

OCEAN-CLIMATE RESEARCH
**VITAL IMPACT FOR
PEOPLE, PLACES
AND THE PLANET**



University
of Victoria

LEADING THE WAY

Our oceans and climate sustain our planet, generating the interconnected and awe-inspiring processes that create and support all life. Deepening and sharing knowledge of this vital system are priorities for the University of Victoria.

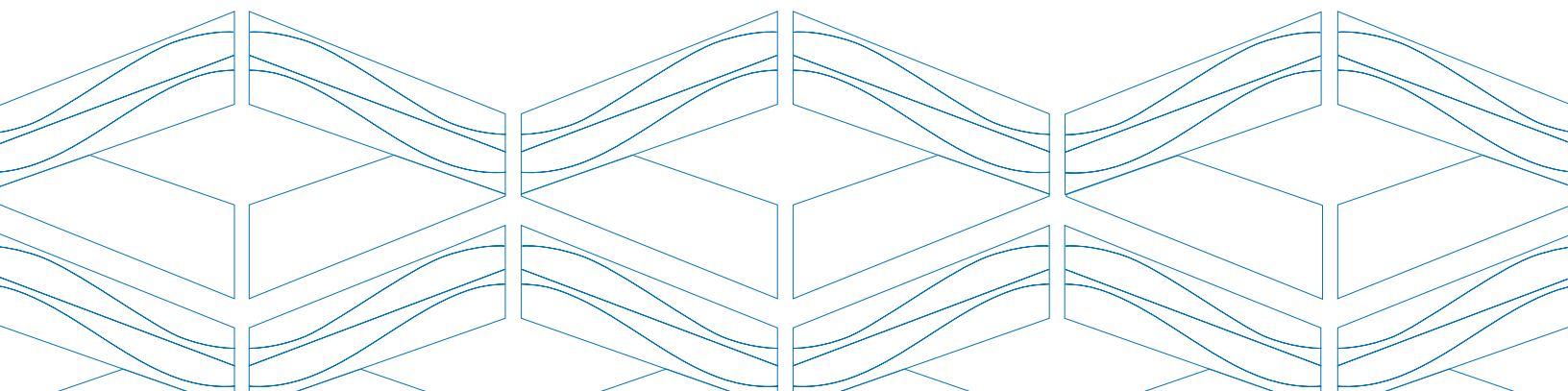
UVic is a world leader in research on ocean science and technology, climate science and the development of innovative clean energy technologies. The integration of ocean and climate science provides the critical knowledge needed to inform decisions by communities, governments and industries on climate change mitigation and adaptation, and on sustainable ocean management. UVic is uniquely positioned for this work, with a network of internationally recognized climate and ocean researchers supported by the on-campus expertise and infrastructure of key centres and institutes.

Ocean and climate research at UVic happens in labs, schools, departments, centres and institutes all across campus—in biology, geography, earth and ocean sciences, environmental studies, biochemistry, business, law, history, and electrical, computer, mechanical and civil engineering. These diverse areas of study underline the interconnectedness of Earth's systems, from the minuscule phytoplankton that capture carbon from the atmosphere, to harnessing the ocean waves that may one day power our cities.

Much of this research will soon take place in UVic's new ocean and climate centre, which provides the physical space to further spark the collaborations across disciplines that are the driving force behind UVic research. This Ocean Climate building at Queenswood, located within walking distance of the main university campus, will house one of the largest concentrations of ocean-climate researchers in Canada.

UVic hosts three research and knowledge-sharing institutes focused exclusively on ocean and climate: Pacific Climate Impacts Consortium (PCIC), the Institute for Integrated Energy Systems (IESVic), and Ocean Network Canada (ONC). A fourth centre, the UVic-hosted and -led Pacific Institute for Climate Solutions (PICS), is a collaboration with BC's three other research-intensive universities that studies the impacts of climate change and develops positive approaches to mitigation and adaptation.

In addition, UVic is home to two Environment Canada labs—the Canadian Centre for Climate Modelling and Analysis, a flagship, internationally recognized climate-modelling laboratory, and the Water and Climate Impacts Research Centre, specializing in hydro-climatology and the hydrologic and ecological impacts of atmospheric change and variability, particularly in the Canadian Arctic.



PACIFIC CLIMATE IMPACTS CONSORTIUM (PCIC)

Measures to mitigate the impact of climate change are a global imperative. But in the meantime, climate change is already upon us, and there's an urgent need for data, insights and analysis to help prepare our communities to be resilient to that change. The work of UVic's Pacific Climate Impacts Consortium is at the forefront of those efforts.

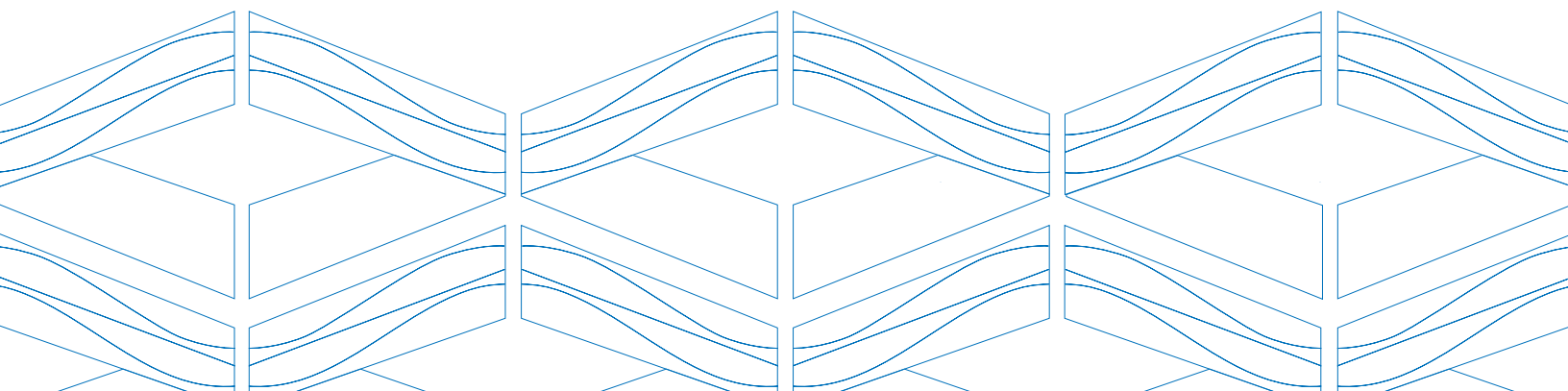
PCIC provides practical data and conducts applied research to help leaders and decision-makers understand how to prepare for a changing climate—whether they're municipal planners embarking on new infrastructure, blueberry farmers worried about winter drainage, policy makers seeking regulatory guidance or homeowners wondering about investing in a heat pump.

Under the leadership of climatologist Francis Zwiers, PCIC is bringing thousands of climate-related information threads together and sharing that information publicly, with everyone from curious beginners wondering how the climate is changing in their region, to veteran climate scientists seeking inputs for further research and exploration.

"Francis Zwiers' compelling, rigorous and insightful work illuminates the details of humans' role in changing climate," said Philip Mote, President-Elect of Global Environmental Change for the American Geophysical Union.

Using a wealth of BC weather data provided through a multi-partner agreement unique in Canada, PCIC aggregates, analyzes and disseminates information on the physical impacts of climate variability and change in the Pacific and Yukon regions. Data is collated from more than 6,700 weather-monitoring sites around BC, some of which have been in use since the late 1800s.

That information is made available without charge to everyone through the PCIC Data Portal. At any given time, PCIC scientists are involved in 10 or more applied research projects for specific users—agricultural associations, municipalities, federal and provincial regulators and more. Those research findings provide evidence-based insights and analysis that are helping our world prepare to be resilient in the face of climate change.



THE INSTITUTE FOR INTEGRATED ENERGY SYSTEMS (IESVic)

IESVic is a Canadian leader in the promotion and development of creative energy alternatives through original research. Its areas of expertise include fuel cells, cryogenic fuels such as liquid hydrogen, energy systems analysis and energy policy development.

Research is conducted in six areas:

- **Energy systems**—assessing impacts and viability of energy system structures
- **Clean transportation**—hybrid propulsion, low-carbon fuels such as hydrogen and natural gas, electric vehicles
- **Sustainable communities**
- **Renewable energy**
- **Energy technology**
- **Human dimensions of energy**—behaviour, policy, social licence and “energy justice,” which takes into account the social and economic inequalities inherent in some energy systems

IESVic hosts the West Coast Wave Initiative, the centre of Canadian wave energy research and development, which has deployed buoys on BC’s coast to assess the potential of clean wave energy to feed into the province’s electrical grid.

The institute’s 2060 Integrated Energy Pathways Project is looking at new forms of energy to integrate into the grid as well. Its “technology-neutral” approach is identifying opportunities for new forms of clean, renewable energy that can be shared with other jurisdictions that lack the abundant clean-energy resources of BC.

The Pacific Regional Institute for Marine Energy Discovery (PRIMED) is a new IESVic initiative to bridge the knowledge gap and provide clean-energy solutions for remote coastal communities currently reliant on diesel fuel generators for meeting energy needs.

With no one-size-fits-all solution capable of addressing our world’s complex energy needs, IESVic researchers take an integrated viewpoint on how future needs for clean, sustainable energy will be met.

“We need integrated energy systems—integration between electric, gas, wind, solar and others. We need new strategies and approaches. The future is not the past.”
Andrew Rowe, IESVic director and 2060 project lead

IESVic AT A GLANCE



22 FACULTY



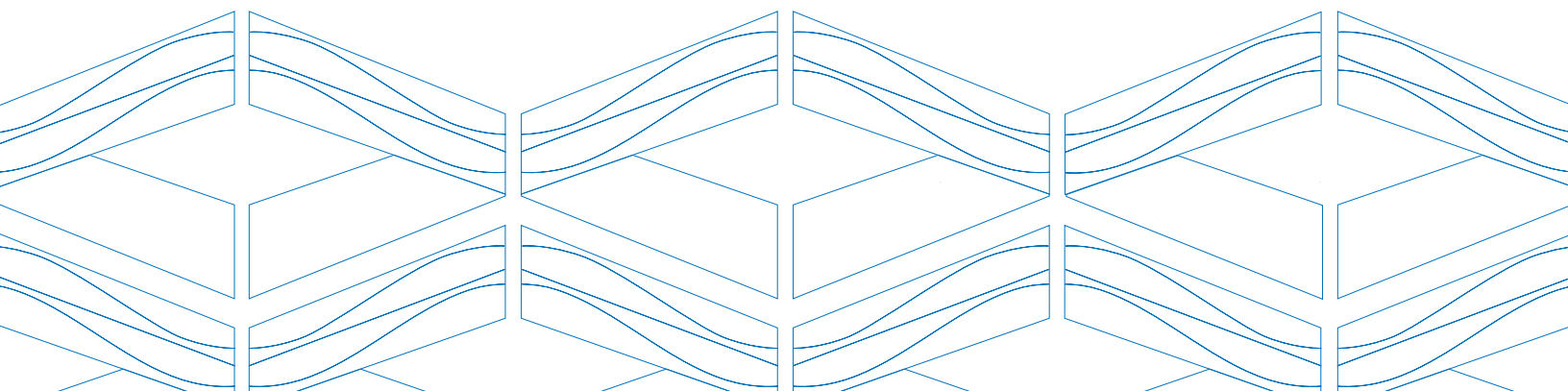
75+ RESEARCHERS



80+ PATENTS



200+ PAPERS



OCEAN NETWORKS CANADA (ONC)

The ocean is changing around the world as the climate changes—less oxygen, warmer water, higher acidity. Quantifying and observing those changes has never been more important, and the innovative Ocean Networks Canada at the University of Victoria is leading the way.

ONC has six “wired” seafloor observatories and more than 50 instrument platforms collecting deep-sea data along all of Canada’s three coasts. Fibre-optic cable installed on the seafloor of BC’s Coast and in the Arctic now stretches an astounding 900 kilometres, providing continuous real-time data for scientific research that communities, governments and industry need to make informed decisions about the future.

The 280 gigabytes of daily data from ONC’s extensive observation network are available without cost via a public web portal that connects ocean researchers and citizen scientists around the world. Unique scientific and technical capabilities permit researchers to operate instruments remotely and receive data at their home laboratories anywhere on the globe. The extensive data is fuelling new research that wasn’t possible in the past.

Community engagement is a vital component of ONC’s work. Since 2014, ONC has been installing community observatories on Vancouver Island, along the BC coast and in the Arctic, partnering with First Nations and coastal communities to measure ship traffic, weather, underwater acoustics and more.

In Campbell River, community members use ONC data to manage the impact of increased acidification from climate change on local shellfish farms. In Kitamaat Village, ONC helps the Indigenous community quantify the impact of industrial development on marine mammals.

In Cambridge Bay, Nunavut, ONC monitors and shares information on ocean temperature, oxygen, salinity, sea ice thickness, underwater noise and meteorological conditions—vital data for informing local decision-making and advocacy efforts.

ONC deep-sea sensors are also improving life on land, monitoring earthquake activity and stresses in the Earth’s crust. Highly sensitive equipment on ONC’s NEPTUNE observatory form part of one of the most precise tsunami-monitoring systems in the world. Elsewhere in the network, specialized underwater microphones track the movements of marine mammals, increasing understanding of how human activity in busy inland waters is affecting marine wildlife.

Closer to home, ONC’s coastal observatory provides new understanding of vital water ways including the Strait of Georgia and Fraser River delta. An expansion of this seafloor network, coastal radar and surface systems will provide new data for marine safety, search and rescue, and oil spill response.

ONC BY THE NUMBERS:

2 REGIONAL AND **4** COMMUNITY OBSERVATORIES

7 SHORE STATIONS

850+ KM SEAFLOOR BACKBONE CABLES (**NEPTUNE** AND **VENUS** OBSERVATORIES, STREAMING LIVE DATA)

OVER 50 INSTRUMENTED SITES WITH PLATFORM

7 MOBILE INSTRUMENT PLATFORMS

400 INSTRUMENTS CONTAINING **OVER 5000** SENSORS ONLINE 24/7/365

2006—THE YEAR DATA BEGAN TO FLOW FROM THE VENUS OBSERVATORY IN SAANICH INLET

500+ TERABYTES OF DATA ARCHIVED IN **OVER 26 MILLION** FILES

280 GIGABYTES OF DATA COLLECTED EVERY DAY

35 GIGABYTES OF DATA ARE DISTRIBUTED EVERY DAY

\$0.00—YOUR COST TO USE THE DATA

For more information on partnering with us,
contact the research and partnerships office: rpkm@uvic.ca

