientist Aotearoa please contact [admin@gsnz.org.nz](mailto:admin@gsnz.org.nz).

All GSNZ members will be sent an electronic version.

This is your newsletter and the editor seeks correspondence, news items, interim or preliminary reports of current research, reviews of books and of recent geological publications and other topical articles. Reviews of New Zealand geology, geochemistry and geophysics published overseas are particularly welcome. This publication is not a peer reviewed academic journal. Format requirements are outlined on the next page.

Preference will be given to articles submitted by GSNZ members however any appropriate contributions may be accommodated depending on space. Submissions will be subject to the following guidelines for acceptance:

- Contributions for potential publication for our membership are screened carefully and with a view toward the Society's core values.
- With a view to providing balance and best informing members, any individuals or specific science programmes mentioned by name, should be accorded the professional courtesy that is offered when publishing in academic literature, which is an opportunity to view the article beforehand and be given right of reply.
- No articles will be accepted 'in confidence' and may be subject to review by the editorial committee.
- Submissions received after the deadlines have passed may be held over for the following issue.

Unless indicated otherwise, views expressed are those of the authors and are not the official views of the editor or the Geoscience Society of New Zealand. Although encouraging informed debate, the Society moreover gives no guarantee concerning the accuracy, completeness or suitability of any information provided and takes no responsibility for any loss or damage that use of information in this publication may cause to anyone. Use of any information contained in any issues of this publication is the responsibility of the user.

Note that names are normally of the format "John Smith" or "Jane Smith". We prefer not to use titles such as Mr, Dr or Professor, nor to worry about whether we should use Miss, Mrs, or Ms.

ADVERTISING: \$400 for full page colour  
\$150 for a full-page B/W  
\$75 for a half page B/W  
Copy supplied by advertiser

## SPECIFICATIONS

### FORMAT

Geoscientist Aotearoa is formatted for A5. Email copy in any text format is acceptable. Attributed images and graphics are encouraged.

The current two column format accommodates approximately 500-550 words per page, *without* images. We suggest a limit of four pages (including images) in the current format for most contributions with minimal but key referencing. Depending on space, longer articles suitable as feature articles with illustrations are often published. If your article will run to more than four pages please contact the editor prior to submitting.

### IMAGE RESOLUTION

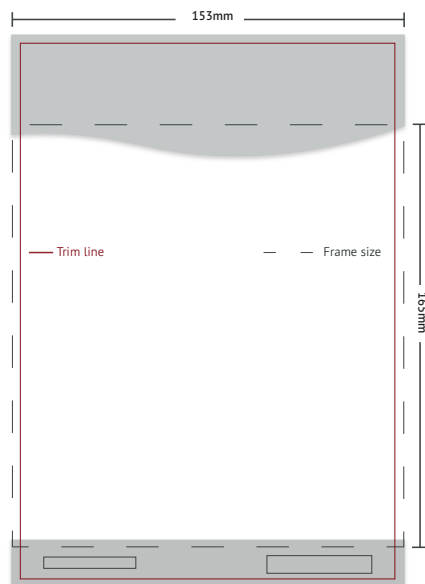
We seek to provide a high quality publication for our readership. Accompanying photos for articles must be sent as email attachments at the highest resolution possible. Please do not embed images in a Word document as they are often rendered unsuitable for the printing process. Annotation of images (numbering and descriptions on photos) is discouraged.

Any images supplied to be *considered* for front cover use must adhere to the following minimum *resolution* specifications: For A5 front cover (portrait suits best but landscape may be accommodated at the editor's discretion) 2551 x 1819 px. For A4 (full cover landscape wraparound) 3579 x 2551 px. The editor will reserve judgement on whether an image is suitable for A4 wraparound, bearing in mind that some elements may be hidden under the header, in particular (see below).

### COVER IMAGES

Sizing of photos considered for cover of Geoscientist Aotearoa is not straightforward due to the variety of aspect ratios of photos provided, particularly when cropped. In many cases, the original submitted photo cannot *proportionally* fit within the allotted frame. In part, this is due to the title and footer block (shown in grey) design and some elements of the image would be hidden beneath them.

While the publication is A5, and image size in terms of resolution is already specified, proportions needed to fit the visible frame on the cover are different. Adjusting an image to fit may involve proportional resizing tweaks or "zooming in" to a specific portion of the image and is at the editor's discretion. A photo competition cover image presented "zoomed in" will be printed in its entirety inside the publication, albeit much smaller. It is recommended to have an image sized, proportionally, to fit a frame approximately 153mm wide and 165mm high for best results.







Front cover : Rivers in Garnet sand, Woodpecker Bay, West Coast.

Photo: Mary Traves