

**Status of Eureka Base, Ellesmere Island**

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# Polar Environment Atmospheric Research Laboratory (PEARL)

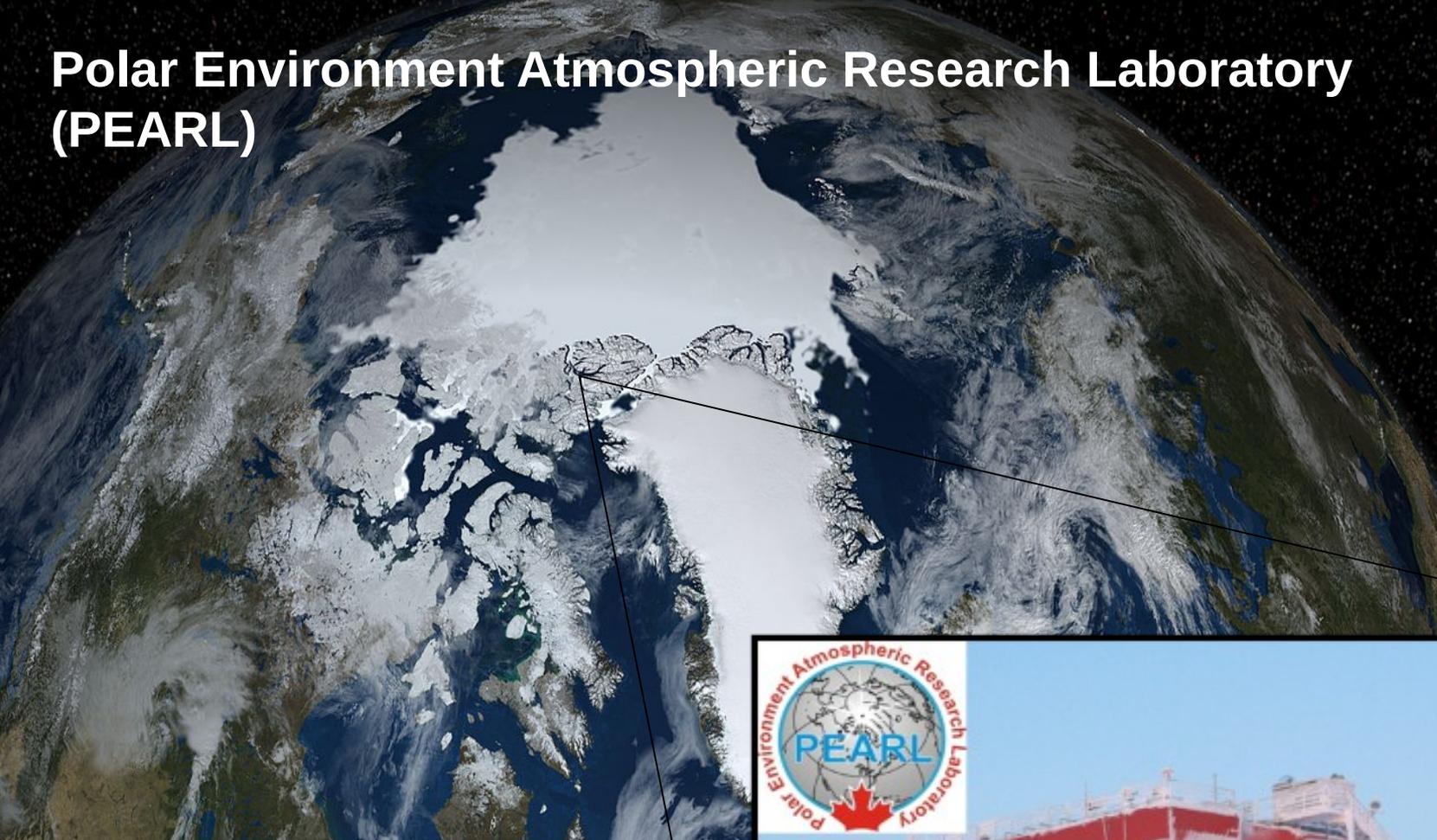


Photo courtesy of Pierre Fogal

**80 degrees North latitude**  
**610 metres elevation**  
**15 km from Eureka by road**  
**Year-round access without**  
**winterover**

## Clarity

Usable sky ( $V < 2$  mag): **86%**

Clear sky ( $V < 0.5$  mag): **68%**

Photometric sky: **48%**

[MK: 80%, 70%, 50%]<sup>1</sup>

Steinbring et al., 2012, PASP, 124, 185

## Opacity

Median tau (225 GHz): **0.14**

Modal tau (225 GHz): **0.09**

[ALMA: 0.08, South Pole: 0.06]<sup>2</sup>

Matsushita et al., 2013, IAU, 124, 185, 204

Asada et al., 2012, SPIE, 8444, 1

## Brightness

Grey ( $V$ ): **19.7 mag/sq-arcsec**

[MK: 19.5, Dome C: 19.8]<sup>3</sup>

Dark ( $V$ ): **20.7 mag/sq-arcsec**

Infrared ( $J$ ): **15.8 mag/sq-arcsec**

Steinbring et al., 2012, PASP, 124, 185

Sivanandam et al., 2012, SPIE, 8446, 43

## Seeing

Median total ( $V$ ): **0.76 arcsec**

Median free ( $V$ ): **0.50 arcsec**

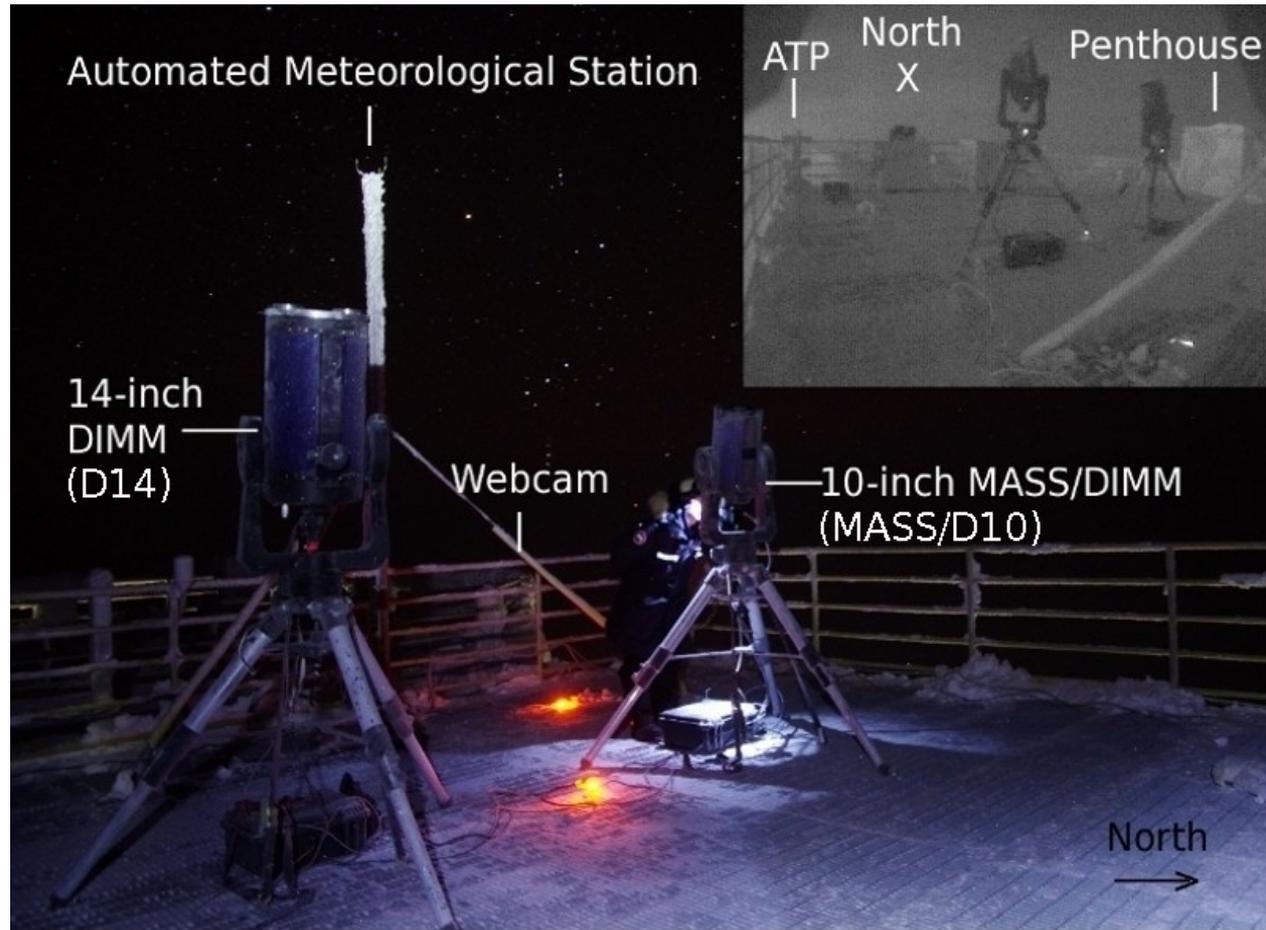
[MK: 0.75, 0.33; CTIO: 0.79, 0.50]

Modal free ( $V$ ): **0.23 arcsec**

Steinbring et al., 2013, PASP, 125, 866

Hickson et al., 2013, MNRAS, 433, 307

Hickson et al., 2010, SPIE, 7733, 53



1: Gemini usable, clear, and photometric fractions, 2: Yearly means, 3: Median of 12 degree twilight

# Arctic Wide-Field Cameras (AWCams)

TABLE 1  
THE SPECIFICATIONS OF THE AWCAM SYSTEMS

## Survey characteristics

Pointing	North Celestial Pole
Survey dates	14 February 2012 – 21 February 2012
Survey length (total)	152 hours
Survey length (dark and clear)	98 hours
Data collected	44,583 images (1.36 TB)

## CCD Hardware

CCD	4096 <sup>2</sup> front-illuminated (KAF-16803)
Peak CCD Quantum Efficiency	59%
Pixel size	9 $\mu$ m
Readout time	4 seconds

## 85mm camera

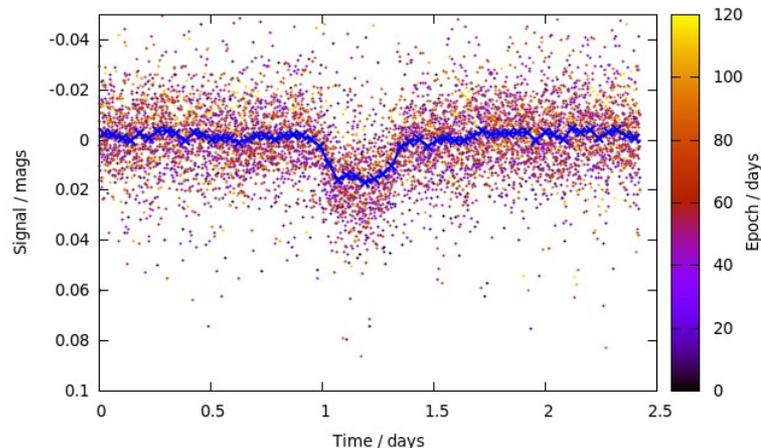
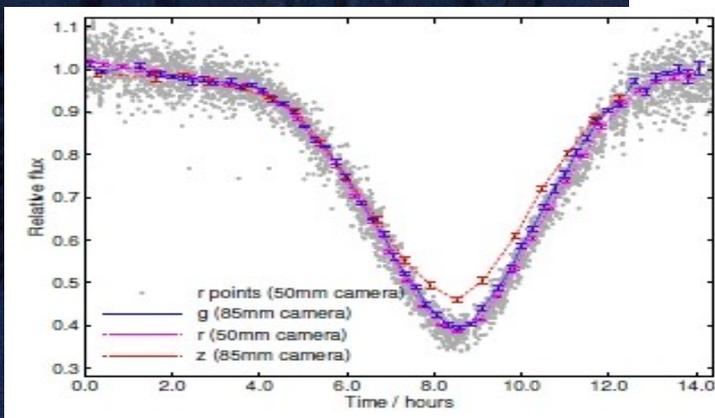
Camera lens	Canon EF 85mm f/1.2L II USM
Field dimensions	25.4 $\times$ 25.4 degrees
Continuous-coverage field	504 square degrees
Pixel scale	22.3"/pixel
Image quality	2-5 pixel FWHM over entire field
Filters	Clear, g, r, i, z

## 50mm camera

Camera lens	Canon EC 50mm f/1.2L USM
Field dimensions	40.8 $\times$ 40.8 degrees
Continuous-coverage field	1295 square degrees
Pixel scale	35.9"/pixel
Image quality	2-5 pixel FWHM over entire field
Filters	Clear, g, r, i, z

**Millimag  
photometry  
demonstrated  
over clear  
periods lasting  
days, over  
complete dark  
periods**

Law et al., 2014, SPIE, 91450  
Law et al., 2013, AJ, 145, 58  
Law et al., 2012, SPIE, 8444, 5





## Autonomous Site-Testing Telescope (Ukaliq)

- Meade RC f/8 “sealed” OTAs with corrector plates
- Custom aluminum tripod for 80 deg latitude
- Sturdy mounting to rooftop reduces vibration
- Astro-Physics 3600 GTO Arctic-hardened mount
- Mechanical limit switches replaced with proximity
- Dedicated swappable guiding telescope
- All off-the-shelf cameras: SBIG and Moravian
- No enclosure; defrosting OTAs with “parking box”
- Up to two other mounting locations on mount
- Large, easy-to-release clamps
- Pre-focussed OTAs swappable back in cold
- All electronics in a single warmbox on roof
- Shutdown at 8 m/s wind, or from east or west

**Adapting a seeing monitor for autonomous operation at PEARL has taught some lessons for future high-precision photometric studies**

Steinbring et al., 2015, JPhCS, 595, 10234

# Summit Station and the Greenland Telescope Project

