

Cross-Disciplinary Breakouts

- Notional breakouts (chair): rooms
 - Disturbance – Vegetation (Brendan Rogers) RM 155
 - Wildlife – Hydrology / snow (Laura Prugh) RM 165
 - Carbon – Disturbance (David Butman) Plenary
 - Permafrost – Carbon – Hydrology (Tom Douglas) 160
 - Carbon – Modeling – Scaling (Abhishek & Josh) 150
- Assign / volunteer a rapporteur

Modeling groups may want to break into various sub-groups

- Ideas on other possible cross-cutting themes?
- Volunteers to lead breakout groups welcome

Breakout charge

How can the various disciplinary (thematic WG) efforts inform more interdisciplinary efforts?

- Leverage efforts *across* WGs
- Broaden the development of synthesis activities(?)
- Get into (more) specifics re: data & knowledge gaps...
 - Field mmts & remote sensing
 - Modeling efforts
- Scaling considerations
 - How will you/we link field to airborne to satellite data?
 - Which data sets are most advanced to address this?
 - How can we best address scaling using data-driven models?
- How does / can the Airborne campaign data help address these questions / objectives?

Carbon-hydrology-permafrost- disturbance break-out

- Merge of break-outs
- Database of thermokarst locations (Chip)? Olefeldt, Lewkowicz (Banks island, tools relevant though)
- Outside natural cycle/increasing frequency?
- Canadian permafrost network/database (Merritt)
- UAVSAR for frequency/size change – link with drone/river discharge data
- Fate of carbon from thermokarst/slumping: aquatic/sediments/atmosphere? Attribution?
- Vegetation as proxy for subsurface hydrological change

How to leverage ABoVE measurements for these subsurface(1-2 m) processes?

- 3 m deep groundwater detection in CA Central Valley from drone radar
- Arp paper: SAR for frozen/floating ice boundary
- Some GPR datasets as best bet
- Knowledge gap for 0.5-5 m within ABoVE
- AEM data as a need for increased sensitivity over larger extents
- NISAR panarctic ALT map? Technological limitations

Fire disturbance

- 2007 Anaktuvuk river fire well monitored (Adrian), otherwise little data
- Longer-term (decadal) C dynamics after fire in permafrost terrain?
- Little known on tundra fire compared boreal forest, very limited sampling
- Gap: post-fire fluxes in permafrost terrain

GPP-permafrost emissions: net C exchange

- Wetting-drying (NGEE Arctic), Ted Schuur: first GPP increase, then wetter sites back to starting point (neutral)

*Chronosequences (space for time) from (In)SAR, for example soil moisture

Disturbance in models

- Link with models for fire disturbance and recovery?
- GPP better estimated with SIF instead of traditional VI, phenology better captured in shoulder seasons
- Models do not capture late-season respiration well
- Koven (2015): CLM study about sink-source from panarctic talik formation including fire. Fire accelerates permafrost degradation.
- Pest outbreaks: beetle infestation -> more or less flammable -> Interactions between disturbances not included in models (or big differences between models)

Misc

- Temporally episodic, spatially fractal events: need for experimental/mechanistic data
- ABoVE tools useful for scaling?
- FirEX as example of a multi-agency collaboration
- Phase 3: more field sites a possibility?
- Coastal erosion along Arctic: needs repeat (LiDAR data 10 years ago) for long-term record (on purpose left out in ABoVE from the beginning)
- Anthropogenic/linear cutline disturbance (oil/gas): what are the effects?
- Pre-sampling before opening up ANWR (Nolan photography)

Super sites

- ‘super’ sites with coincident field, airborne and spaceborne measurements for increased mechanistic understanding – already partly accounted for in airborne planning
- Anaktuvuk river fire, Delta junction, Healy, Big Trail Lake, Barrow, YK delta, Bonanza Creek, Wolf Creek, Scotty Creek currently as heavy monitored sites (O. Sonnentag sites)
- Drone/UAS measurements
- Identifying which measurements and disturbance history per site

Synthesis opportunities?

- Synthesis over all towers finalized/ongoing (J. Watts, S. Natali).
- Towers cover different ecoregions, yet not disturbance.
- Time perspective over disturbance events: how long do we need to measure? Space for time?
- International tundra experiment: plot level spectra
- Terrestrial-aquatic linkages
- Potential activity: identify signals of these disturbances

- How to estimate C, water and energy fluxes from fires? Multiple methods to estimate uncertainty.
- Relevance for forest/fire management in context of time scales (fire cycle of +/- 100 years, mismatch with operations)
- Partitioning of C in CO₂, CH₄, CO emissions → emission factors from flaming/smoldering phases → highly uncertain

