

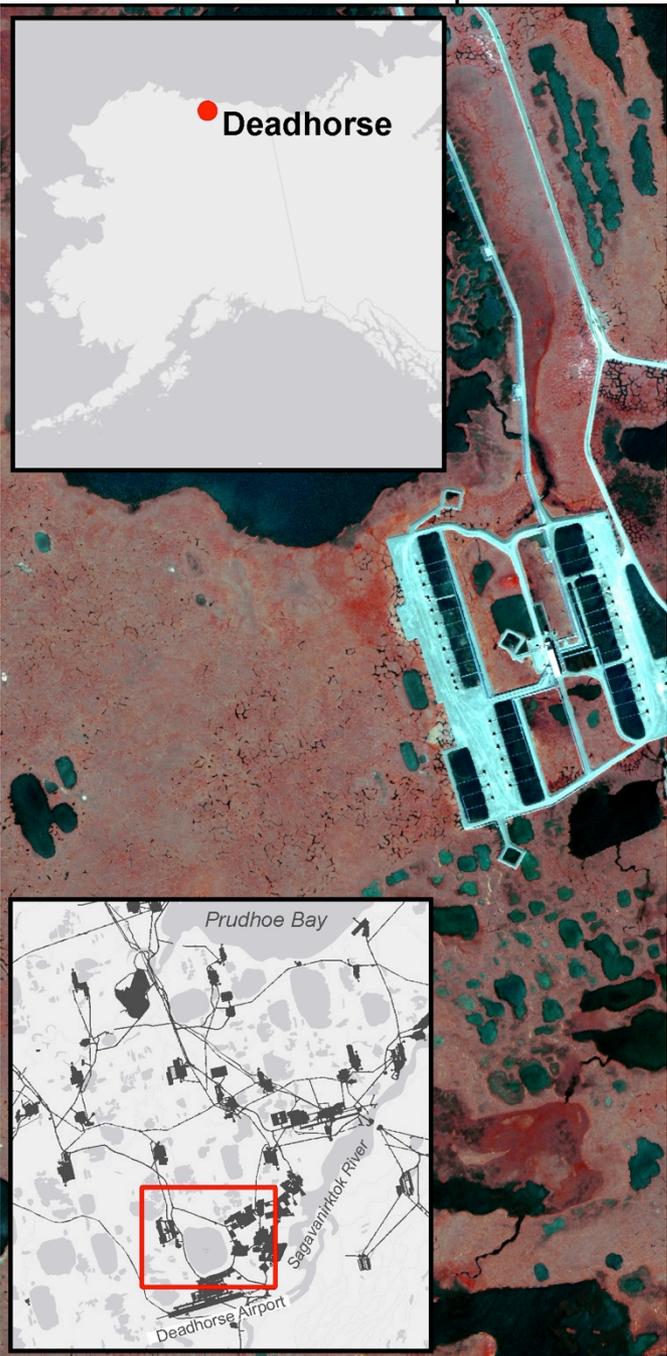
Case Study 1: Cumulative effects of climate and infrastructure in the Prudhoe Bay Oilfield, AK

Field work at Colleen site A, Prudhoe Bay, AK in 2014



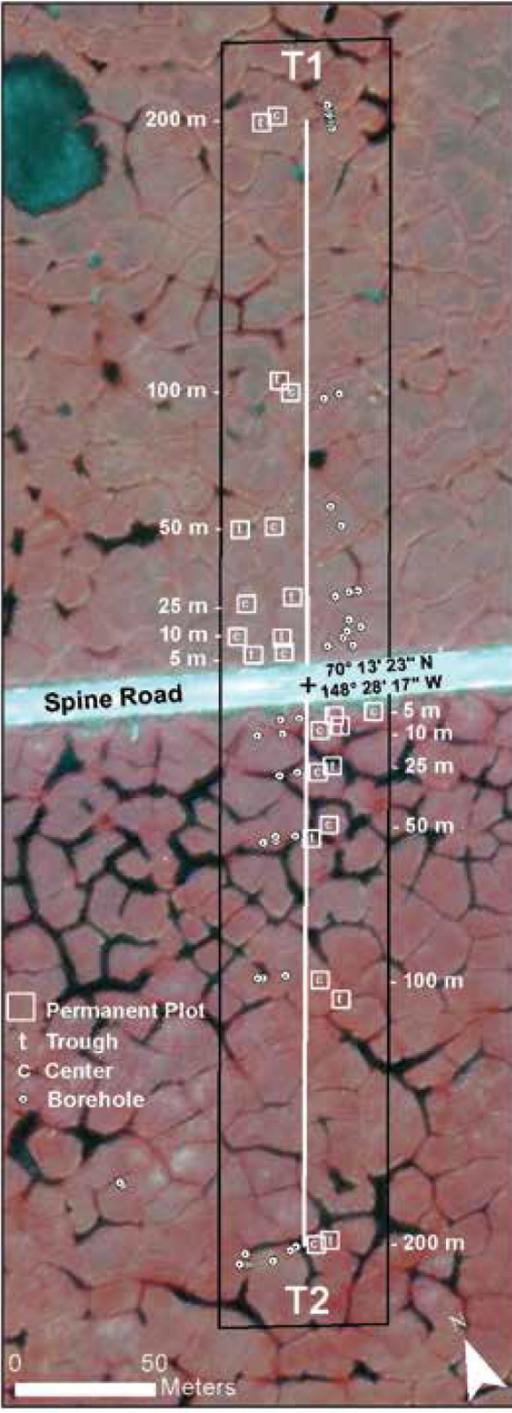
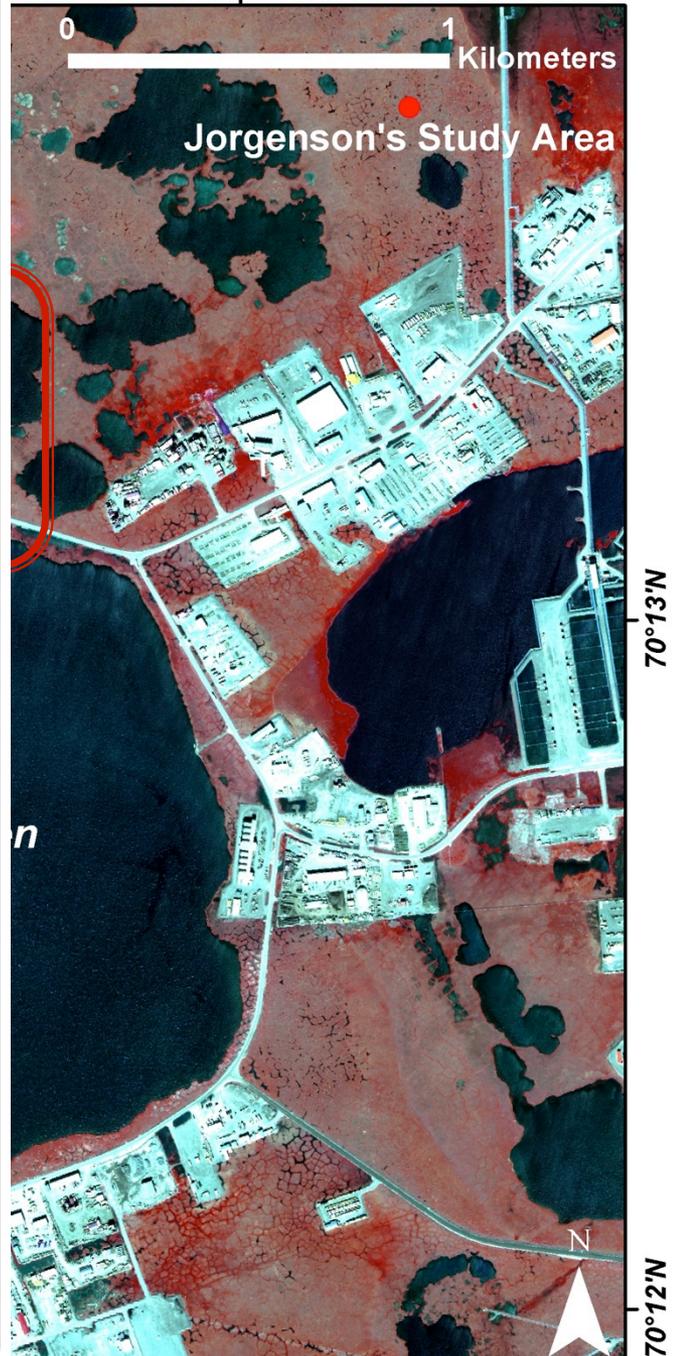
148°30'W

Deadhorse



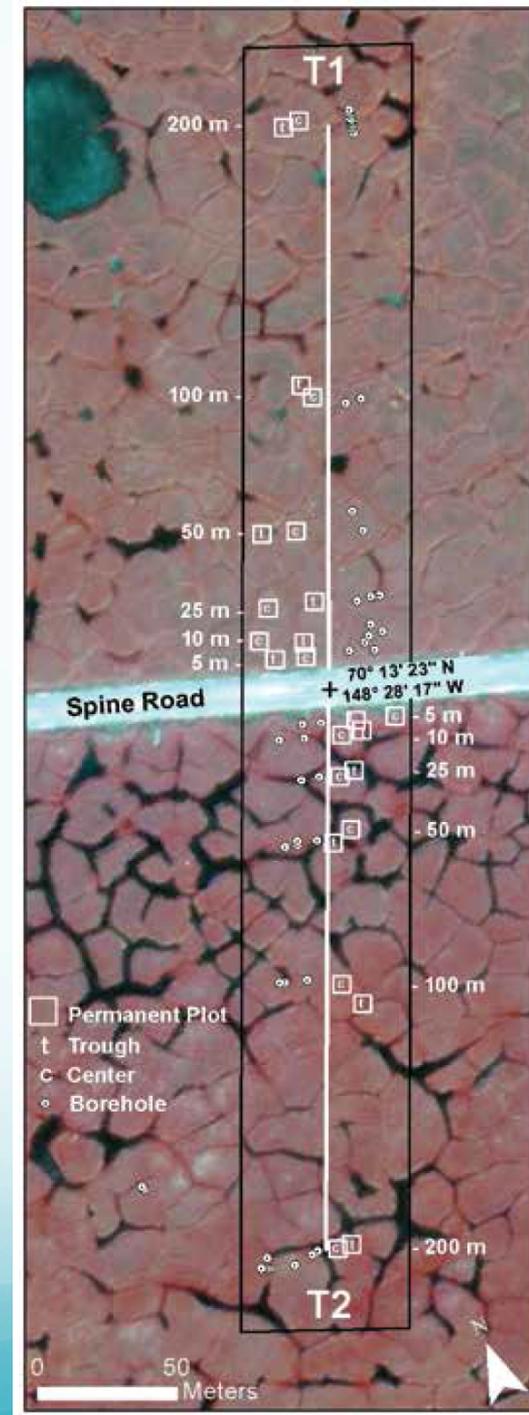
148°26'W

Jorgenson's Study Area



2014 sampling program - transects -

- We introduced two 200m long transects NE (T1) and SW (T2) of the Spine road
- Transects T1 and T2 were established to quantify changes to the vegetation, soils, active layer, and permafrost in relationship to distance from the road
- Pin flags were placed at one-meter intervals within 100m and then at 5-m intervals to 200 m
- Vertical 150-cm PVC posts with red stripes at 100 and 150 cm height were placed at 50, 100, and 200 m in order to locate the transects in winter
- At each pin flag, we measured thaw depth, terrain elevation, plant-canopy height, water depth, thickness of the dust horizon, vegetation type, and leaf-area index (LAI).



2014 sampling program

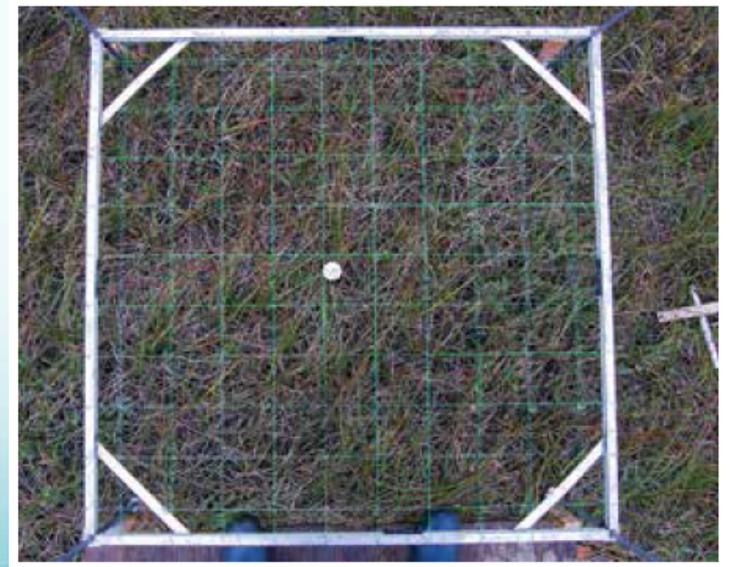
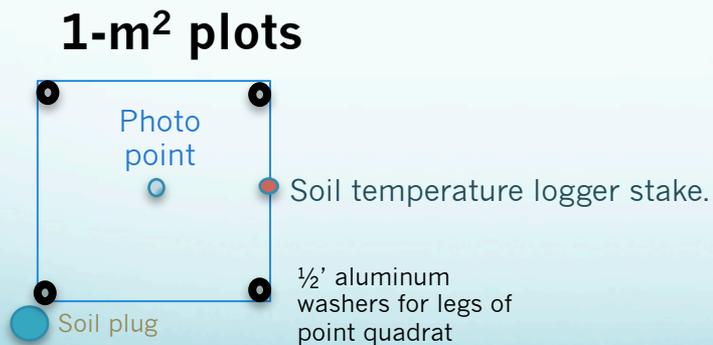
- permanent vegetation plots -

- 24 marked permanent vegetation plots are located in polygon centers and troughs of ice-wedge polygons at 5, 10, 25, 50, 100, and 200 m from the road
- Environmental data were collected including GPS location, elevation, slope, aspect, landform, site and soil moisture, disturbance, microsite relief and thaw depth
- Lists and voucher collections of all vascular plants, mosses and lichens were collected
- Moreover, we measured LAI at each plot and took soil cores for soil description and laboratory analysis

2014 sampling program

- permanent vegetation plots -

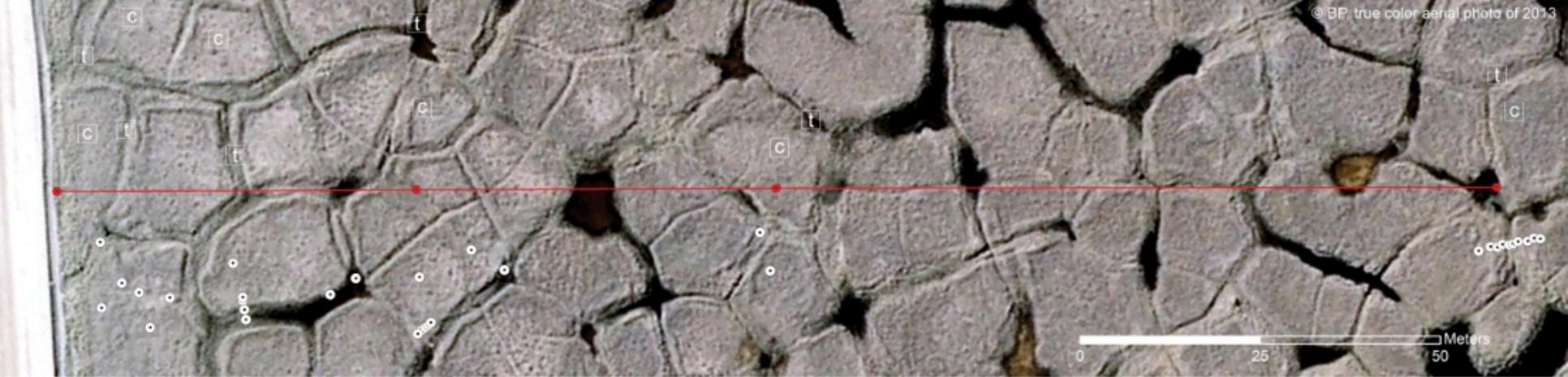
- Installation of 130 Thermochron iButtons for soil (0, -20, -40 cm) and air (10, 20, 50, 100, 150 cm) temperature logging every 4 hours over 1 year (PLUS 3 logger in a pond)
- 57 permafrost boreholes are located at the same distances from the road in centers and troughs were introduced



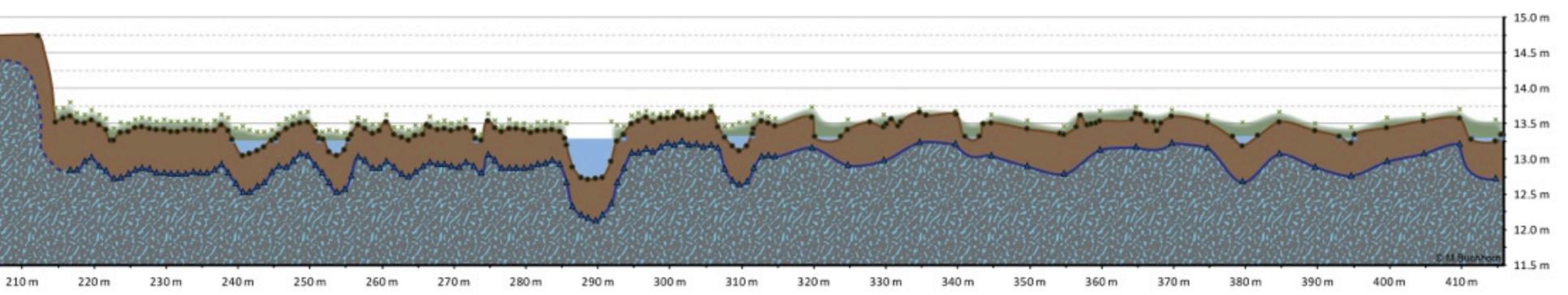
Topographic survey

- Location and elevation of all boreholes, transects, vegetation plots and other reference points were surveyed using a combination of a GPS realtime kinematic (RTK) system (Topcon HyperLite +) and a robotic imaging system (Topcon IS3)
- all measurements were connected to the stable NOAA (National Oceanic and Atmospheric Administration) National Geodetic Survey (NGS) benchmark point TT 3749
- A total of 1038 points were surveyed

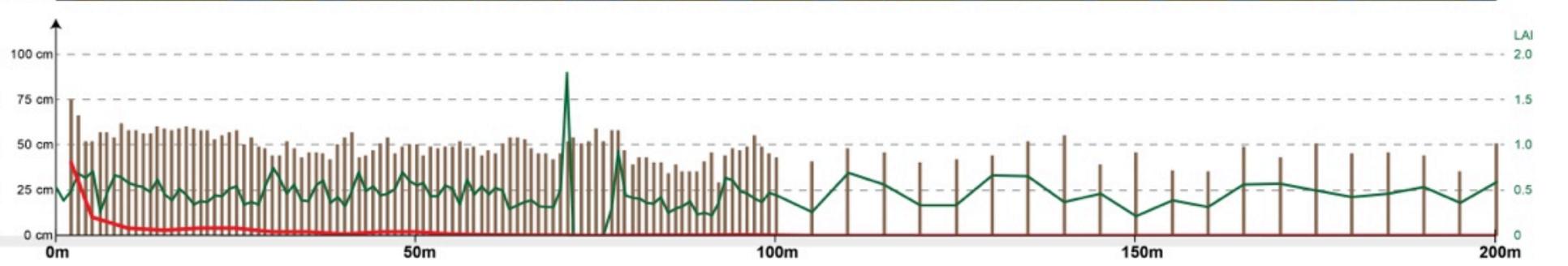


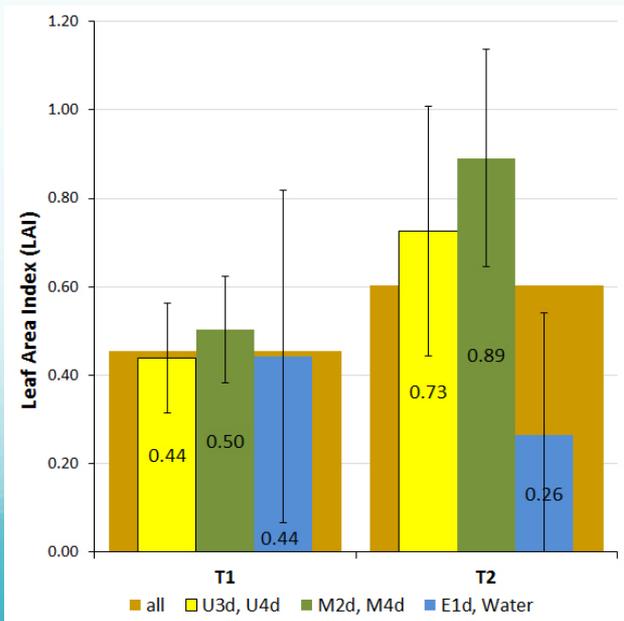
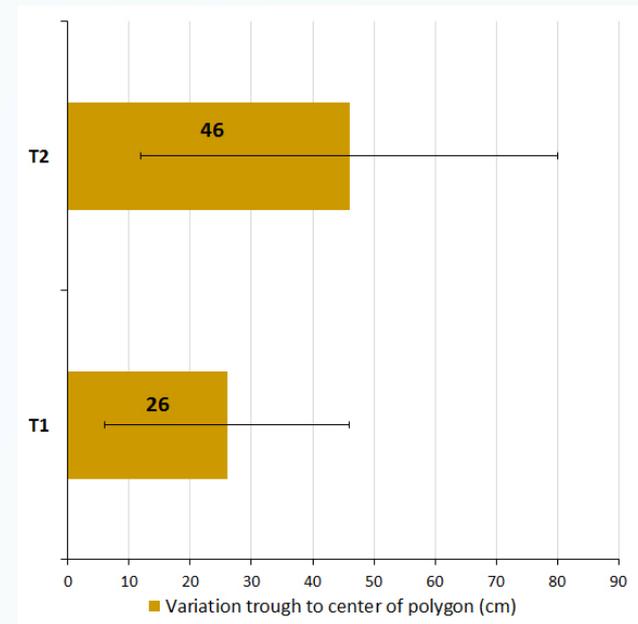
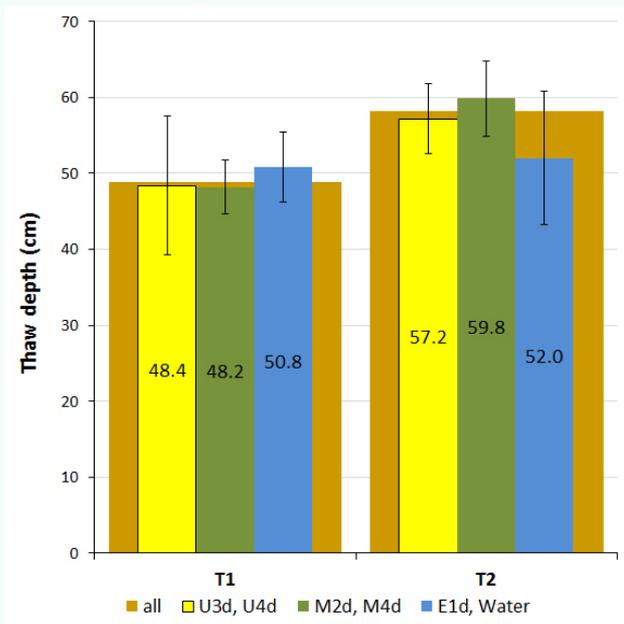


Road 0m 50m 100m 150m 200m NE
Transect T1



Road 0m 50m 100m 150m 200m NE
Transect T1





- Transect T2 shows a nearly double trough to center of polygon contrast
- Increased thaw depths at the south side of the road (T2) for all vegetation communities
- Transect T2 shows higher productivity compared to transect T1 expressed by higher LAI

Thanks for your attention.

