The Arctic-Boreal Vulnerability Experiment (ABoVE)

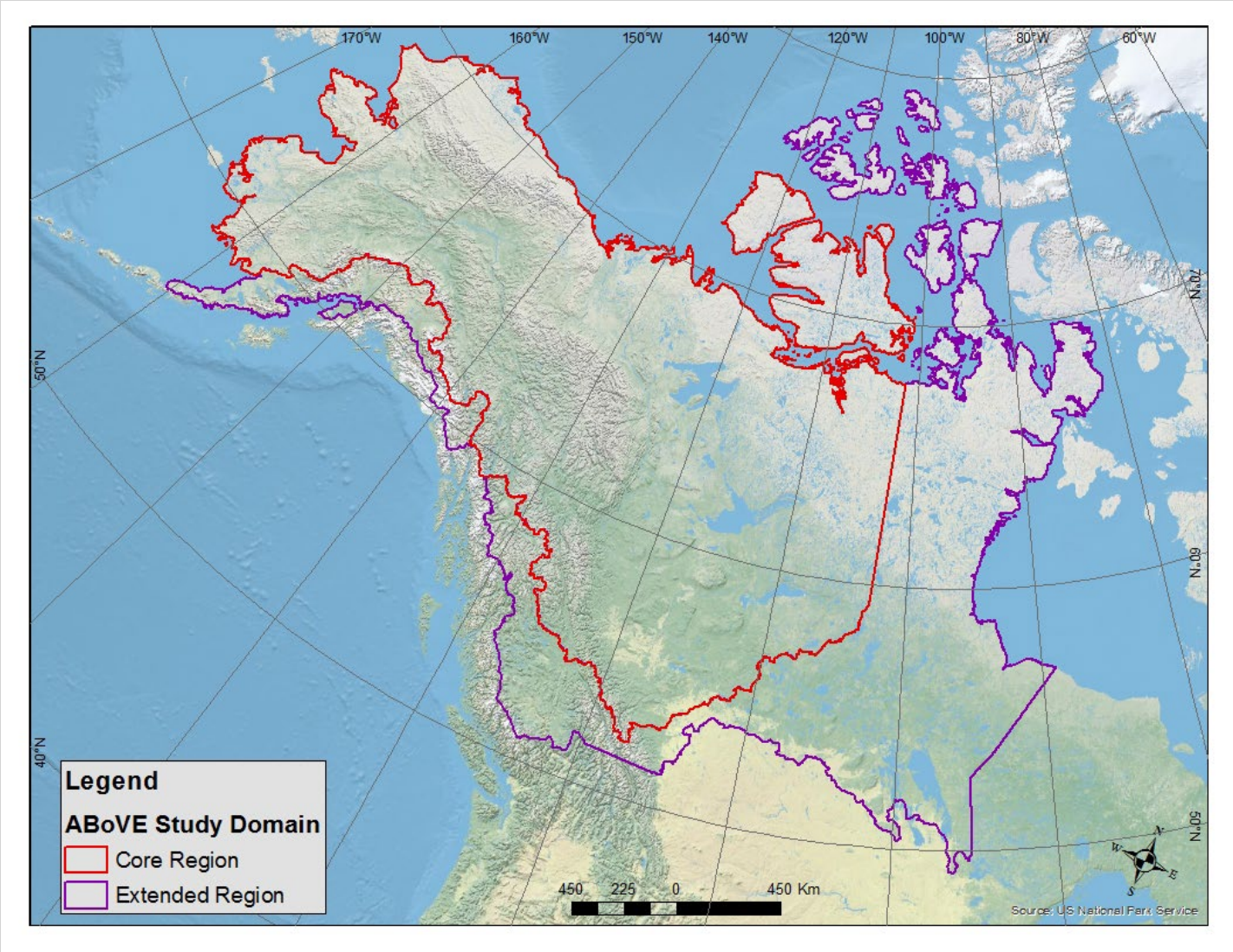
A NASA Terrestrial Ecology Field Campaign 2014ish – 2025 (?)

https://above.nasa.gov/index.html?

Libby Larson, Carbon Cycle & Ecosystems Office

NASA GSFC/SSAI libby.larson@nasa.gov

ABoVE Study Domain

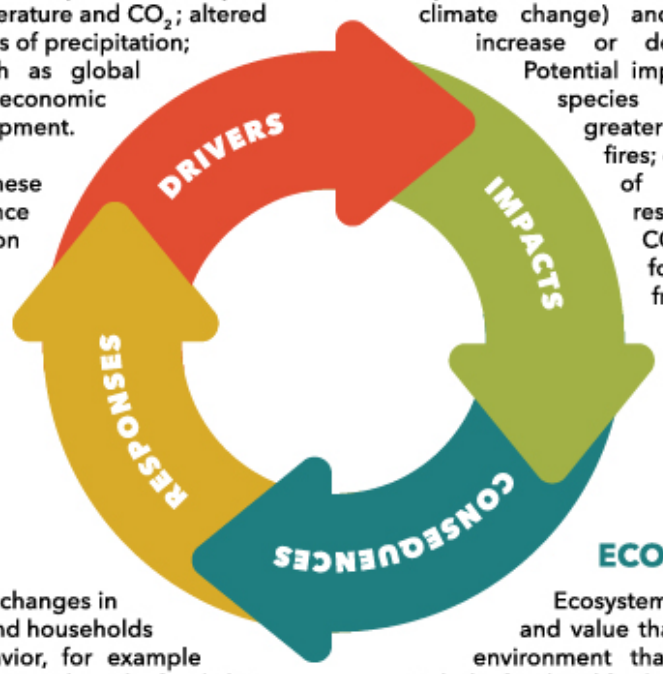


VULNERABILITY AND RESILIENCE FRAMEWORK

CAUSES OF CHANGE

Many factors from the local, to regional, to global scales drive changes to ecosystems. Examples include: increasing temperature and CO_2; altered timing, amount, and types of precipitation; and social factors such as global demand for fossil fuels, economic stability, and land development.

To varying degrees, these drivers interact to influence the structure and function of ecosystems.



CHANGES TO ECOSYSTEMS

Ecosystem structure and function are impacted by drivers that are both external (e.g., global climate change) and internal (e.g., natural increase or decrease in population). Potential impacts include: changes in species range and biodiversity; greater intensity and frequency of fires; changes in the distribution of insects; increased soil respiration and production of CO_2 and methane; lake formation due to permafrost thaw.

SOCIAL SYSTEMS

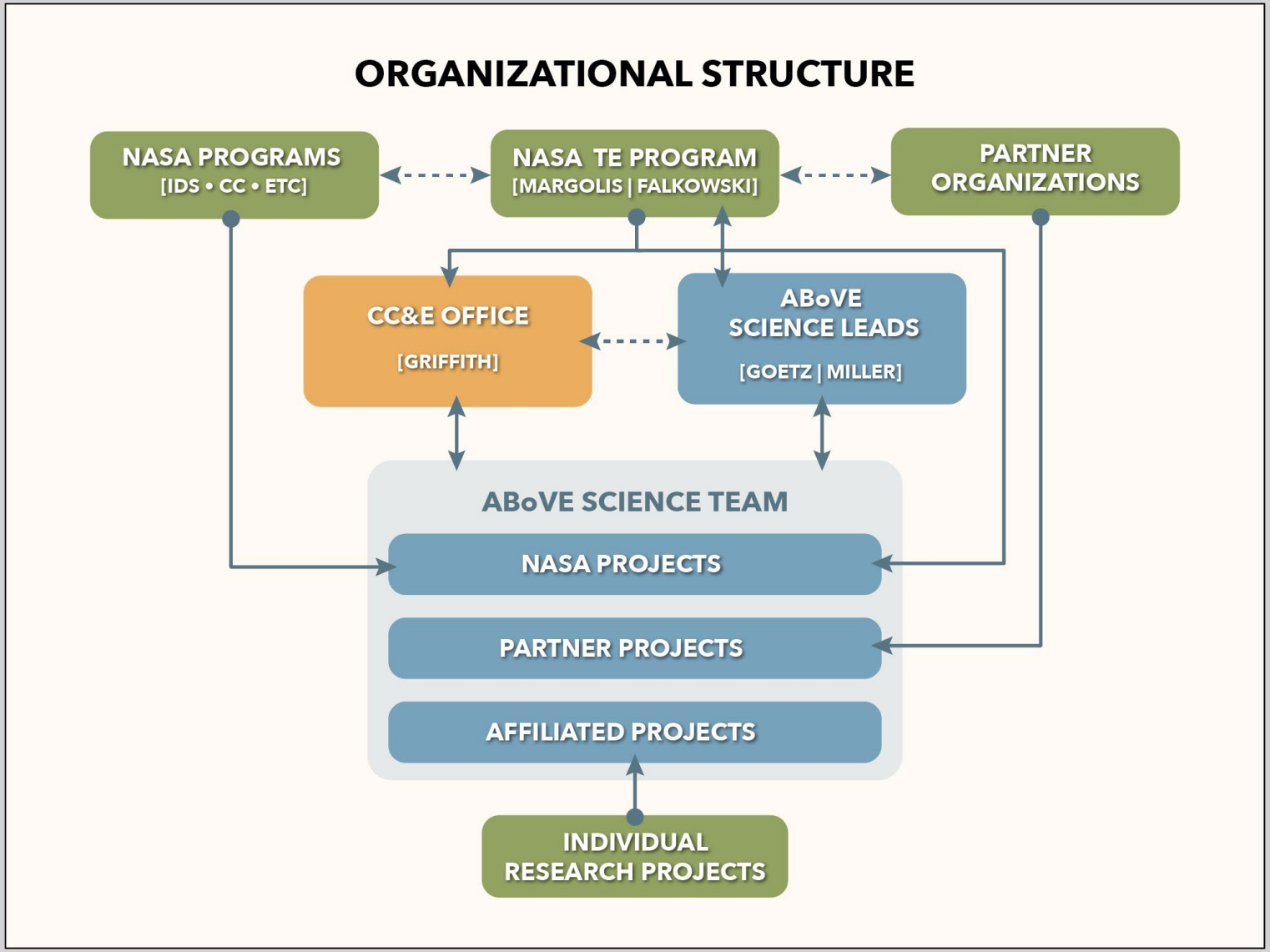
People respond to these changes in many ways. Individuals and households may change their behavior, for example relying more heavily on store-bought food than subsistence hunting. Communities may invest in new infrastructure or move to a new location. Governments may change wildfire suppression strategies or enact policies for reducing greenhouse gas emissions.

All of these responses may influence the drivers of change in both intended and unintended ways.

ECOSYSTEM SERVICES

Ecosystem services are the benefits and value that people derive from the environment that sustains us. Examples include: food and freshwater production; solid soil foundations for building and transportation infrastructure; indigenous wildlife harvest for subsistence.

When ecosystem structure and function changes, there are consequences to the types, timing, and amount of ecosystem services available.



Science Team Members: 831

Project Leads: 95

Project Leads + Co-Investigators: 285

Project Leads, Co-Investigators + Collaborators: 450

Projects:

- NASA-Other: 26
- NASA: 55
- Partner: 2
- Affiliated: 28

Science Team Working Groups

Thematic:

- Carbon dynamics
- Ecosystem Services & Co-production
- Fire and Insect Disturbance
- Hydrology & Permafrost
- Modeling Framework & Comparisons
- Snowscapes
- Vegetation Dynamics and Distribution
- Vegetation Structure & Function
- Wetlands

Other types of working groups:

- Airborne
- Data products
- Synthesis

ABoVE Partners & Collaborators: Project Office Level

US Federal

- **Department of Energy**
  - Next-Generation Ecosystem Experiments Arctic
- **US National Park Service**
  - Alaska Natural Resources Program
  - Alaska Inventory & Monitoring Program
- **US Geological Survey**
  - Alaska Science Center
  - Alaska Climate Science Center
- **US Forest Service**
  - Alaska Region

US: Alaska

- Alaska Fire Science Consortium

Canada Federal

- Polar Knowledge Canada (POLAR)
- Canadian Forest Service, Natural Resources Canada

Canada: Yukon

- Government of Yukon
- Yukon University Research Center
- Council of Yukon First Nations

Canada: Northwest Territories

- Government of the Northwest Territories

Regional Organizations

- Northern Latitudes Partnerships
- Northwest Boreal Partnership

ABoVE Partners & Collaborators: Individual Project Examples

Indigenous Tribes & Organizations:

- Via research license permitting processes in Yukon, NWT
- Consultations with tribes in AK
- Specific project collaborations:
  - Chevak Traditional Council
  - Emmonak Tribal Council
  - Calista Education and Culture, LLC
  - Western Canadian Inuit Land Administration

Non-Profit/NGO:

- Ducks Unlimited Canada
- Royal Alberta Museum
- Union of Concerned Scientists

US Federal Government:

- USDA Forest Service
- National Park Service
- US Fish & Wildlife Service
- USGS
- BLM

Canadian Federal Government:

- Canadian Forest Service, Natural Resources Canada
- Geological Survey, Natural Resources Canada
- Environment and Climate Change Canada
- Polar Knowledge Canada

Alaska:

- AK Dept. of Fish and Game

Northwest Territories:

- GNWT Geological Survey
- GNWT Environment and Natural Resources

Yukon:

- Yukon Dept. of Environment
- Yukon Dept. of Wildland Fire Management

Challenges to partnerships and collaborations

- Perception/legacy of Terrestrial Ecology Program as only “basic” research
- Limitations from NASA grantmaking structures and traditions
- NASA mission limitations – must be tractable with remotely sensed data
- What happens when the field campaign is over?