Remote Sensing Projections and Preliminary Image Products for the Circumboreal Vegetation Mapping Project

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Outline

• **Recommended Geographic Product and Work Regions**
  – Some products will require work to be done at sub-region products for detailed mapping

• **Recommended Geographic Projections**
  – Projections are based on published and recommended parameters

• **Initial Image Products**
  – Sample products
Recommended Geographic Product and Work Regions

• North America
  – All of North America (north of temperate zone)
  – Working view (used for delineation of polygons)

• Eurasia
  – Two Working views
    • one for the entire Eurasia (product presentation view)
    • one split at 60 East with 1/2 degree overlap between the two subareas (working view; used for delineation of polygons)

• Entire CBVM
  – Polar view: final product presentation

• Entire CBVM
  – Boreal View: world boreal view; final presentation product
Recommended Geographic Projections

- **North America**
  - Lambert Azimuthal equal-area projection centered at 45N, Central Meridian of -100W, north of 42 degrees

- **Eurasia**
  - Lambert Azimuthal equal-area projection centered at 45N, Central Meridian of +100E, north of 40 degrees
  - For entire and two working regions
Recommended Geographic Projections

• Entire CBVM (polar view)
  – Lambert Azimuthal equal-area projection centered at the North Pole, Central Meridian of 0, north of 40 degrees

• Entire CBVM (world boreal view)
  – Interrupted Goode Homolosine of the northern hemisphere

• All projections on based on the World Geodetic System (WGS) 84
Lambert Azimuthal equal-area projection

- Areas on the map are shown in true proportion to the same areas on the Earth
- Scale decreases gradually away from center point
- Distortion of shapes increases away from center point
- Map is equal area
- Allows many options for projection of areas over different parts of the globe
Initial Image Products

• Examples of image products
• MODIS satellite baseline products
  – Resolution – 500 m
  – Products for this workshop
    – 5 km
  – Example of resolution
Initial Image Products - Eurasia
Initial Image Products - Eurasia - East
Initial Image Products -
Eurasia - West
Initial Image Products - North America
Initial Image Products – Circumboreal (Centered on North Pole)
Initial Image Products -
Interrupted Goode Homolosine
Standard Products From MODIS

- Surface Reflectance
- Land Surface Temperature & Emissivity
- Land Cover/Land Cover Change
- Gridded Vegetation Indices (Max NDVI & Integrated MVI)
- Thermal Anomalies, Fires & Biomass Burning
- Leaf Area Index & FPAR
- Evapotranspiration
- Net Photosynthesis and Primary Productivity
- Surface Reflectance
- Vegetation Cover Conversion
Conclusions – Mapping Products

• Mapping products would be at 500-m grid cell (resolution)
  • Circum-Arctic Vegetation Map (CAVM) mapped at 1 km grid cell using AVHRR
  • MODIS allows a higher resolution product with multiple standard products that are at free to the user
  • Products presented here and in hard copy are at 5 km grid cells and are used as examples; much higher resolution products can be produced
Conclusions - Projections

• Baseline mapping products using Lambert Azimuthal equal-area projection recommended:
  – Map is equal area: Areas on the map are shown in true proportion to the same areas on the Earth
  – Scale decreases gradually away from center point
    • Sub areas may be produced to reduce this
  – Distortion of shapes increases away from center point
Conclusions - Final Map display products

- Circumboreal (Centered on North Pole)
  - Good for overall view
  - Difficult to produce final printed map product

- Interrupted Goode Homolosine
  - Good for final map product presentation
  - Difficult for showing some mapped regions

- Recommended to use all projections depending on final product and its use (posters, publications, final map products)