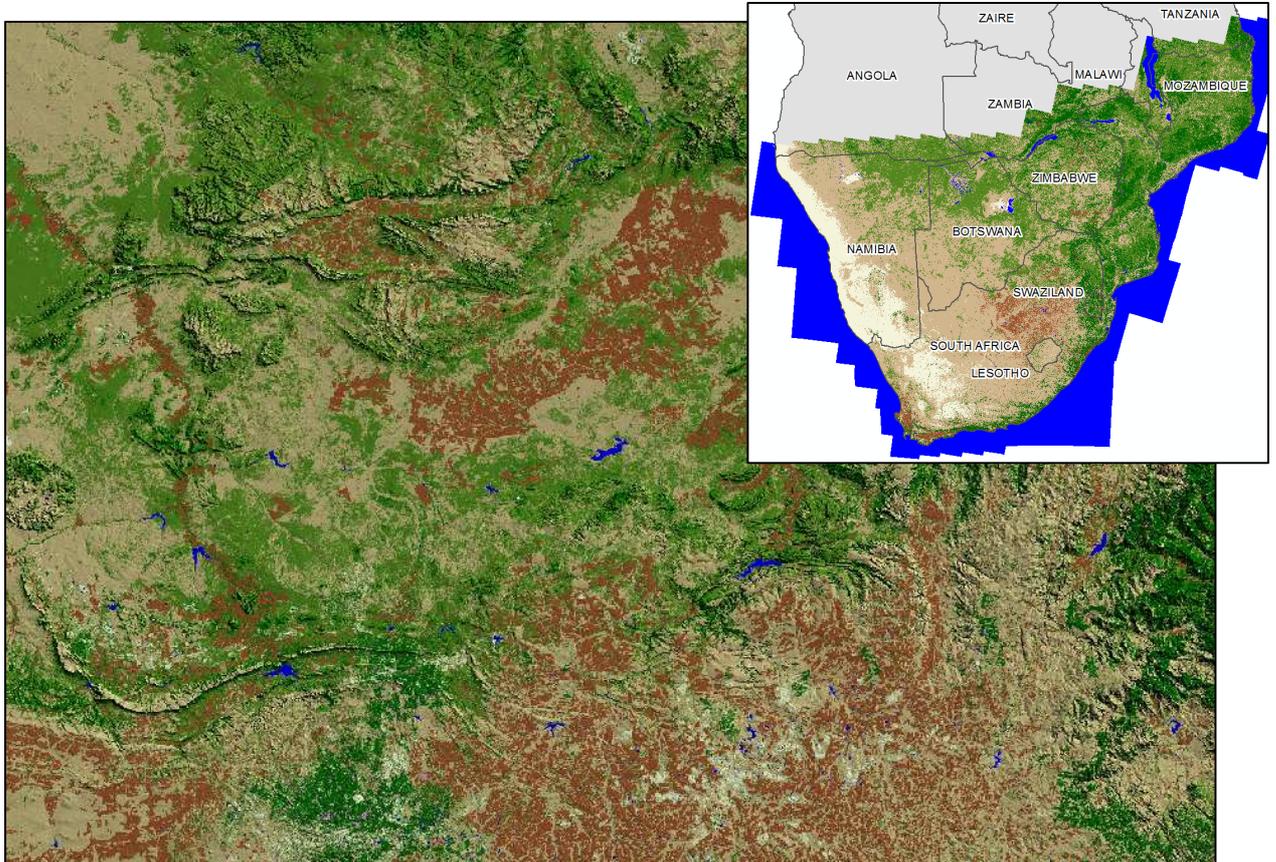


Southern African Land Cover (2013-14) (Hill-shaded 3D version)

Data Users Report and Meta Data

(version 1.2)



A Commercial Spatial Data Product Developed by

GeoTerraImage (Pty) Ltd, South Africa

(www.geoterraimage.com)

Date : November 2014 (copyright reserved)

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1. BACKGROUND AND DATA SUMMARY

The GeoTerralimage (GTI) 2013-14 Southern Africa land-cover © dataset has been generated from multi-seasonal, 30 metre resolution Landsat 8 satellite imagery, acquired between April 2013 and June 2014. The land-cover dataset provides seamless data coverage for all of South Africa, Swaziland, Lesotho, Namibia, Botswana, Zimbabwe and Mozambique, and a portion of southern Malawi. The original classification is not hill-shaded and is available as a commercial geo-spatial digital map product from GeoTerralimage.

The **hill-shaded version** has been created by draping the land-cover dataset over the 30m resolution SRTM¹ terrain data, and applying a hill-shade factor based on 45° sun azimuth and zenith angle, with a 3 x height exaggeration factor. The hill-shaded version is intended primarily for use as a visual backdrop in cartographic map production activities, or similar uses which do not require quantitative geo-spatial analyses.

The land-cover data has been generated using semi-automated data modeling procedures that utilise the seasonal landscape information contained in several different image acquisition dates per Landsat image frame, in order to identify the dominant land-cover characteristics throughout the 2013-14 seasonal cycle, and minimize any misinterpretation of temporary seasonal conditions. The land-cover classification is based on 30 x 30 meter raster cells, equivalent to the original image resolution of the Landsat 8 sensor.

The supplied product is a desk-top generated dataset. No independent verification of statistical mapping accuracy has been calculated nor established.

The 7 x class land-cover product is one of several land-cover products generated from the same 2013-14 Landsat 8 based modelling procedures, and represents the most basic level of detail generated. Additional levels of classification detail will be released shortly, within new data products.

Please contact GeoTerralimage for more information on alternative, more detailed products generated from the same source image data.

¹ Shuttle Radar Topographic Mission.

2. MAPPING SCALES AND COVERAGE

The dataset is suitable for $\pm 1:100,000$ scale, or coarser spatial modelling applications, with a theoretical minimum feature mapping unit of ± 1 ha.

3. LANDSAT 8 SATELLITE IMAGERY

The Landsat 8 imagery used to generate the land-cover dataset was sourced from the web-based image archives of the United States Geological Survey (USGS). The original image data was sourced in geo-corrected UTM (north), WGS84 projection format, and all land-cover classifications and modeling was completed using this projection format.

The land-cover classification is based on multi-seasonal image data from within 165 x Landsat image frames. Typically an average of 7 images from different acquisition dates within one annual, seasonal cycle were used to generate the land-cover data within *each* image frame, with a minimum of 3 x and a maximum of 9 x images per image frame. In excess of 1,200 individual images were processed as part of the multi-seasonal Landsat image acquisition dates. The eastern coastal regions of Mozambique and northern KwaZulu-Natal Province (South Africa) typically had the least number of image acquisition dates per frame due to persistent cloud cover conditions.

The Landsat 8 imagery used in the land-cover classification was all acquired between April 2013 and June 2014. If persistent local cloud cover problems resulted in either no or reduced Landsat 8 image acquisitions during the 2013-14 acquisition period, then alternative, archive Landsat 5 imagery was used. The Landsat 5 imagery was only used if it was 100% cloud free, and had been acquired in a suitable seasonal period and year. Landsat 5 images were used in 28 x frames and represented less than 4% of the total number of Landsat images processed.

4. Land-Cover Legend

The supplied land-cover contains the following basic land-cover information classes that describe the full extent of the landscape in the mapped geographical area:

Class	Class Name	Description
1	Water	All areas of open water that can be either man-made or natural. Based on the maximum extent of water identified in all seasonal image acquisition dates.
2	Bare	Bare, non vegetated areas <i>dominated</i> by loose soil, sand, rock or artificial surfaces. May include some very sparse scattered grass, low shrub and / or tree and bush cover. Can be either natural (i.e. beach) or man-made (i.e. mines or built-up areas).
3	Low Vegetation & Grassland	Grass and low shrub dominated ² areas, typically with no or only a few scattered trees and bushes. Mainly natural or semi-natural vegetation communities in both urban and rural environments. May also include some subsistence cropping fields.
4	Tree / Bush Dominated Vegetation	Low tree and bush <i>dominated</i> areas, typically with lower canopy heights and more open canopy densities (i.e. open to scattered) than class 5 (below). Includes natural, semi-natural and planted vegetation communities in both urban and rural environments. Will also include young planted forest plantation stands.

² The term "dominated" in this specific dataset refers to cover percentages typically in excess of $\pm 45\%$, such that a bush or tree dominated area will typically have $> \pm 45\%$ tree or bush canopy cover. Similarly a grass "dominated" area will typically have $> \pm 45\%$ grass cover, but could also therefore have up to 40 - 45 % tree or bush cover as well, and thus include open or sparse tree or bush covered areas. Additional levels of classification detail, providing more detailed vegetation sub-class information will be released shortly, within new data products.

5	Tree Dominated Vegetation	Tall tree and bush <i>dominated</i> areas, typically with higher canopy heights and more compact canopy densities (i.e. open to closed) than class 4 (above). <i>Note: may include dense thicket, even if <u>not</u> composed of tall trees & bushes.</i> Includes natural, semi-natural and planted vegetation communities in both urban and rural environments. Will also include mature planted forest plantation stands and windbreaks.
6	Cultivated	Large-scale, commercially cultivated fields used for the production of both annual and permanent crops (i.e. maize, sugarcane, orchards etc). The class includes both rain-fed and artificially irrigated fields. The class does not include small-scale subsistence and/or communal type cultivation.
7	Sports, Golf and Parks	Managed grassland areas associated with golf courses, sports fields and urban parks.

Note that the tree, bush, grass, bare and water related cover classes are actually "pure" land-cover categories. For example, the tree related cover class may represent either a natural or man-made environment, but is, in either case, a tree-dominated area . Similarly the bare class may represent a non-vegetated urban environment, a mine excavation pit or a natural beach area. These information land-cover classes are essentially "foundation classes" that can be used as "building blocks" that can be used to adapt the current land-cover dataset into more detailed sub-classes as and where required.

5. DATA PRODUCTS

The 2013-14 Southern Africa land-cover (hill-shade) dataset is available in the raster format:

- 30m raster cell digital product, in ERDAS IMAGINE (*.img) or JPG2000 compressed format. The dataset contains 7 x information classes as per the table above.

6. MAP UPDATES

At present there is no formal planned future update of the original Southern Africa land-cover dataset. However, adapting the basic land-cover dataset to include more detailed sub-class detail, such as (bare or vegetated) urban areas, mangrove swamps, wetlands and / or subsistence cultivation is possible; and can be generated if requested.

GEOTERRAIMAGE SOUTHERN AFRICAN (HILL-SHADED) LAND-COVER DATASET (2013-14) : CORE METADATA ELEMENTS (SANS1878)

1(M) Dataset title: sadc_3d_shadef3_vs2_45-45_utm35n

2(M) Dataset reference date: November 2014

3(O) Dataset responsible party: Produced by GeoTerra Image (GTI) Pty Ltd (Mark Thompson, www.geoterraimage.com).

4(C) Geographic location of the dataset.

WestBoundLongitude: -1345796.00 (Upper Left X)
EastBoundLongitude: 2231344.00 (Lower Right X)
NorthBoundLongitude: -10011802.00 (Upper Left Y)
SouthBoundLongitude: -3939582.00 (Lower Right Y)

Projection coordinates based on Universal Transverse Mercator UTM 35 North, WGS84 (datum), meters.

5(M) Dataset language : "English" (eng)

6(C) Dataset character set: UTF8 (8-bit data)

7(M) Dataset topic category: 010 = Base Map earth coverage

8(O) Scale of the dataset: Original southern African land-cover mapped from 30m resolution Landsat 8 imagery therefore recommended for $\pm 1:100,000$ scale or coarse mapping & modeling applications.

9(M) Abstract describing the dataset: Southern African land-cover generated from multi-seasonal 30m resolution Landsat 8 imagery, acquired between April 2013 - June 2014, using desk-top digital modelling and mapping procedures. National coverage across South Africa, Swaziland, Lesotho, Namibia, Botswana, Zimbabwe, Mozambique and southern Malawi. Dataset contains 7 x information classes. The dataset has been draped over the 30m SRTM terrain data and hill-shaded to create a 3D topographic effect. All copyright and Intellectual Property Rights remain at all times with GeoTerraImage.

10(O) Dataset format name: ERDAS Imagine *.img raster format.

11(O) Dataset format version: version 2

12(O) Additional extent information for the dataset: (vertical and temporal)

Vertical Extent:

Minimum Value: n/a

Maximum Value: n/a

Unit Of Measure: n/a

Vertical Datum: n/a

Temporal Extent: Datasets generated in November 2014, based on 2013-14 Landsat 8 imagery.

14(O) Reference system: Universal Transverse Mercator (UTM) 35 North

CRS:

Projection Used: Universal Transverse Mercator (UTM) 35 North

Spheroid used: WGS84

Datum used: WGS 84

Ellipsoid parameters:

Ellipsoid semimajor axis

axis units

denominator of flattening ratio

Projection Parameters:

UTM Zone: 35 (North)

Standard parallel

Longitude of central meridian: 27:00:00.00 East

Latitude of projection origin: 00:00:00.00 North

False easting: 500000.00 meters

False northing: 10000000.00 meters

Scale factor at equator: 0.999600

Projection units: meters

15(O) Lineage statement: Original southern African land-cover dataset generated in-house by GeoTerralImage (Pretoria) in September 2014, based on 2013-14 Landsat 8 multi-seasonal imagery. Imagery sourced from USGS GLOVIS web-based Landsat data archives, and used as-is in terms of geo-location. Draped over 30m SRTM data in November 2014.

16(O) On-line resource: n/a

17(O) Metadata file identifier: n/a

18(O) Metadata standard name: SANS I878

19(O) Metadata standard version: version 01

20(C) Metadata language: English (eng)

21(C) Metadata character set: 021 (UsAscii)

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23(M) Metadata time stamp: 10 November 2014