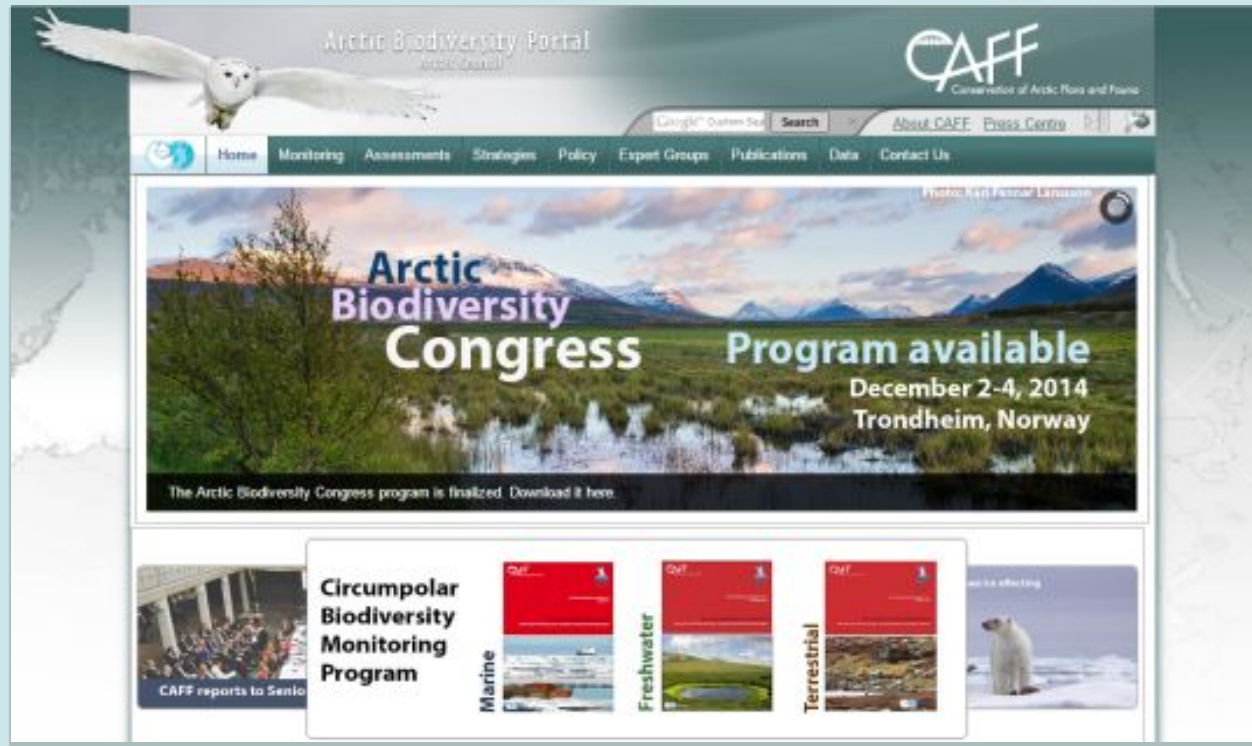



## CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM



### *Herbivory and the Circumpolar Biodiversity Monitoring Program*

Arctic Biodiversity Congress  
December 2, 2014

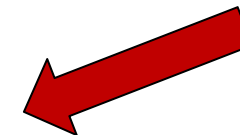
Jason J. Taylor   
U.S. National Park Service



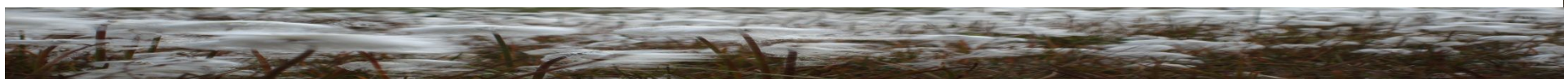
# Circumpolar Biodiversity Monitoring Program



## Four Arctic biomes



Expert Monitoring/Steering Groups develop integrated, ecosystem-based **monitoring plans** for biomes and facilitate implementation



# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

## Terrestrial Expert Monitoring Networks

**VEGETATION**



Plants,  
bryophytes,  
fungi, etc.

**BIRDS**



Shorebirds, geese,  
ptarmigan, raptors,  
passerines, etc.

**MAMMALS**

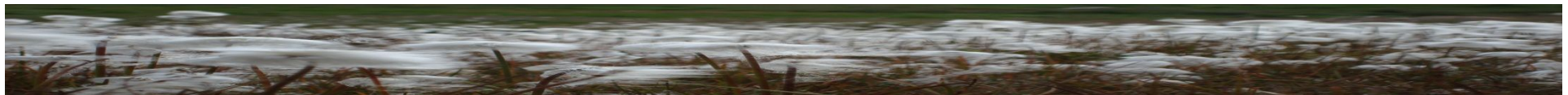


Small, medium, &  
large herbivores,  
carnivores

**INVERTEBRATES**



Arthropods,  
soil mesofauna,  
decomposers, etc.



# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

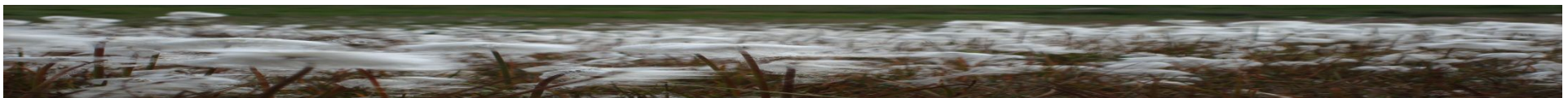
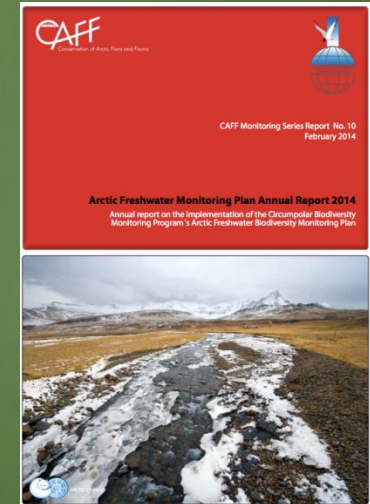
- Purpose (of the *terrestrial* plan):
  - To enhance our ability to detect, understand and report on long - term change in Arctic terrestrial ecosystems and biodiversity.
  - To support harmonization and integration of long-term biodiversity monitoring efforts across the Arctic & establish baselines.
- Audiences:
  - Decision-makers, communities, resource managers, scientists, general public.



# CBMP Terrestrial Monitoring Plan

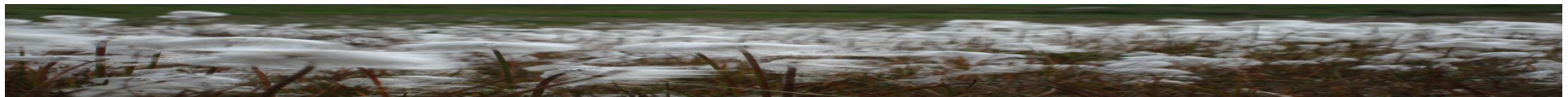
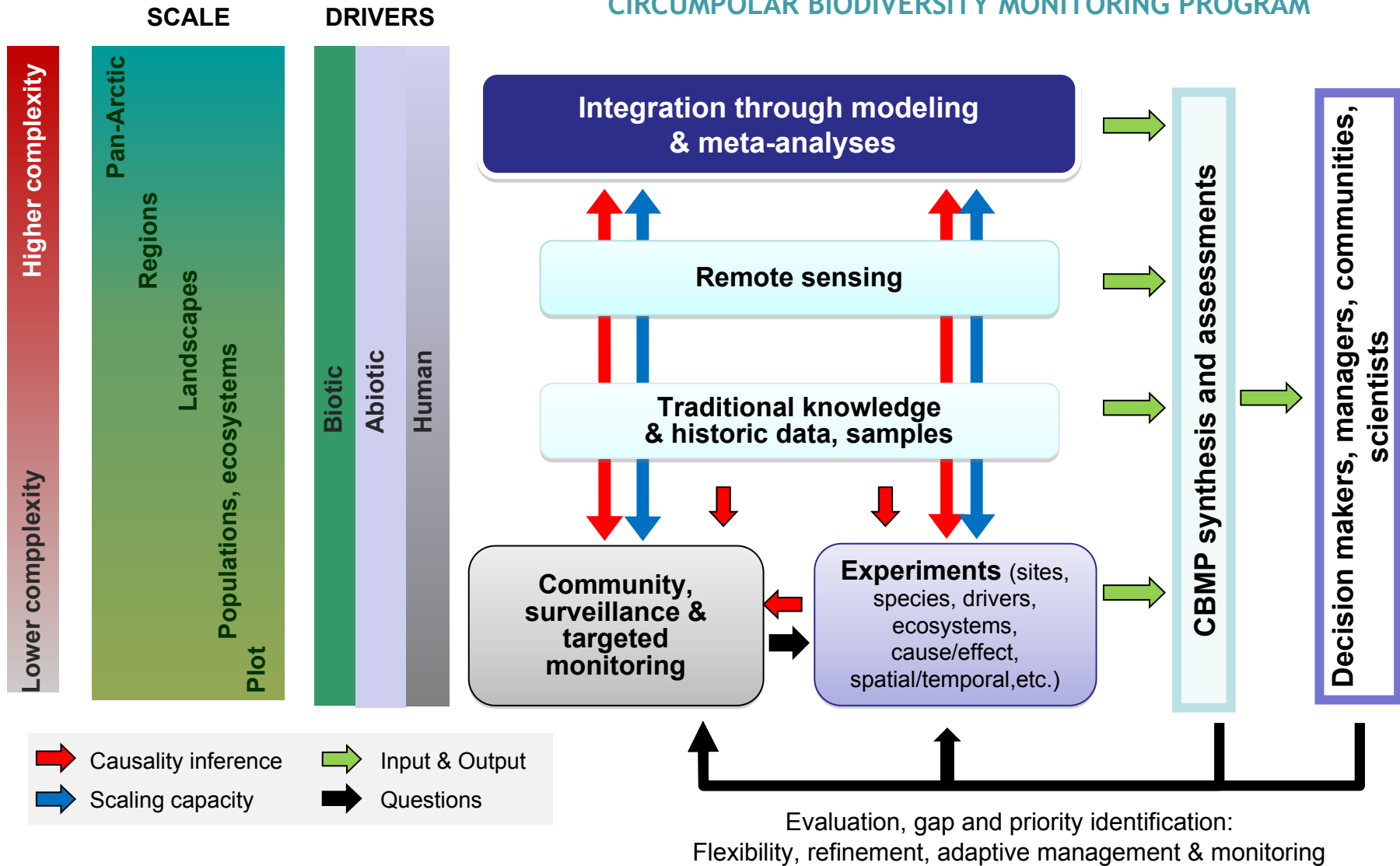
CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

- Target priority focal ecosystem components, ecosystem information needs, relevance to communities & services.
- Build as much as possible upon existing capacity.
- Blend site- and survey-based monitoring.
- Multi-scaled approach; “harmonization” through modelling.



# CBMP Terrestrial Monitoring Plan

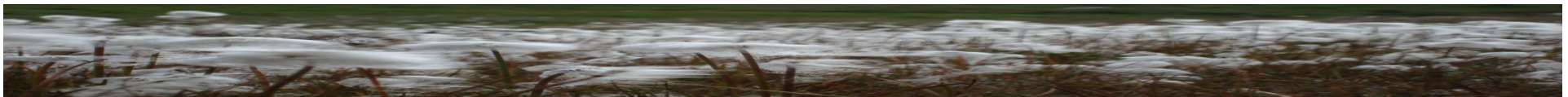
## CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM



# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

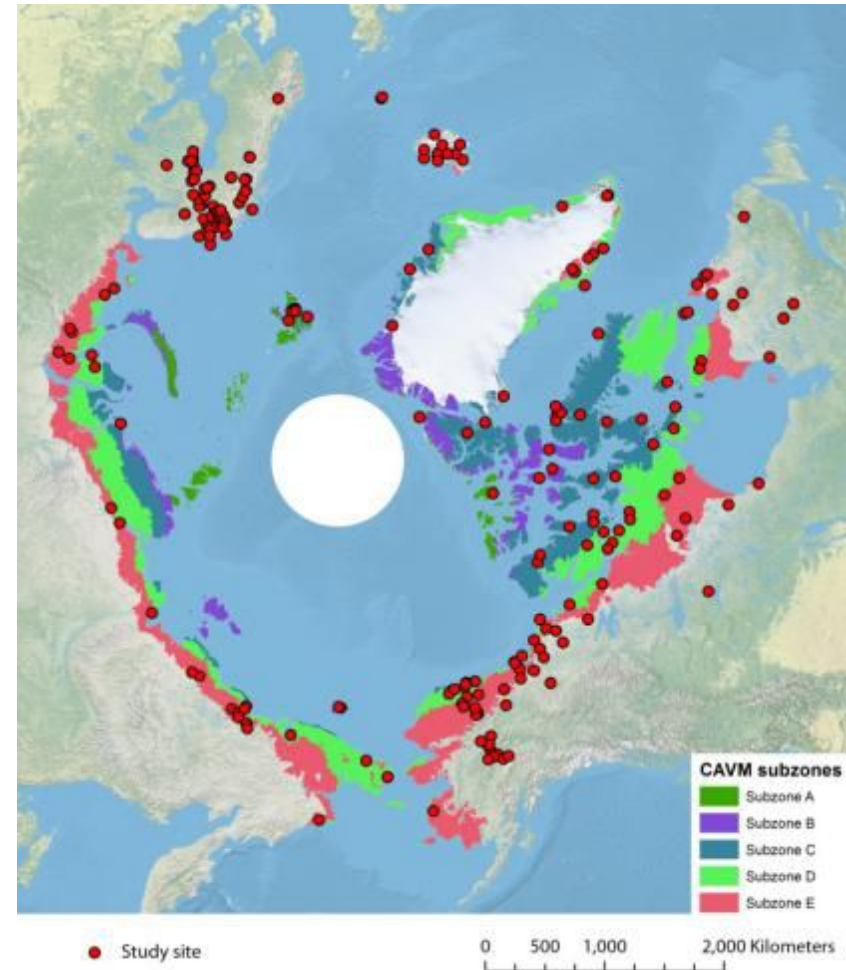
- Arctic Terrestrial Biodiversity Monitoring Plan approved by Arctic Council, published October 2013.
- Implementation started in 2014, first meeting held in Akureyri, Iceland February 2014.
- Next TSG meeting, Ottawa Canada, Feb 2015.
- Rotating TSG chair. Currently Chaired by Canada (2014 – 2015). Sweden is incoming Chair (2015 – 2016).



# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

- Three year work plan developed, to meet the *State of Arctic Biodiversity* Report, 2017.
- Implementation steps:
  - Identify data sources, networks, and on-going work to support analysis.
  - Investigate techniques to combine. Harmonize data. Identify gaps.
  - Conduct integrated assessments.
  - Identify gaps & propose solutions.
  - Propose standardized methods.

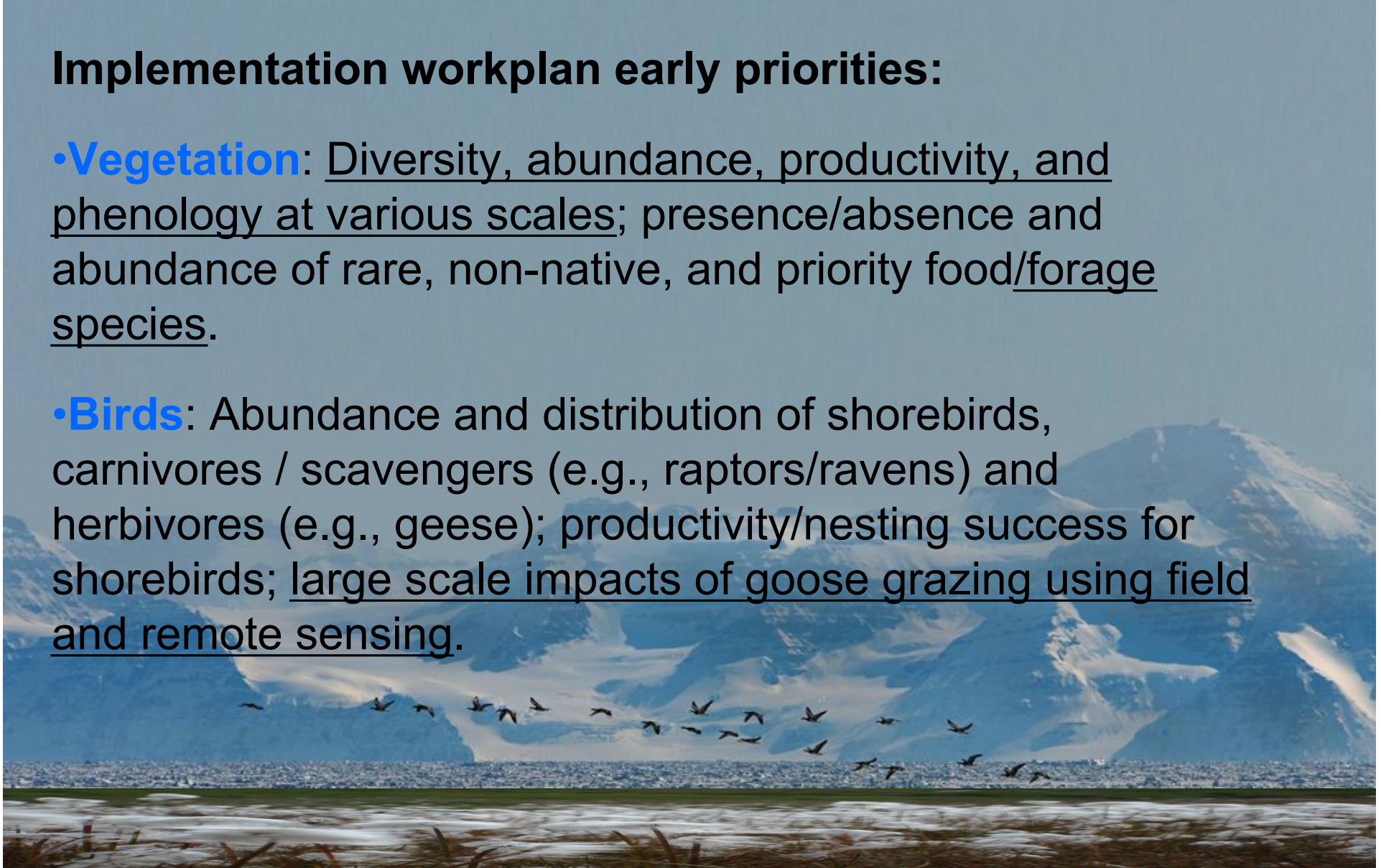


# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

## Implementation workplan early priorities:

- **Vegetation:** Diversity, abundance, productivity, and phenology at various scales; presence/absence and abundance of rare, non-native, and priority food/forage species.
- **Birds:** Abundance and distribution of shorebirds, carnivores / scavengers (e.g., raptors/ravens) and herbivores (e.g., geese); productivity/nesting success for shorebirds; large scale impacts of goose grazing using field and remote sensing.

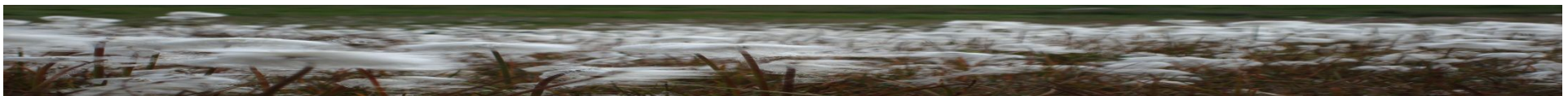


# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

## Implementation workplan early priorities:

- **Mammals:** Abundance, distribution, demographics and health of caribou, muskox, Arctic fox and lemmings/voles.
- **Invertebrates:** abundance and diversity of blood-feeding insects, pollinators, prey, herbivores, decomposers.

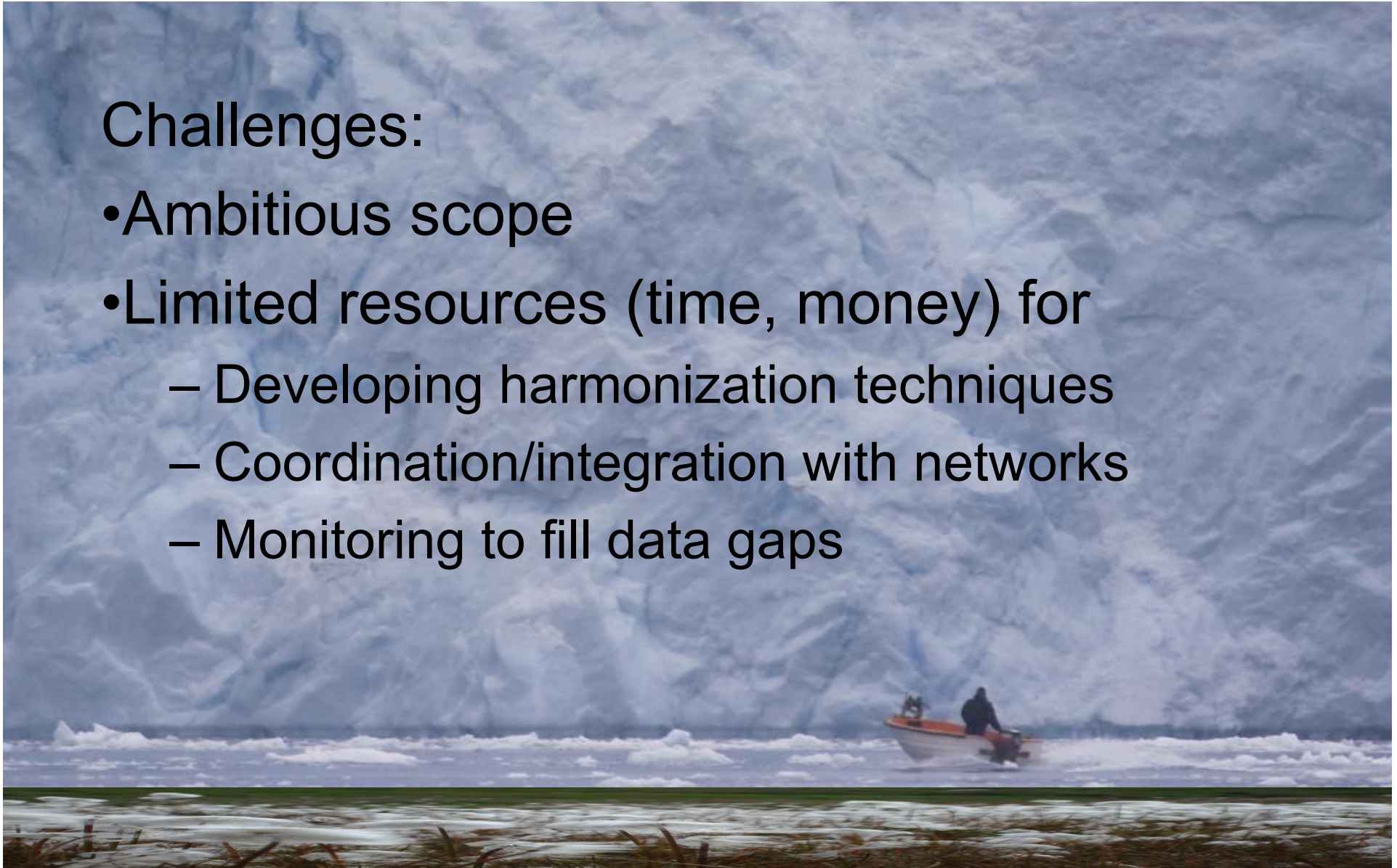


# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

## Challenges:

- Ambitious scope
- Limited resources (time, money) for
  - Developing harmonization techniques
  - Coordination/integration with networks
  - Monitoring to fill data gaps



# CBMP Terrestrial Monitoring Plan

CIRCUMPOLAR BIODIVERSITY MONITORING PROGRAM

- Partners are critical to success
  - Discussions underway with Arctic monitoring networks, researchers, and initiatives to align activities and facilitate cooperation.
  - We are hoping that data collected using the Herbivory Network protocol could be made available to the CBMP, to:
    - contribute to broader pool of vegetation plot-based and mammal data for species level assessments
    - add more plot-based veg data as ground control for improved remote sensing and landscape assessments



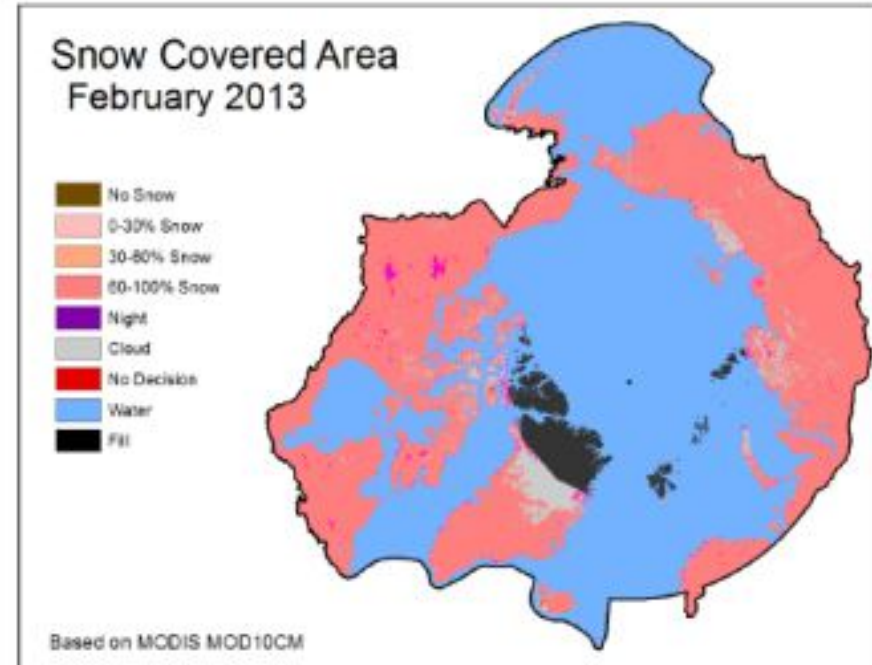
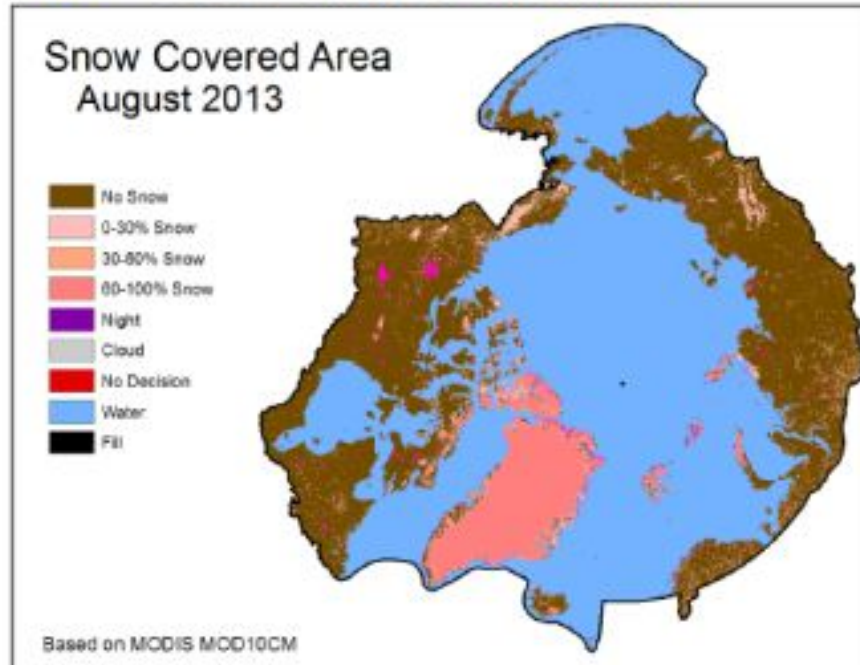


# MODIS Data Products for CAFF System

| Product   | Discipline  | Temporal Delivery                      | Spatial Resolution | Satellite | Product Name | Website | Notes   |
|---|-------------|--|--------------------|-----------|--------------|---------|---|
| Vegetation Indices (Normalized Difference Vegetation Index (NDVI), and Enhanced Vegetation Index (EVI)) | Terrestrial | 16-day; May-September, 2000-2013       | 0.05 deg (~5600 m) | Terra     | MOD13C1      | LPDSSAC |   |
| Land Cover Dynamics (Vegetation Phenology)  | Terrestrial | 2001-2010                              | 500 m              | Combined  | MCD12Q2      | LPDAAC  |   |
| Land Cover Type   | Terrestrial | 2001-2012                              | 0.05 deg (~5600 m) | Combined  | MCD12C1_051  | LPDAAC  |   |
| Land Surface Temperature  | Terrestrial | Monthly; Feb 2000 - present            | 0.05 deg (~5600 m) | Terra     | MOD11C3      | LPDSSAC | Version 5 provided, not compatible with versions 4.1 and 4.2  |
| Albedo  | Terrestrial | 16-day; Feb 2000 - present             | 0.05 deg (~5600 m) | Combined  | MCD43C3      | LPDSSAC | Package includes both Black Sky Albedo (BSA) and White Sky Albedo (WSA), for Bands 1-6. Will deliver entire package for GeoTIFF version<br>16-day temporal resolution, but product created every 8 days; 1 <sup>st</sup> scene of each month provided to CAFF |
| Snow Covered Area   | Terrestrial | Monthly; Mar 2000 - present            | 0.05 deg (~5600 m) | Terra     | MOD10CM      | NSIDC   |   |
| Land Water Mask (Surface Water)   | Terrestrial | One map, produced 2009                 | 250 m              | Aqua      | MOD44W       | LPDAAC  |   |
| Sea Surface Temperature (SST) Nighttime   | Marine      | Monthly; Jun 2002 - present            | 4 km               | Aqua      | MO_SST/4     | OCASST  |   |
| Marine Chlorophyll a  | Marine      | Monthly; Jun 2002 - present            | 4 km               | Aqua      | MO_chlor_a   | OCASST  |   |
| Colored Dissolved Organic Matter (CDOM)   | Marine      | Monthly; March-Oct; Jun 2002 - present | 4 km               | Aqua      | MO_CD0M      | OCASST  |   |
| Marine Primary Productivity   | Marine      | Monthly; Jul 2002 - present            | 9 km               | Aqua      |              | OSU     | From Oregon State University (not provided on standard NASA Ocean Color website)  |

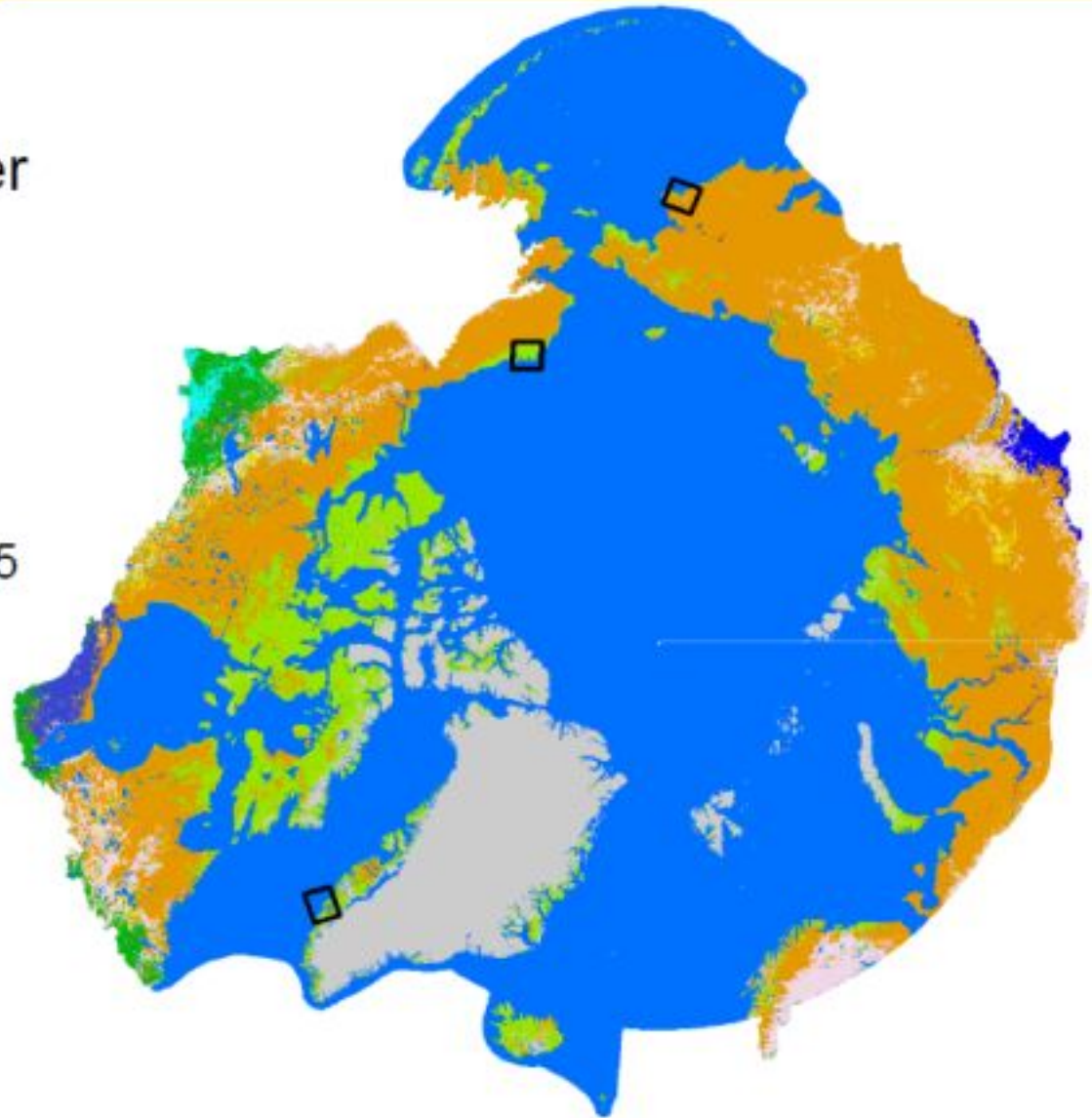
# Snow Covered Area Product

- Snow Covered Area as percentage of pixel
  - Monthly composite
  - 0-100% snow
  - Gaps in data include: clouds, night, no decision, fill, water
  
- ~5.56 km resolution



## MODIS Land Cover

- An exercise to look at MODIS land cover products at the Landsat scale
- Three test sites:
  - Nuuk, Greenland: Landsat Path 6, Row 15
  - Meinypil'gyno, Russia: Landsat Path 91, Row 16
  - Barrow, Alaska, USA: Landsat Path 80, Row 10





**Takk**  
**Questions?**