Maniitsoq Topographic Map Metadata

The following document outlines the data and methods used to compile the topographic map of the Maniitsoq region.

Data sources

DEM:

- Compilation of DEMs from WorldView1, WorldView2 and GeoEye processed by PGC as part of the ArcticDEM or ASP_DEM data set (36 DEM tiles). Time period covered by the compilation is 2012-2015. DEM footprints available in folder "Footprints DEM".

Features:

- Where available, WorldView3 ACOMP processed data provided by Geology Department were used. Footprints available in folder "Footprints Imagery".
- For areas not covered by ACOMP processed WorldView3 scenes, Digital Globe WorldView1(panchromatic) and WorldView2 (RGB) images and Landsat8were used. Footprints available in folder "Footprints Imagery".
- Auxilary data included DEM derived slope and aspect.

Methods

DEM:

- Data resampled to 15 m resolution (bilinear), reprojected to UTM 22N, WGS 84 (bilinear). Mosaicking (bilinear, ignor no-data value). Reprojected from ellipsoid to mean-sea-level heights. Masking out sea using vector data of coastline as a mask band. Median filter (kernel size 3) for removing some errors.
- Hillshade: Sun elevation angle: 45, sun azimuth angle: 315
- Contours: Interval 20 m, Surface tolerance = 0; divided into 4 groups: 100 M, 100M Glacier, 20 M, 20M Glacier. Smoothing algorithm: PAEK (Polynomial Approximation with Exponential kernel); smoothing tolerance: 30 m. Label on 100m contours

Coastline, Lake:

- Additional products were derived from the available satellite data including; NDWI, Principle Component Analysis (PCA), Unsupervised classification (ISO). Note for the areas not covered by WorldVeiw3 data the additional products were limited to PCA and ISO.

- Object based feature extraction using data listed in the above point together with DEM derived slope and aspect.
- Manual editing of vectors, especially shadow and cloud areas, was done using the original image, ASTER scenes, Landsat8 scenes and, for the coastline, the G100 coastline. Where clouds created problems, the existing G100 coastline was used, additionally it was kept in other stretches of coastline where it was adequate.
- A smoothing of 30 m was applied to all features. A size threshold of 30m was applied to Lake features.

Glacier, snow patch :

- Additional products were derived from the available satellite data including; Principle Component Analysis (PCA) and Unsupervised classification (ISO).
- Object based feature extraction using data listed in the above point.
- Manual editing of vectors, especially debris covered regions and seasonal snow patches, was done using the original image, ASTER scenes, and Landsat scenes.
- A smoothing of 30 m was applied to all features. A size threshold of 30m was applied to snow patch features.

River, stream:

- DEM pits were removed in order to create a hydrological corrected DEM (TAuDEM)
- Extraction of flow direction and slope for each cell divided in 8 directions (TauDEM)
- Extraction of Contributing area: counting the number of grid cells draining through each cell (TauDEM)
- Stream definition: All cells with a contribution area > 500 were defined as streams (TauDEM).
- Vectorization (Stream reach; Taudem)
- Attribute "Stream" – 1 (=stream first order) classified as "Stream"; residual as "Rivers".
- Streams within glaciers and lakes were clippes, streams < 100M were deleted.

Stream banks:

- AOI of potential stream banks was created in a GIS using a buffer on identified rivers and streams .
- Principal Component Analysis band 2 was used to carry out unsupervised classification within the areas defined above. Number of classes: min. 5, max 15; max. iteration: 5; Change Threshold 5.00; Min. pixel in classes: 20; max. class std. 1; min. class distance: 2; max. merge pairs: 2
- Median filter (kernel size 5) and combination of classes and vectorization.
- GIS: use Area attribute filter to delete the smallest parts, manually post processing and check of network
- FME: Clip River polygon within Lakes and Sea ("Clipper"), and delete donuts <= 1000 m2 ("DonutHoleFilter", minimum hole area = 1000)
- ArcGIS PAEK Smooth 30 m