NGA295:

Leaf area index (LAI), Teller site, Seward Peninsula, Alaska, 2022

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Description

Leaf area index (LAI) sampled from locations on the Teller MM27 NGEE-Arctic site, Seward Peninsula, Alaska. These data were collected in support of the ongoing NGEE-Arctic and NASA ABoVE data synthesis work. Samples were collected in July 2022 at 100 locations that cover the down slope half of Teller MM27 hillslope. This data package includes sample information and LAI data (.csv), an ESRI shape file (.shp) and a Keyhole Markup Language (.kml) that define the location and area of each LAI measurement. Metadata files include data descriptions (_dd.csv) for tabular data and file level metadata (.csv).

Methods

Leaf area index (LAI) was measured under sunny, clear sky conditions using a LAI-2200C (LI-COR Biosciences, Lincoln, NE, USA). The measurements were collected using one LAI-2200 wand and console, with a 45° restrictor cap installed. Before measurement, a "4A" sequence was collected to enabled scatter correction during data processing. This sequence consists of a measurement with the diffuser cap installed in full sun, a measurement with the diffuser cap installed in full shade, a measurement with no restrictor cap installed in full sun, and a measurement with the 45° restrictor cap installed in full sun. This process was repeated every 10 sample locations.

We collected one "above" and multiple "below" (>4) LAI measurements at each sampled location, with the 45° view angle of the sensor perpendicular to the sun. In regions with low-stature plants, 5 "below" LAI measurements were collected at the center and four corners of a 4 x 4 m square (see illustration below). At locations with tall shrubs, multiple LAI measurements were collected under the targeted shrub patch (see illustration below). Values reported are an average of the readings for each location.

LAI values were computed using the software application FV2200 v 2.2.1 (LI-COR Biosciences, Lincoln, NE, USA). Readings were first scatter corrected by applying the "4A" sequence taken at the start of every tenth location. Then a mask was applied to remove the outer ring from the integrated LAI measurement. Finally, LAI was calculated by comparing each of the "below" readings for a given location with the "above" reading for that location.

The GPS coordinates for each of the sample locations was measured using a portable Trimble Geo7X differential GPS connected to a Zephyr Model 2 Dual Frequency GNSS antenna (Trimble Incorporated, Sunnyvale, California, USA). At each location, we logged a point

measurement every second for at least 1 minute. We post-processed the location using the nearest available base-station data from the Trimble Reference Network (https://www.trimble.com/trs/findtrs.asp). At sampled locations with low stature vegetation the GPS location was recorded in the center of the sampled grid. In locations with tall, dense shrubs the GPS location was recorded on the edge of the region of the shrub patch.

The region of interest (either plot or shrub patch) for each LAI measurement was manually identified based on dGPS location, field notes, and high resolution UAS imagery. The region of interest identifier that corresponds to the LAI sample identifier is included in the attribute of each polygon.
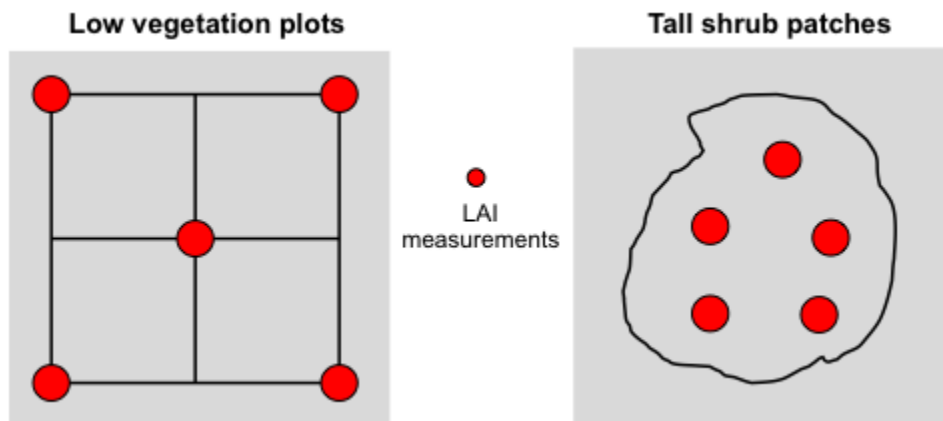

Illustration of leaf area index (LAI) collection methods. In low-vegetation regions (e.g., tussock and low shrubs), LAI was collected using a plot sampling method as shown on the left. In tall shrub regions, LAI of the shrub patches was collected by randomly sampling at multiple locations (>4) of the shrub patch, as shown on the right.