

Breakout 2: Fire-flora recovery / interactions

Main thematic areas:

1. New synergies b/n investigators
2. Data / knowledge gaps (mostly) not being addressed
3. Data sets not being (fully) used.
4. Air campaign instruments & driving science questions

New synergies b/n investigators

- **Post-fire succession** being addressed by *Mack, Rogers, and Goulden*. Interesting seeding / seed rain experiment by Mack.
- **M Chopping** (shrub mapping) looking for input / site recommendations across N Slope and Canada.
 - Shrubs & lichen mapping could be useful for fauna groups.
 - Could bring in Michelle's previous data to derive shrub succession after fire / thermokarst formation.
- **New project: consistent veg map across domain.**
 - Idea that we could work with NGA data to convolve DSM w/spectral information to separate evergreen vs. deciduous crowns (stereo point cloud, visible & NIR, SWIR from WV3). Opportunity for extremely valuable high-res PFT info.
 - Could merge w/G-LiHT (lidar/hyperspectral) or other to drill down to important species
 - Incorporate previous and upcoming ground validation

Data / knowledge gaps (mostly) not being addressed

- **Smoldering and over-wintering fires.** Mostly unexplored but hugely important.
 - M Turetsky has some community reports
 - Worldview 3 has SWIR, high potential. Thermal anomalies on this spatial scale are distinct and rare. Would need to work out tasking.
 - Landsat 8 SWIR and thermal.
 - MODIS/VIIRS active fires
 - Fire progression maps
- **Changes in N cycle** associated with shrub encroachment.
- **Repeat burns.** Both forest & tundra. How much repeat burning & how does it affect veg / soil recovery. M Mack surprised by scarcity of re-burns in NWT.
- **Nutrient losses from fire.** Loss, N mineralization from deeper ALT.
 - How much N transported via aerosols vs pyrodenitrified to N_2 ?
 - Could look at NADP (National Atm Deposition Program) stations
 - P an open, longer-term question. How much is local vs entrained into long distance transport? How much enters aquatic system?
- **Spatial wiki** for field data, special resources, satellite
- **Fire progression in tundra.** What limits progression? Barriers? Strips of unburned shrubs near water bodies.

Data sets not being (fully) used

- **Sentinel 1 & 2.** Issues w/acquisition over ABoVE domain. Can NASA push for more acquisitions and/or stage Sentinel data on ASC?
- **AHAP** (Alaska High Altitude Photography Ortho-imagery, 1978 – 1986). Could be used for change detection
- **NGA.** More projects could do more w/these data, amazing resource. Tasking for next spring/summer due by mid-Jan
- **G-LiHT** (Morton). Wealth of useful data, willing to share. Limited upcoming flights.
 - Flew over fire chronosequence, 440 fires from 1950 – 2013. Could inform succession
 - Pre and post-fire transects on Funny River Fire (Kenai)
 - Photoplots on 20 km grid. Low altitude stereo photos. 75 of 350 stands burned (pre-fire photos)
 - Can do shrub characterization, but S of Brooks Range.
 - D Morton can stage flight lines and canopy height models on ASC. 300 – 350m swaths
- **AIRIS** (Alaska Integrated Resource Inventory System). In 80s, FS tested inventory system using Landsat, high and low-altitude photos, ground plots for AK's inaccessible forests.
- **NGEE-Arctic** lidar acquisitions around Barrow, Tulik
- **Wulder's lidar** transects in Canada (25,000 km)
- **Lightning data** from Canada
- **Energy companies.** Have wealth of data on veg, etc., but won't share.

Air campaign

- **Tundra** is an airborne data gap
- Need to consider **temporal aspects** of acquisition (early, mid, late season). Probably some current constraints on NASA planes/instruments
- **Sensors.**
 - AVIRIS (400– 2500 nm), MASTER (thermal), lidar
 - LVIS lidar may be too coarse, Landsat res
- Need to drive with **big science questions**
 1. **Post-fire subsidence.** Simple question but BIG issue & implications. Can we get large-scale subsidence right after, 1 yr, 2 yrs after fire?
 2. **Pre-post fire.** Targeted acquisitions in areas expected to burn. Sample both surface characteristics and trace gases. Not easy to do: smoke, turbulence, dangerous. Could really benefit from a scoping study. Prelim analysis of how many fires we could feasibly do this for (progression, meteorology, smoke, flight conditions).
 3. **Post-fire recovery.** Really pushing succession patterns forward by mapping species, regional trajectories, coupling w/severity & other geospatial information. Possible to detect changes?
 4. **Tree mortality.** Mapping dead trees (high-res lidar/hyperspectral). Characterize strips of mortality, esp across years. Potential to capture 'mortality events'. Could be really helpful to link with field/inventory, spatially extending. Large-scale vulnerability question.