

Environmental Data Center

Brie Van Dam

TFS Steering Committee Meeting



Photo: Seth Beaudreault

Mission Statement

- I. Collect and manage baseline environmental data
- II. Maintain suite of common-use lab and field equipment
- III. Fieldwork assistance
- IV. Outreach
 - a. Make EDC data available to the public
 - b. Provide project metadata for current and historical projects at Toolik Lake



I. Baseline Environmental Monitoring Program

Met Station 2014 Highlights

- Above-ground sensors replaced with re-calibrated spares
- Temperature sensors converted to $< -55^{\circ}\text{F}$ model
- Spares for the data logger and net radiation sensor acquired (Kipp & Zonen model CNR-4)
- 2014 provisional data provided on request, final data to be posted in January
- Met station data report formalized and available on EDC website
- Collected airborne photos in 2013; collaborated with GIS on processing



Photo: Jessie Cherry

I. Baseline Environmental Monitoring Program

Met Station – in progress

- Ethernet run in conduit to the site, and radio-based comm system installed for redundancy and reliability
- Value added products under development
- Use digital elevation model generated from collected imagery along with value added products to investigate microclimates in the vicinity of TFS



Photo: Jessie Cherry

I. Baseline Environmental Monitoring Program

Biological Monitoring Program

- Vegetation phenology
- NDVI
- Avian point counts
- Bird arrivals/departures

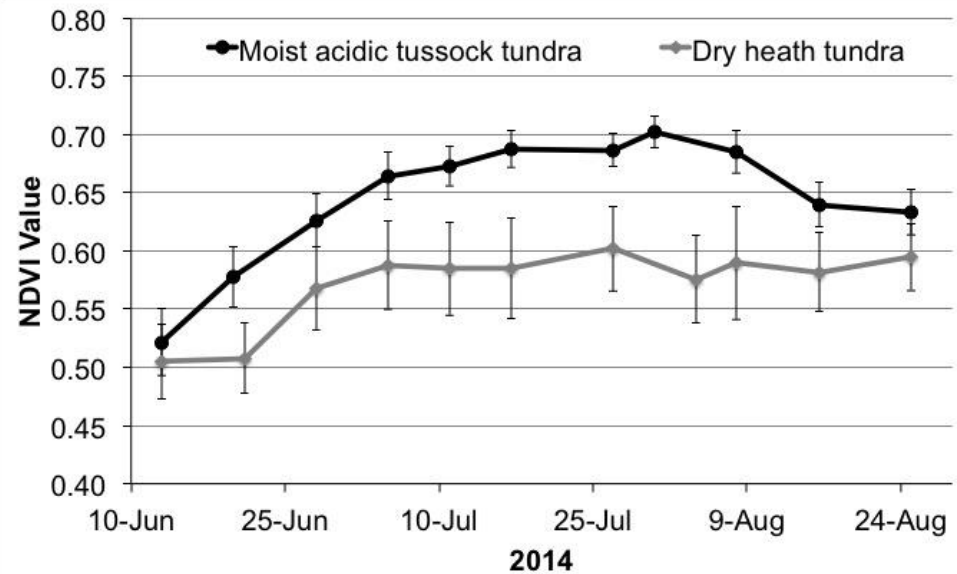


Photo: Seth Beaudreault

I. Baseline Environmental Monitoring Program

Biological Monitoring Program – New in 2014

- ITEX Snapshot phenology
- Vegetation plot imagery and photo-analysis



I. Baseline Environmental Monitoring Program

Snow monitoring program

- Time lapse imagery
- Monthly measurements of depth and density
- Transect set up on Toolik Lake in 2014

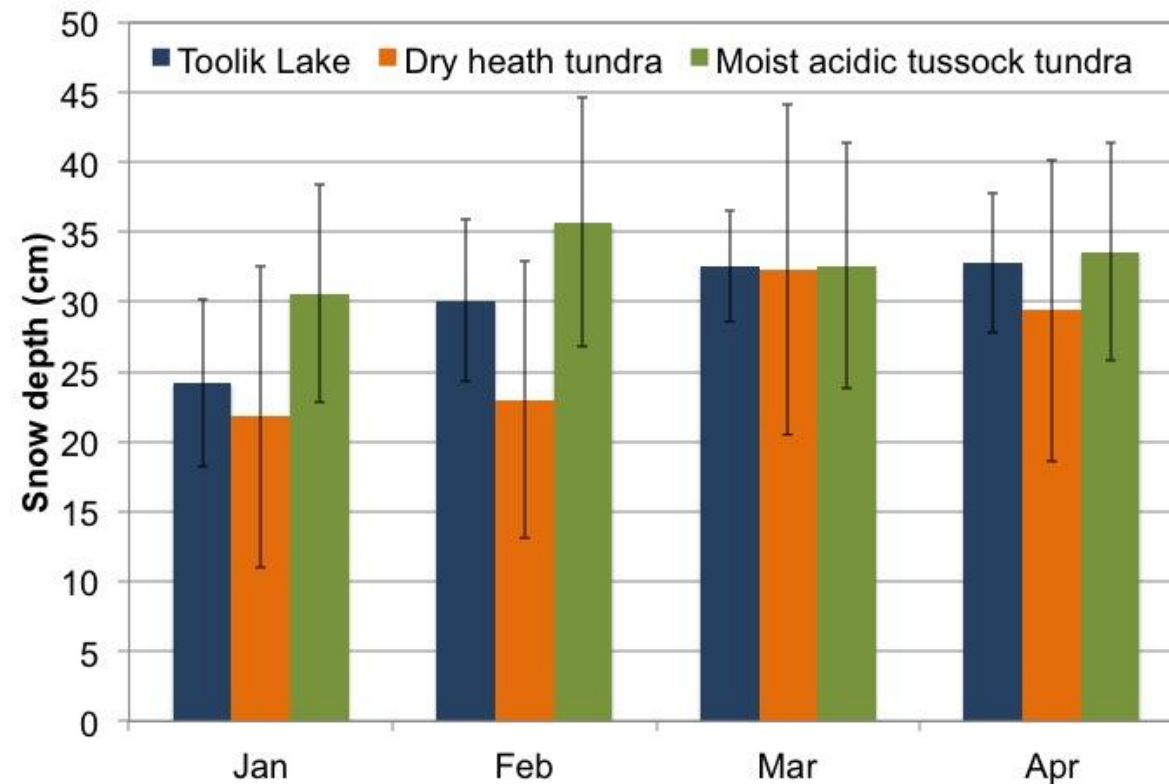


Photo: Brie Van Dam

I. Baseline Environmental Monitoring Program

Herbarium

- New specimens added to on-site Herbarium
- Live plant photos were taken in 2014, will be added to the Virtual Herbarium this winter/spring



Photo: Adeline Murthy

II. Common-use equipment

Equipment	2014	2013	2012	2011	2010	2009
Muffle furnace	33	43	34	31	25	11
Shaker table	58	10	27		3	16
Centrifuge				6	11	
Autoclave				11	23	13
Freeze drier		30	66	76	81	106
Leaf area meter (Licor)		7		18		51
Leaf area meter (WinFolia)	12	58	37	5		
Balances*	129	36	83	63	60	46
Scintillation counter	100	100	95	76		27
Hot stir plates*	16					
Compound microscope		9	75			
Unitron Stereoscope	27	61	51	94	14	79
Heerburgg Stereoscope	11	16	106	51	3	79
Hydrolab water profiler	88	70	70	76	77	26
Unispec spectral analyzer	18	13	37	76		
Flow Tracker	26	10	10			
Soil moisture probes*	6					
Soil temperature probes*						
Handheld weather meter*	7					
Dry Incubator		38	12	71	48	15
Incubation baths (6 total)	551	363	523	406	238	270
Total	1082	864	1226	1060	583	739

*indicates new equipment in 2014

III. Field Work Assistance

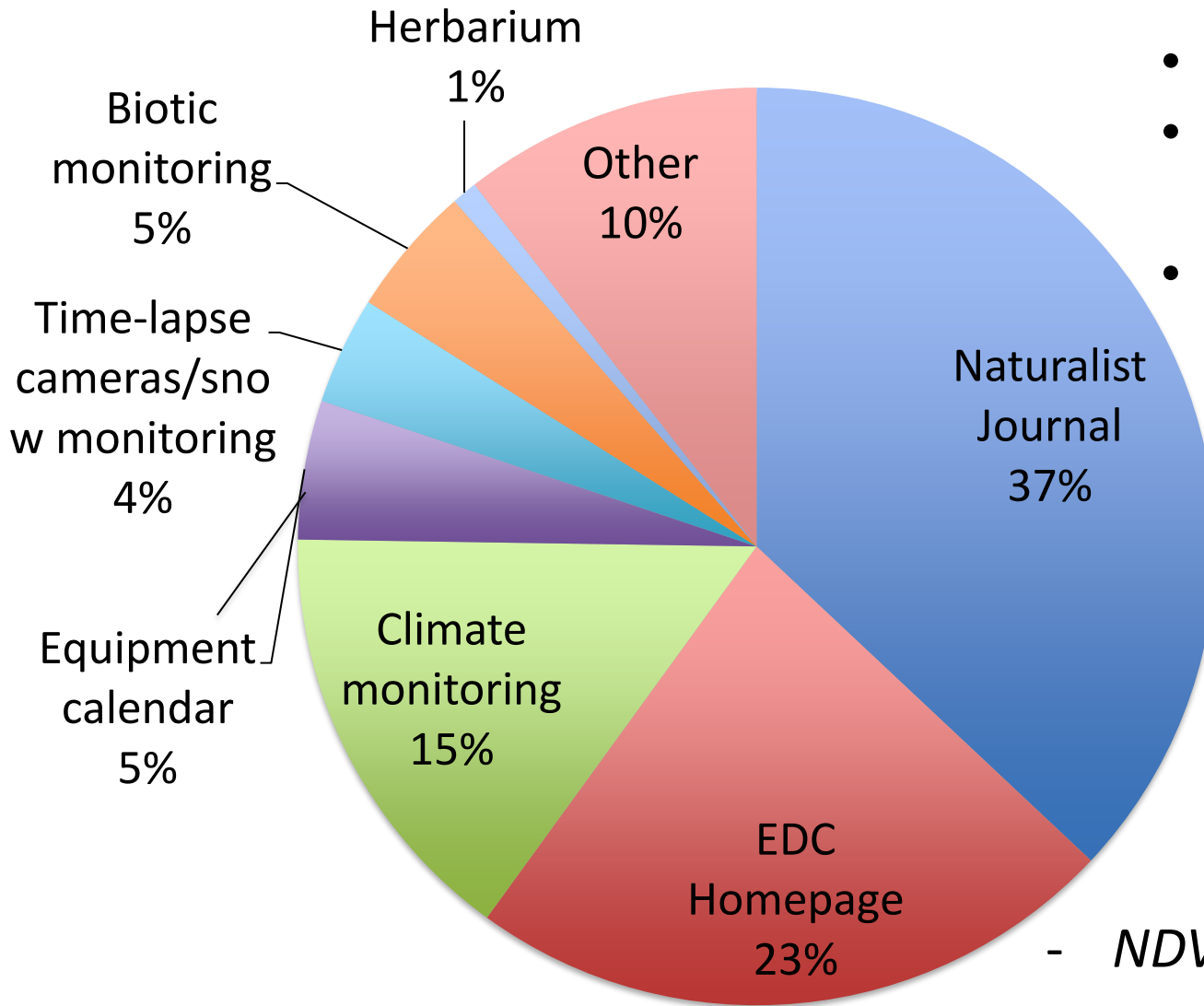
- Apr 1 - Oct 1, 2014 season: ~**185 hrs, 29 researchers**

Examples (not full list):

- Sampling Fog Lakes bi-weekly, Toolik Lake weekly, with Dan White
- Sweepnetting for bugs and collection of pitfall traps for Natalie Boelman in spring
- Troubleshoot Atigun Gorge meteorological station for Team Squirrel in April
- Collected and filtered weekly water samples from Oksrukuyik, Kuparuk, and Toolik Inlet Rivers in the late season for Breck Bowden
- Dismantled Adrian Rocha's flux chambers in late September to allow late-season data collection



V. EDC Website and data use



- **44,832 pageviews**
- **3,806 individuals**
- **10/1/2013 – 9/30/2014**
- **14% increase over previous year**

New for 2014

- *Track biotic data downloads*
- *Updated annual summaries*
- *NDVI and snow monitoring pages in the works*
- *Updated met instruments and common-use equipment*

IV. Data Usage

Meteorological data

- **335 requests** from **70 different users** were made for meteorological parameters
- Example use in a publication:

Cory, R.M., Ward, C.P., Crump, B.C., Kling, G.W., 2014. Sunlight controls water column processing of carbon in Arctic fresh waters. Science (345) 6199, 925-928.

Biological data

- Biological data, including plant phenology and avian point counts, were downloaded **29 times** from the website this year
- Example use in a publication (in preparation):

Kobayashi, H. et al.. Quantifying the understory vegetation phenology in Alaska from time-lapse cameras and satellite measurements. In preparation for Remote Sensing of the Environment.



Photo: Brie Van Dam

V. New and Continuing Projects

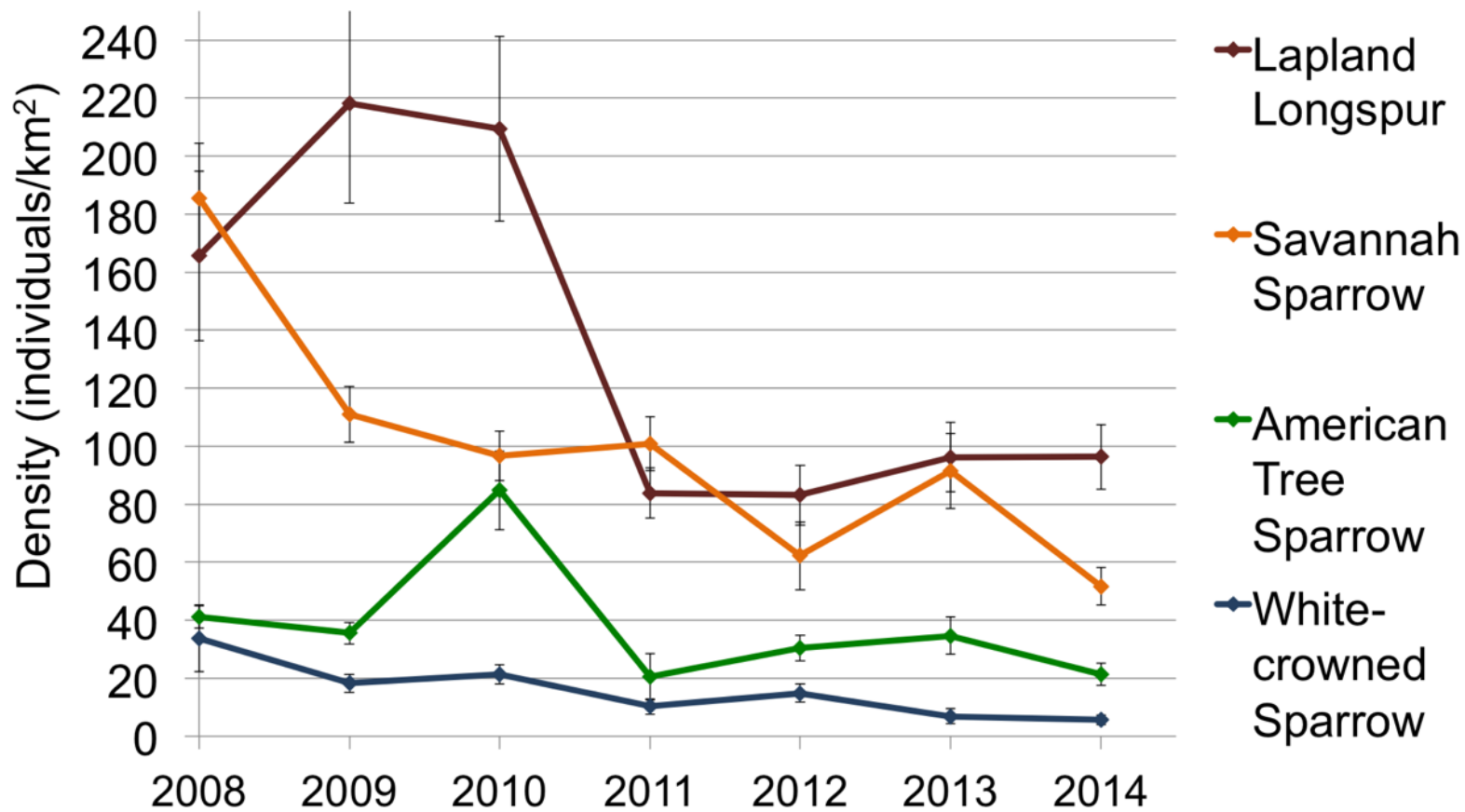
- Analysis of vegetation phenology plot photos
 - Comparison with manual observations
- INTERACT metadata survey complete
 - Assistance with integrating this past project metadata with new project metadata collection and database creation
- Aquatic macrophytes to Herbarium
- Arctic butterfly guide
- Open communication and collaboration with other observing networks on the north slope

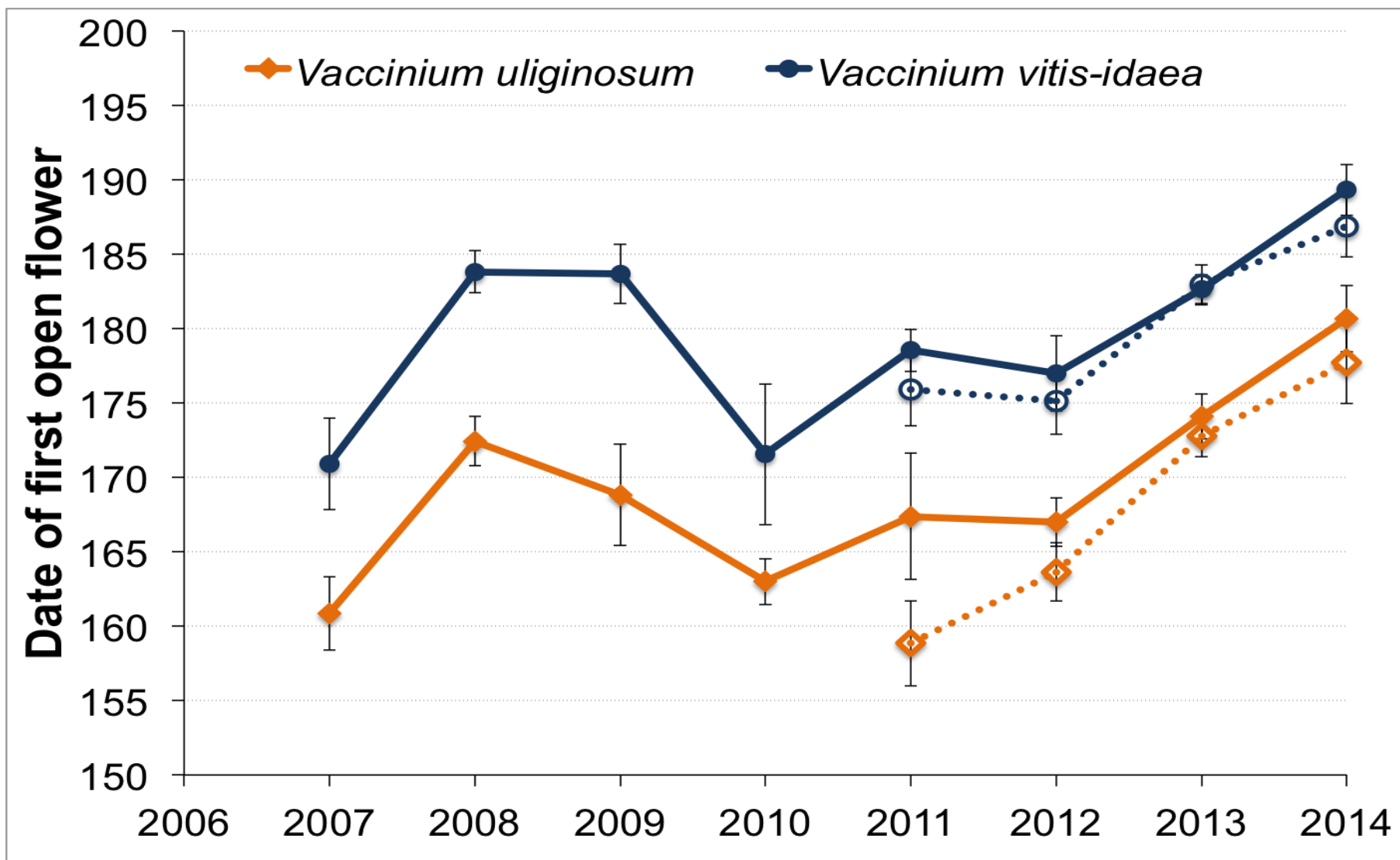


Photo: Seth Beaudreault

A photograph of a bright sun in a cloudy sky, with a faint rainbow visible. The sun is positioned in the center-right of the frame, casting a strong glow. A rainbow is visible in the upper half of the image, arching over the sun. The foreground shows a snowy, hilly landscape with some dark rocks or ice patches.

Comments?





Data management

- We follow the best practices of data management as recommended by NSF.

E.g. parameter definition, consistent data organization, basic quality assurance, documentation of metadata, data protection

- All data are freely available on the EDC website, and the Global Change Master Directory.

The screenshot shows the Toolik Field Station Environmental Data Center website. The header includes the station name and navigation links. The main content area is titled 'Plant Phenology' and describes the monitoring program. A red circle highlights the 'Data' section, which lists two datasets: '2007-2011 Moist Acidic Tundra Phenology Dataset (MS Excel - 176K)' and '2011 Heath Tundra Phenology Dataset (MS Excel - 48K)'. Below this is a 'Species of Interest' list. At the bottom, there is a graph titled 'Spring Green-up to Peak Fall Colors' showing data for the years 2007 to 2011. A text box at the bottom right provides citation information.

**Toolik Field Station
Environmental Data Center**

Plant Phenology

Our plant phenology program, begun in 2007, monitors the timing of certain developmental stages within the plant community commonly found in moist acidic tusssock and dry heath tundra. It is an examination of the development and timing of commonly occurring plant species and how they are affected by a changing climate. Download data from 2007-2011 with the links on the right.

The protocol is based on the ITEX (www.geog.ubc.ca/itex) protocol for the Toolik Snowfence Experiment.

Phenological events of interest are 1) Date snowfree, 2) First leaf evident, 3) First flower bud visible, 4) First flower open, 5) First petal drop, 6) Last petal drop, 7) First seed dispersal, 8) First color change, and 9) Last color change. Observations begin in late May with two observations per week until mid-June. The snowfree date is recorded for the plot in general, after which the field researcher examines the species of interest by scanning the entire plot for the next event. After mid-June, observations are made one time per week until signs of senescence begin, at which time observations resume twice per week. For all other phenological events, the first date on which the event occurs for each species is recorded.

Data

- 2007-2011 Moist Acidic Tundra Phenology Dataset (MS Excel - 176K)
- 2011 Heath Tundra Phenology Dataset (MS Excel - 48K)

Species of Interest

- Alpine Bastard (*Polygonum bistorta*)
- Bigelow's Sedge (*Carex bigelowii*)
- Bog Blueberry (*Vaccinium uliginosum*)
- Bog Cranberry (*Vaccinium vitis-idaea*)
- Bog Rosemary (*Andromeda polifolia*)
- Cloudberry (*Rubus chamaemorus*)
- Crowberry (*Empetrum nigrum*)
- Diamond Leaf Willow (*Salix pulchra*)
- Dwarf Birch (*Betula nana*)
- Labrador Tea (*Ledum palustre*)
- Mountain Heather (*Cassiope tetragona*)
- Tussock Cottongrass (*Eriophorum vaginatum*)

Spring Green-up to Peak Fall Colors

■ full green-up ■ peak fall colors

2006
2007
2008
2009
2010
2011

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

If you use data from this page, please cite the data according to the following format:
Environmental Data Center Team. Year of data retrieval. Plant phenological monitoring program at Toolik, Alaska. Toolik Field Station, Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775.

II. Common-use equipment

Equipment	J	F	M	A	M	J	J	A	S	O	N	D	2014
Muffle furnace						10	13	10					33
Shaker table					4	17	22	15					58
Centrifuge													
Autoclave													
Freeze drier													
Leaf area meter (Licor)													
Leaf area meter (WinFolia)							12						12
Balances*					17	19	37	25	31				129
Scintillation counter					14	30	31	25					100
Hot stir plates*						2	2		12				16
Compound microscope													
Unitron Stereoscope							16	11					27
Heerburgg Stereoscope						4	7						11
Hydrolab water profiler				6	21	13	10		28		10		88
Unispec spectral analyzer						4	10	4					18
Flow Tracker					14	6	6						26
Soil moisture probes*							3	3					6
Soil temperature probes*													
Handheld weather meter*					3	1			3				7
Dry Incubator													
Incubation baths (6 total)					59	81	138	147	116	10			551
Total				6	132	187	307	240	190	10	10		1082