EXPLORING THE
DEPTHS

Geothermal Management Course

GNS SCIENCE *TE PŪ AO*   **JOGMEC**

17 - 21 FEBRUARY
ROTORUA, NEW ZEALAND

This 5-day Geothermal Course is co-led by GNS Science

Rotorua, New Zealand
17th – 21st February 2025

This is a uniquely located opportunity to study the effective management of geothermal reservoirs that are utilised by multiple users of both the shallow and deep aquifers.

We're proud to deliver a new geothermal educational programme.

Taking place in Rotorua, New Zealand, this 5-day course is a uniquely located opportunity to study the effective management of geothermal reservoirs that are utilised by multiple users of both the shallow and deep aquifers.

The course will include 3-days of workshop discussions covering a range of technical and management topics:

- working with local communities, indigenous people, and other stakeholders
- management of competing uses
- understanding the resource regarding the integration of geospatial geoscience information and data into 3D visualisation models, the development of both conceptual and numerical simulation reservoir models
- adaptive management of the effects of development on a geothermal resource

There will be 2-days of field trips and site visits to three NZ geothermal fields:

- Wairakei-Tauhara geothermal fields: see the effects of geothermal development, such as activity decline of natural thermal features and ground subsidence. There will also be opportunities to view the Wairakei and Ohaaki geothermal power stations from public lookouts
- Rotorua geothermal field: see the efforts of geothermal monitoring to mitigate the effects of over-utilisation of the resource
- Kawerau geothermal field: an example of multi-tapper utilisation of the deep reservoir, visit natural thermal features and see examples of direct-use applications and a geothermal binary power station

Designed for scientists, researchers, energy industry regulators and non-technical professionals.

The course will combine technical and resource management topics. Participants will deepen their understanding of how a geothermal resource can be utilised by multiple tappers of different parts of the reservoir and how an adaptive management plan can be developed so that the effects of over utilisation are minimised or avoided.

Technical sessions will highlight how geoscientific and reservoir information can be integrated into 3D visualisation models to improve the conceptual understanding of the resource, and guide development of numerical reservoir simulation models that are important tools in an adaptive management resource plan.

The course aims to enable participants to make informed decisions and contribute to the efficient and sustainable utilisation of geothermal resources. It will actively foster discussions and networking amongst participants to create a collaborative learning environment.

The course will enrol 13 - 20 participants. The programme schedule is subject to change. Learn more about the programme, travel information and presenters below.

See course information online at: https: www.gns.cri.nz/news/exploring-the-depths-course-2025

Programme (SUBJECT TO CHANGE)

SESSION **1**

Geothermal values

This session will provide an overview of geothermal resources, communities and values in New Zealand including perspectives from Māori culture and traditions. We will explore the challenges with balancing the protection of important values while enabling appropriate and sustainable development.

With a geothermal resource that is being used by multiple tappers, of both the shallow and deep reservoirs, it is important to understand the needs, requirements, and values of each resource user/stakeholder. In these sessions we will discuss why the values the geothermal community are important, getting their cultural value perspectives, thereby understanding the importance of the resource to them. There will be discussion on the importance of developing effective relationships with the various stakeholders, the benefits of transparent engagement, and how to manage competing values and the challenges that can come with different perspectives.

SESSION **2**

Working with stakeholders

In this session we will discuss the importance of developing effective relationships with communities and stakeholders in geothermal policy and project development. We will discuss how to identify relevant stakeholders, the benefits of early and transparent engagement, engagement techniques and how to manage the challenges that can come with different perspectives. We will discuss the importance of keeping your community well informed about geothermal development and will share some examples of successful engagement on geothermal projects.

SESSION **3**

3D Visualisation Modelling

This session, participants will learn about 3D visualisation modelling of geothermal systems, the principles and key benefits, the key components of a 3D model, and typical geospatial datasets needed for a 3D geothermal model. They will learn how the model is used to gain insights into the spatial relationships of the reservoir and can be used for resource management. Participants will have hands-on experience with a demonstration model learning how to view different components of the model.

These are technical sessions that provide the technical background to understanding a resource, the connectivity between shallow and deep resources, understanding the resource capacity, and the importance of collecting time-based technical information for monitoring any changes and understanding natural variability.

Programme (SUBJECT TO CHANGE)

SESSION 4

Geothermal Conceptual Models

Participants will learn how conceptual models are a key component for undertaking resource evaluations, developing well targeting strategies and the approach to developing geothermal conceptual models through integration of multidisciplinary datasets.

SESSION 5

Geothermal Monitoring

Understanding the natural variability of shallow aquifers that feed geothermal surface features and shallow bores is a vital component for sustainable geothermal resource management. Participants will learn about geothermal monitoring methodologies, the various datasets needed to be included in a monitoring programme. The objective is to show how geothermal monitoring can be used as a tool to minimise the environmental effects of a geothermal development.

SESSION 6

Numerical Modelling

Participants get an understanding of what numerical models are and how they can be applied to geothermal resource management. They will learn what are the required datasets to build a numerical model and how numerical models can be use at all stages of a geothermal development (from exploration to production).

SESSION 7

Managing Development Effects

In this session we will provide an overview of the regulatory framework applying to geothermal resources in New Zealand, including the permitting process. The process required for identifying and addressing potential effects and the importance of an adaptive approach to effects management. We will also discuss the importance of baseline, consent and compliance monitoring and the lessons that have been learned over time in managing geothermal resource development in New Zealand.

This session will provide an overview of the geothermal regulatory framework and the process required for identifying and addressing potential effects, and the importance of an adaptive approach to geothermal management. We will also discuss the importance of baseline, consent and compliance monitoring and the lessons that have been learned over time in managing geothermal resource development in New Zealand.

Site Visits

1. Learn about the effects of geothermal development in the **Taupō/Wairakei district**. The decline of natural hot springs, changes to steam venting areas and subsidence. There will visits to power station and steamfield (Wairakei, Ohaaki) lookouts.

1. Learn about the cultural values of Māori people at **Whakarewarewa**, Rotorua. How the area was affected by resource over-utilisation from shallow bores, how monitoring is used and how the resource has changed and improved through managed utilisation and controlled bore-use.

1. Visit **Kawerau geothermal field**, a multi-tapper geothermal reservoir, to see direct-use applications, natural features and a geothermal binary power plant (lookout).

Registration Information

Registration

Register here: https://www.gns.cri.nz/about-us/jogmec

- Limited number of spaces available (13 - 20 participants)
- Registration closes on the 20 December 2024
- A follow-up email from GNS Science will direct participants to a private billing form which will confirm your placement on the course.

Course Costs

NZ$ 8,750 per person

Includes the course fee, site visits, lunch and coffee breaks during the course.

Not included: Accommodation, breakfast, dinner, international flights, travel insurance or specific medical costs are not covered.

Please note that the organisers will coordinate a couple of networking dinners during the course.

Travel Information

Participants are expected to arrive and leave directly at/from the venue.

Reception opens 30 minutes before the course begins on Monday 17 February.

Accommodation

Participants are responsible for their own accommodation in Rotorua. Accommodation is not included in this cost. Here are a list of accommodation options the organisers recommend:

1. **Rydges Hotel Rotorua, 10 Tryon Street, Whakarewarewa, Rotorua 3010, New Zealand**

Phone: +64 7 348 1189
https://www.rydges.com/accommodation/new-zealand/rotorua

2. **Millennium Hotel Rotorua, 1270 Hinemaru Street, Rotorua 3010, New Zealand**

Phone: +64 7 347 1234
https://www.millenniumhotels.com/en/rotorua/millennium-hotel-rotorua

3. **Novotel Rotorua Lakeside, Lake End, Tutanekai Street, Rotorua 3010, New Zealand**

Phone: +64 7 346 3888
https://all.accor.com/hotel/1874/index.ja.shtml

Our Presenters

Andrew Rae
Senior Geothermal Geologist

Andrew joined GNS Science in 2005, to work as a Geothermal Rig Geologist and is presently a Senior Geothermal Geologist. He was initially involved with ongoing geological wellsite services, leading to management of the rig geology drilling services team that has operated at all New Zealand's power producing geothermal systems. He has mainly worked on volcanic-hosted geothermal systems in rhyolitic and andesitic settings of the western Pacific, and more recently in non-magmatic systems such as orogenic settings (Southern Alps, NZ; Central Ranges, Taiwan), and sedimentary-hosted settings (West Coast, New Zealand). His work is now mainly consultative, undertaking geothermal resource assessments for clients in New Zealand, Indonesia, Papua New Guinea, Philippines, Taiwan, Japan, Nicaragua, Kenya, Uganda and Chile. These projects involve working in multidisciplinary teams of geochemists, geophysicists, numerical modellers, reservoir engineers, assessing and integrating datasets to develop conceptual models that lead to better understandings of the geothermal resource. The objectives are to build more robust recommendations and strategies for exploration, geothermal drilling campaigns, and/or field management.

John Burnell
Geothermal Reservoir Modeller

John's research expertise is in computational modelling of heat and mass flows. Most of his recent work has focussed on developing models of geothermal systems throughout the world, including New Zealand, Japan, the Philippines, and Papua New Guinea. A key focus of his work is to develop models that are realistic representations of the physical system that allow robust assessments of future development options. John has developed software for reservoir modelling simulations and pre- and post-processing. He has led successful research programmes focussed on developing new methodologies for modelling geothermal systems and is currently the NZ convener of the IPGT Reservoir Modelling Group.

Our Presenters

Samantha Alcaraz
Geomodeller

With GNS Science since 2009, Samantha's technical role is focussed on integrating multi-disciplinary data to create geoscience and spatial models that support the understanding of the geothermal resources. She leads the Geothermal Geology and Modelling Team at GNS, a group of 10 passionate geothermal experts including geologists, reservoir modellers and engineers. They collectively work on a wide range of geothermal projects, from high temperature geothermal resource assessment to direct use applications in New Zealand and internationally. Samantha has several governance roles and is well connected with the international geothermal community: a Board member of the New Zealand Geothermal Association and hold the office of Secretary; Treasurer of the Asia-Western Pacific Regional Branch (AWPRB) of the International Geothermal Association; co-Executive Secretary of the International Energy Agency Geothermal Technology Collaboration Programme (IEA Geothermal TCP).

Robert Reeves
Senior Geophysicist and Team leader of the Geophysics Team at GNS

Rob joined GNS Science in 1992, to work as a Geophysics technician and is presently a Senior Geophysicist and Team leader of the Geophysics Team at GNS. Since starting at GNS, he has worked across the geothermal, mining and groundwater industries. Rob's research focus is on geothermal exploration, near surface geothermal-groundwater interactions, remote sensing and environmental issues associated with geothermal development. He has authored/coauthored 28 journal papers and over 200 consultancy reports. He has worked on projects extensively within the geothermal industry for both environmental regulators and power companies, including providing expert witness testimony in consent hearings. He has worked in projects as part of multidisciplinary teams in New Zealand, Columbia, Comoros, Indonesia, Japan, Papua New Guinea, and Thailand.

Our Presenters

Simon Bendall
Founding Director of Traverse Environmental Limited

Simon is an environmental planner and founding director of Traverse Environmental Limited, a specialist environmental planning and project management consultancy based in Taupō, New Zealand. With over 20 years' experience in the environmental planning sector, Simon has worked extensively with local government, Iwi and private sector clients on a wide range of environmental projects. Simon's specialist areas include natural hazards planning, facilitation, process design, resource consenting and community engagement. Since 2019, Simon has been part of the Geothermal: the Next Generation research programme lead by GNS Science. Simon's key role in this programme is providing insights into optimising the planning regime to support future sustainable supercritical resource allocation, consenting, utilisation and system management.

Deborah Kissick
Principal Planner at Traverse Environmental

Deborah is a Principal Planner at Traverse Environmental with 20 years' experience in New Zealand and the UK. Deborah has a broad range of expertise and experience in planning, across both the local government and private sectors. Deborah specialises in project management for complex multi-disciplinary projects, providing policy guidance on regional and district plans and national policies, managing consultation processes, preparation of assessments of environmental effects as well as preparing and presenting expert planning evidence at hearings. Like Simon, Deborah has been providing planning advice to the Geothermal: The Next Generation research programme. Deborah's work has examined New Zealand's regulatory and planning frameworks for conventional geothermal resources and its applicability for utilisation of supercritical geothermal development.

Our Presenters

Penny Doorman

Geothermal Programme Leader at the Bay of Plenty Regional Council.

The Bay of Plenty Regional Council manages natural and physical resources in the Region, including 12 geothermal systems, including Kawerau and Rotorua systems. Penny's role at Council is working closely with Council's geothermal staff to ensure the geothermal workstreams within Council are coordinated and focused, including across planning, community engagement, science, resource consenting and compliance. Penny works closely with the community, tangata whenua, geothermal industry, and key stakeholders, and ensures that policy is well informed by technical inputs. Identifying competing geothermal values, and priorities in managing geothermal is a key part of this role. Penny has a Master's degree in Environmental Science and Geography. She has worked in Local Government in New Zealand in various organisations for over 30 years. She lives in Whakatane, on the East Coast of New Zealand's North Island.