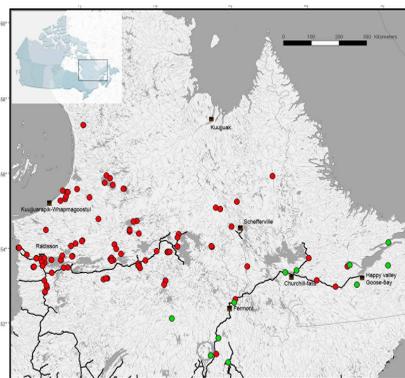


## ARCHIVES: ABOUT THE NORTH'S PAST AND FUTURE

ARCHIVES (Analyse rétrospective des conditions hydroclimatiques à l'aide des indicateurs de leurs variabilités à l'échelle séculaire) aims to document variations in hydrology and climate over the past 1000 years in Northern Québec.

The research project uses various natural indicators: tree rings (their width, density and carbon and oxygen isotopic ratios) and lake sediments allowing the spatio-temporal reconstitution of hydrological and climate variables. These spatio-temporal climate reconstitutions were compared to climate simulations produced by the Canadian Regional Climate Model over a period of 150 years in order to validate and interpret the climate variations in relation to atmospheric circulation.

The project came to an end this year after the deployment of enormous scientific effort and the mobilization of a diversity of expertise. The teams covered a vast territory, spanning 600 000 km<sup>2</sup> from Mistassini Lake (51°N) to the forest tundra



Sampling sites of the ARCHIVES project

(57°N) and from Hudson Bay to the coast of Labrador. To date, over 2500 tree remains from lake bottoms have been sampled to reconstitute a climate history spanning 1400 years – the longest continuous climate history ever reconstructed for eastern North America!

Results show that summer temperatures have progressively declined since the

Middle Ages, before beginning the upward trend of the Twentieth century. Since 1800, the water supply has increased by 30% in the James and Hudson Bay regions. This increase is explained by an increase in snow fall. Furthermore, models predict a 10% increase in water supply by 2050. These results represent excellent news for the producers of hydroelectricity, although summer temperatures and water loss through evapotranspiration are increasing.

ARCHIVES project results carve a place for dendrochronological data from north-eastern America in futur international reports, such as the Intergovernmental Panel on Climate Change (IPCC). ARCHIVES brings together participants from INRS, UQAR, UQAM, the Geological Survey of Canada, OURANOS, IREQ, Université de Liège in Belgium and the CEREGE in France. The project was supported by NSERC, ArcticNet, the Geological Survey of Canada and CEN.

For more information: <http://archives.ete.inrs.ca>

## TWO PROJECTS STUDYING UNDERGROUND WATER

Two CEN initiatives join efforts to acquire knowledge on groundwater in Quebec and Nunavik.

### Réseau IMMATSIAK

In response to a request by the MDDEFP, in spring 2010 the CEN submitted a research proposal to deploy a network of piezometric stations in Nunavik to measure groundwater levels.

Later in 2010, the Immatsiak network (meaning groundwater in Inuktitut) was created and is led by R. Fortier with the aim of 1) measuring the impacts of climate change on groundwater levels in cold regions; 2) making data accessible to stakeholders and users, to ensure the sustainable use of this renewable resource.

The network is part of the Réseau provincial de surveillance des eaux souterraines (RSESQ).

### PACES NEBSL

Financed for three years by regional partners and the Quebec government, PACES NEBSL (Programme d'acquisition de connaissances sur les eaux souterraines au Nord-Est du Bas-St-Laurent) aims for the acquisition of knowledge on the subterranean waters near the coastal margin of the Lower St-Laurence.

More specifically, the project aims to develop a picture of regional aquifers, their recharge areas and their vulnerability to contamination. The project also examines the interactions between surface water and groundwater in an environment where aquifers appear to be strongly connected to surface water and where there is a risk of saltwater intrusion.

PACES NEBSL is coordinated by Professors T. Buffin-Bélanger and G. Chaillou at UQAR and promotes the sustainable management of ground water in the Lower St-Laurence region.

## CEN / PAGE 21 PARTNERSHIP

NSERC's Discovery Frontiers mega-project ADAPT, led by CEN's W. Vincent, and Page21 (7th Framework Program) signed a MOU last fall. This memorandum aims to facilitate exchange and collaboration between experts on permafrost and northern ecosystems and geosystems. This collaboration will increase ADAPT's visibility internationally and showcase CEN's extensive resources (data, stations, breadth of expertise).

## NORDICANA D IS ONLINE!



The CEN Network yields a wealth of data and requests for these data are increasing. Consequently, the CEN has created Nordicana D, a formatted, online data journal archived at CEN.

Nordicana D is produced only in electronic form and is freely and openly accessible to CEN researchers and to other users. Nordicana D has been conceived to aid the management of data sets, to ensure and maximize the exchange and accessibility of relevant data for various stakeholders, and to provide a lasting legacy of CEN monitoring and research activities.

Each issue is published in French and English, and is indexed via an assigned Digital Object Identifier (DOI). Each issue contains data sets and extensive metadata that describe the origin and format of the data, the history of updates via different version numbers, and information on how to cite the data.

<http://www.cen.ulaval.ca/nordicanad/>

## A WORD FROM YOUR STUDENT REPS

Dear student colleagues,

Winter is coming to an end and, for most of us, getting ready for field work has become a priority. Others are graduating and will soon take their first steps as professional scientists. Why deal with it alone? The Association of Polar Early Career Scientist (APECS) helps you start your career by sharing ideas and experiences and providing opportunities for professional career development. APECS frequently holds career development webinars and promotes education and involvement for young scientists. Whether you are an undergraduate, a graduate student, a postdoctoral fellow or a young professional scientist, you can become a member of APECS and APECS Canada ([www.apecs.is](http://www.apecs.is)) for free.

For those who want to continue their education this summer, CEN and its partners offer several summer courses covering a wide spectrum, many of which take place directly in the field. Visit the Website [cen.ulaval.ca](http://cen.ulaval.ca), click on École d'été under the Students green tab (available only in French).

Finally, we would like to thank all of the student(s) who participated in the evaluations conducted by the U. Laval Research Committee (CRUL) and the FRQNT. These assessments are critical to ensure continued CEN funding and, amongst other things, ensure the maintenance and development of our research infrastructure and to maintain the Student Awards Program. CEN has received excellent feedback following these evaluations and the FRQNT Committee particularly appreciated our commitment and the sense of belonging to CEN that we clearly demonstrated!

Your Devoted Student Reps : Valérie Mathon-Dufour (Géo-ULaval), Pascale Ropars (Bio-ULaval), Rémi Lesmerises (UQAR), Yannick Duguay (INRS) and Michel Paquette (Secteur Sud-Ouest).

## GEOCRYOLAB, A CEN LABORATORY AT UNIVERSITÉ DE MONTRÉAL

Written by Laurent Gosselin, Bachelor's student in Geography at the GEOCRYOLAB, 2012

The mission of GEOCRYOLAB is to study the environmental dynamics of cold regions. The team conducts research in areas spanning southern Quebec's alpine environments, the extreme northern reaches of Ward Hunt Island, coastal Nunavik, Yukon and Alaska. Research topics encompass permafrost degradation by thermal erosion, underground flows in permafrost environments, the thermo-mechanics of ice and soils, and the development of mitigation techniques to prevent permafrost degradation. With funding from CFI, the laboratory has recently acquired a cold room to generate permafrost simulations and experimental models of freeze/thaw cycles. Under the supervision of Daniel Fortier, the GEOCRYOLAB team currently counts two research assistants, three doctoral students and nine graduate students.



Daniel Fortier, CEN member and professor, is head of the Geocryolab at the U. de Montréal. He specializes in periglacial geomorphology and paleo-climatology, in geotechnical properties of the permafrost and in engineering techniques to control permafrost degradation. Daniel is associate professor at the Northern Engineering Institute (U. of Alaska Fairbanks) and in U. Laval's Geology Department.



Isabelle de Grandpré began her MSc degree in geomorphology in 2009 under the supervision of D. Fortier, becoming the first student of the Geocryolab. With her research on the impact of groundwater flow on permafrost degradation, she published 2 papers in peer-review journals and presented her results in scientific conferences. Since 2012, Isabelle is research coordinator for the Geocryolab.



Sabine Veuille obtained her MSc degree in fluid dynamic simulation and heat transfer at Université de Paris XI. She also has a MSc degree in Anthropology from U. de Montréal. She has worked for the Geocryolab since 2011 as research coordinator, where she is the reference for numerical modelling and fundamental physics. She also participates in student supervision, field research, and lab work.



**CENTRE D'ÉTUDES NORDIQUES**  
CEN Centre for Northern Studies



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The CEN symposium (May 7-8) will be held in conjunction with the 81st Congrès de l'Acfas at Laval University. The symposium will highlight its members' contributions to the development of the North and the CEN's expertise in northern environmental research. The program features the latest scientific advances in northern regions undergoing rapid change. The symposium will include a public lecture on the evening of May 7th, followed by a full day of lectures and a poster session on May 8th.

## LARGE SCALE PLAN NORD

In an open letter to readers of the journal Conservation Biology, CEN researcher Dominique Berteaux summarizes two years of debate over the conservation objectives of Plan Nord. He shows a prudent optimism and questions the value of pursuing a conservation strategy based primarily on banning industrial activities in 30% of the territory (by 2035). He recalls that many believe in a conservation strategy based on the controls and limits of industrial development where it is likely to occur. The researcher is concerned that media attention will focus solely on the 50% protected area, to the detriment of the sustainable development of the other half of the territory. The impacts of governments' turnover on these issues remain unknown.

Berteaux, D. 2013, Québec's Large-Scale Plan Nord, Conservation biology, Volume 27, No. 2, 242-247.

## MORE NEWS

*A discovery of the knowledge and wealth of Inuit people »*

*Découvrir Magazine presents the video "An Arctic trip with Joel Bête" »*

*Louis-Edmond Hamelin co-published the book "L'apparition du Nord" »*

*Intercultural Workshop: Research on Inuit land »*

*Florent Dominé is awarded the 2013 Louis Agassiz Medal »*

*Warwick Vincent receives the Ramón-Margalef Award »*

*Sarah Aubé Michaud Rewarded for her Excellence »*