

# Ideas on the Edge

## Looking for Signs North of Mars

OUR ATMOSPHERE IS CHANGING.  
AND JAMES DRUMMOND OF THE UNIVERSITY OF TORONTO  
IS STUDYING THE ARCTIC SKY  
FOR CLUES ABOUT WHAT COMES NEXT.



PHOTOS BY TOBIAS KERZENMACHER AND HERMANN BERG

How isolated is PEARL—the Polar Environment Atmospheric Research Laboratory?

“Well,” explains the lab’s director, Dr. James Drummond, “let’s just say that the place on Devon Island where people run a Mars simulation is south of us.”

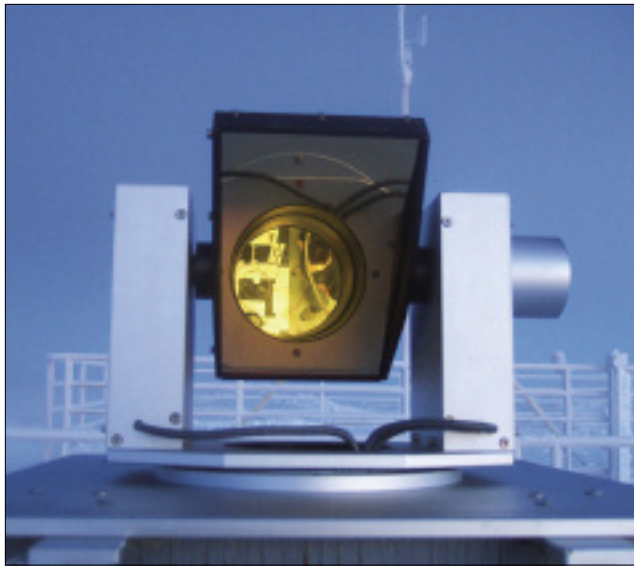
The remote location at the northern end of Ellesmere Island—about 1,100 kilometres from the North Pole—makes PEARL an ideal place for measuring what’s happening to the earth’s atmosphere. No nearby human activity can skew observations, and extreme conditions make atmospheric trends easier to spot. “The high

arctic is always reckoned to be the place where things happen,” says Dr. Drummond “If you’re going to see any changes in the atmosphere, you look for them in these extreme places first.”



### Polar Sunrise

The long polar night is another aspect of the extreme location that provides unique opportunities for research. “After six months of darkness,” says Jim Drummond, “the atmospheric chemistry has changed considerably. Then, when it gets panged with sunlight, you get some very different things going on. So polar sunrise is a very critical time for us.”



To help scientists identify and measure those changes, PEARL is packed with sophisticated and sensitive devices. A lidar system—think radar, but with light waves—allows researchers to probe atmospheric conditions 100 kilometres up. The suite of equipment, plus renovation of the building—a former weather

research station—was funded in part by an investment from the Ontario Innovation Trust.

Observations from PEARL will be important in building a picture of what's happening to the atmosphere globally.

“The key to understanding the environment is to



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measure it,” says Dr. Drummond. “If you don't do that, no matter how much modeling you do, you're never going to get it right.

By way of example, he points to the discovery of the Antarctic ozone hole in the 1980s, which revealed a global

reduction in the earth's ozone layer. “We didn't predict that, we discovered it. If we hadn't had someone there making observations over a long period, we wouldn't have known it was happening. In the same way, we can't predict reliably what the next environmental issue is going to be. We're going to have to discover it.”

**RESEARCH THAT MATTERS**  
REAL-WORLD BENEFITS FOR ONTARIANS:

- Long-term understanding of atmospheric trends, leading to better air quality in the future.



DR. JAMES DRUMMOND

Dr. Drummond admits that the importance of gathering this data can be a hard sell. “If I don't make my measurements, nobody will die tomorrow.” So why is it important? Jim Drummond has a very succinct answer.

“Breathe in. Breathe out.”

**Project:** The Polar Environment Atmospheric Research Laboratory  
**Institution:** University of Toronto  
**Research Sector:** Environment  
**Principal Investigator:** James Drummond  
**Trust Investment:** \$1,807,730  
**ORF Investment:** \$815,590  
**CFI Investment:** \$3,293,176  
**Total research investment from all sources:** \$8,721,306



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**Infrastructure for Innovation**  
**About the Ontario Innovation Trust**

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario's universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario's position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.