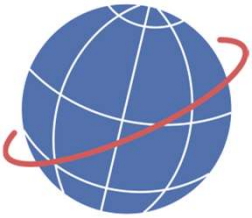
ESfS Earth Science for Society

Resources and You

Energy for Us



One Dynamic Earth

Our Future!

March 17, 18, 19, 2024
MacEwan Hall
University of Calgary

FREE Admission!

Open to the Public

12:00 pm – 5:00 pm Sunday March 17
9:00 am – 2:15 pm Monday March 18
6:00 pm – 9:00 pm Monday March 18
9:00 am – 2:15 pm Tuesday March 19

Scavenger Hunt Booklet
sponsored by

Canadian Geological Foundation / Fondation géologique du Canada

1968

Jérôme H. Remick III
Endowment Trust Fund

Earth Science for Society

A huge thanks to all of our generous sponsors

GOLD

CSPG FOUNDATION

Canadian Natural

CSEG Foundation

SILVER

CAOEC Canadian Association of Energy Contractors

WHITECAP RESOURCES INC

2x Anonymous CSEG Foundation Donor

STRATHCONA RESOURCES LTD

Canadian Geological Foundation / Fondation géologique du Canada

TOURMALINE OIL CORP.

Alberta

cenovus ENERGY

LITHIUM

Scotia Wealth Management

McDANIEL

CRESRC.CA

PULSE Energy Data. On Demand.

Imperial

BIRCHCLIFF ENERGY

APEGA The Association of Professional Engineers and Geoscientists of Alberta

Eavor™

LITHIUM

COPPER

EARTH SIGNAL PROCESSING LTD

SAIT

seisware

STATCOM Ltd SEISMIC DATA PROCESSING

E3 Project: Earthquake Early Warning Education

EDUCATOR RESOURCES

CRESRC.CA

PERIMETER INSTITUTE

Inside education

Natural Resources Canada / Ressources naturelles Canada

ConocoPhillips Canada

Geoscientists Canada / Géoscientifiques Canada

TenPeaks

let's talk science outreach

Ocean Networks Canada

E3 Project: Earthquake Early Warning Education

DOOR PRIZES

SBT

Calgary Farmyard

Granary Road

Canmore Cave Tours

Journey 2050

LITHIUM

CRESRC.CA

Butterfield Acres ...the REAL Farm Experience!

BOW Habitat Station

Ocean Networks Canada

Alberta Palaeontological Society

TenPeaks

E3 Project: Earthquake Early Warning Education

SIGMA

StudioBell

National Music Centre / Centre National de Musique

Exhibitors

Resources and You (pages 4-5)

Alberta Geological Survey of the Alberta Energy Regulator
Canadian Natural
Mining Matters
Women in Science and Engineering UCalgary
Yukon Dan Gold Panning

Answer the questions for the prize draw (page 13) and you may win!

Energy for Us (pages 6-7)

Canadian Nuclear Society
CREWES, University of Calgary
CSPG Foundation
Natural Resources Canada – Geological Survey of Canada (Calgary)
RASC Calgary
Ten Peaks Innovation

One Dynamic Earth (pages 8-9)

Alberta Palaeontological Society (Sunday)
Calgary Rock and Lapidary Club
Canadian Rockies Earth Science Resource Centre
Earth@UCalgary
ESfS Trilobite Fossil Station
Inside Education (Monday and Tuesday)
Let's Talk Science

Our Future! (pages 10-11)

Canadian Association of Geophysical Contractors
Canadian Society of Exploration Geophysicists
Journey 2050
Ocean Networks Canada
Rothney Astrophysical Observatory
SAIT: The Connector Lab and Geomatics Engineering Technology

Resources and You

What did you see or learn about at these booths?

Alberta Geological Survey of the Alberta Energy Regulator

- Groundwater is found underground in cracks and spaces between grains of soil, sediment, and rock
- Groundwater plays a role in the water cycle and can be linked to rivers, streams, lakes, and wetlands
- Many Albertans depend on groundwater for drinking, washing, farming, and industrial use
- Once groundwater is polluted it is difficult to clean

Canadian Natural

- Facies are the combinations of sediments deposited in environmental systems
- Geoscientists make visualizations based on interpretations
- Interpretations are tested by drilling a well or mining

Resources and You

What did you see or learn about at these booths?

Mining Matters

- ○ Minerals have physical properties that can be measured and used to identify and classify them
- ○ The physical properties of minerals determine how they are used in manufacturing
- ○ Minerals are used to make everyday products
- ○ Critical minerals are required to manufacture modern technology

Women in Science and Engineering UCalgary

That one of these is correct:

- ○ Non-newtonian fluids have a constant viscosity (thickness)
- ○ Non-newtonian fluids change viscosity (thickness)
- ○ Liquid water is a Non-newtonian fluid

Yukon Dan Gold Panning

- ○ Fool's gold tricked many people
- ○ Gold is expensive because it is hard to find
- ○ Gold miners lived tough lives

What I like best about **Resources and You** is _____

Energy for Us

What did you see or learn about at these booths?

Canadian Nuclear Society

- A Nuclear Engineer won the Miss America Pageant last year
- Aggressive new construction programs were announced across Europe (14 reactors in France, 6 in Poland, 9 in Ukraine)
- In Canada, 8 new reactors were announced in Ontario, and Ontario Power Generation signed an agreement with the Alberta Government for advanced nuclear reactor deployments in Alberta
- At the COP28 climate conference in Dubai, 25 nations, including Canada, committed to tripling global nuclear generating capacity by 2050

CREWES, University of Calgary

Some of these are examples of man-made seismic sources:

- Dynamite
- Vibroseis
- Earthquake
- Weight-drop
- GPR
- Hammer

CSPG Foundation

- Petroleum resources, like oil and natural gas, are found by geologists by drilling wells, and working with geophysicists and engineers
- Geologists look at core, which is a cylindrical sample of rock collected from drilling wells, to help understand the geology underground
- There are three types of rocks: igneous, sedimentary, and metamorphic
- Fossils can be either a part of a prehistoric organism, like a bone, or a 'mold' or 'cast', like a footprint

Energy for Us is sponsored by
Canadian Society of Petroleum Geologists Foundation

Energy for Us

What did you see or learn about at these booths?

Natural Resources Canada - Geological Survey of Canada (Calgary)

- Every part of Canada has different kinds of rocks of different ages
- The landscape is a product of the kind of rocks found in a place
- Energy resources vary across Canada due to the local geology
- In Alberta electricity is produced (in descending order) from gas, wind, coal and solar

RASC Calgary

- Meteorites are commonly magnetic
- A dark night is important for a healthy ecosystem

Ten Peaks Innovation

- Energy can be delivered by changing it from one form to another
- Carbon Capture is a big deal in Alberta and to Canada in reducing greenhouse emissions
- There are many forms of energy, and all forms of energy are important in order to meet the energy demands of the world
- Producing energy with the lowest amount of greenhouse gas emissions is the key to limiting or reversing climate change

What I like best about **Energy For Us** is _____

One Dynamic Earth

What did you see or learn about at these booths?

Alberta Palaeontological Society (Sunday)

- ○ The name of the oldest rock on earth
- ○ One of the first animals with shells
- ○ When Alberta had coral reefs
- ○ How long ago the Ice Age was

Calgary Rock and Lapidary Club

- ○ That there is a rock and lapidary club in Calgary that I can join to learn more …

Canadian Rockies Earth Science Resource Centre

- ○ A seismometer records energy from an energy source such as dynamite, reflected back from the subsurface
- ○ Energy recorded by a seismometer leads to images of the subsurface after considerable effort by a geophysicist. The image is called a seismic section
- ○ A geophysicist makes a map from a series of seismic sections. The map may lead to drilling a well in hopes of finding oil or natural gas
- ○ Natural gas heats most homes in Alberta

Earth@UCalgary

- ○ I saw the augmented reality sandbox
- ○ I learned how to make a cast of a fossil
- ○ I learned how to identify real and fake pearls and amber

One Dynamic Earth is sponsored by
Canadian Society of Exploration Geophysicists Foundation

CSEG Foundation

One Dynamic Earth

What did you see or learn about at these booths?

ESfS Trilobite Fossil Station

- Molting is when a trilobite sheds its exoskeleton
- Today's closest relative to a trilobite is a horseshoe crab
- Trilobites had compound eyes with multiple separate lenses
- Molds are an imprint of an organism left in rock

Inside Education (Monday and Tuesday)

- Renewable resources used for energy in Alberta include wind, solar, biomass, hydro and geothermal
- Non-renewable resources used for energy in Alberta include coal, oil and natural gas
- I can be a good steward and help conserve natural resources by using less energy (examples: walking, biking, unplugging electronics)
- Alberta's energy landscape is changing with innovations like carbon capture, hydrogen, bitumen beyond combustion, small modular nuclear reactors, and many other cool technologies!

Let's Talk Science

- Human interactions and climate change can alter the interactions and populations of species within a food web
- Biodiverse and healthy ecosystems are often more resilient to disruptive events
- Humans rely on healthy food webs and ecosystems for many reasons!

What I like best about **One Dynamic Earth** is _____

Our Future!

What did you see or learn about at these booths?

Canadian Association of Geophysical Contractors

- Sound waves are used to find resources like Oil, Gas, Potash, Water, Salt and Buried treasure
- There are lots of job opportunities, such as Geophysicist, Driller, Helicopter Pilot, Vibrator Operator
- Seismic workers cross paths with lots of animals, e.g. Grizzlies, Polar Bears, Moose, Caribou, Elk & Deer
- Working on a seismic crew is a rewarding career opportunity working close to nature

Canadian Society of Exploration Geophysicists

- How compressional and shear energy travels through the earth (slinky)
- That smart phones and tablets can be used to detect seismic energy
- How seismic is used for oil and gas exploration
- What the CSEG does for its members

Journey 2050

- The 3 primary nutrients to help plants grow are N (nitrogen), P (phosphorus), and K (potassium)
- Farmers use the 4R's when applying nutrients (Right Source, Right Time, Right Rate, Right Place)
- It takes 435 L of water to make one loaf of bread

Our Future! is sponsored by
Two Anonymous CSEG Foundation donors

Anonymous
CSEG Foundation Donor

Our Future!

What did you see or learn about at these booths?

Ocean Networks Canada

- ○ Ocean Food Webs are complex combinations of animals, from microscopic plankton to apex predators
- ○ Ocean-based life, such as salmon and plankton, have irreplaceable impacts on many land-based ecosystems
- ○ Canada plays a major role in monitoring, observing, studying and stewarding the world's Oceans
- ○ Indigenous knowledge and stewardship continue to be an essential part of Ocean Science

Rothney Astrophysical Observatory

- ○ Whether gravity attracts or repels
- ○ If the amount of gravity is different on the eight planets of our solar system
- ○ Linear and angular motion are different

SAIT: The Connector Lab and Geomatics Engineering Technology

- ○ A total station measures angles and distances

What I like best about **Our Future!** is _____

Geo-Theatre Presentations
Sunday March 17

Dr Eva Enkelmann: Rocky Voices – the stories that rocks can tell you (12:45 pm and 1:30 pm)

Summary

Imagine – rocks could talk! What would they tell you? Eva will take you to some well-known locations in the Rocky Mountains and tell you the adventurous, heartbreaking, and fun stories of the mineral characters that live there. These fact-based stories will take you through hundreds of millions of years and the many changes of Alberta, from the time when there was a tropical ocean here to building the Rocky Mountains and glaciers covering most of the areas.

Eva Enkelmann is a geology professor at the University of Calgary and researches mountain-building processes and educates the next generation of scientists. She was born and raised in Germany and worked in the US for ten years before she came to Calgary, Alberta in 2017. She loves the outdoors and spends most of her free time climbing, hiking, and skiing in the Rocky Mountains.

Dr Annie Quinney: Rex Appeal (2:15 pm and 3:15 pm)

Summary

From its discovery in 1902, Tyrannosaurus rex was destined to make headlines, becoming a major star in film and print. For better or worse, depictions of this fearsome dinosaur have shaped our understanding of how T. rex looked and lived. Let's step back in time to uncover how our perceptions of the most famous dinosaur have changed.

Annie Quinney is a Senior Instructor in the Department of Earth, Energy, and Environment at the University of Calgary, where she teaches an entire course about dinosaurs. She attributes her love of palaeontology to growing up in the badlands of Drumheller. As a young teen, Annie secured a job in the cafeteria at the Royal Tyrrell Museum, where she dutifully flipped Brontoburgers and cleaned up after hot, cranky tourists. Eventually, she transitioned into other departments at the museum, including Security (no, sir, you cannot ride the Triceratops), Gallery Interpreter (the bathrooms are located in the Cretaceous Garden), and, finally, Education (today, we are going to look at the super, secret mystery fossil!).

Annie's training and experiences at the museum set her up for a lifelong love of learning and teaching science. After completing a B.Sc. and M.Sc. in geoscience at the University of Calgary, Annie pursued a Ph.D. at Monash University in Australia, where she studied amber palaeontology. Upon her return to Canada, she completed a Postdoctoral Fellowship at the Arctic Institute of North America. She has been happily teaching at the U of C since 2016.

Prize draw contest for K-12 students
Answer the questions to be eligible to win a prize!

What did you learn about today?
You can check more than one answer

- ○ Rocks and minerals
- ○ Fossils/trilobites
- ○ Oil and Gas
- ○ Renewable resources
- ○ Possible careers
- ○ Technology/Instruments
- ○ Seismic energy
- ○ Uses of natural resources
- ○ Natural disasters
- ○ Earth processes

What did you like best about ESfS?
You can check more than one answer

- ○ Hands-on activities
- ○ Lots of cool information
- ○ Friendly/informative people
- ○ Models/displays
- ○ Info about the Earth
- ○ It made learning/science fun
- ○ Lots of awesome topics
- ○ Career info
- ○ Freebies
- ○ Other _____

Has this visit increased your interest in science or engineering?

○ Yes ○ No

Has this visit increased your understanding of science or engineering?

○ Yes ○ No

Do you think you might study science or engineering?

○ Yes ○ No

Would you consider a career in science or engineering?

○ Yes ○ No

Please tell us something about your experience today

So that we can contact you if you win: (please print clearly)

Name Age

School/Youth groups only: School/Youth group

Public visitors only: Parent/Guardian name

and Home phone

Tear out this page and drop it in the box or give it to a geoscience guide

Exhibitors' Websites

Alberta Geological Survey of the Alberta Energy Regulator	ags.aer.ca
Alberta Palaeontological Society	albertapaleo.org
Calgary Rock and Lapidary Club	crlc.ca
Canadian Association of Geophysical Contractors	cagc.ca
Canadian Natural	cnrl.com
Canadian Nuclear Society	cns-snc.ca
Canadian Rockies Earth Science Resource Centre	cresrc.ca
Canadian Society of Exploration Geophysicists	cseg.ca/foundation/schools-public-outreach
CREWES, University of Calgary	crewes.org
CSPG Foundation	cegageos.ca/foundation
Earth@UCalgary	science.ucalgary.ca/earth
Earth Science for Society	esfscanada.com
Inside Education	insideeducation.ca
Journey 2050	journey2050.com
Let's Talk Science	letstalkscience.ca
Mining Matters	miningmatters.ca
Natural Resources Canada - Geological Survey of Canada (Calgary)	nrcan.gc.ca/earth-sciences/earth-sciences-resources/10778
Ocean Networks Canada	oceannetworks.ca
RASC Calgary	calgary.rasc.ca
Rothney Astrophysical Observatory	science.ucalgary.ca/rothney-observatory
SAIT: The Connector Lab and Geomatics Engineering Technology	sait.ca
Ten Peaks Innovation	10peaks.ca
Women in Science and Engineering UCalgary	uofcwise.com
Yukon Dan Gold Panning	yukondan.com

ESfS Organizing Committee

Julia Davison (Chair)

Alyssa Middleton (Administrator)
Annette Milbradt (Budget/Finance Chair)
Cathy Martin (Budget/Finance Vice-Chair)
Daniela Waldbott von Bassenheim (Speakers Chair)
David Karran (Volunteers Chair)
Helen Isaac (Program Delivery Chair)
Hunter Brett (Marketing Co-Chair)
Jeff Allison (Venue/Logistics Chair)
John Duhault (Exhibits Vice-Chair)
Laurie McGhie (Exhibits Chair)
Lorraine Stratkotter (ESfS in Motion Vice-Chair; Sponsorship)
Natasha Morris (Sponsorship Vice-Chair; Speakers Vice-Chair)
Pam Pribilovic (Sponsorship Chair)
Renu Sahota (Marketing Co-Chair)
Tezla Hayduk (ESfS in Motion Chair)

Ariana Pumo (Marketing)
Elias Carciente (Exhibits)
Hilary Schumacher (Volunteers Advisor)
Maureen Hill (Sponsorship)
Robynn Dicks (Volunteers)

Earth Science for Society (ESfS)

Need help?
Ask an organizing committee member in a lime-green T-shirt