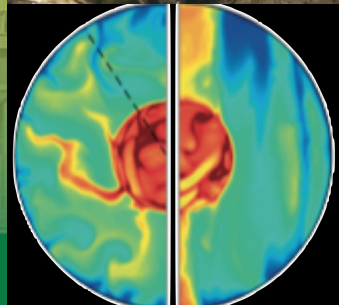
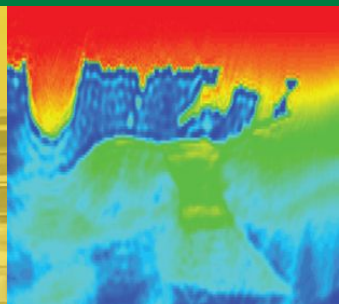


GEOFYSICS



UALBERTA
PHYSICS

advancing our understanding of Earth's structure and evolution

The wide variety of research in Geophysics at the University of Alberta includes both fundamental and more applied geophysical science projects. Current research focuses on the field of geophysical data processing, theoretical and applied seismology, earthquake studies, geodynamics, geomagnetism and paleomagnetism, magnetotellurics, environmental geophysics, geothermal energy, climatology and planetary geophysics.



Claire Currie, Professor
Geophysics & Geodynamics

Dr. Currie's research examines the structure and dynamics of tectonic plates, especially at subduction zones and continental collision zones. Her group uses computer models to understand the relationship between mantle dynamics and continental evolution. Current research focuses on the factors that control surface topography, magmatism, and deformation on a range of timescales (from earthquakes to mountain-building).

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Mathieu Dumberry, Professor
Physics of Planetary Interiors

Dr. Dumberry's research focuses on the physics of planetary interiors, including the study of flows in the fluid core of planets, the generation and evolution of planetary magnetic fields, the rotational dynamics of planetary bodies and fluid-solid interactions at interior boundaries. His work is mainly theoretical, including numerical simulations, with an emphasis on relating specific observations to simple models of the dynamics.

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Jeff Gu, Professor
Crust and Mantle Seismic Structure

Dr. Gu's main research area is earthquake seismology, including regional crust and mantle seismic structure analysis, induced earthquakes, and global seismic imaging.

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Moritz Heimpel, Associate Professor
Dynamics of Planetary Interiors

Dr. Heimpel's main research interest is dynamics of planetary interiors. This involves theoretical and numerical modelling of fluid dynamics and magnetohydrodynamics applied to planetary atmospheres and interiors. Work on planetary dynamos have implications for the dynamical evolution of several of the solar system planets, particularly Mercury, Earth, Jupiter, Saturn, Uranus and Neptune, as well as exoplanets.

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Vadim Kravchinsky, Professor
Paleomagnetism & Petromagnetism

Dr. Kravchinsky uses paleomagnetism, rock magnetism, archaeomagnetism, astrochronology, and numerical methods to investigate past climate and environmental change, plate-tectonic reconstructions, geomagnetic field behaviour, and the dating of geological and archaeological materials. His work also includes data-driven and numerical modelling applications, including permafrost thaw and geophysical signal analysis.

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David Potter, Professor
Petrophysical & Geophysical Techniques

Dr. Potter's research interests are in several broad areas of geophysics and petrophysics, both fundamental and applied. These include rock physics (particularly rock magnetism), palaeomagnetism, nanomagnetism, petrophysical parameter prediction (for the oil, gas, and geothermal energy industries), borehole logging, core analysis, anisotropic properties, shock impact processes, and geophysical fluid dynamics.

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Mauricio Sacchi, Professor
Seismic Data Processing and Imaging

Dr. Sacchi's lab conducts research in the area of statistical and transform methods for seismic data processing, waveform imaging and inversion with an application to applied and global seismology. His group has become recognized for the development of algorithms for multi-dimensional seismic data reconstruction, de-noising and the application of sparsity promoting and dimensionality reduction methods to seismic data processing.

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Bruce Sutherland, Professor
Geophysics & Fluid Dynamics

Atmospheric, oceanic and environmental fluid dynamics; stratified flows, internal waves, plumes and gravity currents; particle-bearing and particle-laden flows.

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Martyn Unsworth, Professor
Electromagnetic Geophysics

Dr. Unsworth's research is in the field of electromagnetic geophysics, primarily using the magnetotelluric method to image Earth structure in 3-D. His research includes using magnetotellurics in (1) exploration for mineral and geothermal resources (2) studying plate tectonic processes and earthquakes and (3) imaging magma beneath active volcanos to better understand eruptions and hazards.

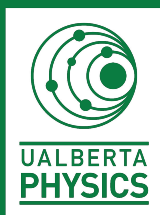
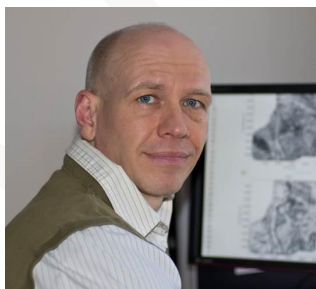
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Mirko van der Baan, Professor
Seismic Wave Propagation & Geomechanics

My research interests span signal processing, seismic wave propagation, geomechanics and microseismicity. Some research questions my students and I are tackling: Does fracking cause earthquakes? How can we mitigate human-induced seismicity? Can we model rock deformation during hydraulic fracturing treatments? How can we enhance data quality and resolution to detect weak events and features? Can machine learning algorithms predict failure? I collaborate extensively with the hydrocarbon industry and many of my students have found positions there.

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GEOFYSICS

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