



PI: Bruce Cook, NASA

Fingerprinting Three Decades of Changes in Interior Alaska (1982-2014)

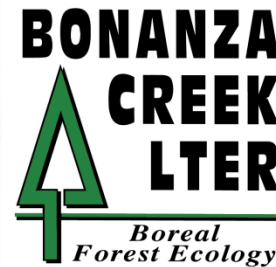
Cook-B-02:

NASA: Douglas Morton

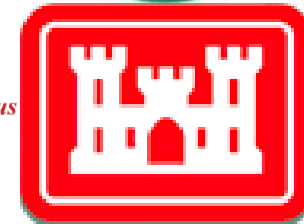
USFS: Hans-Erik Andersen, Robert Pattison

Institutional Collaborations

- USDA Forest Service
- Army Corps of Engineers
- US Geologic Survey
- National Park Service
- US Fish & Wildlife Service
- UAF
- UAA



The Nation's Forest Census

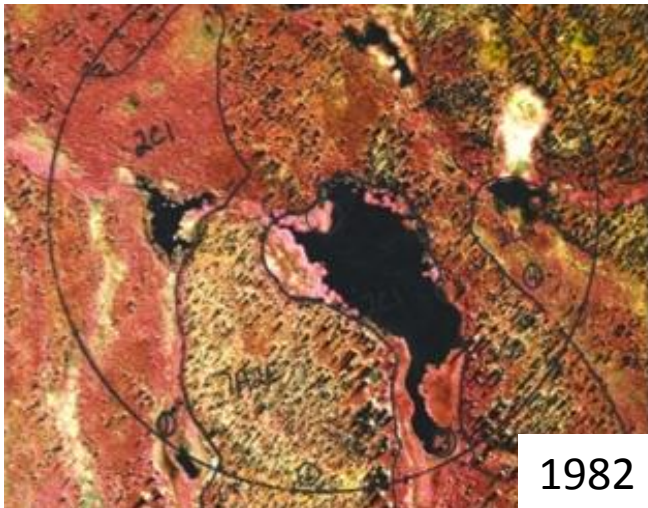


Summary:

- Winter warming in interior Alaska alters forest productivity, composition, and disturbance dynamics.
- But, long time series (>25 years) of very high resolution ($\leq 1\text{m}$) remote sensing data are needed to capture fine-scale changes in ecosystem structure.
- Therefore, we will characterize three decades of changes in interior Alaska using a field measurements and airborne remote sensing data (1982-2014).

Science Questions & Objectives

- Tier 2 Science Questions addressed: #2, 4, 5, 6
- Tier 2 Science Objectives
 - Ecosystem Dynamics: #1, 3, 5, 6
 - Ecosystem Service # 4, 5, 6

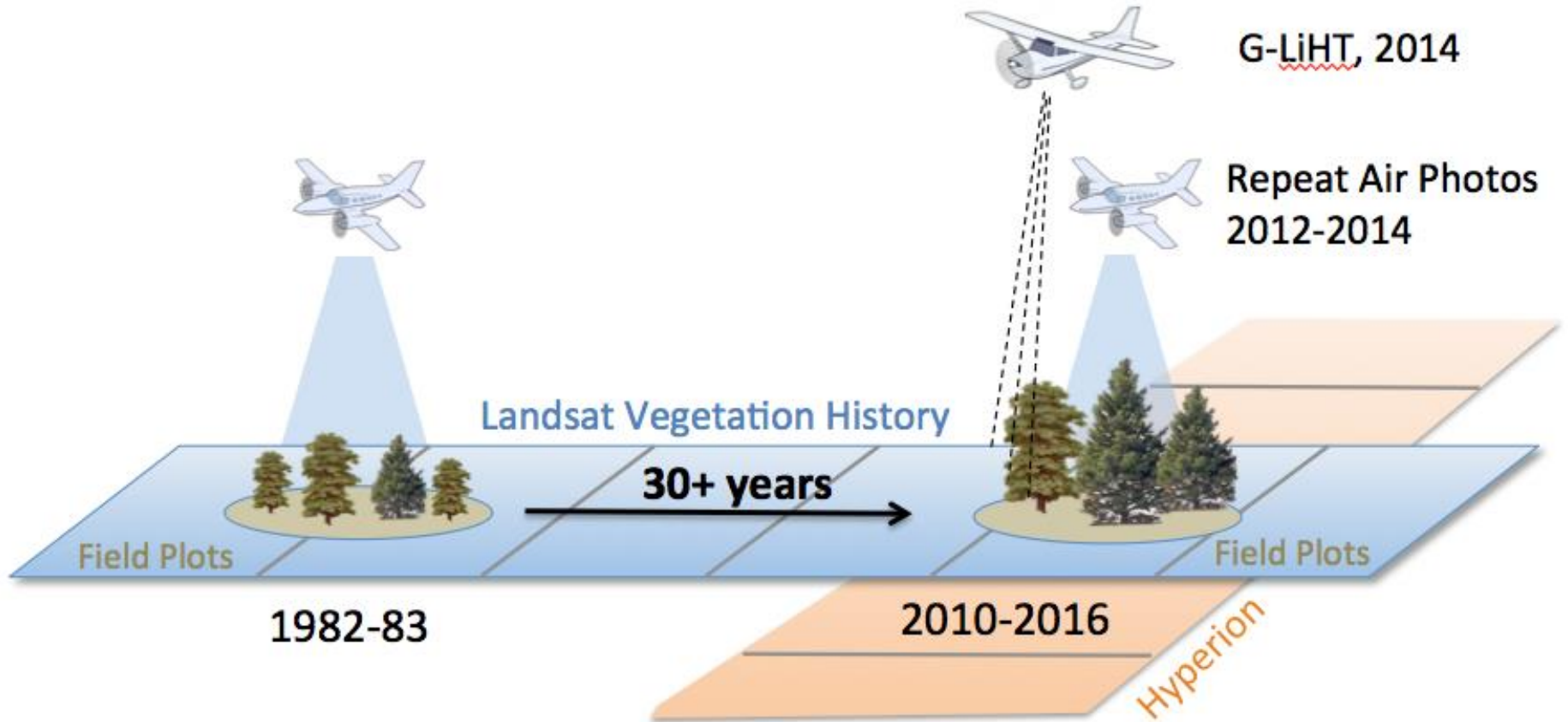


1982

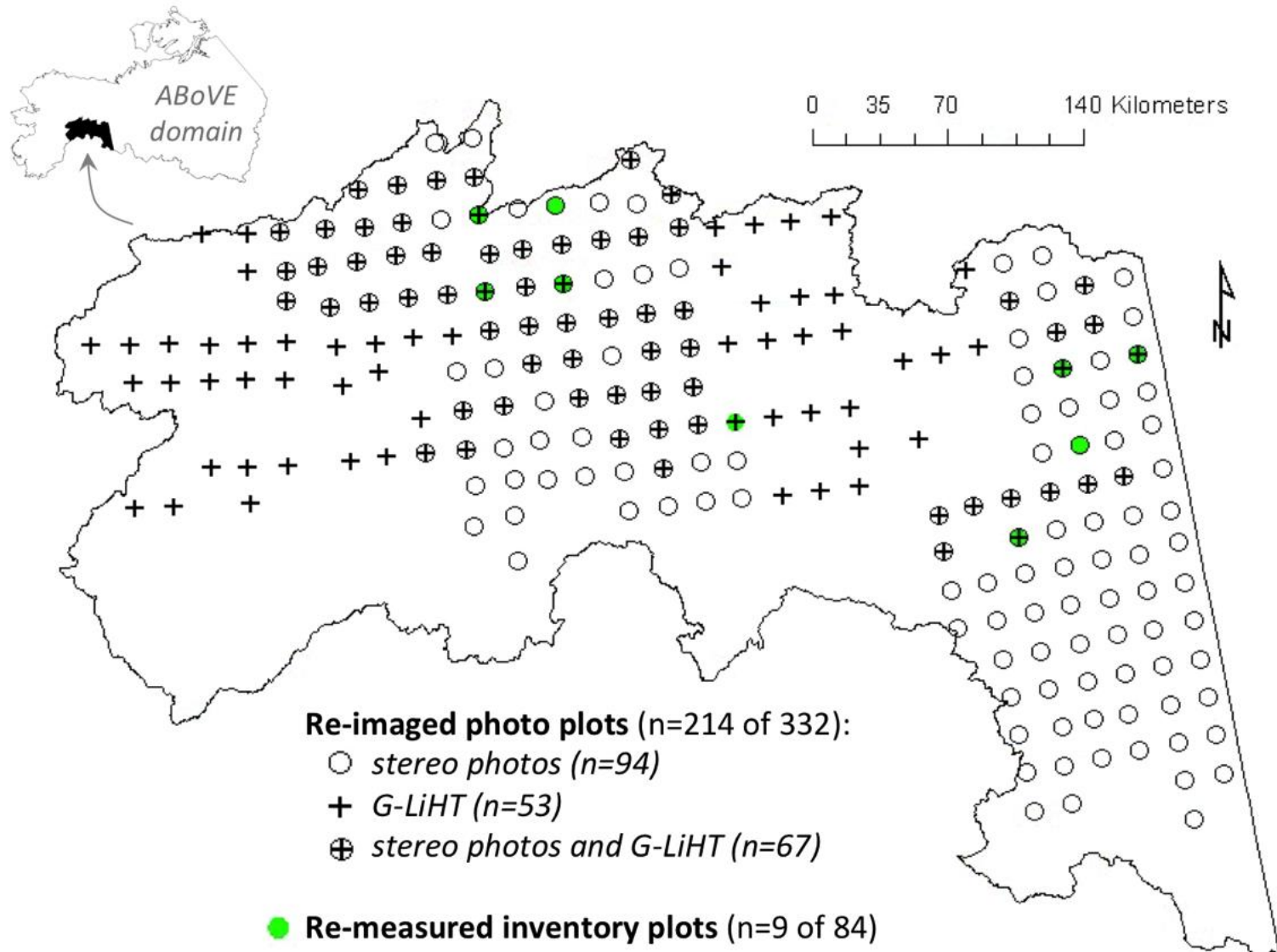


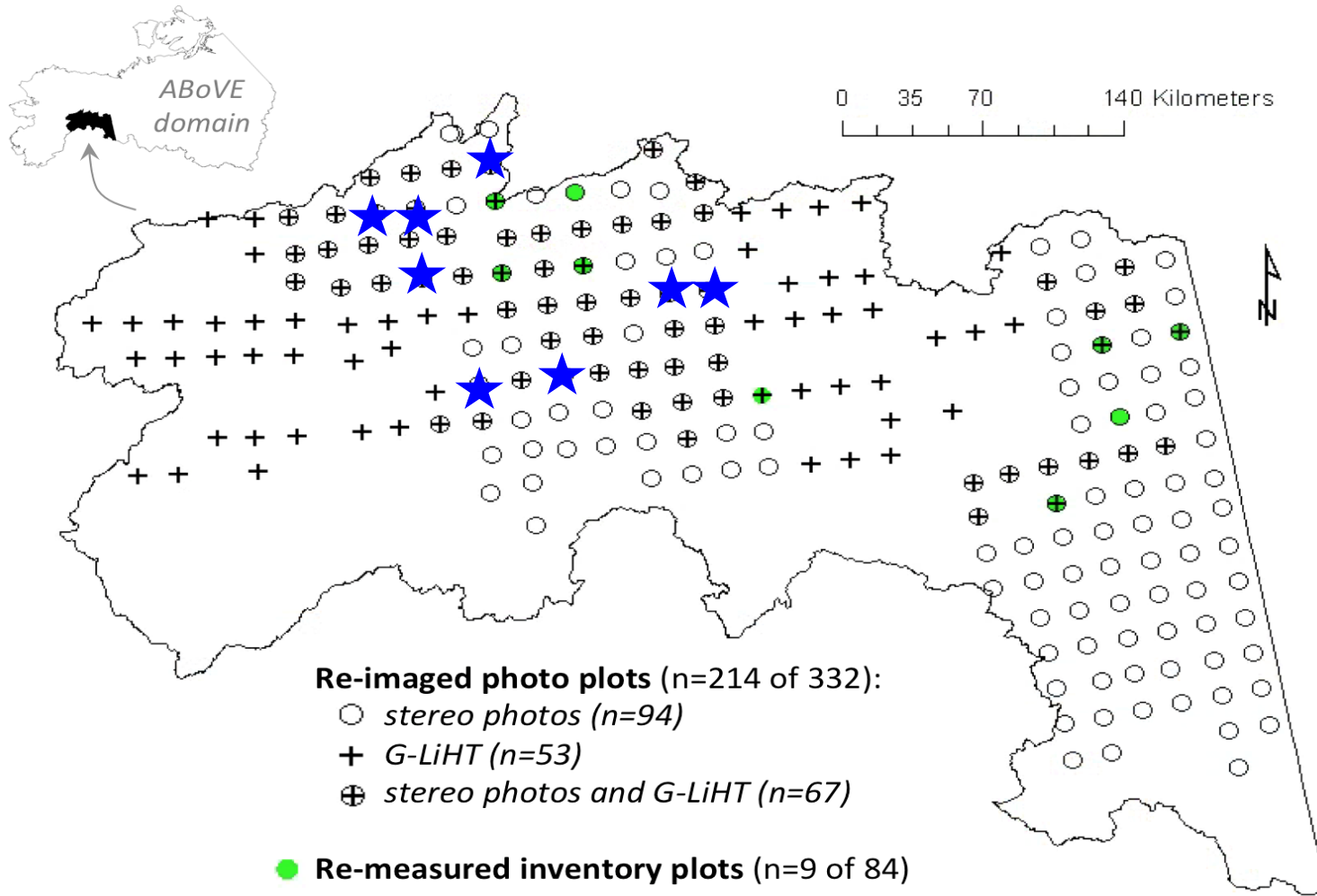
2012

Study Design



Study Design





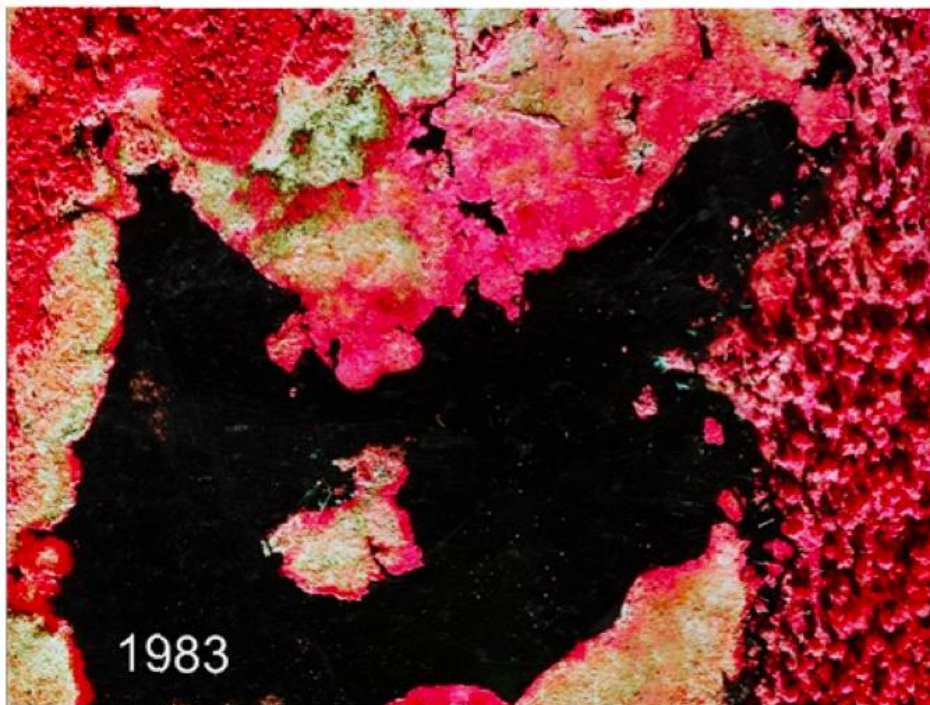
Field Data Collection

- AIRIS Plot Protocol: 1982-1983; 2010-2016

PLOT TYPE	MEASUREMENTS
Tree (≥ 10 cm DBH)	species, DBH, live/dead, height, damages (insect, disease), height and crown dimensions, percent cover, age and radial growth rate
Shrub	species, height, percent cover, number of stems
Ground	species, percent cover, moss and permafrost thickness

Airborne Remote Sensing

- Stereo Air Photos (1982, 2012-2014)
- 2014 G-LiHT Data (gliht.gsfc.nasa.gov)



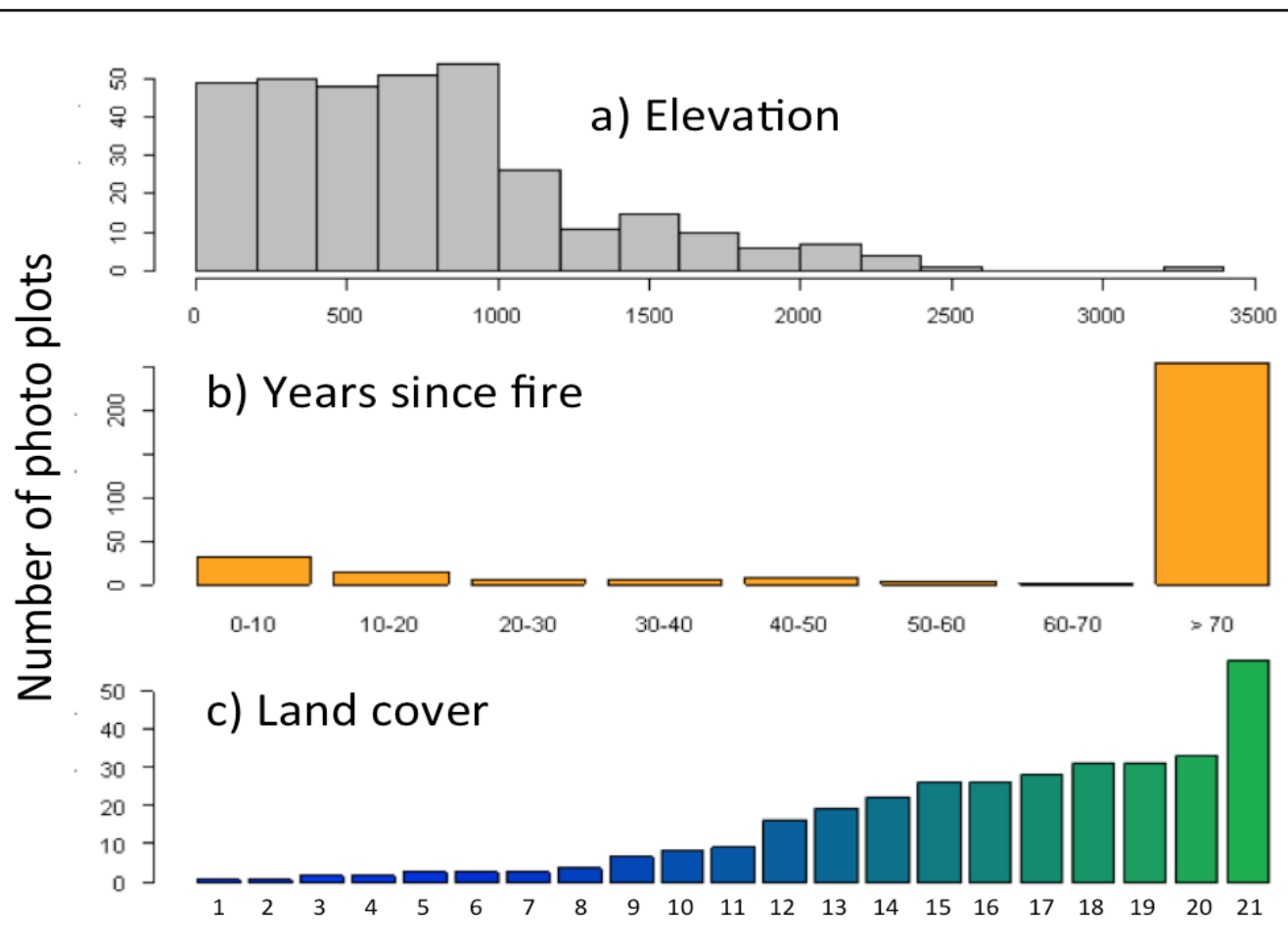
Geospatial Data Products

- G-LiHT products for AIRIS plot locations
- Stereo photo products for AIRIS plot locations
- Scaling up: G-LiHT products outside plot locations; Landsat and Hyperion-derived products via AST collaboration

Other expected products / outcomes

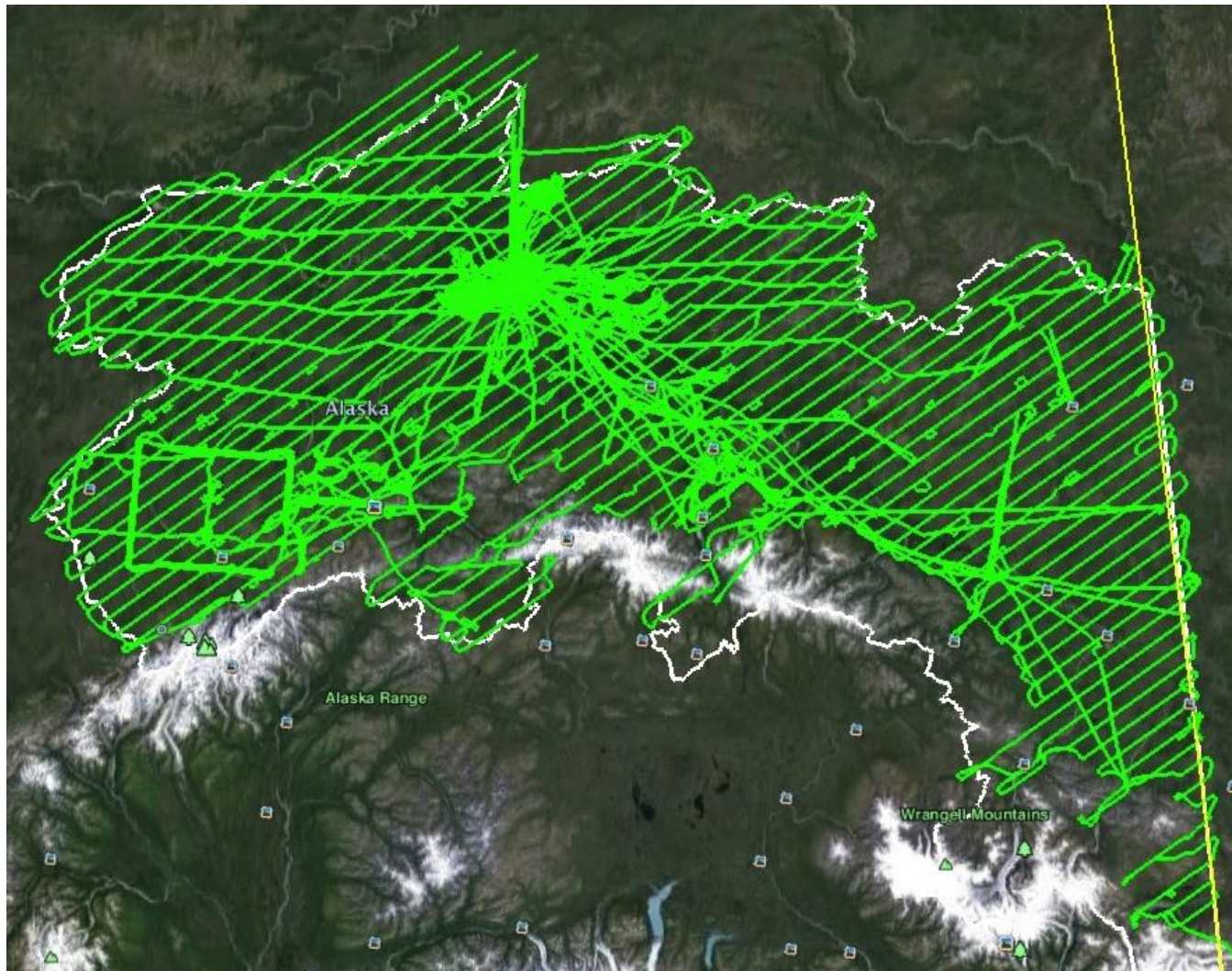
- Observations to constrain ecosystem models: a “fingerprint” of change processes over 30 yr.
 - Height, radial growth, AGB
 - fractional cover, composition (trees, shrubs, moss/lichens, water)
 - Permafrost, topographic changes

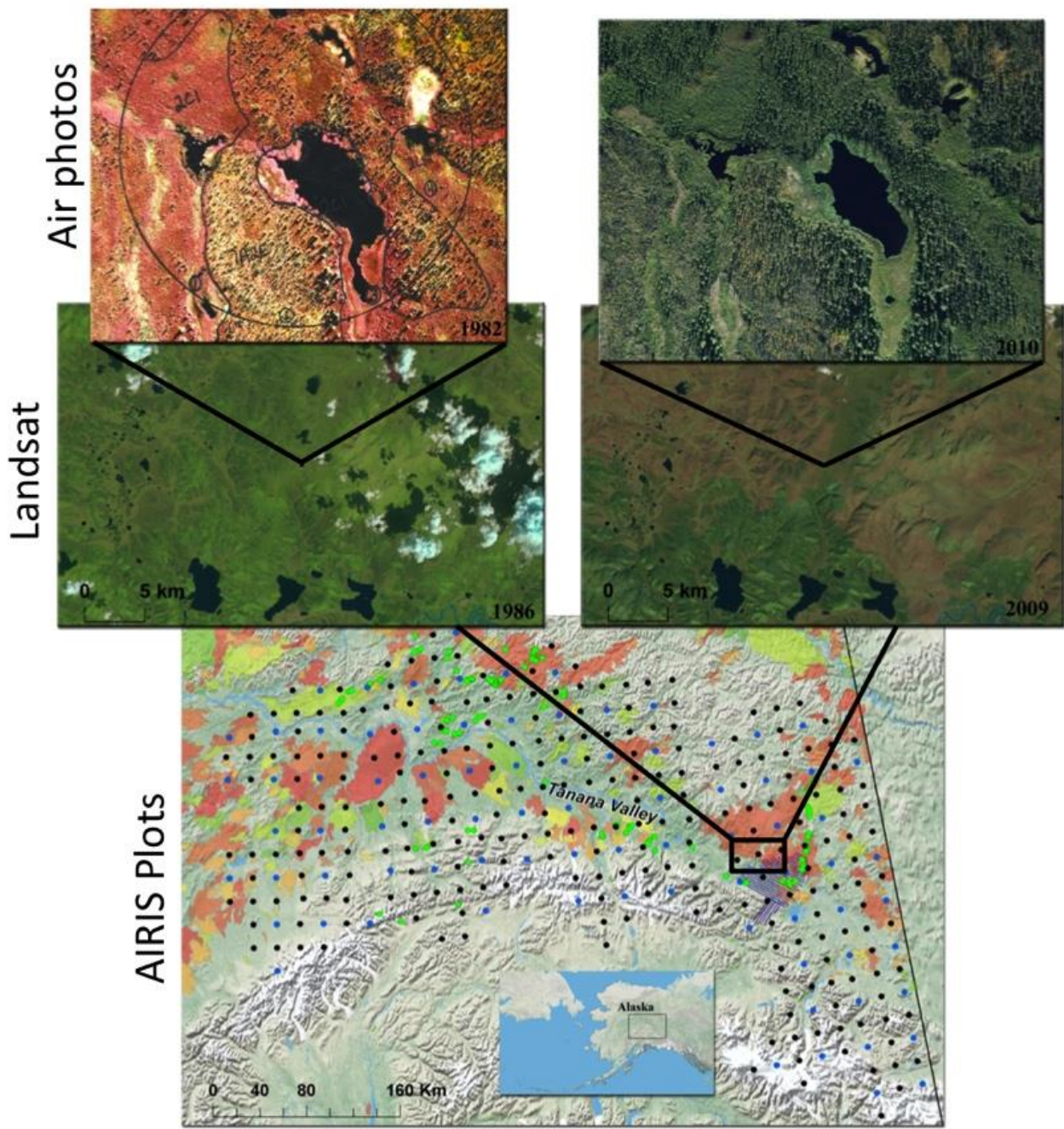
Sampling:



- LAND COVER CLASSES**
- 1) Shrub swamp
 - 2) Spruce-Lichen woodland
 - 3) Boreal grassland
 - 4) Shrub/Herbaceous floodplain wetland
 - 5) Alder shrubland
 - 6) Alpine floodplain
 - 7) Unclassified
 - 8) Shrub/Herbaceous peatlands
 - 9) Open water
 - 10) Wet meadow
 - 11) Tussock Tundra
 - 12) Snow-Ice
 - 13) Floodplain forest/shrubland
 - 14) Birch-Aspen forest
 - 15) White spruce-hardwood forest/woodland
 - 16) Willow shrubland
 - 17) Dwarf shrubland
 - 18) Barren
 - 19) White spruce forest/woodland
 - 20) Peatland forest
 - 21) Black spruce forest/woodland

2014 G-LiHT Collection





AIRIS field plot-

20 acres (8 ha)

19 points –

Not all points are measured

Variable radius plots

Fixed radius plots

Veg tallied on 2 points per

Plant community type

Priority for remeasurement is

Veg and trees

