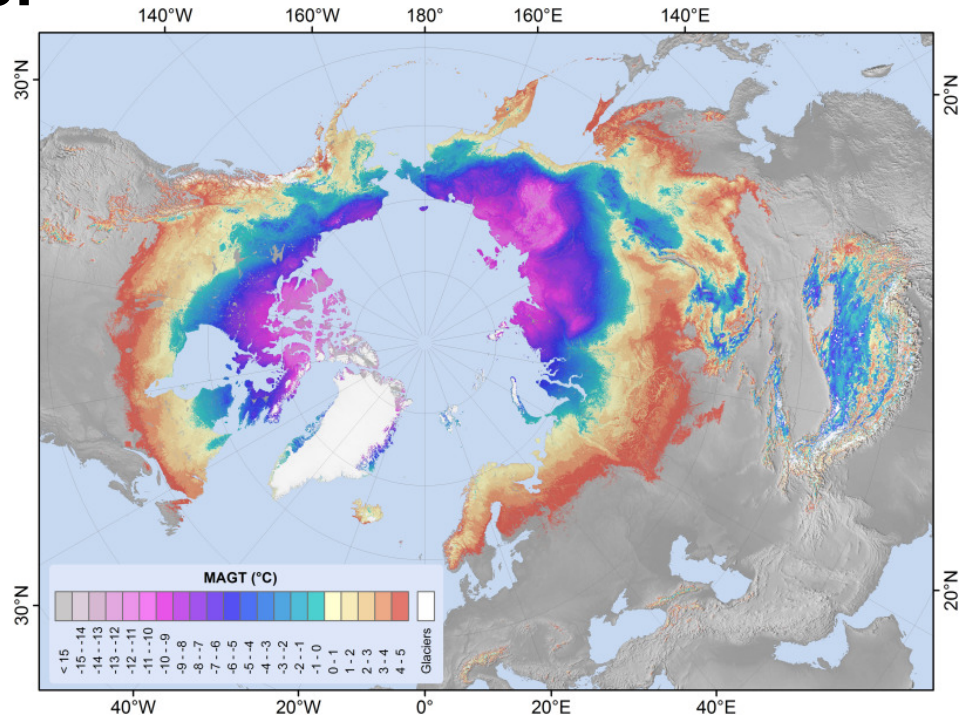
# Case Study 2: Cross-Analysis of HotSpot vs GT/ALT model

## Cross Analysis of Data Products

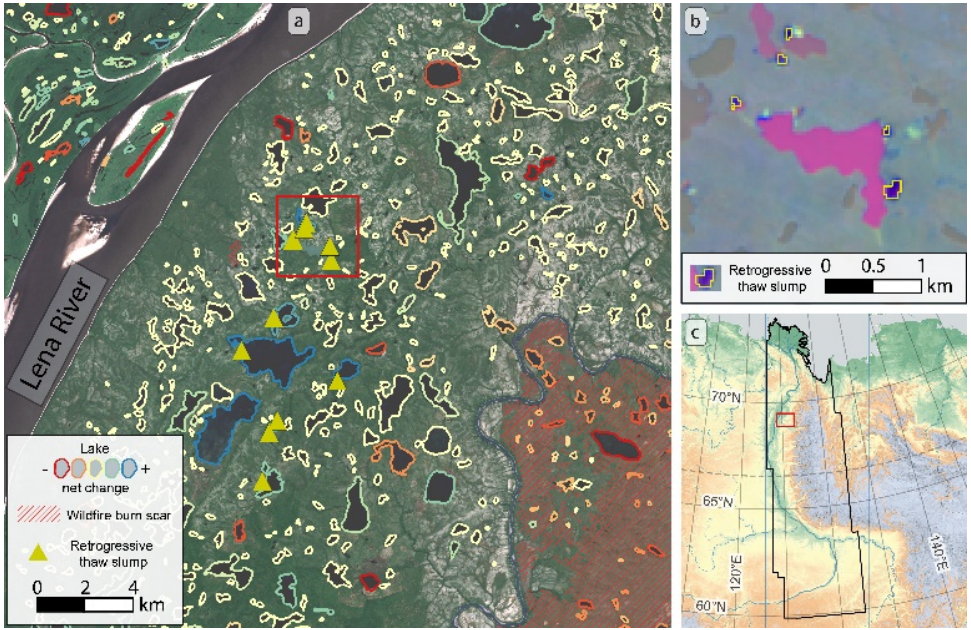
1. GlobPermafrost Hot-spot Regions of perma frost change products
- Landsat Trends: 30m, 1999-2014
- Lake dynamics, Thaw slumps, fire scars
- > 600k Lakes
- ~ 2.3 Mkm²

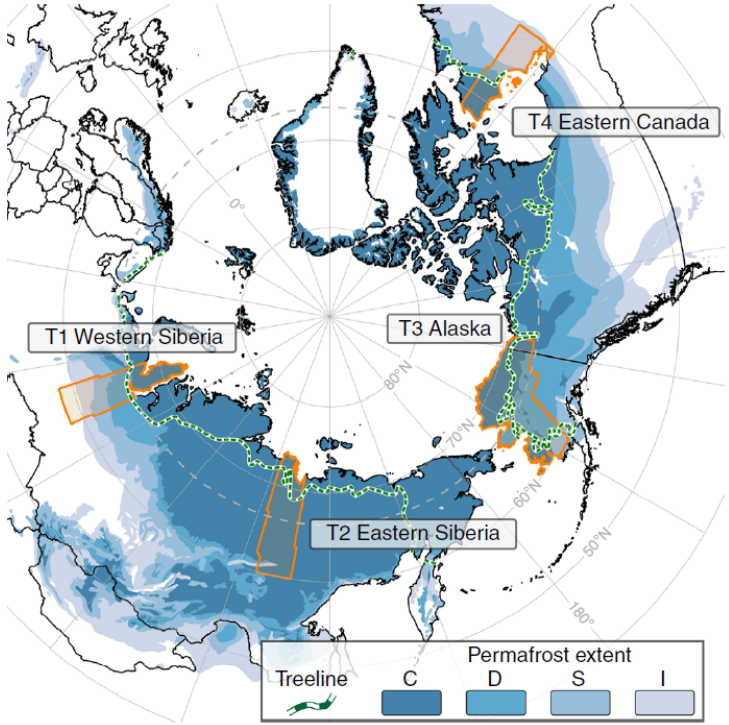
2. CCI Permafrost Data products
- ALT, Ground Temperature, PF probability
- Dynamic/change (v1/2)




Obu et al., 2019

# Case Study 2: Cross-Analysis of HotSpot vs Ground Temperature ALT model



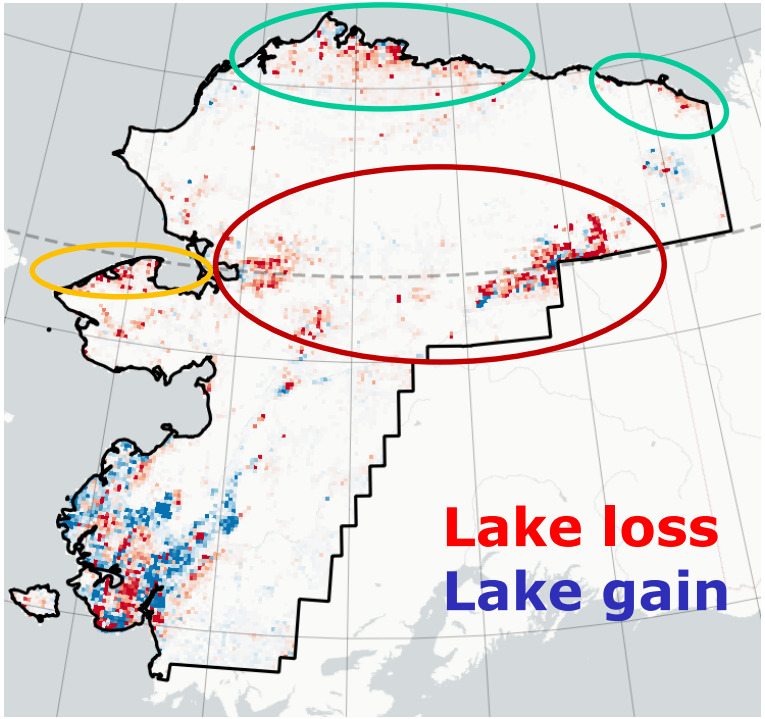

Figures: Nitze et al., 2018

# Science Case Studies

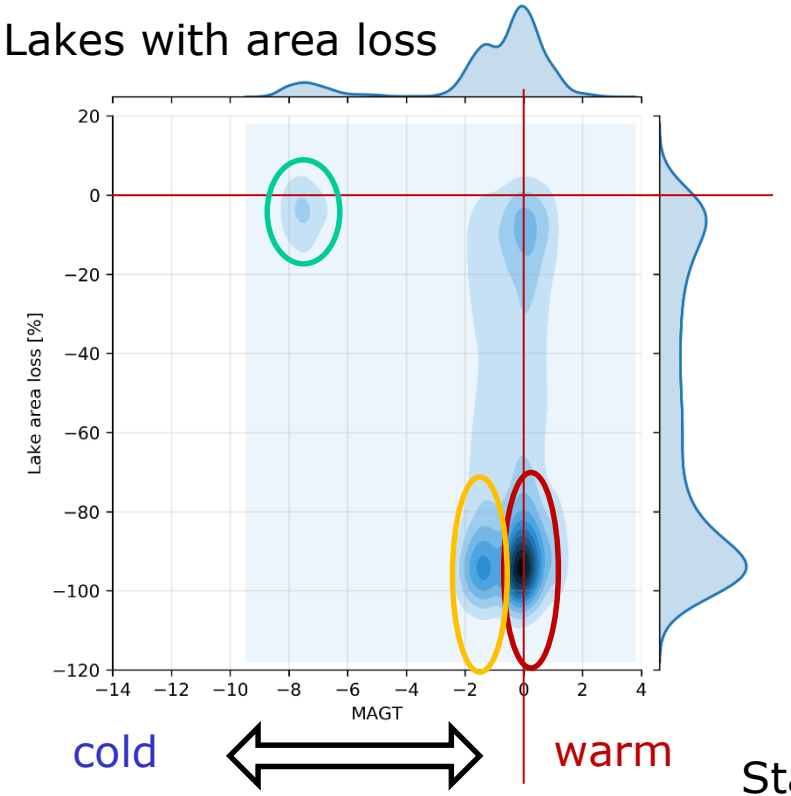
**1. Are Ground Temperature (GT) and Lake Drainage related?**

**2. Do fires impact the Active Layer Thickness (ALT)?**

# Lake Drainage

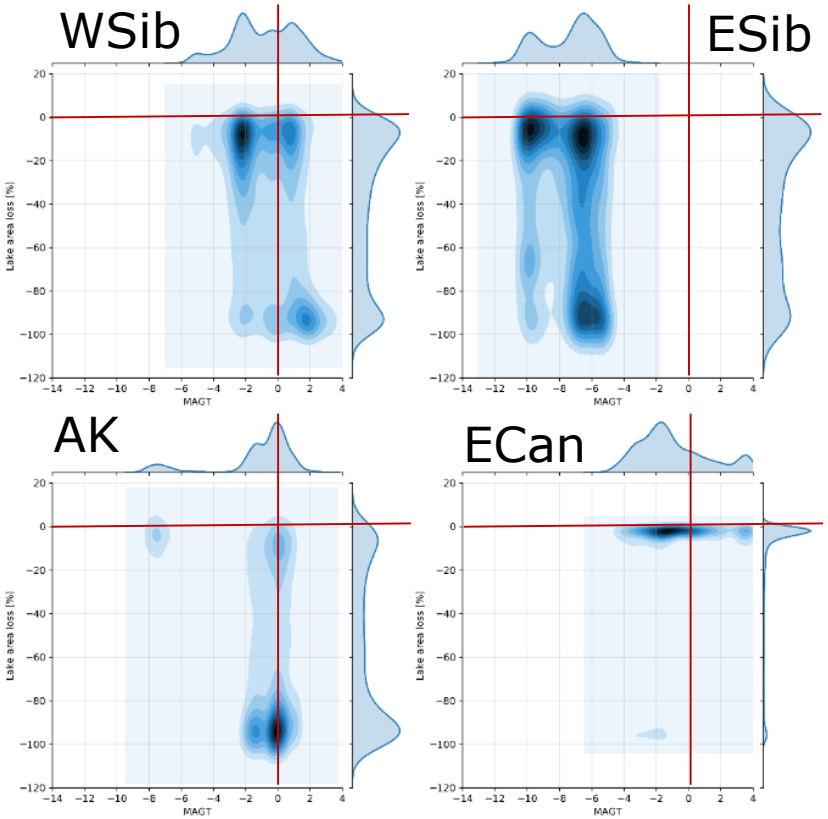


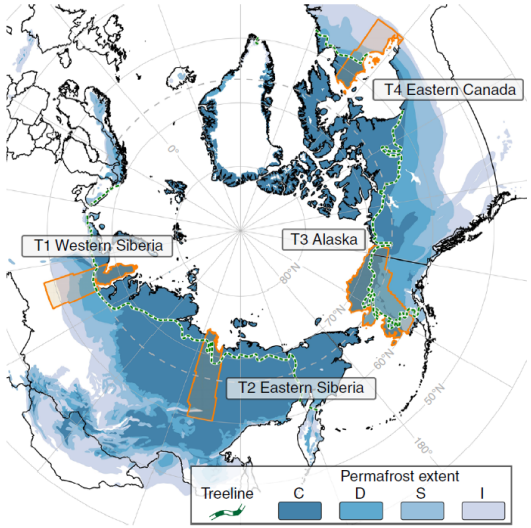

Net lake change in T3 Alaska
1999-2014 (Nitze et al., 2018)




Static PF-GT

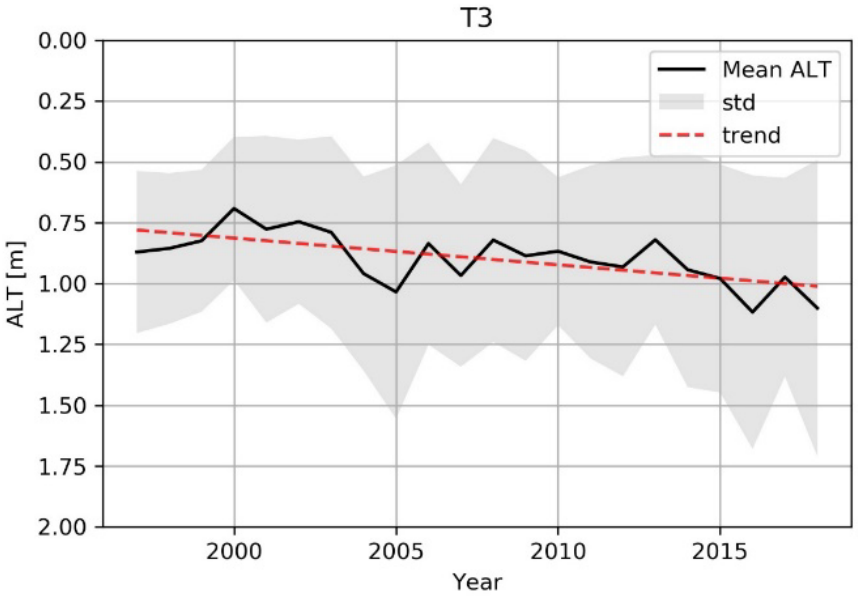
# Lake Drainage



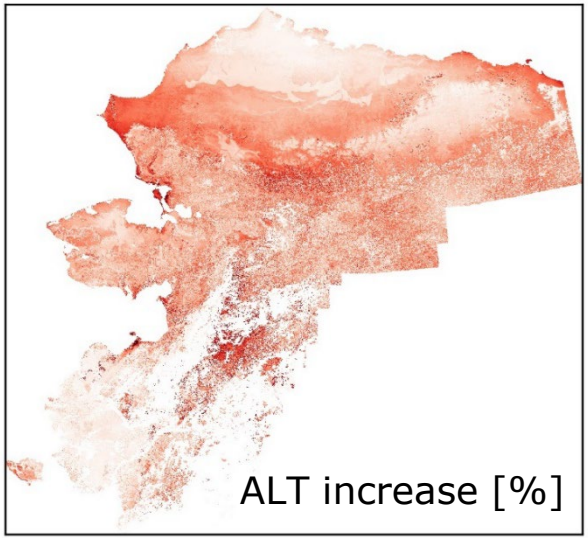




- Multimodal distribution
- Regional context
- Hard to generalize
- Full drainage rather in „warm“ PF

# Science Case Studies




Trends in Active Layer Thickness
(CCI PF Products v2)



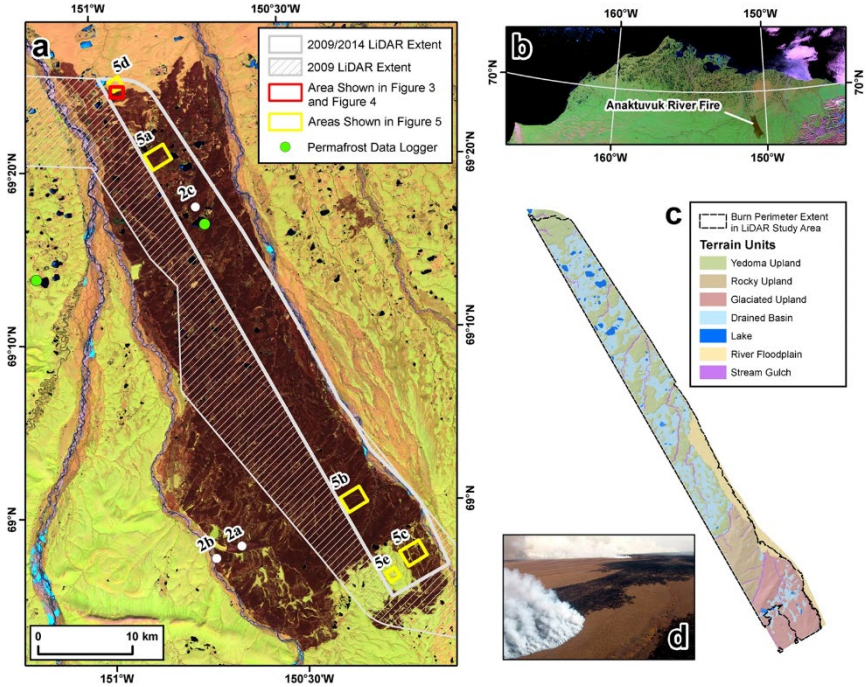

Deepening Active Layer

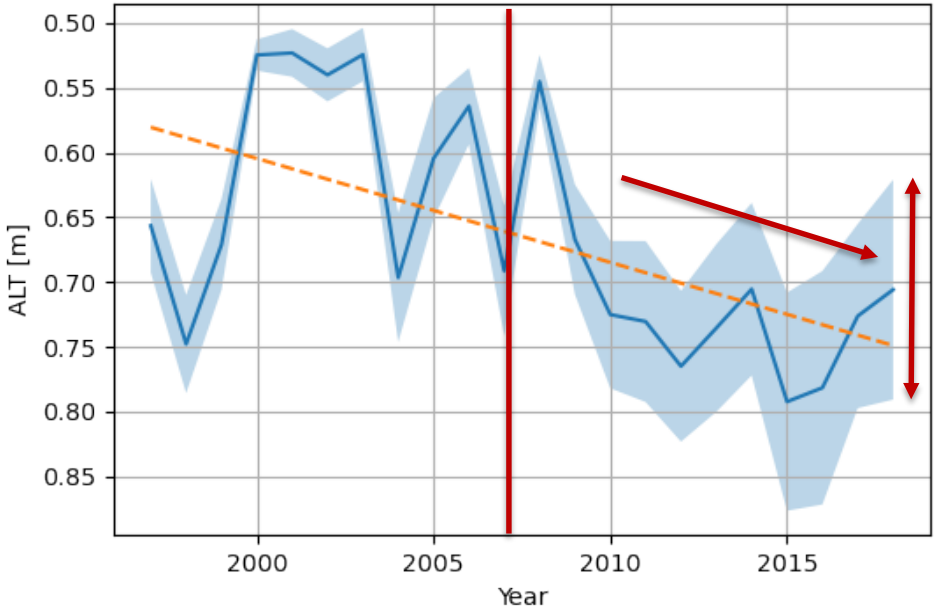
More variability

Strong regional differences

# Fire ALT interactions

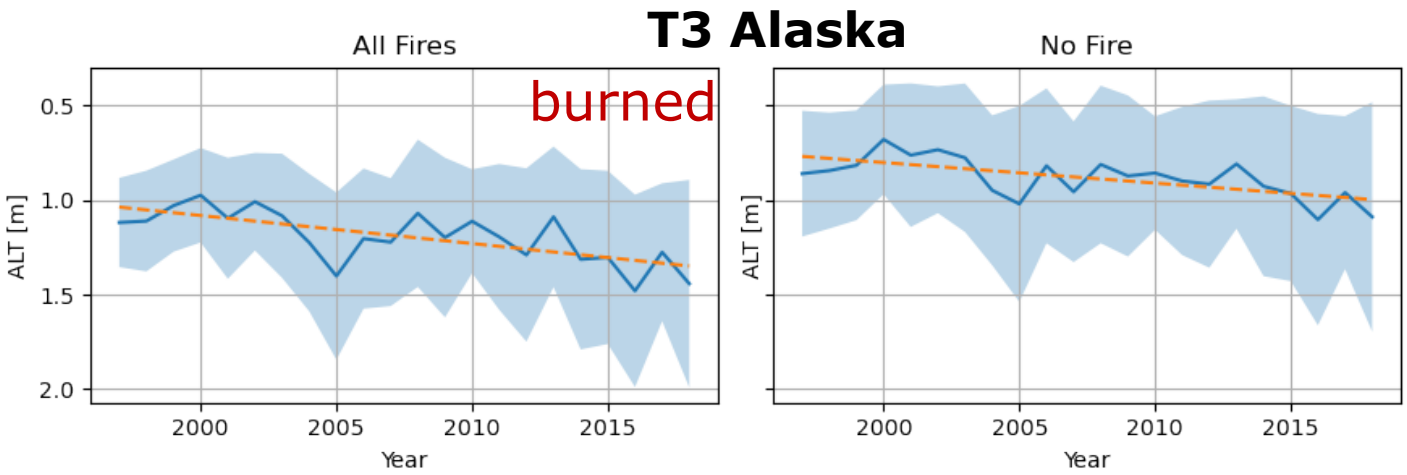
## Anaktuvuk Fire




Jones et al., 2015, Scientific Reports

# Fire ALT interactions




ALT change 1997-2018

| | Fire | | No Fire | |
|---|---|---|---|---|
| Region | *Mean* | *Std* | *Mean* | *Std* |
| **T1** | +40.10 | +102.23 | +49.11 | +47.44 |
| **T2** | +15.45 | +21.66 | +13.59 | +10.11 |
| **T3** | +30.05 | +95.73 | +29.74 | +59.37 |
| **T4** | +30.95 | +56.63 | +0.86 | +34.33 |

ALT increase in all sites regardless of burn

Increase in variability

Bias: Fires typically in warmer areas

# Outlook

## Conclusions

Some relationship of Disturbances + Ground Thermal Regime

Multiple regional Influencing factors

More analysis necessary

## Outlook

New CCI+ Product versions

More in-depth statstics

- Spatial
- Temporal
- Significance
- ...

More datasets

- Climate,
- new/updated data products