Shutdown of PEARL Operations - 30th April 2012

As of April 30, 2012, the Polar Environment Atmospheric Research Laboratory (PEARL), located at Eureka, Nunavut, Canada, will cease full-time year-round operation. CANDAC, the Canadian Network for the Detection of Atmospheric Change, which operates the facility, has been unable to acquire sufficient funding (approximately $1.5M per year) to permit a year-round science program. CANDAC deeply regrets this situation, but in the absence of funding or even funding opportunities, these draconian steps are forced upon us.

PEARL is Canada's most Northerly civilian research station and has been operating continuously since 2005, gathering atmospheric information related to air quality, ozone studies and climate changes. It is linked to many national and international programs and networks and has provided a uniquely Canadian perspective to this global activity.

This loss comes at a highly significant time when Arctic conditions are changing rapidly: Witness the recent rapid loss of permafrost, the appearance of the first large Arctic ozone depletion last year and many other harbingers of significant Arctic change. Without PEARL there will be no continuous active measurements in the High Arctic of many atmospheric quantities scientists believe greatly affect both our Arctic and the whole planet.

The Canadian Government has committed to a new “Canadian High Arctic Research Station” in Cambridge Bay. However, this facility is not scheduled to be operational until 2017 and it will be 1300km to the south of PEARL. The gaps in space and time cannot be bridged: Cambridge Bay is not Eureka and 2012 is not 2017.

CANDAC is pursuing funding for short-term research campaigns but will be unable to operate the facility on a continuous basis, and particularly during the Polar night, until and unless new funding opportunities present themselves and applications are successful.

We thank everyone for their support and hope that some solution to this situation can be found in the future.

http://www.candac.ca

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What is being said about PEARL?

"PEARL was an iconic Canadian development that showed our commitment to Polar research. Its closure shows a stunning lack of interest on the part of the Canadian Government in long-term Arctic issues." *Jim Drummond, Dalhousie University, Principal Investigator, CANDAC and PEARL*

"PEARL has provided us with a significant new dataset of chemical composition measurements for studying atmospheric processes and long-term trends in the High Arctic. These measurements are in great demand, resulting in numerous national and international collaborations. The closure of PEARL will end these measurements just as our need for high-quality data in the changing Arctic is becoming ever more important." *Prof. Kimberly Strong, University of Toronto, PEARL researcher*

"The closure of PEARL will mean the loss of the only TCCON site in Canada and a valuable Arctic dataset for greenhouse gas column measurements. This will have a negative impact on our ability to detect changes in carbon emissions in the Arctic, and on our ability to validate high-latitude space-based measurements by Japan's GOSAT mission and NASA's upcoming OCO-2 mission." *Paul Wennberg, CalTech, USA, Lead for TCCON*

"PEARL is the most northerly station in the MUSICA network and the only one in Canada. The closure of PEARL will eliminate a unique set of High Arctic water vapour measurements that are essential to our global effort to better understand the atmospheric water cycle and its links to climate." *Matthias Schneider, Karlsruhe Institute of Technology, Germany, Lead for MUSICA*

"Over the decades Canadians through their governments have made major financial and scientific investments in the facilities at PEARL and the lack of sustained scientific support loses the benefits to Canadians and the international community of these investments by Canadians." *Gordon McBean, President-Elect, ICSU*

"The unique location of PEARL makes it ideal for the detection of air pollutants transported from lower latitudes by atmospheric circulation." *Jim Sloan, University of Waterloo, PEARL researcher*

"The loss of the Canadian PEARL instruments during the continued operation of similar systems at the High Arctic Norwegian Islands (Spitsbergen) provides a serious obstacle to understanding upper atmosphere coupling processes." *Alan Manson, University of Saskatchewan, PEARL Researcher*

"The facilities and personnel at PEARL have been a great help in our work to develop a Canadian Arctic [Astronomical] Observatory." *Ray Carlberg, University of Toronto, Collaborator on Arctic Telescope*

"PEARL has allowed me to grow scientifically in ways which would not be possible had I remained in the south, studying arctic clouds remotely." *Emily McCullough, University of Western Ontario, Graduate student*

"Without PEARL, I would not have a dataset and I would have missed out on the best learning experience of my graduate work." *Christen Adams, University of Toronto, Graduate student*

Q and A

What is the Polar Environment Atmospheric Research Laboratory (PEARL)?
PEARL is Canada's most-northerly permanent non-military Arctic research laboratory founded in 2005, but related measurements have been made at the site since the early 1990s. (Routine weather measurements have been made at the nearby Eureka weather station for over 60 years and will continue, but the research measurements at PEARL will cease.)

Where is PEARL?
PEARL is located at Eureka, Nunavut at 80N, 86W on Ellesmere Island in Canada's High Arctic close to the Environment Canada weather station. It is 450km to the North of Grise Fiord, Canada's most northerly permanent settlement.

Who operates PEARL?
PEARL is operated by the Canadian Network for the Detection of Atmospheric Change (CANDAC) an informal organisation of university and government researchers.

What does PEARL do?
1. It operates a large number of instruments year-round to measure Arctic atmospheric conditions.
2. It hosts a number of intensive campaigns that make concentrated use of the instruments and infrastructure
3. It enables national and international researchers to safely and cheaply do research in the High Arctic
4. It does outreach and education activities in schools and other places throughout Canada.

Why is the High Arctic so important?
The four million square kilometres of land mass in the Canadian High Arctic is unique in the global system. No other country has such a large fraction of its land mass in the High Arctic. PEARL, which for many years has been the most-northerly permanent non-military research facility in the world, is Canada's atmospheric outpost in the High Arctic and a primary source of information about that region. Canada has committed to exercising sovereignty over this region and it is also likely to hold significant natural resources that will be needed in the future. The weather systems of the region are neither adequately understood or modeled, yet many believe that planetary changes will be seen there first. The High Arctic has been described as a planetary version of the “canary in the coal-mine”.

Who funds PEARL?
PEARL has been funded by a series of research grants through the Natural Sciences and Engineering Research Council (NSERC), the Canadian Foundation for Climate and Atmospheric Science (CFCAS), the Government of Canada International Polar Year (IPY) program and the like. These funding opportunities no longer exist.

Who uses PEARL?
PEARL is used by a large group of Canadian and international researchers from the atmospheric and other fields of study. Most of the research on the High Arctic land is still done utilising small research camps during the summer months. However, an increasing number of researchers in many fields have been taking advantage of the sizable infrastructure at PEARL. For example, using this strategy, many researchers have taken advantage of the communications capability that CANDAC has brought to PEARL which operated the most northerly geostationary communications systems on the planet. Plans are at various stages of advancement for a Polar telescope and a magnetic observatory, both of which are strongly predicated on the presence of PEARL facilities.

How much does it cost to operate?
It costs about $1.5Mpa to operate PEARL

Why is PEARL closing?
PEARL is closing because the operators, CANDAC, have been unable to secure funding for operations. This is mainly because of a lack of appropriate funding opportunities.

Why is PEARL important?
The loss of PEARL will negatively impact Canada's own research needs and Canada's contributions to the global data pool of Arctic measurements. Specific losses will be in inputs to the Aerosol Robotic Network (AERONET), the Network for the Detection of Atmospheric Composition Change (NDACC), the Total Carbon Column Observing Network (TCCON) and other similar international networks. PEARL also made it possible to continue measurements through the Polar night, a time period about which we are still largely ignorant. Canada will also become more reliant on information from international scientists rather than doing its own science. There will also be a loss of training opportunities and expertise in Polar measurements.

How much has been invested in PEARL?
About $15M has been invested in PEARL over the past six years for both local and regional measurements.

What about the Canadian High Arctic Research Station?
The Canadian Government has committed to building and operating a new "Canadian High Arctic Research Station" in Cambridge Bay a full 1300km to the South of PEARL. [This is about the distance between Toronto, Ontario and Nashville, Tennessee.] This facility is not scheduled to be operational until 2017. The gaps in space and time cannot be bridged by any means: Cambridge Bay is not Eureka and 2012 is not 2017. Further, by 2017, the generation of Arctic scientists trained at PEARL will have changed fields or left the country. In short it will be necessary to start all over again.

Why can't we use models to get the same information?
Numerical models are extremely useful, but they need to assimilate continuous reliable measurements to produce credible results. They are not good at predicting the unexpected: The Antarctic Ozone hole was not predicted by models, it was discovered by measurements at a site like PEARL.

Why can't we use satellites to get the same information?
Satellites are really useful for getting a global picture but they cannot make measurements of all the important atmospheric components. Many of those must be measured from the ground. Also most satellites only operate when the sun is up, limiting measurements when conditions are most variable. They are also in orbit for such a long time that they need to be continually tested against ground-based measurements to ensure that they are telling the truth. PEARL researchers did much satellite validation over the Arctic and there are very few sites that can do that on a continuing basis and even fewer for measurements over Canada.

What do other countries do?
Other Arctic (and non-Arctic) countries operate laboratories in the High Arctic and/or Antarctic year-round. These are regarded as important indicators of a country's research and political interests in the region. Canada is unusual in having such a large Arctic landmass and such a low commitment.

PEARL allowed Canada to benefit from ongoing polar research in other countries by the improved channels of communication among international researchers, and by providing leadership in cutting-edge approaches to Arctic science. This will now cease.

The World Meteorological Organisation Congress in 2011 recognised the importance of the Polar regions: Resolution 58 *Invites Members, particularly those that have operational activities in Polar Regions: (1) To ensure continuity of their weather, climate, water and related environmental programmes in Polar Regions;.....(4) To consider the possibility of cooperating with other Members in sharing the costs of re-opening and operating previously functioning stations, in expanding existing stations or in deploying new observing and communication systems.* WMO is asking for closed facilities to be re-opened – Canada is closing operational facilities.

What Now?
CANDAC will continue to make intermittent measurements as it can obtain funding which will be only occasionally and only for the daylight months. There will be particularly severe losses in information in the four months of the Polar night and information on seasonal changes will be lost. Since the Arctic is changing so rapidly, this is a very serious loss of information if we hope to use the Arctic in the future.