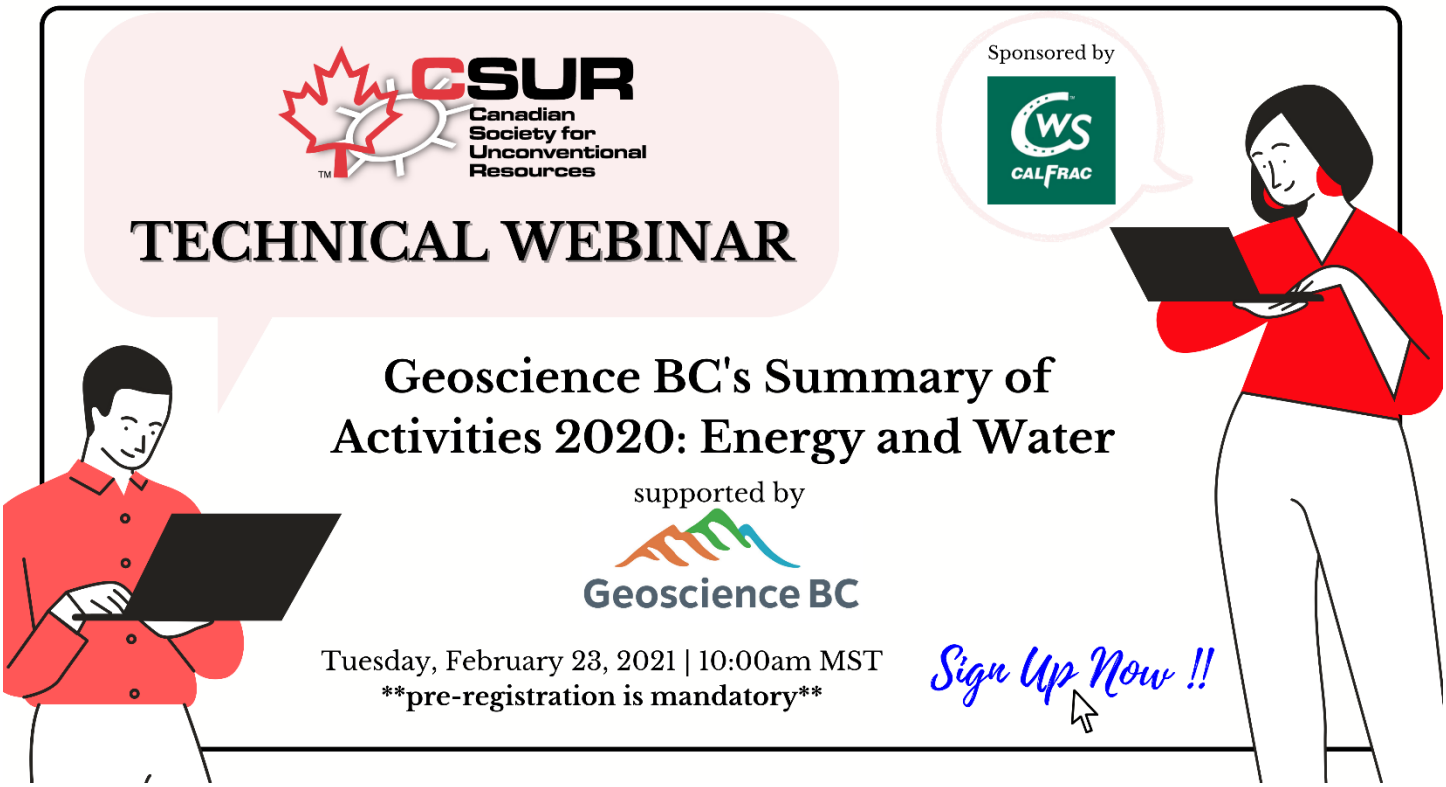
February 2021 – CSUR Technical Webinar #2



Geoscience BC's Summary of Activities 2020: Energy and Water

Projects under the auspices of Geoscience BC (GBC) took center stage during CSUR's Technical Webinar Series for February 2021. This webinar session was specifically designed to allow for the selected projects to be highlighted from GBC's Summary of Activities 2020: Energy and Water. For 2020, GBC funded / sponsored 16 projects or scholarship recipients within their strategic focus areas of energy (including oil & gas and geothermal) and water. Based on GBC's strategic objectives, the overall program was divided into four distinct sections:

1. Facilitating Responsible Natural Resources Development
2. Advancing Science and Innovative Geoscience Technologies
3. Enabling Clean Energy, and
4. Understanding Water

The webinar featured 6 of those projects, encompassing 3 of the above-mentioned objectives (1, 2 & 4).

After opening comments from Carlos Salas, Executive VP & Chief Scientific Officer at GBC, each of the six speakers was given the opportunity to provide a high-level summary of their individual or group project, including the objectives, scope & progress of their work and highlight significant achievements or findings.

From the "Facilitating Responsible Natural Resources Development" section, Bei Wang presented the details and ongoing work of the investigation (source & triggering mechanism) into Canada's largest hydraulic fracturing induced seismic event (Mw 4.6), which occurred in August 2015. From the same section, Afshin Amini elaborated on his work and findings using machine learning to determine the impact of various factors influencing induced seismicity in the Montney play in NE BC.

In the "Advancing Science and Innovative Geoscience Technologies" category, three projects were featured. Dr. Brad Hayes summarized the key aspects of the Wastewater Disposal into the maturing Montney Play Fairway of NE BC, while Gareth Chalmers discussed the Isotropic Fingerprinting process being utilized to determine the Sulphur sources of the Hydrogen Sulphide gas in the Montney Formation. Pablo Silva's work also revolves around Hydrogen Sulphide, but within the Triassic Doig Formation. The extension of his work entails the regional mapping and the resource assessment of the Doig Formation.

From the "Understanding Water" group, Dr. Suzan Lapp delved into the Pilot Collaborative Water Monitoring Program in NE BC. The unique feature and scope of this work is to collaboratively gather data using both Western-based science and Traditional Knowledge from the various First Nations Groups at multiple river sites. The main objectives of this program are to be able to facilitate a two-way knowledge sharing pathway and integrate traditional knowledge into the decision-making process for ongoing water use in the area.

For additional & more detailed information on these and other projects, please visit GBC's web portal at: geosciencebc.com/SummaryofActivities2020.

Summary

Geoscience BC's Summary of Activities 2020: Energy and Water, contains 16 papers from Geoscience BC–funded projects or scholarship recipients that are within Geoscience BC's strategic focus areas of energy (including oil and gas, and geothermal) and water. The papers are divided into four sections, based on Geoscience BC's strategic objectives of:

1) Facilitating Responsible Natural Resource Development
2) Advancing Science and Innovative Geoscience Technologies
3) Enabling Clean Energy
4) Understanding Water

During this Webinar, we will hear from 6 of those researchers, covering 3 sections of Geoscience BC's Strategic Objectives:

- Within the 'Facilitating Responsible Natural Resource Development' section, there will be two talks. Bei Wang et al.'s paper a study on the largest hydraulic fracturing induced earthquake in Canada: numerical modeling and triggering mechanism will expound on earthquake-triggering mechanisms attributable to an induced seismic (Mw) 4.6 event, while Afshin Amini presents his findings on machine learning analysis of factors influencing induced seismicity susceptibility in the Montney play region of northeastern British Columbia.

- The 'Advancing Science and Innovative Geoscience Technologies' section is represented by three papers. Hayes et al.'s summary of Wastewater Disposal in the Maturing Montney Play Fairway of Northeastern British Columbia looks at wastewater disposal in the maturing Montney play of northeastern BC. Gareth Chalmers et al. will discuss Isotopic Fingerprinting Sulphur Sources of the Hydrogen Sulphide Gas in the Montney Formation, British Columbia. While Pablo Silva will go beyond his article Hydrogen Sulphide within the Triassic Doig Formation and talk about regional mapping and resource assessment of the Doig Formation.
- Lastly, in the 'Understanding Water' section The paper Pilot Collaborative Water Monitoring Program in Northeast BC by Lapp et al. explains the unique Pilot Collaborative Water Monitoring Program aimed at gathering Western-based science along with Traditional Knowledge at multiple river sites.

PRESENTERS:

"Wastewater Disposal in the Maturing Montney Play Fairway of Northeastern British Columbia"

Dr. Brad Hayes, PhD, P.Geol
Outreach CSUR Director
President at Petrel Robertson Consulting Ltd.

Brad Hayes is President of Petrel Robertson Consulting Ltd., a geoscience consulting firm applying subsurface skills to energy technologies in conventional and unconventional oil and gas, non-petroleum resource exploration, energy storage and geothermal applications.

Brad earned a PhD in geology from the University of Alberta, and a BSc from the University of Toronto. He joined PRCL in 1996 after 15 years of exploration experience in the petroleum industry. Brad is a Director for the Canadian Society for Unconventional Resources (CSUR), and an active member and Past-President of the Canadian Society of Petroleum Geologists (CSPG). He recently completed a six-year term as Councillor for the Association of Professional Engineers and Geoscientists of Alberta (APEGA), and is also registered as a Professional Geoscientist in BC and Nova Scotia.

Brad is an active Adjunct Professor in the University of Alberta Department of Earth and Atmospheric Sciences, and a sessional lecturer at Mount Royal University. With CSUR, Brad manages the Outreach Program, sharing accurate, unbiased scientific information related to unconventional oil and gas development.

"Hydrogen Sulphide Gas Generation in the Triassic Montney Unconventional Play, British Columbia and Alberta, Canada"

Gareth Chalmers
University of British Columbia

Gareth Chalmers has used geochemistry, petrophysics and sedimentology to investigate coal seam gas and shale reservoirs since 2002 at University of British Columbia (UBC), Canada. He also worked at Shell to develop the Duvernay shale reservoir. Gareth currently lectures at the University of the Sunshine Coast and is researching Australian gas reservoirs. His MSc (Newcastle University) expanded sequence stratigraphy into coal-bearing strata by correlating surfaces using coal petrology. Gareth then completed his PhD at UBC where he used to investigate shale and coal gas resources. Gareth is currently investigating the origin and distribution of toxic H2S gas within unconventional reservoirs.

"Regional Mapping and Resource Assessment of the Doig Formation"

Pablo Lacerda Silva
University of British Columbia

Pablo is a petrophysicist with background in geology and seven years of experience in the petroleum industry, currently a Ph.D. candidate at the University of British Columbia, researching geochemical and reservoir properties of source-rock reservoirs. He joined Chevron in 2008 after obtaining a BSc. degree in Geology, and worked as a geologist in the development of a deep-water oil field, offshore Brazil. In 2011 he started a petrophysics competency development assignment in San Ramon, California, and in 2013 he obtained his MSc. degree in Geology on the stratigraphy and facies of deep-water deposits. Upon completion of his training as a petrophysicist, he took on the position of lead petrophysicist for Chevron in Brazil, until 2015. He is currently pursuing higher education in the field of source-rock reservoirs, as a Ph.D. student at the University of British Columbia.

"Pilot Collaborative Water Monitoring Program in Northeast BC"

Dr. Suzan Lapp, P.Geo., P.Ag.
BC Oil and Gas Commission

Dr. Suzan Lapp (P.Geo., P.Ag.) has over 15 years of technical and outreach experience as a professional in the fields of watershed management, hydrology and climate change. In the fall of 2017 she joined the BC Oil and Gas Commission as their hydrologist. Her role at the OGC is to provide technical support to water decisions and she is building a water monitoring program in partnership with First Nations in northeast BC. Prior to the OGC, Suzan worked as a consultant and taught University/College courses on water related topics. She has conducted numerous channel and watershed assessments for forest licences, and source water assessments and protection plans and water supply and demand analysis for water suppliers across the province. In her spare time she helps run a small cow calf operation.

"Investigating Source properties and Possible Causative Mechanisms for the Largest Hydraulic Fracturing Induced Earthquake Sequence in Canada"

Honn Kao, PhD
Research Scientist
Geological Survey of Canada, Natural Resources Canada

Honn Kao obtained his BSc in Geophysics from the National Central University, Taiwan, in 1985, MSc and Ph.D. in Geophysics from the University of Illinois at Urbana-Champaign in 1991 and 1993, respectively. He was recruited by the Institute of Earth Sciences (IES), Academia Sinica, Taiwan, as an Assistant Research Fellow immediately after finishing his Ph.D. During his initial years at IES, he was in charge of establishing the Broadband Array in Taiwan for Seismology (BATS). He was promoted to Associate Research Fellow in 1996 and then Research Fellow in 2000. He was awarded the Outstanding Research Award of the National Research Council of Taiwan twice (1999 and 2001). In 2001, he was awarded the

Distinguished Youth Medal of the Republic of China. He joined the Geological Survey of Canada, Natural Resources Canada (NRCan) in 2002 as a research scientist working on earthquake source characteristics and seismogenic structures. In 2006, he was appointed by the School of Earth and Ocean Sciences, University of Victoria, as an Adjunct Professor. In 2019, he received NRCan's Departmental Achievement Award for impact and contributions to excellence in science. Currently, he is the leader of NRCan's Induced Seismicity Research Project.

Dr. Bei Wang
Researcher
University of Victoria and Geological Survey of Canada

Dr. Bei Wang is a postdoc researcher at University of Victoria and Geological Survey of Canada. His research focuses on dynamic triggered earthquakes from remote mainshocks near injection sites, injection-induced earthquakes (IIE) in Western Canadian Sedimentary Basin, such as numerical simulation of the potential triggering mechanisms of IIE, source properties and how fluid/rock interactions affect IIE.

"Machine learning analysis of factors influencing induced seismicity susceptibility in the Montney play region of northeastern British Columbia"

Afshin Amini
University of British Columbia

Afshin is a postdoctoral researcher at University of British Columbia. His main research interest include investigating the influence of different operational and geological parameters on susceptibility to injection induced seismicity and magnitude distribution of these events using statistical analysis and numerical modelling techniques.