



VEGETATION GROWTH RATE (DMP) SPOT-VEGETATION

1. OUTLINE

• Information of spatial data product specification			
Title	Specifications for the DMP derived from SPOT-VEGETATION sensor		
Date	22/10/2008		
Implementer	ENDELEO project VITO, Dr. Else Swinnen		
Language	English		
Engineering field	Environmental monitoring		
Document data format	PDF		
• Purpose			
<p>DMP, or Dry Matter Productivity, is the scientific name for the ‘vegetation growth rate’. It reflects the daily increase of the dry matter biomass (growth rate) of the overall vegetation and is expressed in kilograms of dry matter (kg DM) per hectare per day.</p> <p>DMP images are resulting from a combination of remote sensing data with (modeled) meteorological data from ECMWF. The ECMWF data are made available through the MARSOP project.</p> <p>When crops are healthy and water and nutrients are not limiting, dry matter production is proportional with the amount of light intercepted by a crop canopy. Estimates of the productivity of terrestrial vegetation can be made by combining satellite imagery with solar radiation and temperature information using the classical Monteith (1972) approach.</p>			
• Spatial extent			
ULX	-113550m	LRX	834381m
ULY	10556023m	LRY	9444577m
Kenya			
• Temporal extent			
April 1998 – present; update each 10 days.			
• Reference standards			
• Terminology and definitions			
The following technical terms and definitions are used with this data product specification: Kenya profile for geographic standards (KPGIS) ver. 1			
• Abbreviations			
DMP: Dry Matter Productivity ULX: Upper left X coordinate ULY: Upper left Y coordinate LRX: lower right X coordinate LRY: lower right Y coordinate ECMWF: European Centre for Medium-Range Weather Forecasts			

2. DOMAIN OF VALIDITY

• Domain of validity identification	
Data product specification of the DMP for the territory of Kenya	
• Hierarchical level	



Dataset

3. DATA PRODUCT IDENTIFICATION

<ul style="list-style-type: none"> Name of spatial data product
DMP from SPOT-VEGETATION
<ul style="list-style-type: none"> Date
Produced each 10 days since April 1998, update still ongoing
<ul style="list-style-type: none"> Contact Information
Ir. Josefien Delrue VITO Boeretang 200 B-2400 Mol Belgium e-mail: josefien.delrue@vito.be
<ul style="list-style-type: none"> Geographical description
The territory of Kenya

4. DATA CONTENTS AND STRUCTURE

<ul style="list-style-type: none"> Application schema class diagram
Not applicable

<ul style="list-style-type: none"> Application schema class document 			
Feature	Image		
Definition	DMP		
Parent class	None		
Abstract/Concrete	Abstract		
Attributes			
Name	Definition	Collection condition	Domain
	-	-	Within geographical extent

Feature	Image		
Definition	DMP		
Parent class	-		
Abstract/Concrete	Concrete		
Attributes			
Name	Definition	Collection condition	Domain
Data format: GeoTiff	-	-	Within Geographical extent

5. REFERENCE SYSTEM

<ul style="list-style-type: none"> Spatial reference system 	
Compound coordinates reference system	
Identical name	Clarke 1880, Mean sea level (Mombasa), UTM zone 37
Coordinates reference system 1 (Horizontal component)	
Identical name	Clarke 1880, UTM zone 37
Domain of validity	Nairobi



Datum	
Identical name	New (1960) Arc
Type	Geodetic
Fixed origin	500,000m Easting, 10,000,000m Northing
Ellipsoid	
Identical name	Clarke 1880, (Modified)
Semi major axis	6378249.145
Inverse flattening	1 / 293.465
Prime meridian	
Identical name	Greenwich meridian
Greenwich longitude	39deg 00min East of Greenwich
Coordinate system	
Identical name	UTM zone 37
Type	Projected
Number of dimensions	2
Coordinate axis	
Name	Northing
Direction	Positive to true north at origin
Unit identifier	Meter
Coordinate axis	
Name	Easting
Direction	Positive to true east at origin
Unit identifier	Meter

• **Temporal reference system**
 A new image is produced on the 2nd, the 12th and the 22nd of each month. Each image represents the maximum value of the DMP within the periods 1-10, 11-20 and 21-end of the month.

6. DATA QUALITY

• Quality requirements and quality evaluation procedure		
COMPLETENESS: not applicable		
LOGICAL CONSISTENCY		
(1) Formal consistency		
Domain of validity	Data quality evaluation index	
All imagery	Name	Omission percentage
	Definition	Data can be opened by ArcGIS as GeoTiff format with no opening error
	Quality conformity level	Error: 0%
(2) Domain consistency		
Domain of validity	Data quality evaluation index	
All imagery	Name	Geographical extent error percentage
	Definition	Check dataset is only inside map sheet border
	Quality conformity level	Geographical extent error: 0%
POSITIONAL ACCURACY		
(1) Gridded data positional accuracy		
Domain of validity	Data quality evaluation index	
	Name	Gridded data positional accuracy
	Definition	



	Quality conformity level	300m
Quality evaluation procedure		
The SPOT-VEGETATION image quality center (QIV) ensures the data quality of the input data for the DMP.		
TEMPORAL ACCURACY: not adopted		
THEMATIC ACCURACY: not applicable		

7. DATA PRODUCT DISTRIBUTION

Distribution format information
• Format name
GeoTiff
• Encoding rules
http://trac.osgeo.org/geotiff/
• Language encoding method
UTF-8
• Language
English
Distribution media information
• Unit of product
Image of the DMP derived from SPOT-VEGETATION for Kenya
• Media name
FTP

8. METADATA

• Direction of metadata creation
Metadata must be produced together with spatial data
• Format of metadata
KSISO19115 metadata is adopted
• Indication of metadata elements
• Direction of unit of metadata creation
Metadata is provided for each spatial data product dataset unit.

9. OTHERS

• Spatial resolution
1km x 1km

• Values
Physical values of DMP range between 0 and 327. The DMP is expressed in kgDM/ha/day.
Scaling of the values
The DMP values are rescaled such that they only occupy an integer. The physical range 0 to 327 is rescaled to the range 0 – 32767, using the following formula: $\text{Image value} = \text{physical value} * 1000$
To convert the image values back to physical values, the following formula is used: $\text{Physical value} = \text{image value} * 0.01$



• **Flags**

The following values correspond to flags:

- 300 = missing Meteorological data
- 257 = NDVI<0
- 5=missing value
- 4=cloud
- 3=snow
- 2=sea
- 1=back
- 2=back
- 255=out

• **Interpretation**

To measure the 'vegetation growth rate', the DMP or 'Dry Matter Productivity' can be used.

The physical DMP values range between 0 and 327.67 kg dry matter per hectare per day, where higher values indicate a higher growth rate, so more production of dry matter biomass.

DMP typically increases at the start of the growing season to reach its maximum after which it decreases towards the end of the season.

Cumulating DMP from the start of the season onwards provides estimates of the final dry matter production over time (kg/ha). Although these estimates are often well correlated with the final crop yields, they should not be confused with final yields estimates. (Cumulative) DMP reflects only the above-ground dry matter (no fresh matter) biomass. Stress factors as water surplus or deficit, poor availability of nutrients or occurrence of pests are not directly considered in the DMP calculation (but intrinsically included in the fAPAR measurement), and as such DMP or cumulative DMP should be interpreted as indicative for "potential" production. DMP gives no indication about the quality of the harvested crops. It describes the total biomass production of the crop and makes no difference between those parts of the plants which are harvested (e.g. in case of root or fruit crops) or not.

DMP is practically used in the MARS Crop Yield Forecasting System (MCYFS) of the European Commission - DG JRC - Agrifish Unit since 2000 (Boogaard et al., 2002).

• **Example**

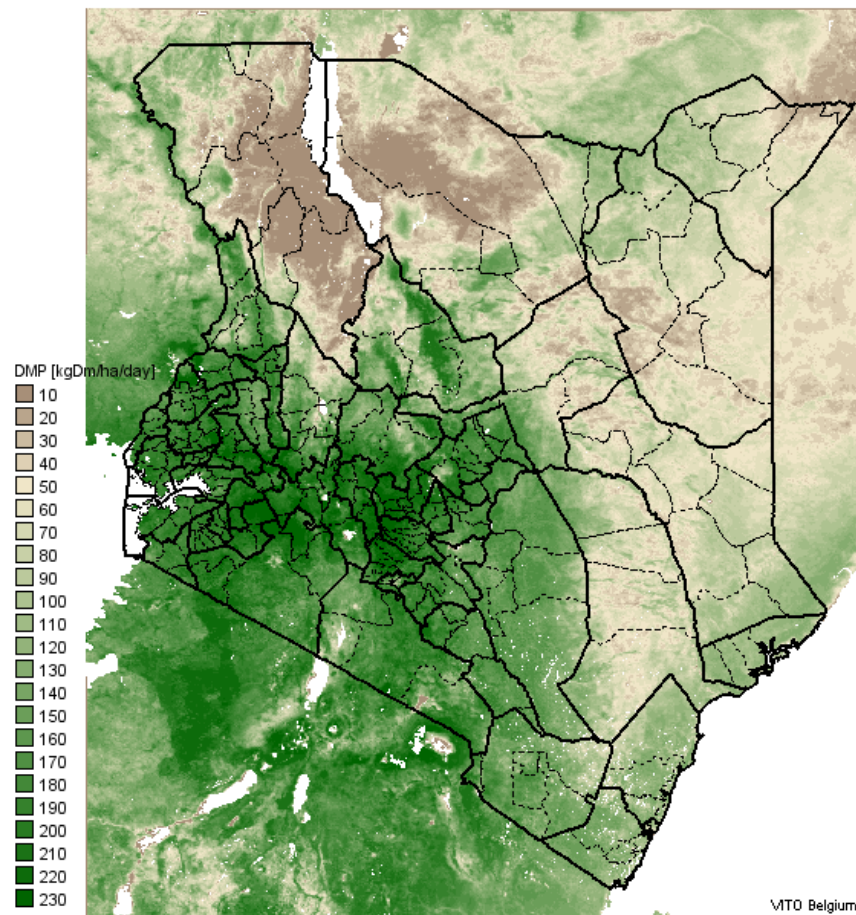
Dry Matter Productivity (DMP)

Kenya

from: 01 January 2007

SPOT-VEGETATION

Projection: UTM 37S (Arc 1960)



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• *More information*

SPOT-VEGETATION mission

<http://www.spot-vegetation.com>

<http://www.vgt.vito.be>

SPOT-VEGETATION data for Africa

<http://www.vgt4africa.org>

ENDELEO project

<http://dfwm.ugent.be/endeleo>

<http://endeleo.vgt.vito.be>

Related projects

<http://www.gmfs.info>

<http://www.marsop.info/>