aava_atlas1_dwalker_2000_readme_metadata.pdf

AAVA readme file for ATLAS-1 (Atqasuk, Barrow, Ivotuk, Oumalik) Vegetation Plots (July 19, 2016)

Dataset Title: Alaska Arctic Vegetation Archive: ATLAS-1 (Atqasuk, Barrow, Ivotuk, Oumalik) Vegetation Plots

Dataset Author: Donald A. ‘Skip’ Walker

Alaska Arctic Vegetation Archive Dataset Name: atlas1_dwalker (ATL1_DW)

Dataset Description:

The ATLAS-1 dataset is part of larger NSF-funded Arctic Transition in Land-Atmosphere System (ATLAS) project. ATLAS-1 contains the North Slope portion of the project with 15 releves located within 8 grids at Barrow, Atqasuk, Oumalik, and Ivotuk. The full ATLAS Transect also includes locations at Council and Quartz Creek, which are in the ATLAS-2 dataset (Raynolds et al. 2002). The focus of the ATLAS project was to improve understanding of controls over spatial and temporal variability of terrestrial processes in the Arctic that have potential consequences for the climate system, i.e., processes that affect the exchange of water and energy with atmosphere, the exchange of radiatively active gases with the atmosphere, and delivery of freshwater to the Arctic Ocean. The purpose of the ATLAS vegetation studies was: 1) to characterize the major zonal vegetation types found along the North Slope climate gradient, 2) to quantify differences between acidic and non-acidic tundra along the same gradient, and 3) to investigate relationships between plant biomass, Leaf Area Index (LAI), and Normalized Difference Vegetation Index (NDVI). The data reported here are from a National Science Foundation funded, ATLAS study by D. A. Walker and colleagues titled Arctic Climate Change, Substrate and Vegetation (OPP-9732706). The data from fieldwork conducted in 1998 and 1999 are in a data report by Edwards et al. (2000).

Grids were delineated as follows: 100 x 100 m grids were established at Atqasuk (A-1 (1 grid)), Barrow (B-1 (1 grid)), and Ivotuk (I-1, I-2, I-3, I-4 (4 grids)), while at Oumalik 50 m x 50 m grids (O-1 and O-2 (2 grids)) were established. Subjectively located within the grids were one or more circular releves, the locations of which are described in remarks with respect to the grid. Releves were 10 meter in diameter, except for Oumalik, where they were 5 meters in diameter. Where present, location information for the releves within the grid is given in the remarks field. The 15 releves were obtained from homogenous areas of the dominant vegetation within the grids. In some cases where the vegetation was more heterogeneous, as for example in patterned ground, areas with frost boils, stone stripes, or closely

spaced water tracks, samples were divided into representative microhabitats with each releve representing a microsite within the grids. These microsites were labeled with the letters A, B, C as needed. Plots occur in 14 plant communities within 5 broad habitat types including: a) willow shrub vegetation of riparian areas and warm habitats (south-facing slopes) (1 plot); b) sedge grass and dwarf shrub mire and fen vegetation (2 plots); c) bog vegetation, acidic mires, including tussock tundra (6 plots); d) frost boil vegetation in nonacidic tundra (1 plot); and e) dry and mesic dwarf-shrub and graminoid vegetation on non-acidic substrate (5 plots).

GPS coordinates were obtained for most grid corners. Species and environmental data (including subjective site assessments, soil physical variables, spectral data) were collected in the field and plant samples (biomass) and soil samples (pH) were brought back to the lab for analysis. Also included in this report but not archived here are accuracy assessment data (plant cover and LAI) from the transects.

These data were subsequently used in several reports and publications listed below.

References:

Edwards, E. J., A. Moody, and D. A. Walker. 2000. A western Alaskan transect to examine interactions of climate, substrate, vegetation, and spectral reflectance: ATLAS grids and transects, 1998-1999. ARCSS-ATLAS-Northern Ecosystem Analysis and Mapping Laboratory data report. Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska, USA.

Jia, G. J., H. E. Epstein, and D. A. Walker. 2002. Spatial characteristics of AVHRR-NDVI along latitudinal transects in northern Alaska. Journal of Vegetation Science 13:315-326.

Riedel, S. M., H. E. Epstein, D. A. Walker, D. L. Richardson, M. P. Calef, E. Edwards, and A. Moody. 2005a. Spatial and temporal heterogeneity of vegetation properties among four tundra plant communities at Ivotuk, Alaska, U.S.A. Arctic, and Alpine Research 37:25-33.

Riedel, S. M., H. E. Epstein, and D. A. Walker. 2005b. Biotic controls over spectral reflectance of arctic tundra vegetation. International Journal of Remote Sensing 26:2391-2405.

Walker, D. A., G. J. Jia, H. E. Epstein, M. K. Raynolds, F. S. Chapin III, C. Copass, L. D. Hinzman, J. A. Knudson, H. A. Maier, G. J. Michaelson, F. Nelson, C. L. Ping, V. E. Romanovsky and N. Shiklomanov. 2003. Vegetation-soil-thaw-depth relationships along a low-arctic bioclimate gradient, Alaska: synthesis of information from the ATLAS studies. Permafrost and Periglacial Processes. 14:103-123.

Walker, D. A., H. E. Epstein, J. G. Jia, A. Balser, C. Copass, E. J. Edwards, W. A. Gould, J. Hollingsworth, J. Knudson, H. A. Maier, A. Moody, and M. K. Raynolds. 2003. Phytomass, LAI, and NDVI in northern Alaska: Relationships to summer warmth, soil pH, plant functional types, and extrapolation the circumpolar Arctic. Journal of Geophysical Research 108, 8169, doi:10.1029/2001JD000986, D2.

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Direct Plot Archive Record Link: http://geobotanical.portal.gina.alaska.edu/manager/catalogs/9781-atlas-1-atqasuk-barrow-ivotuk-oumalik-vege

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Link to VegBank Record: Add when available

Missing data: Indicated by ‘-9999’ for numerical data and ‘n/a’ for categorical or text data

Files Available for Download:

1) AAVA ATLAS-1 Modified Source Data

1a) ATLAS-1 Species Cover
aava_atlas1_dwalker_2000_spp_modsrc.csv
aava_atlas1_dwalker_2000_spp_modsrc.xlsx

These files contain species cover data for the ATLAS-1 vegetation studies in both comma separated value (.csv) and Microsoft Excel (.xlsx) format. The source of these data is the data report Edwards et al. (2000); Tables 4 and 5. Both the author's determination and the current taxonomy according to the Panarctic Species List (PASL) are listed. Taxa are listed in alphabetical order according to the accepted PASL name. Species cover classes are old Braun Blanquet: r (rare), + (common, but less than 1 percent cover), 1 (1-5 percent), 2 (6 to 25 percent), 3 (26 to 50 percent), 4 (51 to 75 percent), 5 (76 to 100 percent). In addition, cover of Saxifraga cernua (+) was added to the data from original data sheets for releve B-1A. In 3 instances, taxa were lumped into a single taxon in the PASL: 1) Cladonia squamosa (Cladonia squamosa and Cladonia subsquamosa), 2) Dicranum spadiceum (Dicranum angustum and Dicranum spadiceum), 3) Polytrichastrum alpinum

(Polytrichastrum alpinum and Polytrichastrum fragile). The field plot numbers in the source data are the author's. The main plot numbers in the Turboveg database are accession numbers and will differ. The author's plot numbers (location (first initial only), grid number, letter = releve (microsite)) are retained in the 'Field releve number' field in the Turboveg database.

1b) ATLAS-1 Environmental Data
aava_atlas1_dwalker_2000_allenv_modsrc.csv
aava_atlas1_dwalker_2000_allenv_modsrc.xlsx

These files contain modified environmental data for the ATLAS-1 vegetation studies in both .csv and .xlsx format. The source of these data is the ATLAS-1 data report by Edwards et al. (2000); Tables 1, 4, and 5, author communication, original datasheets, and Google Earth, in that order. The header data in the Turboveg database only includes a subset of these data. The field plot numbers in the source data are the author's. The main plot numbers in the Turboveg database are accession numbers and will differ. The author's plot numbers (location (first initial only), dash, grid number, letter = relevé (microsite)) are retained in the 'Field relevé number' field in the Turboveg database.

Improvements to the source data include: 1) Plant community B-1A was corrected to Carex aquatilis-Saxifraga cernua by the author, D. A. Walker after a review of the original data sheet and addition of that species from the sheet to plot B-1A, 2) Releve shape was provided by the author (D. A. Walker), and 3) Latitude and longitude are from the original datasheets except for Atqasuk which came from Table 1, Edwards et al. (2000) and are given in WGS 84. All of the data are for the SW corners of the grids except for O-1A and O-1B, where they came from the center of the grids, and Atqasuk where the location for the point in Table 1 is not given. Any other documented grid corners or centers, and in some cases the location of the releve with respect to grid points are recorded in the 'Remarks' field.

2) AAVA ATLAS-1 Turboveg Database
aava_atlas1_dwalker_2000_tv.zip

This file is the ATLAS-1 Turboveg Database file (.dbf). Turboveg is a software program for managing vegetation-plot data (see http://www.synbiosys.alterra.nl/turboveg/). The database includes both species cover and environmental header data. The header data for the database are consistent across all datasets in the AAVA. There are both required and recommended fields for inclusion in the AAVA. Consequently, only a subset of the modified source environmental data are included in the database and these may be cross-walked to the AAVA data dictionary. The species nomenclature used in the database is according to the Panarctic Species List (beta 1.0) created for the Arctic Vegetation Archive. The current data dictionary and PASL files

are required for the correct use of these data in Turboveg. These files are updated periodically and available for download via 'Data and Resources' section of the data record.

For the crosswalk from the modified source data to the Turboveg database, we made the following changes: 1) slope for the grid was used and in one instance it was given as a range. To crosswalk a mean was calculated and used for this plot, 2) aspect for the grid in degrees was used and numbers rounded up or down to the nearest cardinal, primary intercardinal, and secondary intercardinal direction, 3) soil texture for the grid was abbreviated to the major soil separates, plus gravel and loam, 4) latitudes and longitudes in decimal degrees WGS 84 were obtained by entering the original data recorded as Degrees Minutes Common Geocode into Google Earth. All of the data are for the SW corners of the grids except for O-1A and O-1B which came from the center of the grids, and Atqasuk where the location of the point from Table 1 at the grid is undefined. Any other documented grid corners (or centers) and the location of the releve with respect to the grid points are recorded in the 'Remarks' field, 5) approximate elevations were obtained from Google Earth for the documented grid corner, and 6) Species names that are missing from the PASL were crosswalked as needed and these changes are noted in the ‘Remarks’ field.

3) AAVA ATLAS-1 Ancillary Data

3a) ATLAS-1 Location Map
aava_atlas1_dwalker_2000_plotmap_anc.jpg

This file is a plot map of the ATLAS-1 vegetation grids. All releves occur within the grids.

3b) ATLAS-1 Plot Photos
aava_atlas1_dwalker_2000_plotphotos_anc.pdf

These are photos of the grids.

3c) AAVA ATLAS-1 Spectral & Biomass Data
aava_atlas1_edwards_2000_grid_spectrldataivotuk_anc.csv
aava_atlas1_edwards_2000_grid_spectrldataivotuk_anc.xlsx
aava_atlas1_dwalker_2000_grid_tbl6_biomass_anc.csv
aava_atlas1_dwalker_2000_grid_tbl6_biomass_anc.xlsx
aava_atlas1_dwalker_2000_grid_tbl7_lai_anc.csv
aava_atlas1_dwalker_2000_grid_tbl7_lai_anc.xlsx

Spectral, biomass, and lai data are associated with grid points. Location information for releves in relation to the grid is available in ‘Remarks’ in the modified source data and the Turboveg database.

Biomass data (Edwards et al. 2000, Table 6) were obtained from clip

harvests collected in 1999 from ten random 20-50 cm plots within each grid (except for Ivotuk 2 and 4) for aboveground biomass estimates. Clip harvests were sorted by major plant functional type in the field. Vascular plants were clipped at the top of the moss surface. Green stem bases below the moss surface were also included in the clip harvest. Mosses were carefully clipped at the base of the green portion. Shrub categories were divided into their foliar, reproductive and stem components. Samples were frozen and sent to the laboratory for drying and weighing.

LAI (Leaf Area Index) data (Edwards et al. 2000, Table 7) for Atqasuk, Barrow and Oumalik grids were collected between July 5-17, 1999 using a LICOR-2000 Plant Canopy Analyzer. An above-canopy reading (control) was followed by four below-canopy readings (which were taken above the moss layer) at 33 random points within each grid. At each point, the four below-canopy measurements were taken along the axes of the grid at 1 meter from the grid point. All measurements were taken facing away from the sun and an umbrella was used to shade the sensor on sunny days. LAI was calculated for each point.

In 1999, Howard E. Epstein (U. Virginia) collected spectral and biomass data from each of the four Ivotuk grids (MAT - moist acidic tundra (Ivotuk 1), MNT - moist nonacidic tundra (Ivotuk 3), ST - shrub tundra (Ivotuk 2), MT - mossy tussock tundra(Ivotuk 4)). Each grid was 100 x 100 m, with each grid point represented by a letter (A-K) and number (1-11) combination. Sampling periods are as follows (1 - June 6-11; 2 - June 18-25; 3 - July 2-10; 4 - July 15-26; 5 - July 29 to August 6; 6 - August 13-20; 7 - August 22-26). NDVI data were collected using an Analytical Spectral Devices, FieldSpec Pro. Data were collected preferentially during clear sky conditions and close to midday (10AM-3PM). The fiber-optic sensor with a 25 degree field of view was held at nadir above each releve at 1 m height, yielding a circular footprint of about 0.15 square-meters. Each measurement is the average of 5 samples taken at 1-second intervals. White reference calibrations were made prior to each measurement using a Spectralon plate, as well as a dark reference. LAI data were collected using a LICOR LAI-2000, with each data point representing one above-canopy measurement and four below-canopy measurements. One 20 cm x 50 cm quadrat of biomass was harvested for each grid point/date combination. Vascular biomass was clipped at the top of the moss layer, and the moss was clipped at the bottom of the green layer. Biomass was sorted into the following vegetation types: algae, moss, lichen, horsetail, other forbs, graminoids, deciduous shrubs, and evergreen shrubs. Graminoids were further sorted into live and dead, and shrubs were further sorted into wood, foliar live, foliar dead. Biomass samples were dried, weighed, and values presented as 0.1 g/square meter.

3d) ATLAS-1 Publications
edwardse_2000_datareport_westrnalaskaatlasgrids.pdf
jiag_2002_jvegsci_spatialpattrnndvi_latitudenaltrnsct.pdf

reidels_2005a_arctantarctalpresaar_spctrlresrchtundraivotuk.pdf
reidels_2005b_interjremotesens_bioticspectrlreflecarctictund.pdf
walkerd_2002_jgeophysres_phytomsslaindvi_atlas.pdf
walkerd_2003_permafrostperiglac_vegsoilthawatlasgrid.pdf

These are the Adobe Acrobat portable document files (.pdf) of all of the references cited in the dataset description (above) for the ATLAS-1 vegetation studies. Journal names are abbreviated using the standards for the abbreviation of titles of periodicals and serial titles.

4) AAVA ATLAS-1 Metadata
aava_atlas1_dwalker_2000_envlegend_metadata.pdf
aava_atlas1_dwalker_2000_readme_metadata.txt

These files include a legend for the environmental data and the readme metadata for the ATLAS-1 vegetation study plots.

Modifications to environmental source data:

The table below in comma separated values format indicates the modifications made to source data in the preparation of the AAVA ATLAS-1 Modified Source Environmental Data files (aava_atlas1_dwalker_2000_allenv_modsrc.csv and aava_atlas1_dwalker_2000_allenv_modsrc.xlsx) and fields that were used to crosswalk these data to the Turboveg database (aava_atlas1_dwalker_2000_tv.zip).

VARIABLE,IN ENVIRONMENTAL MODIFIED SOURCE DATA FILE,IN TURBOVEG FILE AS THE SAME NAMED FIELD,DATA SOURCE AND CHANGES MADE TO THE DATA
SITE,Y,N,"Table 1, Edwards et al. 2000. Turboveg field 'Location.'"
FIELD NUMBER,Y,Y,"Table 4, Edwards et a. 2000. For field releve number, the first letter is an abbreviation of the site (A-Atqasuk, B-Barrow, I-Ivotuk, O-Oumalik, the number indicates the grid number at that site (where there are more than one), and the second letter indicates individual releves at microsites within the grid. Turboveg field 'Field number.'"
SURFICIAL GEOLOGY - GRID DATA,Y,Y,"Table 1 grid data, Edwards et al. 2000. Turboveg field 'Surficial geology.'"
SURFICIAL GEOMORPHOLOGY - GRID DATA,Y,N,"Table 1 grid data, Edwards et al. 2000. Aided with Turboveg field 'Habitat type.'"
TOPOGRAPHIC POSITION - GRID DATA,Y,Y,"Table 1 grid data, Edwards et al. 2000. Crosswalked to Turboveg field 'Topographic position.'"
SLOPE - GRID DATA (DEGREES),Y,Y,"Table 1 grid data, Edwards et al. 2000. Slope is given as a range of degrees in one instance. A mean was calculated to crosswalk to Turboveg field 'Slope.'"
ASPECT - GRID DATA (DEGREES),Y,Y,"Table 1 grid data, Edwards et al. 2000. Aspect measurements were rounded up or down to the nearest cardinal, primary intercardinal, and secondary intercardinal direction to crosswalk to Turboveg field 'Aspect.'"

SOIL PH - GRID DATA,Y,Y,"Table 1 grid data, Edwards et al. 2000. Turboveg field 'Soil pH.' No information about the pH is provided in the report."
PLANT COMMUNITY NAME,Y,Y,"Table 4, Edwards et al. 2000. 'Plant Community' for site B-1A was corrected by D. Walker to CARAQUA-SAXCER after a review of the original datasheet for the releve where some data was left out of the species list."
RELEVE SHAPE,Y,Y,D. Walker communication. Turboveg field 'Releve shape.'
RELEVE AREA (SQUARE METERS) ,Y,Y,Original datasheets.
ORGANIC LAYER DEPTH (CM),Y,Y,Original datasheets.
SOIL TEXTURE (TOP MINERAL HORIZON),Y,Y,Original datasheets.
DATE OF SITE VISIT (YYYYMMDD),Y,Y,Original datasheets.
LOW SHRUB (PERCENT),Y,Y,Original datasheets.
DWARF SHRUB (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require and integer. Turboveg field 'Cover erect dwarf shrub.'"
PROSTRATE DWARF SHRUB (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
EVERGREEN SHRUBS (PERCENT),Y,N,Original datasheets.
DECIDUOUS SHRUBS (PERCENT),Y,N,Original datasheets.
FORBS (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
GRAMINOIDS (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
LICHENS (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
BRYOPHYTES (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
HORSETAILS (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
ROCKS (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
BARE SOIL (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
WATER (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet Turboveg standards which require an integer."
FROST SCARS (PERCENT),Y,N,Original datasheets.
TOTAL DEAD (PERCENT),Y,Y,"Original datasheets. Changed r (rare) and + (common, but less than 1 percent) cover values to 1 percent to meet

Turboveg standards which require an integer.”
HEIGHT OF CANOPY (CM),Y,Y,Original datasheets.
REMARKS,Y,Y,"Environmental, descriptive, and location data from original datasheets is recorded in the source and Turboveg 'Remarks' fields."
LATITUDE (WGS 84),Y,Y,"Original datasheets except for Atqasuk which came from Table 1, Edwards et al. (2000). Modified source data is in Degrees Minutes Common Geocode format for the SW corner of the grid except for O-1A and O-1B which came from the center of the grid and Atqasuk where the location at the grid is not defined. Any other documented grid corners are recorded in 'Remarks' field. These latitudes were converted to DD WGS 84 using Google Earth for Turboveg field 'Latitude.'"
LONGITUDE(WGS 84),Y,Y,"Original datasheets except for Atqasuk which came from Table 1, Edwards et al. (2000). Modified source data is in Degrees Minutes Common Geocode format for the SW corner of the grid except for O-1A and O-1B which came from the center of the grid and Atqasuk where the location at the grid is not defined. Any other documented grid corners are recorded in 'Remarks' field. These longitudes were converted to DD WGS 84 using Google Earth for Turboveg field 'Longitude.'"
ELEVATION (M),Y,Y,From Google Earth.