Pre-ABoVE: Arctic Alaska Vegetation, Geobotanical, Physiographic Data, 1993-2005

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Documentation Revision Date: 2016-12-14

Data Set Version: v

Summary

This data set provides the spatial distributions of vegetation types, geobotanical characteristics, and physiographic features for the Arctic tundra region of Alaska for the period 1993-2005. Specific attributes include dominant vegetation, bioclimate subzones, floristic subprovinces, landscape types, lake coverage, and substrate chemistry. This data set generally includes areas North and West of the forest boundary and excludes areas that have a boreal flora such as the Aleutian Islands and alpine tundra regions south of treeline.

The products included with this data set were developed from the Circumpolar Arctic Vegetation Map (CAVM), an international effort to map the vegetation and associated characteristics of the circumpolar region using a common base map (Raynolds et al., 2005). The map expands on the Alaska portion of the Circumpolar Arctic Vegetation Map (Walker and Raynolds, 2016).

This data set is distributed as 10 data files. This includes seven compressed directories (*.zip) containing shapefiles and three files in GeoTIFF (*.tif) format.

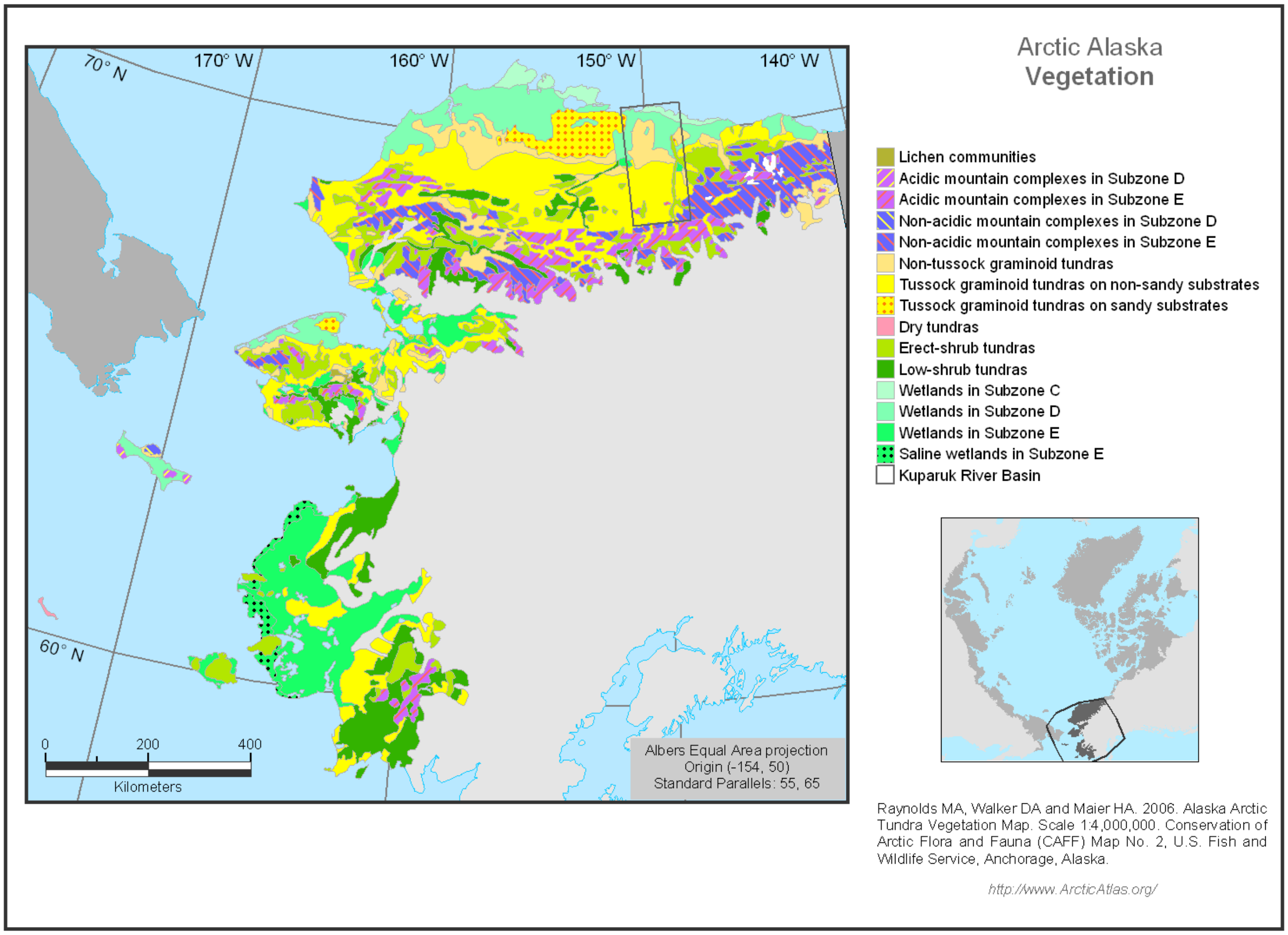

Figure 1. Arctic Alaska Tundra vegetation map (Raynolds et al., 2006).

Citation

Raynolds, M.K., and D.J. Cooper. 2016. Pre-ABoVE: Arctic Alaska Vegetation, Geobotanical, Physiographic Data, 1993-2005. ORNL DAAC, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1353

Table of Contents

1. Data Set Overview

This data set provides the spatial distributions of vegetation types, geobotanical characteristics, and physiographic features for the Arctic Tundra region of Alaska. Specific attributes include dominant vegetation, bioclimate subzones, floristic subprovinces, landscape types, lake coverage, and substrate chemistry data.

The products included with this data set were developed from the Circumpolar Arctic Vegetation Map (CAVM), an international effort to map the vegetation and associated characteristics of the circumpolar region using a common base map (Raynolds et al., 2005).

Project: Arctic-Boreal Vulnerability Experiment (ABoVE)

The Arctic-Boreal Vulnerability Experiment (ABoVE) is a NASA Terrestrial Ecology Program field campaign that takes place in Alaska and western Canada between 2016 and 2021. Climate change in the Arctic and Boreal region is unfolding faster than anywhere else on Earth. ABoVE seeks a better understanding of the vulnerability and resilience of ecosystems and society to this changing environment.

Related Data Set:

Walker, D.A., and M.K. Raynolds. 2016. Pre-ABoVE: Circumpolar Arctic Vegetation, Geobotanical, Physiographic Data, 1982-2003. ORNL DAAC, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1323

Acknowledgements:

These data were obtained from the Alaska Arctic Geoecological Atlas (http://agc.portal.gina.alaska.edu), which provides access to existing Arctic vegetation plot and map data in support of the ABoVE campaign.

Related Publications:

Raynolds, M.K., Walker, D.A., Epstein, H.E., Pinzon, J.E. and Tucker, C.J., 2012. A new estimate of tundra-biome phytomass from trans-Arctic field data and AVHRR NDVI. *Remote Sensing Letters*, *3*(5), pp.403-411. http://dx.doi.org/10.1080/01431161.2011.609188

Raynolds, M.K., Comiso, J.C., Walker, D.A. and Verbyla, D., 2008. Relationship between satellite-derived land surface temperatures, arctic vegetation types, and NDVI. *Remote Sensing of Environment*, *112*(4), pp.1884-1894. http://dx.doi.org/10.1016/j.rse.2007.09.008

Raynolds, M.K., Walker, D.A., Maier, H.A. 2005. Plant community-level mapping of arctic Alaska based on the Circumpolar Arctic Vegetation Map. Phytocoenologia. 35(4):821-848. http://dx.doi.org/10.1127/0340-269X/2005/0035-0821

Walker, D.A., Raynolds, M.K., Daniëls, F.J., Einarsson, E., Elvebakk, A., Gould, W.A., Katenin, A.E., Kholod, S.S., Markon, C.J., Melnikov, E.S. and Moskalenko, N.G., 2005. The circumpolar Arctic vegetation map. *Journal of Vegetation Science*, *16*(3), pp.267-282. http://dx.doi.org/10.1111/j.1654-1103.2005.tb02365.x

Walker, D.A., Gould, W.A., Maier, H.A. and Raynolds, M.K., 2002. The Circumpolar Arctic Vegetation Map: AVHRR-derived base maps, environmental controls, and integrated mapping procedures. *International Journal of Remote Sensing*, *23*(21), pp.4551-4570. http://dx.doi.org/10.1080/01431160110113854

2. Data Characteristics

Spatial Coverage: Arctic Alaska Tundra

Spatial Resolution: 15 km

Temporal Coverage: 1993-06-01 to 2005-03-30

Temporal Resolution: Annual

Study Area: (all latitudes and longitudes given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Circumpolar Arctic	-173.052	-138.542	71.37033	57.08472

Data File Information:

This data set is distributed as 10 data files: seven compressed directories (*.zip) containing shapefiles (*.shp) and three files in GeoTIFF (*.tif) format.

These data are a subset of the CAVM, expanded for the state of Alaska.

Shapefiles

The shapefiles and their descriptions are listed in the Table 1. The attribute descriptions of the individual shapefiles are listed in separate tables. The shapefile data are also provided as companion files in .kmz format for visualization in Google Earth.

These files provide the distributions of various features in the the Arctic Tundra within Alaska in *.shp format. The *.zip files contain the .shp, .shx, .dbf, .prj files, that support the shapefile and a .lyr file. Some of the files also contain additional files such as .sbn or .sbx (spatial index files). All shapefiles are stored in the GCS_WGS_1984 geographic coordinate system and Lambert Azimuthal Equal Area projection.

Table 1: Shapefiles and their descriptions

File Name	Description

aga_arctic_ak_vegetation_2005.shp	The vegetation of the Arctic Tundra within Alaska, north and west of the forest boundary
aga_arctic_ak_geobotanical.shp	Contains seven attributes: ZONE, PHYTO, CHEM, LAKEPIXCAT, LANDSCAPE, PHYSIOG, COMM. A layer file for each attribute is zipped with this shapefile.
aga_arctic_ak_bioclimate_2005.shp	Bioclimatic subzones from A-E where A is the coldest and E is the warmest
aga_arctic_ak_floristic_2005.shp	Floristic sectors of the Arctic Tundra within Alaska
aga_arctic_ak_landscape_2005.shp	Physiography of the Arctic Tundra within Alaska
aga_arctic_ak_substrate_chem_2005.shp	Identifies acidic areas, carbonate, neutral, saline, and glacier or ice cap areas of the Arctic Tundra within Alaska
aga_arctic_ak_lake_cover_2005.shp	Lake cover based on the number of AVHRR water pixels in each mapped polygon, divided by the number of pixels in the polygon; pixels within 2 km of the coastline were excluded to avoid ocean water.

Table 2: Geographic extent of the shapefiles

Data Files	North	South	East	West
All Shapefiles	71.37033	58.55006	-140.992	-173.0528

Attributes in the shapefiles

Table 3: aga_arctic_ak_vegetation_2005.shp

Attribute Name	Description
COMM	Vegetation types present in mapped polygons. It includes areas north and west of the forest boundary and excludes areas that have a boreal flora such as the Aleutian Islands and alpine tundra regions south of treeline. There are 33 vegetation mapping units that refer to physiognomic groups of plant communities on specific substrates or in different geographic regions of the map. The mapping units are named according to dominant plant functional types except in the mountains where complexes of vegetation are named according to the dominant bedrock (carbonate and noncarbonate mountain complexes). For additional details, refer to: http://www.arcticatlas.org/maps/themes/vegunit_hierarchy The 33 vegetation mapping units: **Barrens** B2.1. Lichens on lava (Seward Peninsula) B3d.1. Acidic mountain complexes (St Lawrence I.) B3e.1. Acidic mountain complexes (Brooks Range) B3e.2. Acidic mountain complexes (NW Alaska) B3e.3. Acidic mountain complexes (Kuskokwim Mtns.) B4d.1. Nonacidic mountain complexes (Seward Peninsula) B4d.2. Nonacidic mountain complexes (St. Lawrence I.) B4e.1. Nonacidic mountain complexes (Brooks Range) B4e.2. Nonacidic mountain complexes (NW Alaska) **Graminoid tundras** G3.1. Moist nonacidic tundra (N. Arctic Coastal Plain) G3.2. Moist nonacidic tundra (St. Lawrence I. G3.3. Moist nonacidic tundra (Arctic Foothills, Seward P.) G4.1. Tussock tundra (entire map) G4.2. Lichen-rich tussock tundra (Seward Peninsula) G4.3. Tussock tundra on sands (Arctic Coastal Plain) **Protrate-shrub tundras**

P2.1. Dry tundra (St Matthew Island)

Erect-shrub tundras

S1.1. Shrubby tussock tundra (NE Alaska)

S1.2. Dwarf-shrub, lichen tundra (NW Alaska)

S1.2. Dwarf-shrub, lichen tundra (NW Alaska)

S1.3. Dwarf-shrub tundra on volcanic rock (Y-K Delta)

S1.4. Dwarf-shrub, lichen tundra (Kuskokwim Mountains)

S2.1. Willow-birch tundra (entire map)

S2.2. Alder shrublands (entire map)

Wetlands

W1.1. Wet acidic coastal complex (N. Alaska)

W2.1. Wet acidic complex (N. Alaska, Seward, P.)

W2.2. Wet nonacidic coastal complex (N. Alaska)

W3.1. Wet acidic complex with tussock tundra (W. Alaska)

W3.2. Wet acidic complex with dwarf-shrub tundra (lower parts of Y-K Delta)

W3.3. Wet acidic complex with low-shrub tundra (Y-K Delta)

W3.4. Wet acidic complex with dwarf shrub tundra (inland parts of Y-K Delta)

W3.5. Wet acidic complex (Nunivak I.)

W3.6. Wet nonacidic complex (warmer parts of NW Alaska)

W3.7. Wet coastal saline tundra (Y-K delta)

Table 4: aga_arctic_ak_geobotanical.shp

Attribute Name	Description
ZONE	Bioclimate Subzone
PHYTO	Floristic Provinces
CHEM	Substrate pH
LAKEPIXCAT	Lake Cover
LANDSCAPE	Landscape
PHYSIOG	Vegetation
COMM	Physiogonomic unit

Table 5: aga_arctic_ak_bioclimate_2005.shp

Attribute Name	Description
BIOZONE	There are five bioclimate subzones of the Arctic but only three (C,D, and E) are in Arctic Alaska: 0 = Glaciers 3 = Subzone C 4 = Subzone D 5 = Subzone E 6 = Non Arctic

Table 6: aga_arctic_ak_floristic_2005.shp

Attribute Name	Description
PHYTO	Floristic provinces and codes: 1=North Beringian Islands 2=Beringian Alaska 3=Northern Alaska

Table 7: aga_arctic_ak_landscape_2005.shp

Attribute Name	Description
LAND	Physiography and codes: Ocean 1=Glacier 2=Lake 4=Plain 6=Hill 7=Mountain 9=Lagoon

Table 8: aga_arctic_ak_substrate_chem_2005.shp

Attribute Name	Description
CHEM	Parent material chemistry: 2=Acidic 4=Circumneutral 4=Carbonate

Table 9: aga_arctic_ak_lake_cover_2005.shp

Attribute Name	Description
PCTWATER	Percent lake cover grouped into four categories: 0=not mapped 1 = < 2% 2 = 2-10% 3 = 10-25% 4 = 25-50% 5 = 50-75% 6= >75% 270=lakes 275=lagoons

GeoTIFF Files

The three GeoTIFF (.tif) files along with their descriptions are listed in Table 10. All the GeoTIFF files are in WGS84 datum with map units in meters. The spatial attributes of each of the GeoTIFF files are listed in Table 12.

Table 10: GeoTIFF (.tif) files and their descriptions

File Name	Description
aga_arctic_ak_avhrr_ndvi_1995.tif	NDVI calculated from Channel 1 and Channel 2 data. Pixel values are a maximum NDVI value composite from 1 April to 31 October 1993 and 1995. This is a subset for Alaska.

aga_arctic_ak_avhrr_cir_1995.tif	Advanced Very High Resolution Radiometer (AVHRR) Channel 1 and Channel 2 data, displayed as false color-infrared. Pixel values are a maximum NDVI value composite from 11 July to 30 August 1993 and 1995. This is a subset for Alaska.
ak_topo_aa.tif	Topographic/elevation data for Alaska.

Table 11: Geographic extent and attributes of the GeoTIFF files

GeoTIFF Files	North	South	East	West
All GeoTIFF files	70.99972	57.08472	-138.542	-171.39

Table 12: Attributes of the GeoTIFF files

File names	Data Type	Number of Bands	Range of Values
aga_arctic_ak_avhrr_ndvi_1995.tif	byte	1	121 to 226
ak_topo_aa.tif	UInt16	1	0 to 5791
aga_arctic_ak_avhrr_cir_1995.tif	UInt16	3	0 to 1010

3. Application and Derivation

These data would be useful to land-use and climate change applications.

4. Quality Assessment

The accuracy of the bioclimate subzone boundaries is an issue. More accurate maps of temperatures that portray maritime-continental influences and elevation would help to more accurately delineate the boundary zones (Walker et al., 2005). In addition, zonal vegetation is dependent on temperature, precipitation, landscape age and substrate chemistry and it is often not clear what the zonal vegetation in a given subzone should be.

5. Data Acquisition, Materials, and Methods

Mapping Procedure

The products included with this data set are subsets and enhancements for Alaska from the Circumpolar Arctic Vegetation Map (CAVM), an international effort to map the vegetation and associated characteristics of the circumpolar region using a common base map (Raynolds et al., 2005).

The CAVM used the approach of the Panarctic Flora (PAF) initiative (Elvebakk et al., 1999) which considered the Arctic to be equivalent to the five Arctic Bioclimate Zones, where Subzone A is the coldest and most barren subzone, and Subzone E is the warmest and most lushly vegetated. In Alaska, there are three bioclimate subzones (Subzones C, D and E), with southern boundaries corresponding approximately to mean July temperatures of 7, 9 and 12 degrees C, respectively. The two colder subzones (A and B) do not occur in Alaska. After the base map was established with the bioclimate subzones, additional geobotanical features were examined including the floristic features, elevation and landscapes, lake cover, and substrate pH.

Look-up tables of dominant plant community types were made for most regions of the CAVM map based on the vegetation literature from each region. Floristic regions are east-west circumpolar subdivisions, based on the floristic provinces of Yurtsev (1994). There are three floristic provinces in Alaska: Northern Alaska, Beringian Alaska, and North Beringian Islands. There were four tables for Alaska, one for each of the Alaska floristic provinces and an additional table for Southwestern Alaska. These tables could not be used directly as a legend, because there was redundancy between the tables and many of the communities occurred in patches smaller than the minimum mapping unit (10 km2). Less common communities, such as those occurring on snowbeds and streamsides, were useful in describing the range of plant communities occurring in a polygon, but were not the dominant community mapped for a polygon. Tables were combined and original community descriptions from the literature were compared. If the community descriptions from two sources were similar and included similar dominant plant species, they were combined into one description with two literature citations. If two community descriptions had small differences, their appearance on the CAVM base image was checked. If the communities could be distinguished on the image, they were mapped separately; if they could not, they were mapped as the same unit, with both community descriptions included in the table.

In practice, most of the polygon boundaries shown on the new map already existed in the CAVM data set. Some were not visible on the printed version of the map because adjacent polygons with similar physiognomy were mapped together when using the 15 units of the CAVM legend. These polygons could be coded differently using the 33 unit plant-community legend. In addition to re-coding existing CAVM polygons, the new map also included a few changes to polygon boundaries. Corrections were made to some polygon locations in the eastern Brooks Range to improve the map's registration at the larger scale and on Nunivak Island to include information from additional studies. Data were compiled on the wetland plant communities in Southwestern Alaska, so that polygon boundaries could be added to subdivide the largest polygon on the CAVM map of Alaska, the wetlands of the Yukon-Kuskokwim

Delta (Raynolds et al., 2005).

Detailed Product-Attribute Information

This section provides additional information pertaining to the geobotanical attributes provided in each data file.

Map products (shapefiles- refer to Section 2 in this document)

aga_arctic_ak_vegetation_2005.zip: A shapefile-geoecological map of the Arctic Tundra within Alaska. It includes areas north and west of the forest boundary and excludes areas that have a boreal flora such as the Aleutian Islands and alpine tundra regions south of treeline. The map expands on the Alaska portion of the Circumpolar Arctic Vegetation Map. The major difference between the CAVM and this map is a numeric suffix that has been added to each map polygon code to provide more information about the dominant plant communities. This resulted in 33 map units that refer to physiognomic groups of plant communities on specific substrates or in different geographic regions of the map.

The map was published at 1:4 million scale (Raynolds et al., 2006) and displays the vegetation using 33 map units (legend details: http://www.arcticatlas.org/maps/themes/ak/akvg).

Community codes and names organized hierarchically:

- Bioclimate subzones (C, D, and E)
- Floristic subprovince (Northern Alaska, Beringian Alaska, and Northern Beringian Islands)
- Position of the plant community along an idealized toposequence (dry, moist, wet, snowbed, and riparian)
- Acidic vs. nonacidic substrates

Plant communities were not given formal names on the map because of the wide diversity of approaches used to name communities in the literature. Instead, each numeric code is followed by:

- The common plant functional types (growth forms) and species that were gleaned from the literature. (The dominant or characteristic plant growth forms and species are listed first.)
- Listed in smaller print are:
  - The original plant community reference numbers or map codes and/or names used in the literature
  - typical habitats described in the studies
  - authors and dates of the studies
  - locations of the studies

In several instances, the same or similar lists of plants occur with different numeric codes. This occurs because plant communities can span more than one bioclimate subzone, floristic province, or substrate type, and/or we could not find good information that would justify a unique name for the plant community.

For additional details, refer to: http://www.arcticatlas.org/maps/themes/ak/akvg and http://www.arcticatlas.org/maps/themes/vegunit_hierarchy

aga_arctic_ak_geobotanical.shp: The geobotanical map of Alaska. This map provides seven attributes. A layer file for each attribute is zipped with this shapefile. Individual shapefiles of these attributes are also provided and the attributes are defined in the Data Characteristics section (Section 2) of this document.

Attributes in the geobotanical map:

ZONE: Bioclimate zones

PHYTO: Floristic provinces

CHEM: Parent material chemistry

LAKEPIXCAT: Lake cover

LANDSCAPE: Refers to the landscapes listed in the attribute “LAND”

PHYSIOG: Vegetation

COMM: Physiogonomic unit. There are there are 33 distinct physiogonomic unit codes.

aga_arctic_ak_bioclimate_2005.shp: A shapefile of bioclimate subzones from A-E, where A is the coldest and E is the warmest. In order to characterize the transitions in vegetation that occur across the Arctic’s roughly 10 degrees C difference in mean July temperature, the approach of (Elvebakk et al., 1999) was adopted with some modification. Bioclimate subzones are north-south subdivisions of the Tundra Zone, based mainly on summer temperatures (Elvebakk et al. 1999).

There are five bioclimate subzones, but only three bioclimate subzones in Alaska (Subzones C, D and E), with southern boundaries corresponding approximately to mean July temperatures of 7, 9 and 12 degrees C, respectively . The two colder subzones (A and B) do not occur in Alaska (Raynolds et al., 2005).

aga_arctic_ak_floristic_2005.zip: A shapefile of the floristic sectors based on the PAF project (Elvebakk et al., 1999). The Arctic has a relatively consistent core of plant species that occur around the circumpolar region, but there is also considerable east to west variation in the regional floras, particularly in subzones C, D, and E. This variation is due to a number of factors, including different histories related to glaciations, land bridges, and north-south trending mountain ranges, primarily in Asia. These influences have restricted the exchange of species between parts of the Arctic. Russian geobotanists have described a set of floristic subdivisions based primarily on these floristic differences (Yurtsev 1994).

Alaska is included within the Beringian Floristic Province, and includes three of the 23 circumpolar Sub-Provinces: North Beringian Islands, Beringian Alaska, and Northern Alaska (Yurtsev 1994, Walker 2005). The map was adapted from the PAF project (Elvebakk et al., 1999) based largely on Yurtsev's approach.

aga_arctic_ak_substrate_2005.zip: A shapefile depicting acidic areas, carbonate, and circumneutral areas. This product was derived from a wide variety of available sources including soil, surface-geology, and bedrock-geology maps, and from spectral patterns that could be recognized on the AVHRR base image. The pH values of the three categories were based on the field experience and hundreds of Arctic vegetation releve plots sampled by D.A. Walker on the North Slope and Seward Peninsula of Alaska, in consultation with F.J.A. Daniëls (Greenland) and N.G. Moskalenko (Yamal and Gydan Peninsulas, Russia).

aga_arctic_ak_landscape_2005.zip: A shapefile of surface features (physiography). The landscape type was derived from visual interpretation of the AVHRR false-CIR image supplemented with the topographic data and regional physiographic maps to show areas with plains, hills and mountains, glaciers and lakes. Generally, plains are flat or gently rolling landscapes less than 200 m above sea level. Hills are more dissected than plains (more surface roughness) and are 200-500 m in elevation. Mountains have greater surface roughness and are above 500 m in elevation

aga_arctic_ak_lake_cover_2005.zip: A shapefile of lake cover based on the number of AVHRR water pixels in each mapped polygon, divided by the number of pixels in the polygon. Since the imagery has a pixel size of 1 km^2, lake cover is underestimated for areas with many small lakes. Pixels within 2-km of the coastline were excluded to avoid ocean water. The percent cover data were grouped into six categories: < 2%, 2-10%, 10-25%, 25-50%, 50-75%, and 75-100%.

Related Map Products:

aga_arctic_ak_avhrr_cir_1995.tif: This was the base map false color infrared (CIR) image derived from the AVHRR, a sensor on board the National Oceanic and Atmospheric Administration (NOAA) satellites. Advanced Very High Resolution Radiometer (AVHRR) data were obtained from the USGS Global AVHRR 10-day composite data. (http://edcdaac.usgs.gov/1KM/1kmhomepage.asp) (Markon et al 1995). This is a subset for Alaska of the original CAVM base map.

Glaciers and oceans were masked out using information from the Digital Chart of the World (ESRI 1993). The image is composed of 1 x 1-km pixels. The color of each pixel was determined by its reflectance at the time of maximum greenness, selected from 10-day composite images from 11 July to 30 August 1993 and 1995. These intervals cover the vegetation green-up-to-senescence period during two relatively warm years when summer-snow cover was at a minimum in the Arctic. Maximum greenness was determined from the normalized difference vegetation index (NDVI). Vegetation greenness is calculated as: NDVI = (NIR - R) / (NIR + R), where NIR is the spectral reflectance in the AVHRR near-infrared channel (0.725-1.1 µ, channel 2) where light-reflectance from the plant canopy is dominant, and R is the reflectance in the red channel (0.58 to 0.68 µ, channel 1), the portion of the spectrum where chlorophyll absorbs maximally. The resulting image shows the Arctic with minimum snow and cloud cover. The channel 1 and channel 2 values were then stacked to create as a false-color CIR image (RGB = ch. 2, ch. 1, ch. 1).

aga_arctic_ak_avhrr_ndvi_1995.tif: A GeoTIFF of NDVI from 11 July to 30 August 1993 and 1995. NDVI was calculated as: NDVI = (NIR - R) / (NIR + R), where NIR is the spectral reflectance in the AVHRR near-infrared channel (0.725-1.1 µm, channel 2) where light-reflectance from the plant canopy is dominant, and R is the reflectance in the red channel (0.5 to 0.68 µm, channel 1), the portion of the spectrum where chlorophyll absorbs maximally (Bhatt et al., 2010). Advanced Very High Resolution Radiometer (AVHRR) data were obtained from the USGS Global AVHRR 10-day composite data (http://earthexplorer.usgs.gov/). Glaciers and oceans were masked out using information from the Digital Chart of the World (ESRI 1993). The image is composed of 1 x 1-km pixels. The color of each pixel was determined by its reflectance at the time of maximum greenness, selected from 10-day composite images from 11 July to 30 August 1993 and 1995 (Markon et al., 1995). These intervals cover the vegetation green-up-to-senescence period during two relatively warm years when summer-snow cover was at a minimum in the Arctic (Markon et al., 1995). This is a subset for Alaska of the original CAVM NDVI map.

ak_topo_aa.tif: A GeoTIFF of landform elevations for Alaska. Areas less than 100-m above sea level were separated to show low-level plains. Elevation above 100-m was divided into 333-m intervals to show decreases of about 2 degrees C as predicted by a lapse rate of 6 degrees C per 1000-m elevation.

This data set was provided by the GINA repository at http://geobotanical.portal.gina.alaska.edu/catalogs/9603-circumpolar-arctic-vegetation-map-all-layers. For more information on this dataset please refer to http://www.arcticatlas.org/maps/themes/cp/

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Pre-ABoVE: Arctic Alaska Vegetation, Geobotanical, Physiographic Data, 1993-2005

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Elvebakk, A. 1999. Bioclimate delimitation and subdivisions of the Arctic. Pages 81-112 in I. Nordal and V. Y. Razzhivin, editors. The Species Concept in the High North - A Panarctic Flora Initiative. The Norwegian Academy of Science and Letters, Oslo.

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