



GEOTHERMAL TECHNICAL DIVISION TALK

Geothermal Energy Potential of the Mount Meager Volcano – The Hottest Place in Canada

Speaker: Steve Grasby, Geological Survey of Canada

January 14, 2020 | 12:00 pm-1:00 pm MDT

1 CPD (Continuing Professional Development) credit will be awarded for this event

ABSTRACT

Canada stated goal of achieving net zero emissions by 2050 requires a significant transition to renewable energy resources. While wind and solar power have been a primary focus, their intermittent generation creates challenges to support a grid. Geothermal energy has many benefits compared with other renewables, principally it provides a highly stable, reliable, and dispatchable power supply. The reliability of geothermal energy is countered by the high exploration risk associated with drilling deep exploration wells to discover hot, and more critically, permeable reservoirs. Reducing these exploration risks requires novel geoscience tools.

Mount Meager is the only active volcano in Canada, last erupting about 2400 years ago, and today being characterised by fumaroles and numerous thermal springs. During the energy crises of the late 70's and early 80's the federal government initiated a Geothermal Energy Program, responsible for collecting much of the geothermal data that exists today. As part of this now defunct program an exploration well was drilled on Mount Meager, this and subsequent wells defined the highest temperature thermal resource known in Canada, with 250 °C waters discovered at about 2 km depth. This is a world class thermal resource – that has never been developed. Initial attempts at power generation were marginally successful and it was determined that despite the high temperature, flow rate was insufficient to produce sufficient power. Permeability became the limiting factor for the project success.

New ideas and methods for the prediction of high-permeability zones at depth are required. To this end the Geological Survey of Canada assembled a team comprised of 34 researchers from a total of seven universities and government agencies. The research program is supported by Geoscience BC and the Natural Resources Canada Emerging Renewable Power Program. Researchers with expertise in geological and structural mapping, volcanology, geophysics (especially gravity, magnetotelluric, and passive seismic surveying), geochemistry, regional stress field analyses, and hydrogeology were brought together into one coherent research project starting in July 2019. The goal is to use an integrated approach to see into the heart of the mountain and enable clearer identification of high-permeability zones within the known thermal anomaly.

The research is ongoing and this presentation will highlight the challenges of running a geothermal field program on a crumbly volcano, current findings of the research team, and future work.

The research occurred on the traditional lands of Squamish and Lil'wat First Nations. Planning and field support by M. Bruce and T. Jenkins of Lil'wat First Nation is greatly appreciated. This research project could not have occurred without the contributions of all the researchers and students involved, including the following: from the Geological Survey of Canada, R. Bryant, Z. Chen, J. A. Craven, J. Liu, S. M. Ansari, and V. Tschirhart; from Simon Fraser University, A. Calahorrano-Di Patre, M. Muhammad, and G. Williams-Jones; from the University of Calgary, J. Dettmer, H. Gilbert, R. O. Salvage, and G. Savard; from the University of Alberta, C. Hanneson and M. J. Unsworth; from the University of British Columbia, M. Harris and K. Russell; and from Douglas College, N. Vigouroux-Caillibot. The research team greatly appreciates support from pilots

M. Accurso, D. Vincent, and R. Sliger of No Limits Helicopters; and ongoing field support by Wayne Russell of Innergex Renewable Energy Inc. In addition, the field program was substantially supported by Innergex Renewable Energy, which provided lodging and logistical resources at its nearby run-of-river facility. C. Stenner provided the unique skills required to enter volcanic glacial ice caves.



BIOGRAPHY



Dr. Stephen Grasby is a Senior Research Scientist at the Geological Survey of Canada and leader of the Garibaldi Volcanic Belt Geothermal Project. Since completion of his PhD in 1997 he has worked at the GSC on issues ranging from regional groundwater studies, groundwater systems in permafrost regimes of the High Arctic, and paleo-environment research of the Phanerozoic, mainly focused on stratigraphic records of the Arctic Islands. He has been leading the re-invigoration of geothermal research in the federal government, including a major 2012 report on geothermal potential of Canada. He is also currently President of Geothermal Canada.