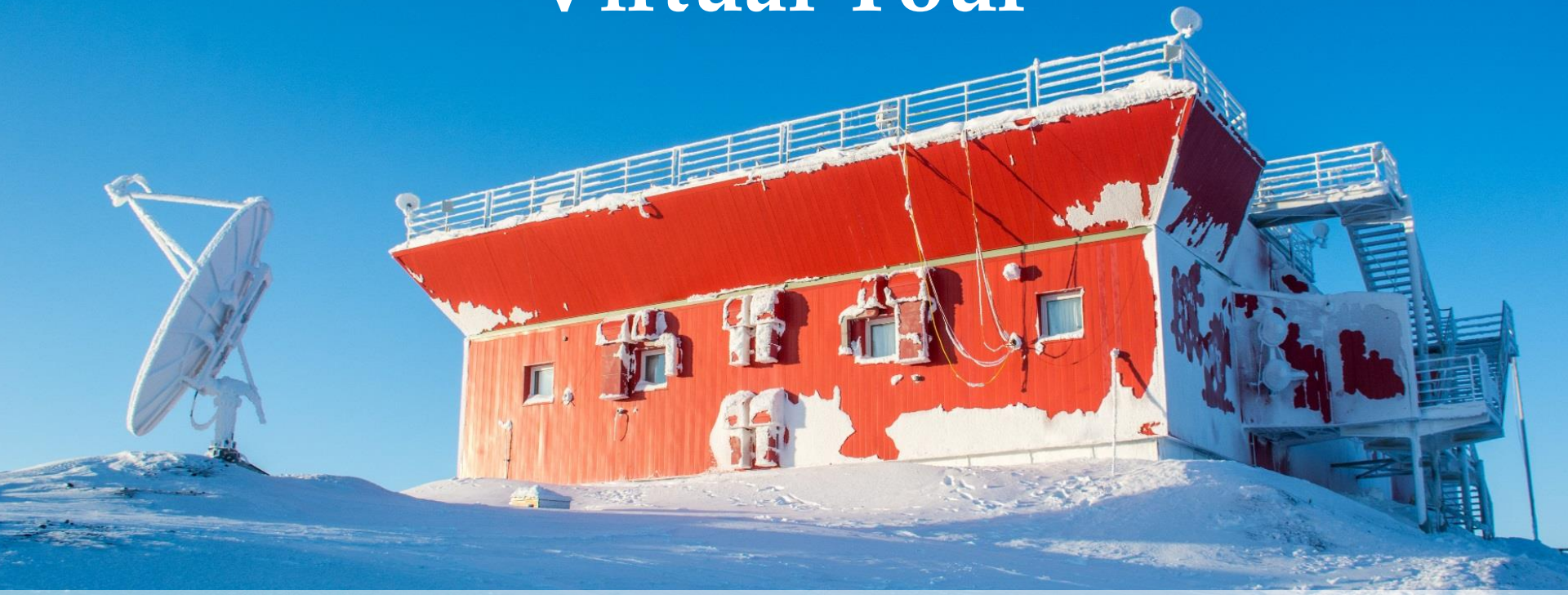
PEARL

Polar Environment Atmospheric Research Lab

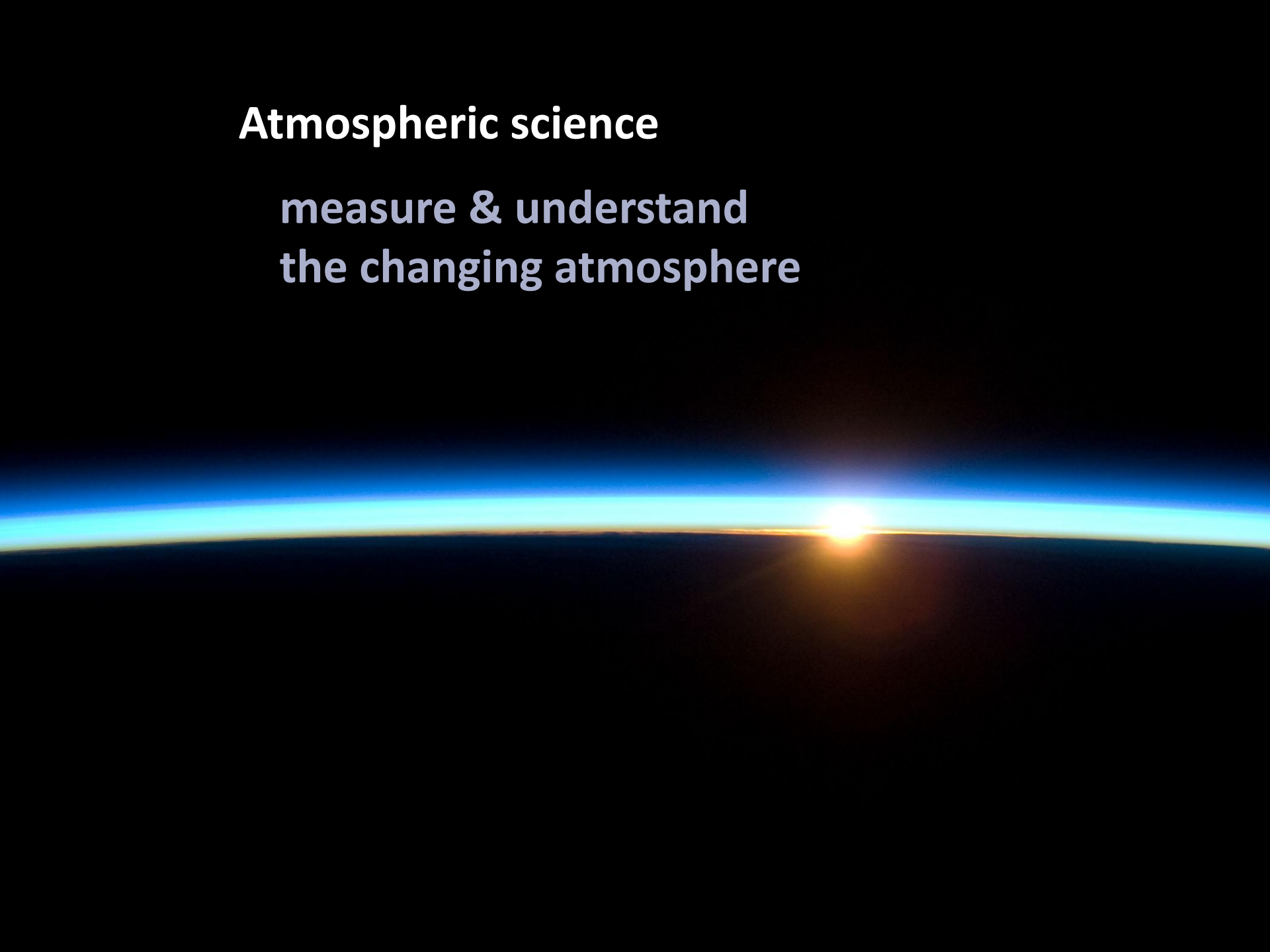
Virtual Tour



Dan Weaver
University of Toronto

Atmospheric science

measure & understand
the changing atmosphere



Research at PEARL

Climate change	Ozone depletion	Arctic atmosphere

Let’s go to Eureka & PEARL…

Canadian Arctic

Our Arctic is 40% of Canada's landmass & is home to over 100,000 Canadians.

Where?

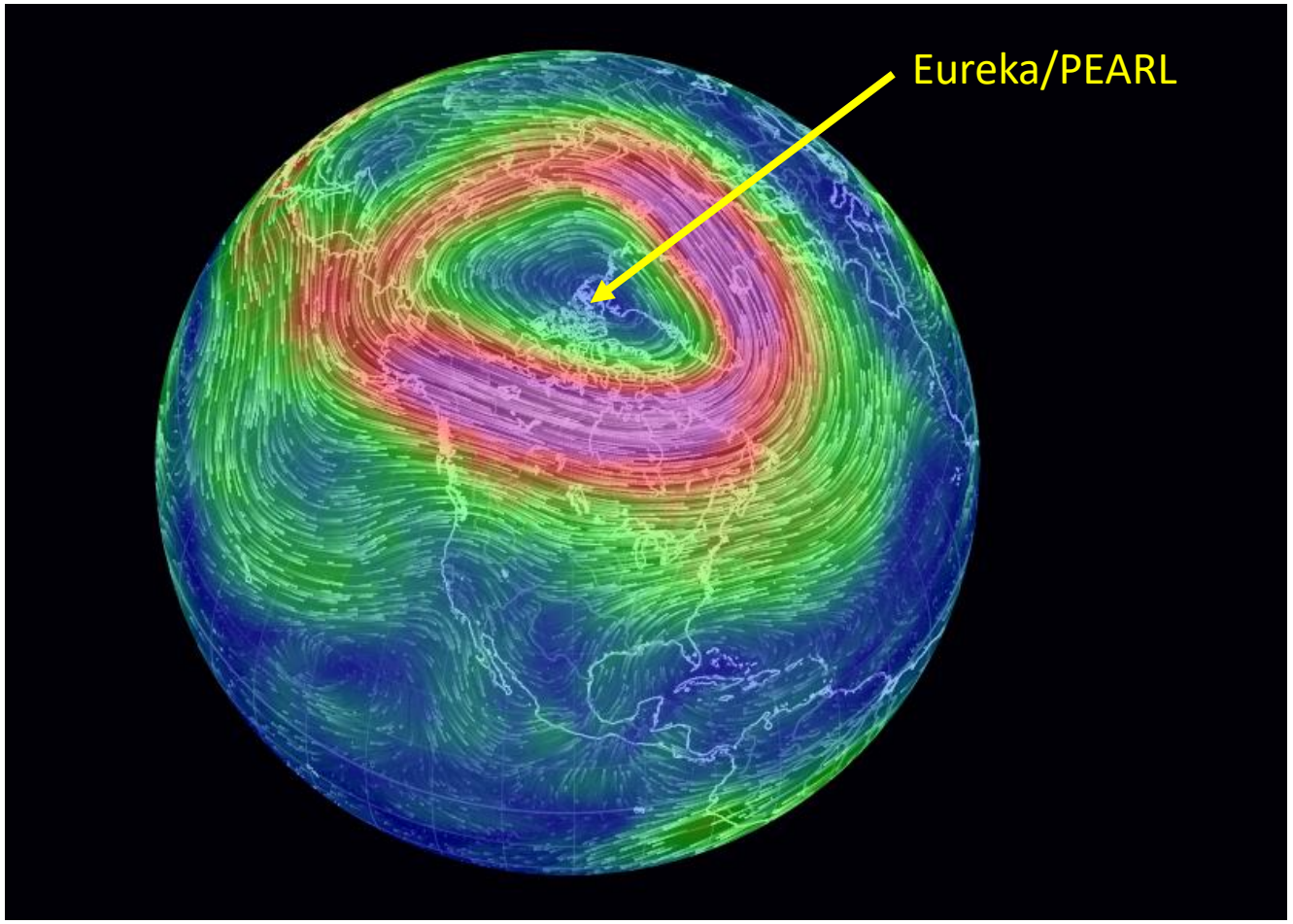
Eureka, Nunavut is at 80°N
on Ellesmere Island

Distances

- Eureka/PEARL is over 4000 km north of Toronto!
- Yellowknife is ~halfway point

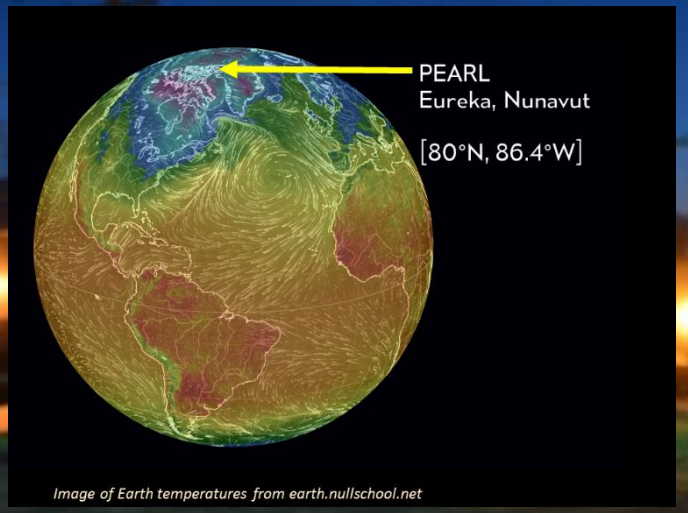
Polar Vortex

March 10, 2015 (70 hPa, stratosphere)



Arriving at Eureka International Airport

Dress warmly!



Eureka

- 8 permanent staff (Environment Canada)
- Short-term research teams

Eureka at twilight

The Eureka Weather Station


WELCOME TO EUREKA
WEATHER STATION
CANADA POSTES
POST CANADA
EUREKA, NU
X0A 0G0
CLARK DOOR

“Mud room” for transitioning between inside & outside

Eureka is like a tiny town, closer to the North Pole than any other civilian outpost.*

*Nord, Greenland and Alert, Nunavut are further north, but are primarily military

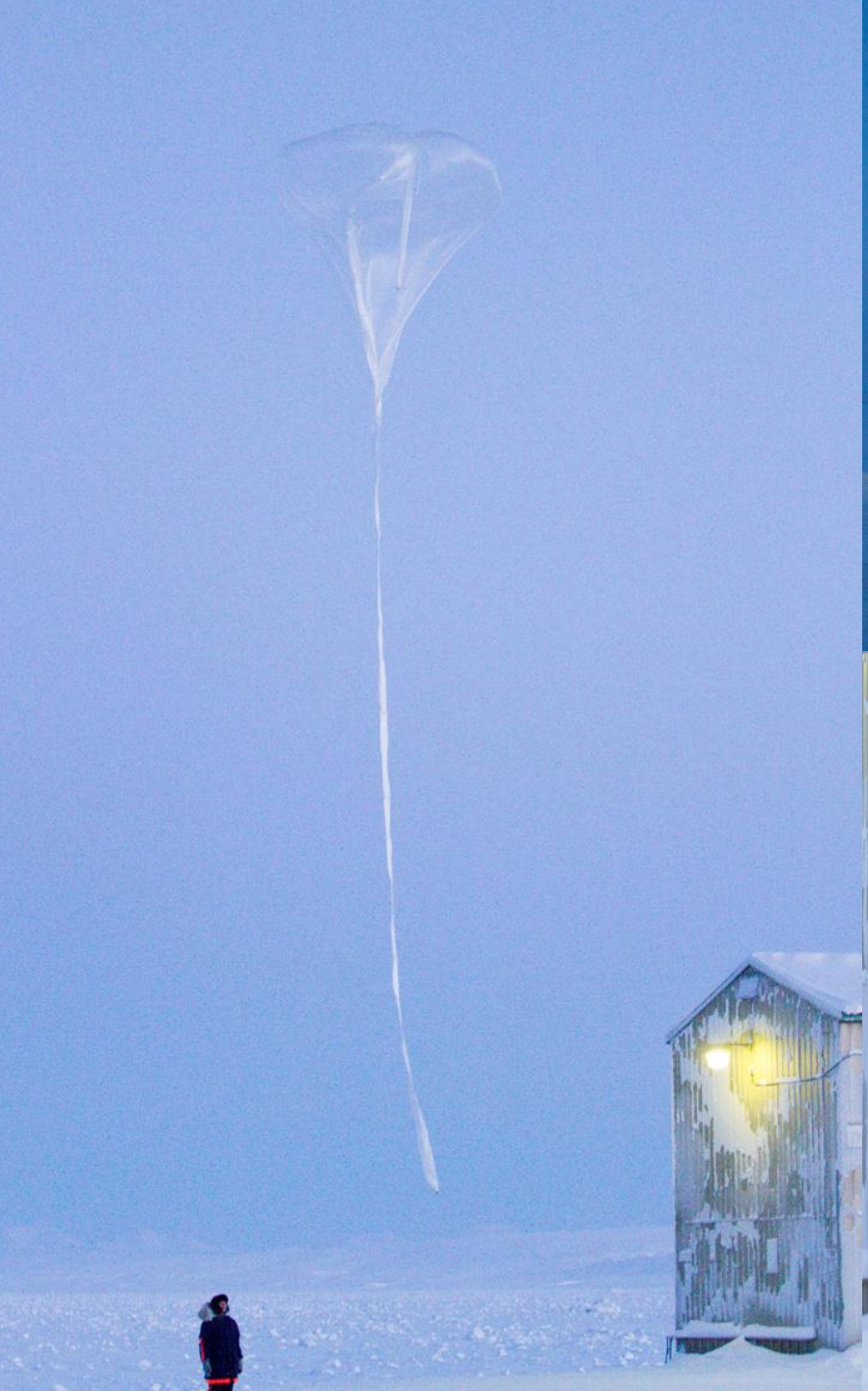
There is:

- Post office
- Store
- Bar (BYOB)
- Airport
- Labs
- Guest rooms
- Power facilities
- Sewage facilities
- Water infrastructure
- ~~Hospital/clinic~~

Dining room

Eureka Weather Station's recreation room

The Hydrogen shed & radiosonde (weather balloon) launch site

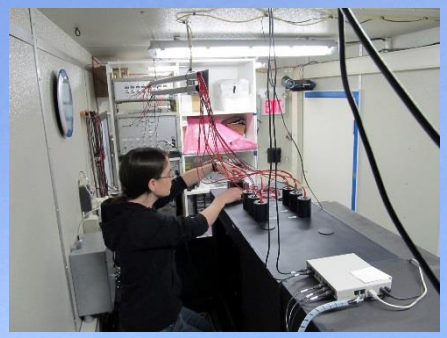


PEARL includes 3 main facilities

- PEARL Ridge Lab
- Zero-altitude PEARL auxiliary lab (OPAL)
- SAFIRE

Zero-altitude PEARL Auxiliary Lab (OPAL)

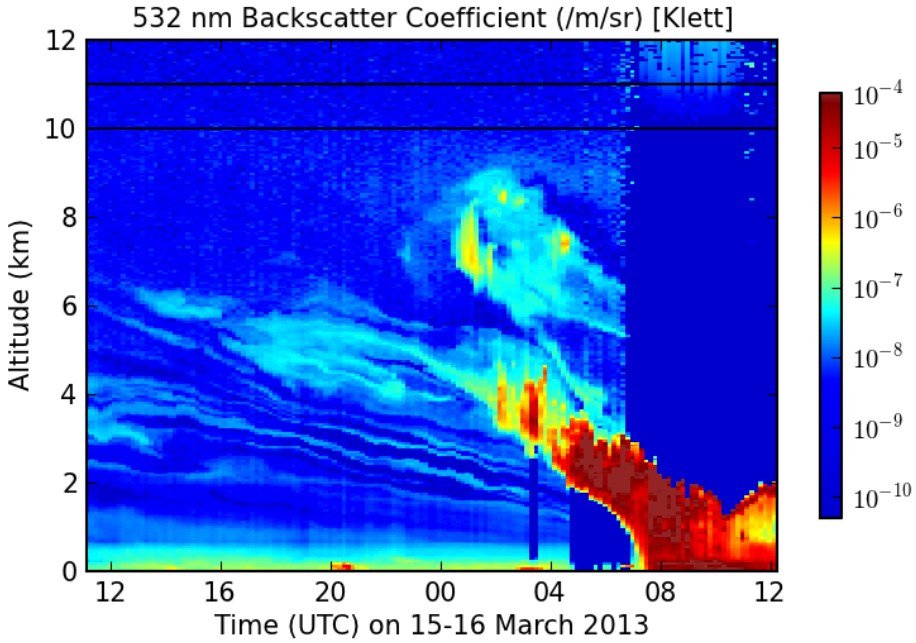


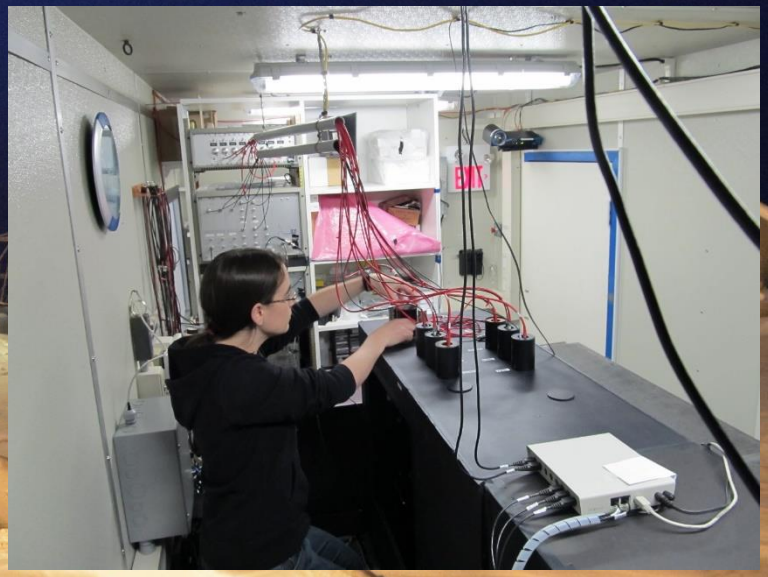



(Near the Eureka Weather Station)

LIDARs

Light detection and ranging





Driving to the PEARL Ridge Lab

DYK:
Canada's high Arctic is a polar desert.
There is very low humidity!

Be prepared to shovel snow when in the Arctic!

Figure .: Location of PEARL relative to Eureka.

If you're *really* stuck…
Environment Canada can help


80° North

Upper Paradise

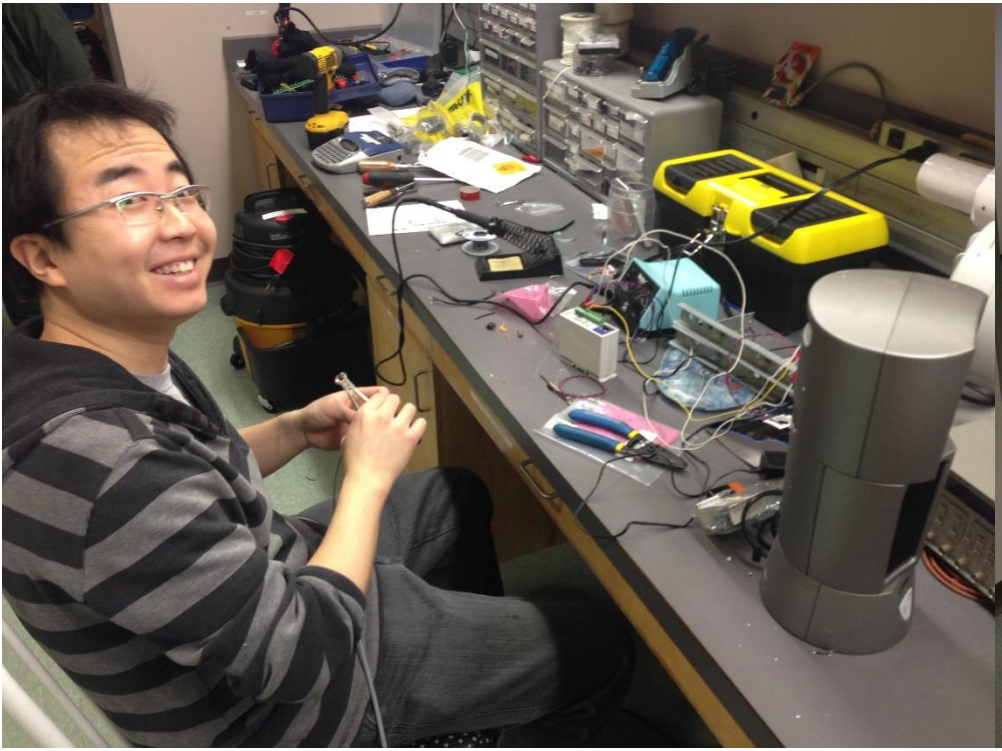
Polar Environment Atmospheric Research Laboratory

- 80.05° North, 86.4° West
- 610 meters a.s.l.
- ~15 km from Environment Canada's Eureka Weather Station


DANGER
NO ENTRY
UNLESS
ACCOMPANIED
BY CANSAC
PERSONNEL
DANGER

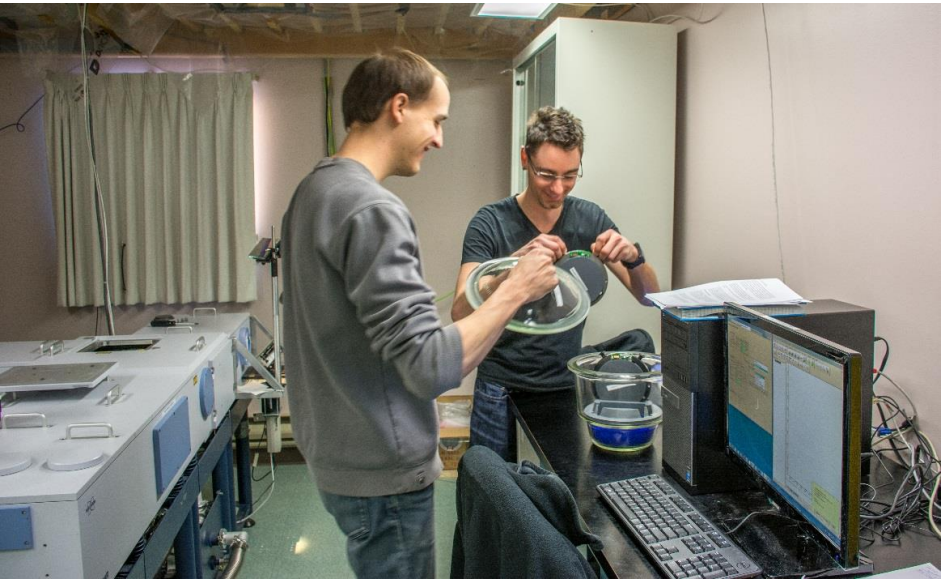
PEARL Ridge Lab kitchen

Lab bench in the hallway

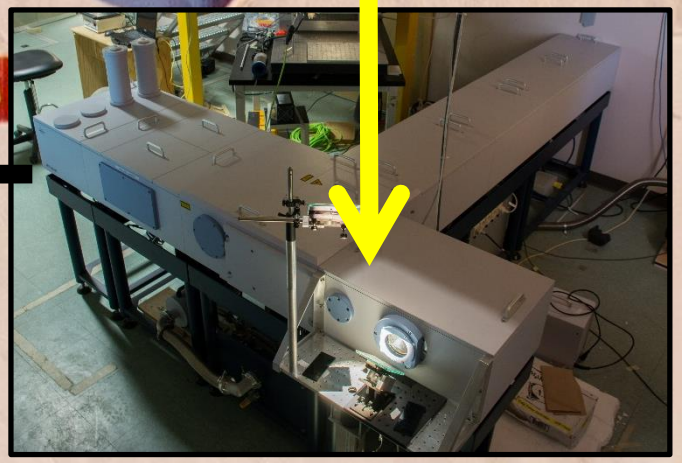


IR lab

Using sunlight to create “maps” of the atmosphere

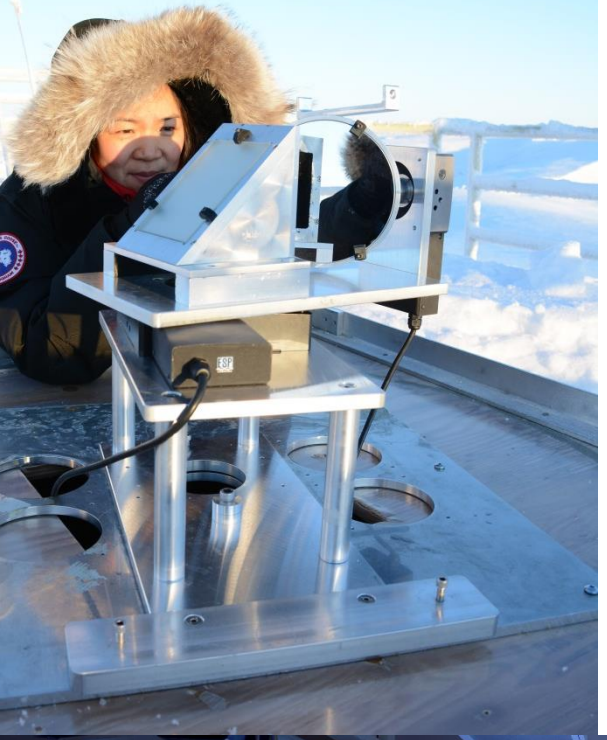


PEARL 125HR

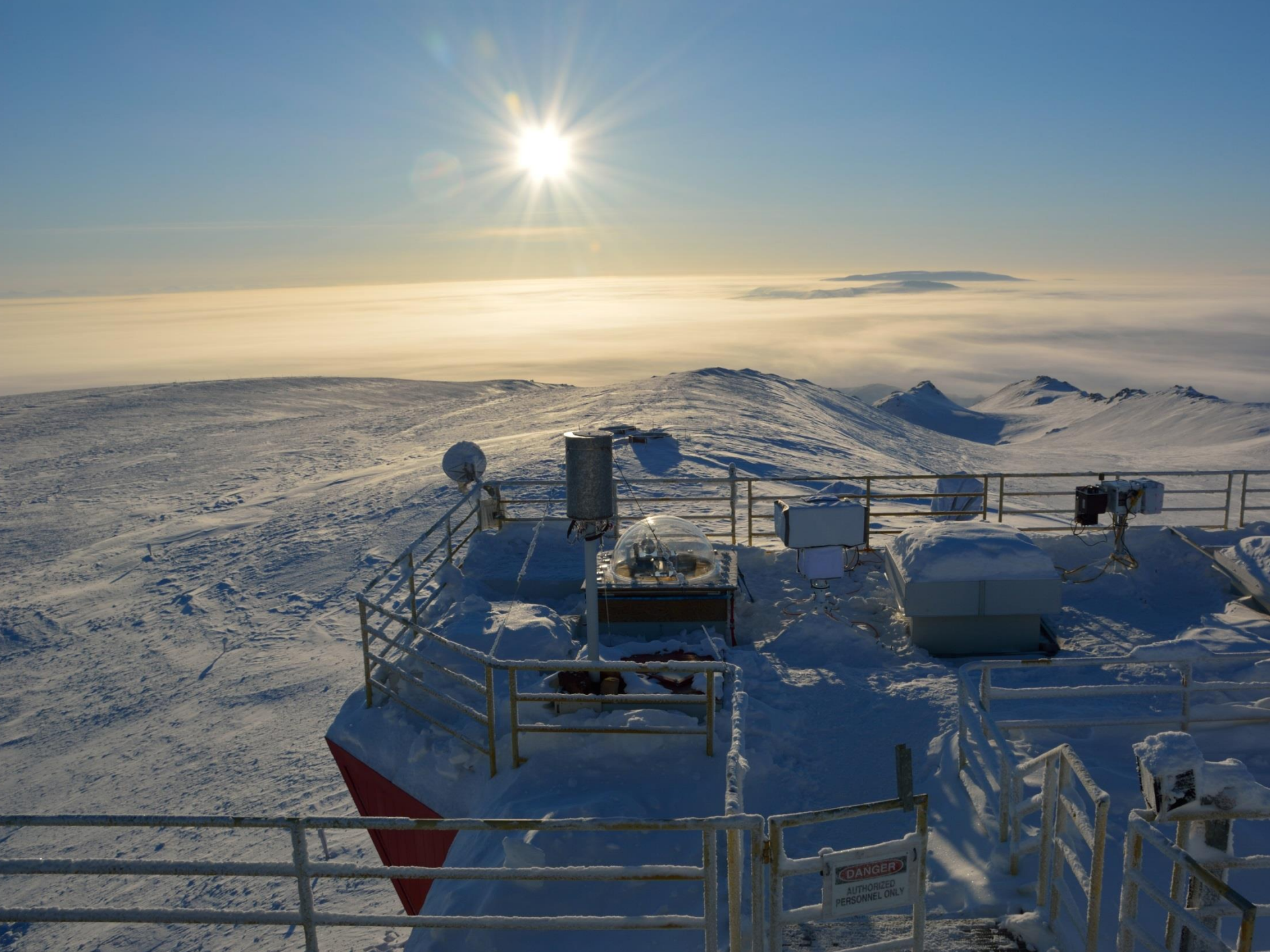


* Sun is not to scale

UV-Vis Lab




Up to the
PEARL Ridge Lab roof


DANGER
AUTHORIZED
PERSONNEL ONLY

Installing instruments for satellite validation

Arctic challenges:
cold temperatures!

View looking back to Eureka

SAFIRE

(Surface and Atmospheric Flux, Irradiance and Radiation Extension)

The flux tower

Arctic challenges:

Meteor antenna needed to be dug out of snow

Measurement experimentation: the PEARL drone

Aiming to take measurements of air near the surface to improve understanding of boundary layer processes.

One more science objective…

Satellite validation

Eureka is easy to get to …for a satellite!

Sun-synchronous orbits provide global coverage, and frequently pass over the poles

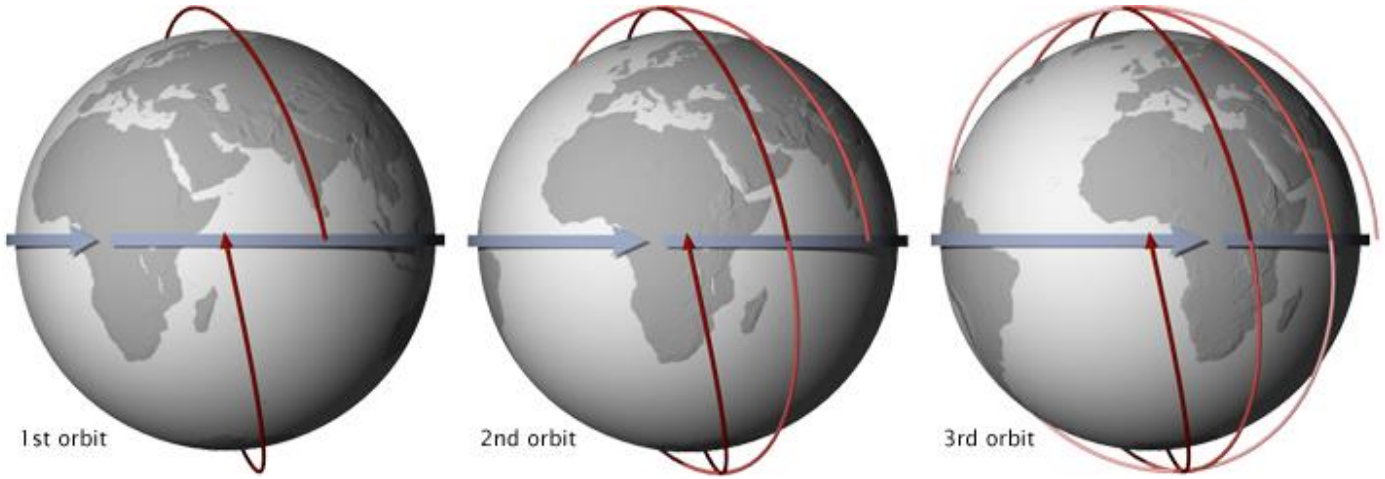
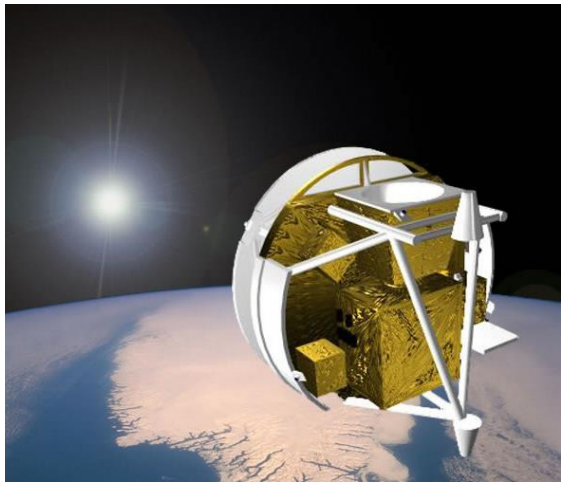


Figure from http://earthobservatory.nasa.gov/Features/OrbitsCatalog/page2.php

ACE (Canada)



OCO-2 (U.S. NASA)

Odin (Sweden & Canada)

GOSAT (Japan)

Wildlife at 80°N?

Fox

Muskox

Arctic Wolves

Arctic Hare

Scenery near PEARL

Thank you.

More information:

CANDAC: www.candac.ca
ACE satellite validation campaigns at PEARL:
http://eureka.physics.utoronto.ca/

PEARL Social Media:

- **Twitter & Instagram**: @CreateArcticSci
- **Facebook**: Canadian Arctic Science
- **Blog**: createarcticscience.wordpress.com/

Contact me:

Email: dweaver@atmosp.physics.utoronto.ca
Web: www.danweaver.ca
Twitter: @DanWeaver_ca