International Arctic Systems for Observing the Atmosphere (IASOA) – A Portal for Discovery, a Platform for Pan-Arctic Collaboration

sandy.starkweather@noaa.gov

How & Why is the Arctic Changing? -> Integrate IASOA datasets and experts in sustained science collaborations

NCEP-NCAR Composite mean air temperature anomalies (1000mb); 2001-2012 compared to 1971-2000. NOAA/ESRL – PSD.
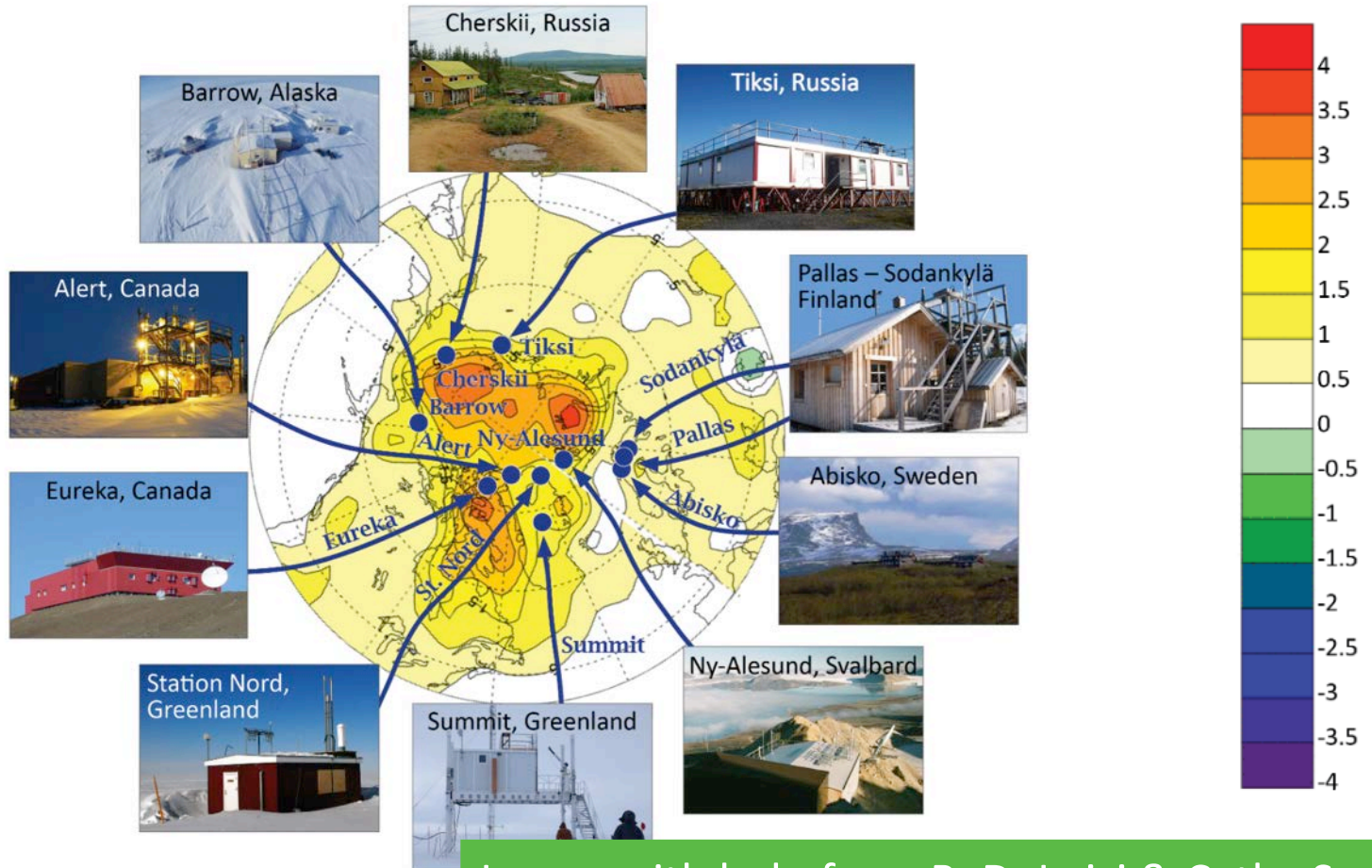
Image with help from B. DeLuisi & Cathy Smith

Integrating across Time, Geography and Process with Arctic Observatories

Records reaching back 30+ years

10 Locations: Coastal, Estuary Continental, Ice Sheet, High Elev.

Social Integration: Time Zones, Languages, Cultures, Expertise, National Needs & Priorities

1000+ Datasets in Atmospheric Physics & Chemistry, Cryospheric, Ecological

Image with help from – B. DeLuisi
Web development – C. Kreuzter

Data Access Portal (cross-site inventory)

- Populated with structured, machine-readable metadata
- Information organized in "IASOA context"

←------- Atm Physics, Chem, Surface -------→

INTERNATIONAL ARTIC SYSTEMS FOR OBSERVING THE ATMOSPHERE

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Data Access Porta

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←-------- Pan-Arctic, Ground-Based, Long-Term -------------→

Category	Abisko	Alert	Barrow	Cherskii	Eureka	Ny-Alesund	Pallas-Sodankyla	Station Nord	Summit	Tiksi
Aerosol	⚫	⚫	⚫		⚫	⚫	⚫		⚫	⚫
Atmospheric State	⚫	⚫	⚫	⚫	⚫	⚫	⚫	⚫	⚫	⚫
Cloud Properties		⚫	⚫		⚫	⚫	⚫		⚫	⚫
Cryosphere				⚫	⚫					⚫
Greenhouse Gas		⚫	⚫	⚫	⚫	⚫	⚫		⚫	⚫
Ozone		⚫	⚫		⚫				⚫	⚫
POPs						⚫	⚫			
Precipitation Chem						⚫	⚫			
Radiometric		⚫	⚫	⚫	⚫				⚫	⚫
Reactive Gas		⚫	⚫		⚫	⚫	⚫		⚫	⚫
Surface Properties			⚫	⚫	⚫					⚫

Portal Population (800+ metadata files)

(~400) Harvested from major archives (as is)
(~200) Working with archives on structure
(~200) Hand Authored

Data Access Portal

About | Help

Category	Abisko	Alert	Barrow	Cherskii	Eureka	Ny-Alesund	Pallas-Sodankyla	Station Nord	Summit	Tiksi
Aerosol	●	●	●		●	●	●		●	●
Physical, Optical	●	●	●		●	●	●		●	●
Physical, Primary			●	●						●
Atmospheric State	●	●	●	●	●	●	●	●	●	●
Cloud Properties		●	●		●	●	●		●	●
Macrophysical		●	●		●	●	●		●	●
Microphysical			●		●				●	
Microphysical and Chemical Properties			●							
Optical and Radiative Properties			●						●	●
Cryosphere				●	●					●
Greenhouse Gas		●	●	●	●	●	●		●	●
Ozone		●	●		●	●	●		●	●
Vertical Ozone Profile	●				●	●	●		●	
Surface Ozone			●				●		●	●
Total Column Ozone		●	●		●	●	●		●	●
POPs						●	●			
Precipitation Chem						●	●			
Radiometric		●	●	●	●	●	●		●	●
Reactive Gas		●	●		●	●	●		●	●
Surface Properties			●	●	●					●

🌀 Dataset Search

mole_fraction_of_surface_ozone_in_dry_air values from station Summit (GAWID=SUM) (data generation: continuous, reporting interval: unknown interval)

Measurements in this dataset:
Surface ozone

Take me to the data

Date Range: 2000-06-01 to 2005-03-01

Data Contact: Oltmans, Samuel, Mr. | Samuel.J.Oltmans@noaa.gov |

(Abstract) (Navigation Tips) (Full Metadata Record)

GAW

Summit ... **e Measurements**

Meas...
Surface ozone

Take me to the data

Date Range: 2012-01-01 to Current

Data Contact: Irina Petropavlovskikh | irina.petro@noaa.gov |

(Abstract) (Navigation Tips) (Format Info) (Full Metadata Record)

NOAA

Summit TAWO Hourly Surface Ozone Measurements

Measurements in this dataset:
Surface ozone

Take me to the data

Date Range: 2012-01-01 to 2012-12-31

Data Contact: Irina Petropavlovskikh | irina.petro@noaa.gov |

(Abstract) (Navigation Tips) (Format Info) (Full Metadata Record)

NOAA

Summit TAWO Monthly Averages Surface Ozone Measurements

Measurements in this dataset:
Surface ozone

Take me to the data

Date Range: 2012-01-01 to Current

Data Contact: Conway, Thomas J., Mr. | thomas.j.conway@noaa.gov |

(Abstract) (Navigation Tips) (Format Info) (Full Metadata Record)

NOAA

4 Search Results

Dataset Search

4 Search results for selection: Observatory = Summit, Category = Ozone, Sub-Category = Surface Ozone

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(Abstract) (Navigation Tips) (Full Metadata Record)

GAW

Summit TAWO Daily Averages Surface Ozone Measurements

Measurements in this dataset:
Surface ozone

Take me to the data

Date Range: 2012-01-01 to Current

Data Contact: Irina Petropavlovskikh | irina.petro@noaa.gov |

(Abstract) (Navigation Tips) (Format Info) (Full Metadata Record)

noaa

Emphasize Attribution

Su...   ...rements

Meas...
Surface ozone

Take me to the data

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noaa

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noaa

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Meas
Surf

Emphasize Access

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Su   **rements**

Measurements in this dataset:
Surface ozone

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(Abstract) (Navigation Tips) (Format Info) (Full Metadata Record)

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Summit - NOAA/ESRL

| Parameter Inventory | Parameter Metadata | Station | Contributor |

$^{13}CO_2$ flask	$C^{18}O_2$ flask	$CBrClF_2$* continuous	$CBrClF_2$ flask	CCl_4* continuous	CCl_4* flask	CFCs* continuous	CFCs* flask	CH_2Cl_2 flask	CH_3Br- flask	CH_3CCl_3* flask
CH_3CCl_3* continuous	CH_3Cl- flask	CH_4*** flask	CO_2*** flask	HCFCs- flask	HFCs- flask	N_2O*** continuous	N_2O*** flask	O_3* continuous	SF_6* continuous	SF_6* flask
VOCs- flask										

| Contact Person | Reference | **Data/Quick Plot** |

rvation

World Data Center Contributions

Environment   clean air facility

Measurement Method	Light absorption analysis (UV)
Current status and history of Instruments	2000.06- : TEI 49C (UV- Photometer)
Description of Instruments	1.0 ppb precision +/- 1.0% full scale linearity
Time Zone	UTC
Data Period	2000-06-01 - 2013-07-31
Data Type	hourly, daily, monthly
Parameter detail	

Earth System Research Laboratory
Global Monitoring Division

NOAA

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ESRL/GMD FTP Data Finder

Use this web page to find specific data files available from the public ftp file archive of the ESRL Global Monitoring Division. Alternatively, you can browse the GMD ftp server. Click on the icons (🗄 or 📁) under the 'Data' table heading in the dataset description boxes to either download the data file desired, or take you to the appropriate directory on the ftp server, where you can make selections based on date.

Select from the following lists to narrow your search.

Category ☑	Parameter name	Type	Frequency	Site ☑
Ozone (2)	Ozone (2)	Balloon (1) Insitu (1)	Hourly Averages (1) Vertical Profile (1)	SUM (2)

GMD Data Finder

or enter search term: [   ] 🔍 Search

Information about site codes can be found here. ⓘ

2 Datasets filtered from 3243 originally.   (Reset all Filters)

Sort Results By: Site ▾

Displaying [1 - 2] of 2 records.

Records per page: 100 ▾

	Site	Category	Name	Type	Frequency	Year	Data	
1	**Summit, Greenland (SUM)** Vertical Profile of Ozone from Balloon flight.	Ozone	Ozone (O₃)	Balloon	Vertical Profile	Multiple	📁	
2	**Summit Greenland (SUM)** Continuous measurements of surface ozone.	Ozone	Ozone (O₃)	Insitu	Hourly Averages	Multiple	📁	ⓘ

IASOA's Collaboratory Cycle

- Identify interests and gaps
- Identify observing systems & datasets of interest
- Identify collaborators and experts
- Develop common approaches to data processesing (e.g. GAW)
- Develop common error estimates

Summit, Greenland 50 m

Cherskii 35 m

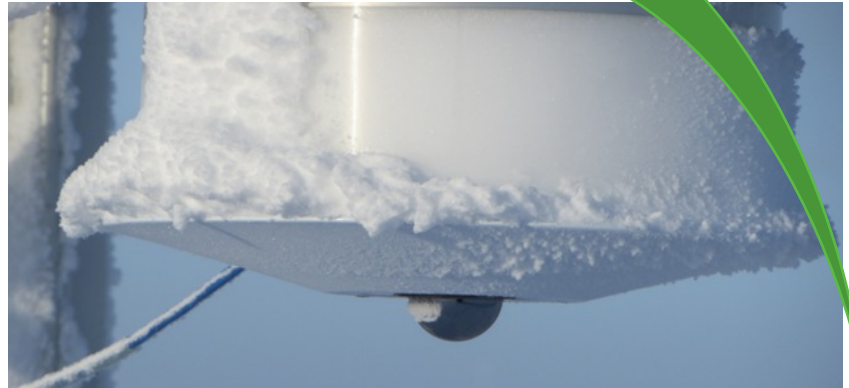Ny-Alesund 30 m

Tiksi 20 m

Eureka 10 m

Alert 2 m
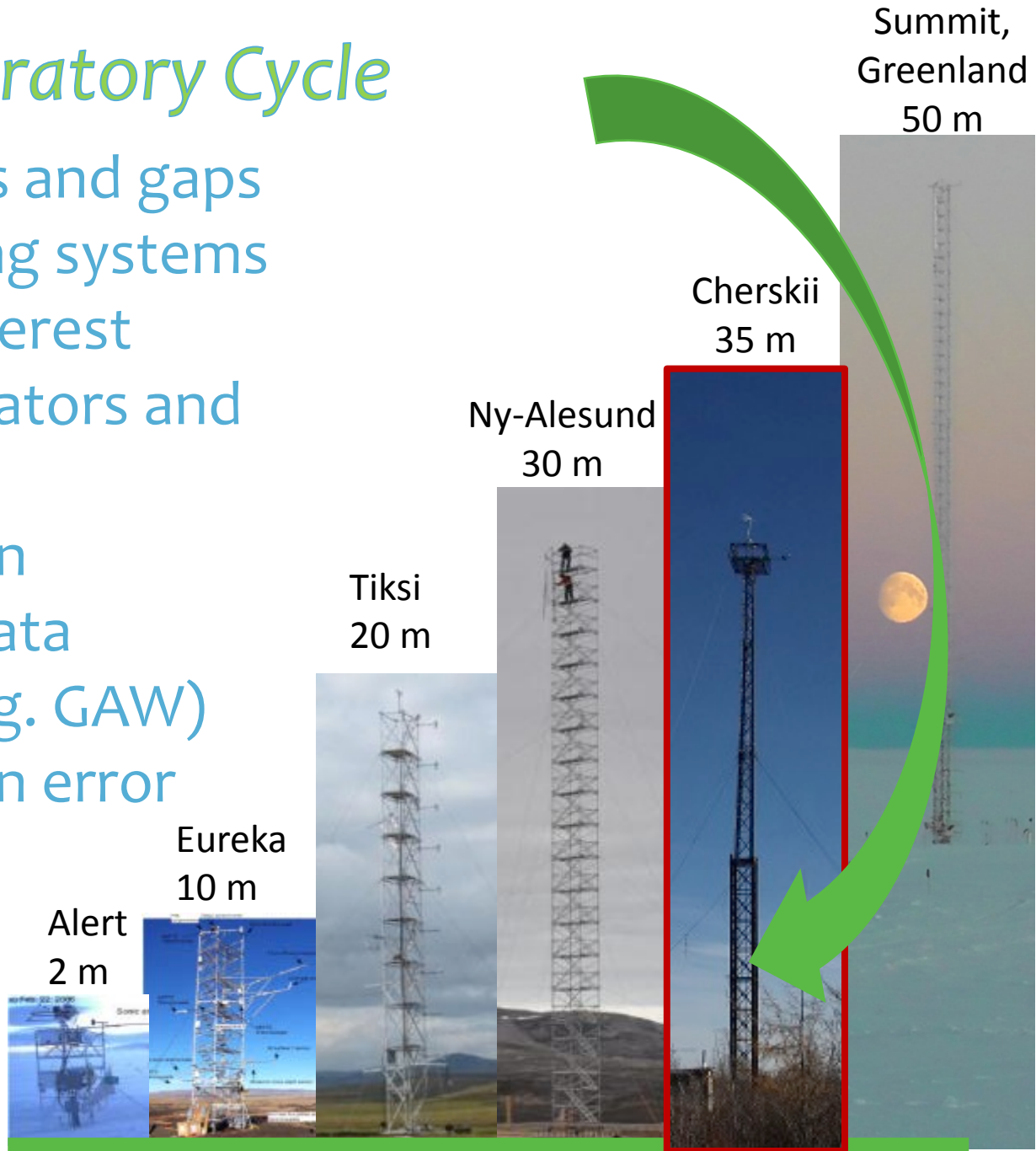
Images courtesy T. Uttal, R. Albee, M. Okraszewski

IASOA's Collaboratory Cycle

- Address Arctic-specific challenges
- Take regional factors into account (e.g. exceptionally clean air, frost and rime)
- Address deficiencies, improve network fitness

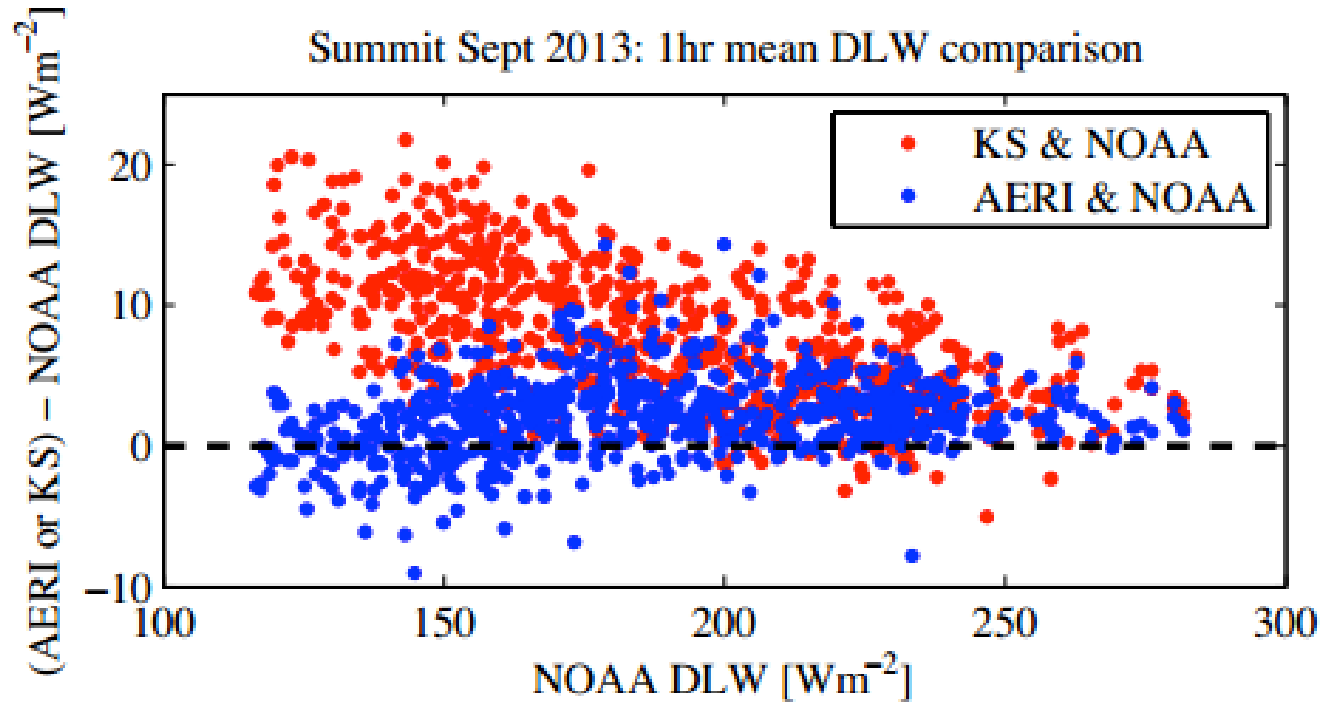Images courtesy Rob Albee

May 20, 2014

GMAC

IASOA's Collaboratory Cycle

Comparison between historical radiometers and new NOAA suite revealed error issues. Large observatories have a lot of diagnostic tools, e.g. AERI

Summit Sept 2013: 1hr mean DLW comparison

- KS & NOAA
- AERI & NOAA

(AERI or KS) − NOAA DLW [Wm^{-2}]

NOAA DLW [Wm^{-2}]

Images courtesy C. Cox and N. Miller. Data: NOAA, NSF-ICECAPS, ETH, DOE-ARM. Rob Albee.

IASOA's Collaboratory Cycle

- Analyze and synthesize
- Improve the metadata
- REPEAT with new questions, diversified expertise (e.g. cal-val)

Image courtesy B. Stone

BRW AND ALT ANNUAL SNOWFREE PERIOD
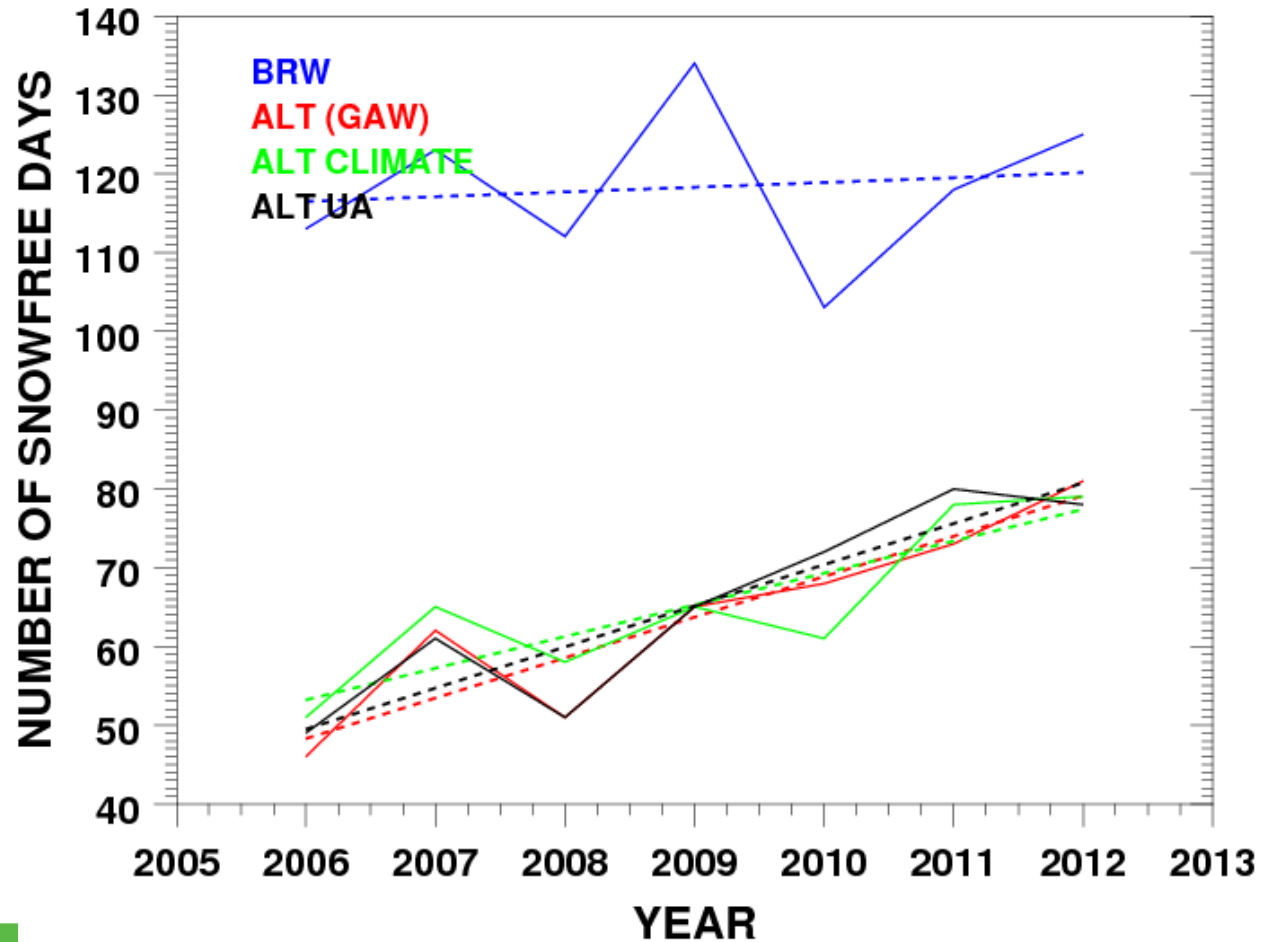
BRW
ALT (GAW)
ALT CLIMATE
ALT UA

NUMBER OF SNOWFREE DAYS

YEAR

IASOA Portal and Collaboration Summary

- Data is discoverable and accessible with machine-readable metadata
- Highly leveraging existing networks
- Reliant on humans to maintain & improve data/metadata
- "Collaboratory" Cycle – Context provides impetus
- Benefits improved network fitness

THANK YOU. Questions?