

Electromagnetic Geophysics at Mount Meager, Southwestern BC: A Volcanic Geothermal Prospect

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The Garibaldi volcanic belt in British Columbia is part of the ring of fire, a belt of volcanic activity that surrounds the Pacific Ocean. Many countries in this region produce electricity from hot water extracted from geothermal reservoirs found beneath these volcanoes, and Canada could do the same. The most recent volcanic activity in the Garibaldi belt occurred 2340 ± 50 years ago at Mount Meager. Steam vents on this volcano have become active in recent years and major landslides have occurred, including an event in 2010 that remains Canada's largest recorded landslide.

Geothermal research has taken place at Mount Meager since the 1970s and suggests that a 200 MW power plant could be economic. To reduce the economic risks of development, additional information about the geothermal reservoir and natural hazards is needed. This can be obtained from geophysical studies of the subsurface.

In 2019 and 2020, magnetotelluric (MT) data were collected in the region around Mount Meager. They were used to generate a 3-D model of electrical resistivity, a property that is sensitive to the presence of fluids. This model gives valuable information about the size and location of the geothermal reservoirs and magma body beneath this active volcano. The uppermost kilometre of the Mount Meager massif is characterized by low resistivity, likely caused by saline aqueous fluids (brines) and hydrothermally altered rocks. There is likely a magma body beneath the Mount Meager massif in the depth range 7-10 km, associated with a conductor that is more than 10 km long, more than 7 km wide, and more than 3 km thick.

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