

# Geoscience Australia Land Cover (Terra MODIS)

## Dynamic Land Cover Dataset 250m 2.1.0

**Version**

2.1.0

**Product ID**

ga\_ter\_m\_dlcd\_ann

**Program**

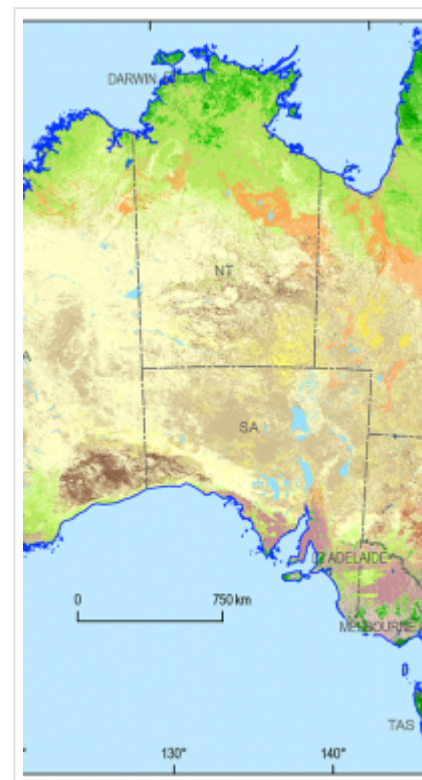
Digital Earth Australia

**Resource type**

Derivative

**Published Date**

12/03/2018



View the [original metadata page](#) for the most up-to-date information on this product.

## Basics

### Background

Land cover is the observed biophysical cover on the Earth's surface including trees, shrubs, grasses, soils, exposed rocks and water bodies, as well as anthropogenic elements such as plantations, crops and built environments.

Land cover changes for many reasons, including seasonal weather, severe weather events such as cyclones, floods and fires, and human activities such as mining, agriculture and urbanisation.

Remote sensing data recorded over a period of time allows the observation of land cover dynamics. Classifying these responses provides a robust and repeatable way of characterising land cover types.

### What this product offers

The Dynamic Land Cover Dataset is the first nationally consistent and thematically comprehensive land cover reference for Australia. It provides a base-line for reporting on change and trends in vegetation cover and extent.

The dataset presents a synopsis of land cover information for every 250m by 250m area of the country from January 2002

to December 2015.

The dataset shows Australian land covers clustered into 22 land cover classes. These reflect the structural character of vegetation, ranging from cultivated and managed land covers (crops and pastures) to natural land covers such as closed forest and open grasslands.

## **Applications**

Information about land cover dynamics is essential to understanding and addressing a range of national challenges such as drought, salinity, water availability and ecosystem health. This product can be used as an input for a wide range of environmental modelling applications, including:

- climate
- wind and water erosion risk
- evapotranspiration
- carbon dynamics
- land surface processes

# Access

## Data access

<b>Link to data</b>	<a href="#">THREDDS</a>
<b>Link to maps</b>	<a href="#">DEA Maps</a>
<b>eCat record</b>	83868
<b>Product ID</b>	ga_ter_m_dlcd_ann
<b>CMI RESTful node ID</b>	131
<b>Security classification</b>	Unclassified
<b>Update frequency</b>	asNeeded
<b>Product life span</b>	09/05/2017

# Details

## Technical information

The Dynamic Land Cover Dataset uses a standard land cover classification to show the change in behaviour of land cover across Australia. The DLCD includes data for every 250m by 250m area on the ground, for the period 2002 to 2015. The DLCD provides a basis for reporting on change and trends in vegetation cover and extent. Information about land cover dynamics is essential to understanding and addressing a range of national challenges such as drought, salinity, water availability and ecosystem health.

The current release of the second version DLCDv2.1 (described in this document) presents land cover information for every 250m by 250m area of the country for each of the two year intervals listed in the table below. It consists of maps based on 2 years of MODIS EVI time-series data. The date ranges for each of the map series are:

- January 2002-December 2003
- January 2003-December 2004
- January 2004-December 2005
- January 2005-December 2006
- January 2006-December 2007
- January 2007-December 2008
- January 2008-December 2009
- January 2009-December 2010
- January 2010-December 2011
- January 2011-December 2012
- January 2012-December 2013
- January 2013-December 2014
- January 2014-December 2015

In conjunction with other data sources, the DLCD can be used to identify emerging patterns of land cover change and provide a spatial and historical context within which to interpret change.

The land cover classification scheme used conforms to the 2007 International Standards Organisation (ISO) land cover standard (19144-2). The dataset shows Australian land covers clustered into 22 classes. These reflect the structural character of vegetation, ranging from cultivated and managed land covers (crops and pastures) to natural land covers such as trees and grasslands.

### How it can be used

The primary purpose of the DLCDv2.1 product is to provide the Australian government with a standardised land cover dataset for understanding of and reporting on land cover change, including to better understand how managed landscapes have responded to droughts, floods and shifts in water allocations. An example application is use within the Australian Bureau of Statistics' Land Accounts.

The product has many secondary uses. For example climate and weather modellers will be able use DLCDv2 to input land cover parameters into climate and weather models. Ecologists, decision makers and carbon modellers will be able to use DLCDv2 to assess how vegetation responds to disturbance including severe fires, floods, cyclones and land clearing

activities. The DLCDv2 can also be used as a contextual layer for products such as the Atlas of Living Australia.

## **Features**

The Dynamic Land Cover Dataset (DLCD) is a nationally consistent and thematically comprehensive land cover reference for Australia. In producing the DLCD, time series analysis techniques are used to classify each pixel based on the way it has behaved over a two year period. Each map can be considered in isolation, or two maps from different intervals can be compared to identify the changes in land cover that have occurred over that time frame.

Each map has been generated by applying a sophisticated time series analysis technique known as Dynamic Markov Chain modelling to two years of MODIS EVI data. The outputs of the time series analysis are filtered using a class change constraint matrix, a terrain mask and MODIS green albedo products. The maps contain 22 land cover classes as outlined in the table below. The class numbers for DLCDv2 are consistent with DLCDv1 which contained several additional classes.

The RGB values listed in the table can be used for display of the dynamic land cover dataset.

**Common name**

**ISO class descriptor**

**Class**

**R**

**G**

**B**

No Data

No Data

0

0

0

0

Mines and Quarries

Extraction Sites

1

130

130

130

Urban areas

Urban Areas

35

200

200

200

Lakes and dams

Inland Waterbodies

3

0

70

173

Salt lakes

Salt Lakes

4

150

225

255

Irrigated cropping

Irrigated Cropping

5

90

36

90

Rain fed cropping

Rainfed Cropping

8

198

141

153

Irrigated pasture

Irrigated Pasture

6

166

38

170

Rain fed pasture

Rainfed Pasture

9

226

194

199

Irrigated sugar

Irrigated Sugar

7

183



18

52

Rain fed sugar

Rainfed Sugar

10

219

77

105

Wetlands

Wetlands

11

0

178

160

Alpine meadows

Alpine Grasses - Open

15

255

255

255

Open Hummock Grassland

Hummock Grasses - Open

16

255

255

115

Closed Tussock Grassland

Tussock Grasses - Closed

14

255

121

0

Open Tussock Grassland

Tussock Grasses - Open

18

255

169

82

Scattered shrubs and grasses

Shrubs and Grasses - Sparse-Scattered

19

255

255

190

Dense Shrubland

Shrubs - Closed

24

175

136

80

Open Shrubland

Shrubs - Open

25

193

168

117

Closed Forest

Trees - Closed

31

0

133

0

Open Forest

Trees - Open

32

20

194

0

Woodland

Trees - Sparse

34

186

232

96

Open Woodland

Trees - Scattered

33

214

255

138

## **Accuracy and limitations**

The accuracy of the dataset has been assessed using over 30,000 field sites distributed across all states and territories of Australia. The data was provided by Federal, State and Territory Government agencies and collected over the period 2002 to 2012 including data contributed from these sources:

- 

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) Riverina Plains Data

- Australian Agricultural and Grazing Industries Survey (AAGIS)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) Colleambally Data
- Department of Agriculture, Fisheries and Forestry (DAFF) rapid assessment sites
- New South Wales Land Practices
- Queensland Herbarium CorVeg
- Sunrise21
- Victorian State Forest Resource Inventory (SFRI) field data
- Victorian Land Use Information System (VLUIS)
- Western Australian Department of Environment and Conservation
- Western Australian WARM

The field site data has been collected for a variety of purposes and is accurate to varying spatial and temporal resolutions; typically the primary field site data are no longer available. A process of translation between the field data collected and the dynamic land cover data was undertaken using expert knowledge.

Due to the unknown spatial, temporal and thematic accuracy of the field site data the assessment with the dynamic land

cover dataset has been reported only for broad themes across all years.

## Theme

### Map accuracy

### User accuracy

#### Crops and Pastures

98.95%

86.44%

#### Grasses

29.00%

62.73%

#### Shrubs

5.22%

4.69%

#### Trees

62.55%

72.34%

The overall accuracy of DLCD assessed using the grouped themes is 81.5%.

The field data comparison demonstrates that for cover classes that are poorly represented by a greenness measure, the associated accuracy of the DLCD is very poor. However for cover classes with significant greenness, the grouped accuracy of DLCD is reasonably high. In addition, more dynamic classes such grasses and shrubs show a lower accuracy when assessing a single date field data point against the general class over a two year period.

The complete error matrix, assessing the full 22 class DLCD against field data is available in an [attachment](#). The full matrix highlights the disparity of the 250 m DLCD versus the field data, and shows those classes that are not

characterisable using the EVI greenness measurements. The overall accuracy using the finer class structure is 31.1%.

Despite the large number of points in the comparison this comprises less than 0.01% of the land cover classification data. Users are encouraged to assess whether the dataset is fit for their purposes in their area of interest, and provide any feedback to [earth.observation@ga.gov.au](mailto:earth.observation@ga.gov.au).

Additionally, the 250 metre pixel scale of the data will limit the use of this data set in studies that depend on the identification of small or detailed features within the landscape i.e. narrow strips of riparian vegetation or managed landscapes where the fields/paddocks are smaller than 250 x 250 metres.

The two year time frame for each map in the map series will limit the capacity to detect short lived changes in land cover such as low-intensity bushfires i.e. the canopy may recover within a two year period. The map series will only provide limited information for land covers that are difficult to discriminate using EVI such as sugar cane.

## Relevant websites

- [Digital Earth Australia](#)
- [National Land Cover Dataset](#)

# Processing

## Lineage

The DLCdv2 is the second DLCd product released by GA. It is based on the MODIS Enhanced Vegetation Index (EVI) product MOD13Q1. For more information on MOD13Q1 see:

[https://lpdaac.usgs.gov/products/modis\\_products\\_table/mod13q1](https://lpdaac.usgs.gov/products/modis_products_table/mod13q1).

The first version of the DLCd product suite (DLCdv1) was published in 2011 and was a single map based on 250 metre resolution MODIS Enhanced Vegetation Index (EVI) data acquired between April 2000 and April 2008. The DLCdv1 is described in detail at <http://www.ga.gov.au/earth-observation/landcover.html>.

## Data sources

- [MOD13Q1 Enhanced Vegetation Index data](#)
- [SRTM DSM/DEM data](#)
- [MCD43A3 MODIS 500m Green Albedo](#)
- [Catchment Land Use Maps 2012](#)
- [South Australian Department of Environment and Natural Resources Natural Resource Database](#)
- [Interim Bioregionalisation of Australia](#)
- [Groundwater Dependent Ecosystem Atlas 2012](#)

## Processing steps

- [Generating Time Series for DLCd](#)
- [Time series noise removal](#)
- [DLCd Time Series Analysis](#)

## Major algorithms

- [DLCd classification \(Lymburner et al., 2011\)](#)

## Schema / spatial extent

### MOD13Q1 Raster Schema

<b>Update frequency</b>	asNeeded
<b>Temporal extent</b>	2001-01-01 00:00:00 – 2015-01-01 00:00:00
<b>Min. longitude</b>	110.00
<b>Max. longitude</b>	155.00
<b>Min. latitude</b>	-45.00



**Max. latitude** -10.00

**Coordinate reference system** WGS 84 (EPSG: 4326)

**Cell size X** 0.00

**Cell size Y** 0.00

# Media

## Files

[DLCD 2.1 Confusion Matrix.xlsx](#) 20.56 KB

# Credits

## Owner

Commonwealth of Australia (Geoscience Australia)

## Principal contributors

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