COMPARING INFORMATION DERIVED FROM GLOBAL LAND COVER DATASETS WITH LANDSAT IMAGERY FOR THE HUAMBO PROVINCE AND GUINEA-BISSAU

A. Cabral*, M. Vasconcelos, D. Oom

Tropical Research Institute, GeoDes, Travessa Conde da Ribeira, nº9, 1300 Lisboa, Portugal – (anaicabral70, maria.perestrelo, duarte.oom)@gmail.com

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ABSTRACT:

Land cover maps, derived from satellite data, are a valuable tool for various global research studies and are often used in multi-temporal approaches to document the dynamics of processes such as agricultural expansion or deforestation. In this study we show how the observed land cover change tendencies diverge widely depending on the scale of observation and on the characteristics of the data sources used. For the analysis we compared land cover changes using two different scale map time-series in the period 1990 - 2009. Two regions were selected, for which there are high resolution imagery and/or ground data available for validation and verification purposes: the entire country of Guinea-Bissau and the Huambo province in Angola. The first map time series consists of data available in international projects (IGBP, GLC2000, and MODIS) obtained from classification of 1 Km resolution imagery for three dates in the study period. The second map-set results from classification and validation of 30 meter resolution images (Landsat TM and ETM+), covering the same area in approximately the same dates. For the comparisons, the different map legends had to be aggregated into a common nomenclature to define five common classes: Forests, Savannas/Shrublands, Grasslands, Croplands/Bare soil and Wetland. The results show large discrepancies in the observed trends in agricultural areas. For example for both regions, the increase in agricultural land during the analyzed period, which is observed in high resolution maps and confirmed by validation and field knowledge, is lost in the coarse resolution maps. The deforestation rates reported by the coarse resolution maps are not verified when high resolution is employed. The consequences of these observations are discussed and future work proposed.

1. INTRODUCTION

In the last years, land cover mapping has become one of the most important sources of information for environmental studies. This type of information becomes even more relevant with the establishment of international agreements such as the Kyoto Protocol, the International Convention on Biological Diversity, and the framework Convention on Climate Change, all of which call for accurate reporting of environmental variables (McCallum et al., 2006). Having information about land cover status is essential, as a baseline, in order to evaluate future changes. Remote sensing data from several satellites allowed obtaining sufficiently accurate land cover mapping in a global scale, evenly in remote areas, and has been used to derive several global land cover maps, that are freely available for a variety of applications, and which are deemed sufficiently accurate for different project types. The use of these land cover maps has been very useful in modelling studies and corresponds to a great advance in earth system science. Since these maps are developed by different and independent national and international initiatives, they were prepared using different data sources, classification systems and methodologies, which are a reflection of the different mapping standards adopted and varied interests. As a consequence, each dataset has some advantages and limitations and it is important to fully understand their applicability bounds. One way to do it is by comparison among different data sets and scales of analysis. This approach helps to better grasp what data sets should be used for monitoring, compliance assessment, and trend analysis. Several efforts have been made in recent years to improve the comparability and compatibility between land cover datasets. GOFC-GOLD (Global Observation of Forest and Land Cover Dynamics) in conjunction with FAO (Food and Agricultural Organization) and GTOS (Global Terrestrial Observation System) developed a new Land Cover Classification System (LCCS) in order to obtain a land cover harmonization methodology (Herold et al., 2008; Jung et al., 2006). The LCCS allows that land cover features be defined at any scale or level of detail, with an absolute level of standardization of class definitions between different users (Di Gregorio and Jensen, 2000). Several studies comparing two or more global land cover products were done at regional (Kalacska et al., 2008) to global scale, which show significant disagreements and reveal uncertainties (Giri et al., 2005; Herold et al., 2008; McCallum et al., 2006). Therefore, a validation and a comparison of these global datasets are necessary before using them in global and regional studies. Different approaches are used to quantitatively estimate the accuracies of the global land cover classifications: confidence values of the classifier, comparison with other maps, cross-validation with training datasets and statistically robust spatial sampling and acquisition of ground reference information (Jung et al., 2006). The purpose of this study is two-fold: (1) to characterize land cover change, with a special focus on deforestation, in two approximately same size regions of Africa; (2) to assess the effect of using coarser resolution global land cover maps for producing the same information in the period of 1990 - 2009. To achieve these goals two different map time series are used. The first map time-series results from classification and validation of 30 meter resolution images (Landsat TM and ETM+). The second consists of data available in international initiatives (IGBP, GLC2000 and MODIS). The analysis is performed for the entire country of Guinea-Bissau

* Corresponding author.

and for the Huambo province in Angola, from where there are high resolution imagery and/or ground data available.

2. STUDY AREA AND DATA PREPARATION

2.1 Study area

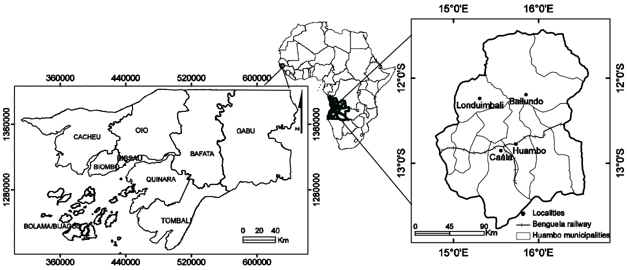

Figure 1 – Study areas

Guinea-Bissau (GB) is a country located in the west coast of Africa with approximately 36125 km^2. It has a continental mainland and a group of islands, the Bijagós Archipelago (Figure 1). This country is characterized mainly by a flat land surface with altitudes below 100 meters. Two large regions area found, namely, the coastal low land area, consisting largely of mangroves and swamps stretching from north to south and the inland, where open forests, as well as, closed forests dominate (especially in the southwest). Savanna woodland is present in the northern and eastern regions of the country (White, 1983). This distribution is dependent on different soils characteristics and mainly on differences in rainfall regimes between north and south, and east and west (Catarino, 2004). Two marked seasons can be observed in this region, characterized by a tropical climate: a dry season between November and April and a wet season between May and October.

The Huambo Province is located on the central plateau of Angola (Figure 1) and has an area of about 34270 km^2 (USAID, 2008). The region includes the higher mountains and the highest peak in Angola, the Môco Mountain with an elevation of 2620 meters, and has a wet season from October and April and a dry season between May and September. The dominant vegetation is mainly composed of *miombo* and savanna woodlands, with grasslands covering large areas of lower drainages. The *miombo* floristic formation is dominated by three species, Brachystegia spp., Combretum spp. and Julbernardia spp, whereas in savannas there is a dominant grass layer with Hyparrenia spp and Androgon spp..

2.2 Landsat data and Field data

For GB, a dataset of five scenes per date of Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper (ETM+) was used for 1990, 2002 and 2007, in a total of fifteen images. The images were from the late dry season, except for 1990. A geometric correction was performed with ground control points, resulting in a RMS error less than 1 pixel. The data were resampled into Universal Transverse Mercator projection Zone 28 north, datum WGS84 with a spatial resolution of 25 meters.

Field data were collected in GB for Mangrove, Closed forest, Open forest and Savanna-woodland, in 293 geo-referenced sample plots selected from a stratified random origin regular net, surveyed in three campaigns conducted in 2007, 2008 and 2009. These data were used for classification accuracy assessment.

For Huambo, a dataset of four images per date of Landsat TM was available, free of charge, for the period 1990/1991/1992 and 2000/2001/2002 from the University of Maryland's Global Land Cover Facility (http://glcfapp.umiacs.umd.edu/) and Landsat ETM+ data was available for 2008/2009 from the U.S. Geological Survey (USGS) Earth Resources Observation Systems (EROS) Data Center (EDC) (http://glovis.usgs.gov/). The Landsat images were, already, geometrically corrected to the Universal Transverse Mercator projection Zone 33 South and with a spatial resolution of 30 meters.

A few forest inventory plots in areas of forest and savanna were collected within the Huambo province and were later used in the classification verification.

2.3 Global land cover maps

Land cover data, produced by three international initiatives (IGBP, GLC2000 and MODIS) were freely available for this study. The International Geosphere Biosphere Project (IGBP[1]) (Loveland et al., 2000) distinguishes 17 land cover classes according the science requirements of IGBPs core projects and was produced based on NOAA-AVHRR imagery from 1992-1993, at a spatial resolution of 1 km.

The Global Land Cover 2000 (GLC2000[2]) (Fritz et al., 2003) distinguishes 22 land cover classes, developed based on the Land Cover Classification System (LCCS) and was derived from 1 km SPOT4-VEGETATION daily data from November 1999 to December 2000.

The maps produced using the Moderate Resolution Imaging Spectroradiometer (MODIS[3]), (Strahler et al., 1999) adopt the IGBP legend, and have two types of products, one based on Terra (T) satellite data and one based on Aqua and Terra combination (AT) satellite data, with a spatial resolution of 1 kilometre and 500 meters, respectively. The last one was converted into a 1 Km grid database to have the same cell size of the other global land cover products. These datasets were produced annually since 2001 until 2007, and in this study two maps were used for GB in 2002, one from Terra (MODIST2002) and one from Aqua/Terra combination (MODISAT2002). Another one was used for 2007 (MODISAT2007). For Huambo, also, two maps were used from 2001 (MODIST2001 and MODISAT2001) and one from 2007 (MODISAT2007).

3. METHODS

3.1 Landsat land cover maps (LAND maps)

A legend with ten land cover classes was established for the Landsat image classification in GB: Closed-forest, Open-forest, Savanna-woodland, Mangrove, Grassland, Croplands/Bare soil, Wet-vegetation, Burnt, Water, and Sand. This legend was defined according to expert knowledge and pre-existing maps at different scales. This information was used to train a supervised classification tree algorithm. Three Land cover maps were obtained for 1990 (LAND90), 2002 (LAND2000) and 2007 (LAND2007). Classification accuracy was assessed using data collected in the field between 2007 and 2009 for four vegetation classes: Mangrove, Closed Forest, Open Forest and Savanna-woodland.

[1] http://edc2.usgs.gov/glcc/tabgeo_globe.php
[2] http://bioval.jrc.ec.europa.eu/products/glc2000/products.php
[3] https://wist.echo.nasa.gov/

A legend with height land covers classes was defined for Huambo, according to expert knowledge, descriptions of vegetation in available literature and pre-existing maps: Closed-miombo, Open-miombo, Savanna-woodland, Grassland, Croplands/Bare-Soil, Wet-vegetation, Burnt and Water. A supervised classification algorithm, based on a maximum likelihood classifier was used to produce land cover maps for 1990 (LAND90), 2000 (LAND2000) and 2009 (LAND2009). The classification accuracy was assessed based on collected data from a random origin systematic grid overlaid on high resolution photographs with dates between 2002 and 2007 and data collected on a few field plots.

Table 1 – Legend translation between the SIMP legend and the IGBP-DISCover (MODIS), LCCS (GLC2000) and LAND maps

SIMP	IGBP-DISCover	LCCS (GLC2000)	LAND (GB/Huambo)
Forest (>30% tree cover)	Evergreen Needleaf Forest (>60%)	Montane Forest (>60%)	Closed-forest/Dense miombo (>60% tree cover)
	Evergreen Broadleaf Forest (>60%)	Closed deciduous forest (>60%)	Open-forest/Open miombo (40-60%)
	Deciduous Broadleaf Forest (>60%)	Deciduous woodland (30-60%)	Mangrove (GB) (>30%)
	Mixed Forest (>60%)	Mosaic forest/Savanna (30-60%)	
	Woody Savanna (30-60%)		
Savannas/ Shrublands (10-30% tree cover)	Savanna	Deciduous Shrub with Sparse Trees	Savanna-woodland (10-40%)
	Closed Shrub	Open Deciduous Shrub	burnt
	Open Shrub	Open Grassland with sparse shrubs	
Grassland	Grassland	Closed Grassland	Grassland
Croplands/ Barren	Cropland	Cropland	Cropland/Bare soil
	Urban/Built-up		Sand (GB)
	Cropland/Natural vegetation		
	Barren		
Wetland	Permanent Wetland		Wet Vegetation

3.2 Legend harmonization

A simplified legend (SIMP) with five classes was defined. This legend accommodates all land cover categories of each land cover map legend from each data set, on an aggregated level. Legend correspondence is shown in table 1.
Combining all different forest or savanna types is a complex task due to the different classification schemes adopted by the global land cover maps. Forest definition adopted by IGBP and GLC2000 is different. GLC2000 considers a tree cover greater than 15%, while, in this range, IGBP distinguishes three classes, savannas with tree cover between 10-30%, Woody savannas between 30-60% and Forest with tree cover greater than 60%. For LAND maps, the definition of Forest adopts a tree cover greater than 30%.

Given these differences and considering the pre-existent information about study areas; maps, descriptions of vegetation, expert opinion and in situ studies (Diniz, 2006; Catarino, 2004) we decided to consider as forest all vegetation types with a tree cover greater than 40%.
Savannas and Shrublands were included in the same class in the SIMP legend, as well as, Burnt class. This option was based on the existing available information for these areas. Field knowledge shows that Burnt class occurred essentially in savannas areas for both regions. The class cropland, due to its spectral similarity with bare and urban classes, was aggregated into the same class. The class Wetland includes Permanent Wetland and Wet Vegetation. Each land cover dataset was reclassified according SIMP legend in order to make all datasets comparable, excluding the class Water.

Due to their higher resolution and accuracy levels obtained (see below), we consider LAND maps from 1990, 2000 and 2007 or 2009 (depending on study area) as reference maps in this study. There are two types of comparisons to be made between the reference maps and the coarser resolution maps (IGBP, GLC200 and MODIS). One concerns the quantity of each category and the other the location of each category (Lambin and Geist, 2006). The first compares the similarity of the proportion of each class in the classification map to the proportion of the corresponding class in the reference map. The second analyzes the location of each category in the two maps (the classification map and the reference map) in terms of similarity. Comparisons are made between the reference map and the closest date of the coarse resolution maps, i.e., LAND90 with IGBP, LAND2000 with GLC2000, and LAND 2007 or LAND 2009 with MODISAT2007.
In this study, a vector boundary was overlaid on each reclassified dataset in order to obtain data only for the study areas. The total areas of each class derived from IGBP, GLC2000 and MODIS products were calculated and compared against the LAND maps in order to quantitatively assess the agreement level of the various datasets. As the quantitative comparison could hide the real quality of the maps, since it provides the proportions of each class but not the locations, a spatial comparison was also made. This allows identifying where agreements and disagreements occur, pixel by pixel. Overlaying the global land cover datasets with LAND maps (resampled to 1Km pixel size using a nearest neighbour algorithm), pixels with the same class in both datasets retained their value and pixels with a different class are labelled with a different value, as disagreement. This allows obtaining a map that includes the classes where the two maps showed equal representation for the same land cover classes.
The Index of agreement between the two maps (the classification and the reference map) was calculated using a measure of association called Kappa (Rosenfield, 1986). Kappa index of agreement is widely used to measure the variability between two or more classified maps, i.e., how often two or more maps agree in their interpretations. The values of Kappa range from 0 indicating no correlation to 1 indicating perfect correlation.

4. RESULTS

4.1 LAND maps accuracy

Percent agreement calculated between image classification and validation data sets built for GB and Huambo (based on field and high resolution photography respectively) resulted in values above 90% for all dates. Even though the validation data corresponds to the more recent dates, the same sample set was also used to estimate percent agreement for previous dates after removing those pixels falling in patches that, by visual inspection, showed a change in spectral response between dates. Nevertheless, since the methodologies defined in REDD[4] assume that a validation procedure conducted for the most recent images is enough to support the validity of the classification approach to apply to an historical data set and to guarantee that the most recent LAND maps are valid. Consequently, the level of accuracy obtained (above 90% for both study areas) provides high confidence in the classifications obtained.

4.2 Areal land cover estimations

The total area of the five aggregated classes derived from the comparison of each land cover product with LAND maps are shown in Tables 2 e 3, for Guinea-Bissau and Huambo, as well as, their percentage deviations.

Table 2 – Land cover area totals in km^2 and their percent deviations (in parentheses) from LAND maps for IGBP, MODIST2002, MODISAT2002,GLC2000, and MODISAT2007 in Guinea-Bissau

Land cover	LAND 90	IGBP
Forest	2820	19754 (600.4)
Savannas/ Grasslands	23129	6049 (-73.8)
Grasslands	638	416 (-34.8)
Croplands/Bare soil	2881	2992 (3.8)
Wetland	553	814 (47.1)

Land cover	LAND 2000	GLC2000	MODIS T2002	MODISAT 2002
Forest	2611	6954 (166.3)	20235 (674.9)	24958 (855.8)
Savannas/ Grasslands	24480	21958 (-10.3)	7534 (-68.22)	1535 (-93.7)
Grasslands	345	0 (0)	616 (78.5)	122 (-64.6)
Croplands/Bare soil	2420	870 (-64.0)	972 (-59.8)	1638 (-32.3)
Wetland	165	3 (-98.1)	738 (347.2)	1841 (1015.7)

Land cover	LAND 2007	MODISAT 2007
Forest	2459	25900 (953.2)
Savannas /Grasslands	23648	316 (-98.6)
Grasslands	608	39 (-93.5)
Croplands/Bare soil	2914	2015 (-30.8)
Wetland	64	1822 (2746.8)

In Guinea-Bissau, for Forest class the higher percentage variation is founded in MODISAT2007 with a value of 953.2% follow by IGBP (600.4%). For Savannas/Shrubland, all maps show a negative percentage variation. Relatively to Grassland class, all maps show negative values, when comparing with the respective reference map, except MODIST2001 with a value of 78.5%. Also, the class Cropland/Bare soil show negative trend for all maps except the IGBP with a n increase of 3.8%. The class Wetland show very higher values for MODISAT2007 (2746.8%) and MODISAT2002 (1015.7%) and lower for MODIST (347.2%) and IGBP (47.1%). Only the GLC2000 (-98.1) show a negative trend for this class.

In Huambo, the map with higher percentage variation, for forest class, is MODISAT2007 with 400.1% follow by MODISAT2001 (340.8%).
For Savannas/Shrubland, all maps show a negative percentage variation, except the IGBP with an increase of 3.52%. For Grassland class, all maps show a decrease of this area. Also, the class Cropland/Bare soil show a negative trend except the IGBP with an increase of 6.2%. Only the map MODISAT2007 has an increase for Wetland class.The class Wetland show very higher values for MODISAT2007.

Table 3 – Land cover area totals in km^2 and their percentage from LAND maps for IGBP, MODIST2001, MODISAT2001,GLC2000, and MODISAT2007 in Huambo

Land cover	LAND 90	IGBP
Forest	5920	9720 (64.1)
Savannas/ Grasslands	18539	19193 (3.52)
Grasslands	5436	4 (-99.9)
Croplands/Bare soil	3295	3500 (6.2)
Wetland	62	0 (0)

Land cover	LAND 2000	GLC2000	MODIST 2001	MODISA T2001
Forest	6107	26682 (336.9)	15168 (148.3)	26922 (340.8)
Savannas/ Grasslands	17818	3647 (-79.5)	16299 (-8.5)	4242 (-76.2)
Grasslands	4599	64 (-98.6)	502 (-89.1)	535 (-88.3)
Croplands/Bare soil	4424	1986 (-55.1)	437 (-90.1)	684 (-84.5)
Wetland	261	0 (0)	15 (-94.2)	38 (-85.4)

Land cover	LAND 2009	MODISAT 2007
Forest	5305	26535 (400.1)
Savannas/ Grasslands	19700	4560 (-76.8)
Grasslands	2759	867 (-68.5)
Croplands/Bare soil	5480	367 (-93.3)
Wetland	64	91 (42.1)

4.3 Spatial comparison

The kappa index of agreement between each map and its reference map, for Guinea-Bissau, is shown in table 4.

Table 4 – Kappa Index of Agreement for Guinea-Bissau

Land cover comparison	Kappa (%)
IGBP/LAND90	51.7
GLC2000/LAND2000	77.9
MODIST2002/LAND2000	61.4
MODISAT2002/LAND2000	52.6
MODISAT2007	51.9

The GLC2000 is the map with the best index of agreement for Guinea-Bissau. This map shows the best agreement for Savanna/Shrublands (84.1%). However, the Forest class

[4]http://www.netinform.de/KE/Wegweiser/Guide2.aspx?ID=6141&Ebene1_ID=49&Ebene2_ID=1978&mode=4

agreement is only 42.8% and Croplands/Bare soil is 15.1%. The MODIST2002 shows the best agreement for Forest (65.1%), followed by MODISAT2007 with 61.6% and MODISAT2002 with 58.6% and IGBP with 48.9%. For Savannas/Shrublands, the values of agreement for MODIST2002 and IGBP are respectively, 21.5% and 14.9%. The remaining maps have values lower than 10 % for this class, grassland and Croplands/Bare soil. Only class Wetland shows values of 12.7%, 11.8%, 26.7% and 32.6% for IGBP, MODIST2002, MODISAT2002, and MODISAT2007. The maps that best represent the Croplands/Bare soil class are GLC2000 and MODIST2001.

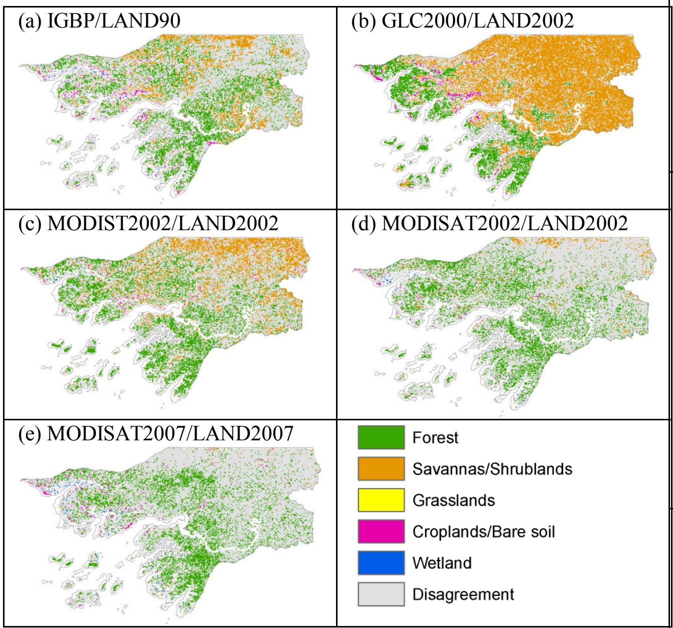

Figure 2 – Maps of agreement and disagreement, for Guinea-Bissau, between land cover products. (a) IGBP-DISCover/1990 LAND map, (b) GLC2000/2000 LAND map, (c) MODISTERRA2001/2000 LAND map, (d) MODISAQUA2001/2000 LAND map, (e) MODISAQUA2007/2007 LAND map

The kappa index of agreement between of each map and its reference map, for Huambo, is shown in table 5.

Table 5 – Kappa Index of Agreement for Huambo

Land cover comparison	**Kappa (%)**
IGBP/LAND90	53.5
GLC2000/LAND2000	42.3
MODIST2001/LAND2000	46.5
MODISAT2001/LAND2000	39.5
MODISAT2009	39.6

The classes with higher agreement are the Forest class (39.1%) and Savannas/Shrublands (45.3%) for IGBP, Forest (88.1%) and Croplands/Bare soil (14.2%) for GLC2000, Forest (36.5%) and Savannas/Shrublands (26.9%) for MODIST2001, and Forest (77.4%, 81.7%, respectively) for MODISAT2001 and MODISAT2007. maps In contrast, the classes with the lower values of agreement (<10%) are Grassland, Croplands/Baresoil and Wetland for all datasets except GLC2000 with Savannas/Shrublands, Grassland and Wetland.

5. DISCUSSION

The accuracy assessment done in this study is based on the comparison of global land cover products (IGBP, GLC2000, MODIS data) derived from coarse spatial resolution with three medium to high resolution maps. As many authors claim that is not possible to reliably identify land cover changes by comparing different datasets from different years (Giri et al., 2005; Jung et al., 2006), we try to minimize this effect by comparing each map with the reference map of the closest date.

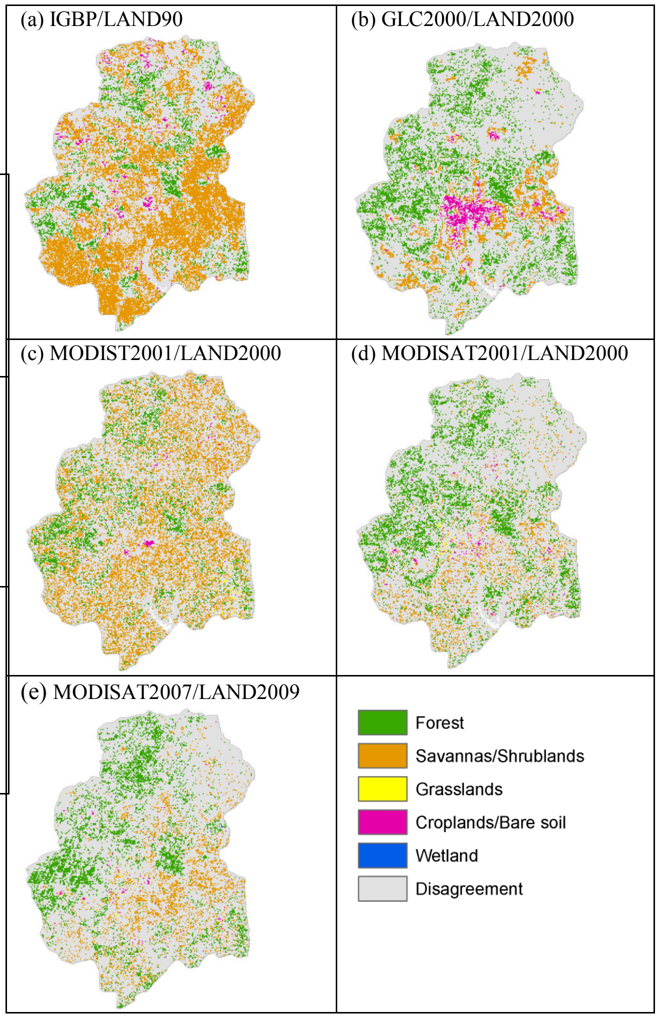

Figure 3 – Maps of agreement and disagreement, for Huambo province, between land cover products. (a) IGBP-DISCover/1990 LAND map, (b) GLC2000/2000 LAND map, (c) MODISTERRA2001/2000 LAND map, (d) MODISAQUA2001/2000 LAND map, (e)MODISAQUA2007/2009 LAND map

This analysis reveals that there are varying levels of discrepancy between the global land cover datasets and that both area totals and spatial agreement or disagreement vary from region to region. This is reflected in three main classes: Forest, Savannas/shrublands and Croplands/Bare soil. Results show that Forest and Savannas/Shrublands classes diverge largely from the reference maps. In general, Forest has high values in global maps and low values in LAND maps. This may be related to the difficulty of harmonizing the different map legends and also, with the options adopted in class aggregation. Although, the limits of tree cover chosen for Forest definition and Savannas/Shrublands for comparison were greater than 40% and between 10 and 40%, respectively, the aggregation of each legend turns difficult because the IGBP legend considers Forest above 30% and Savannas between 10 and 30%. The 10 % difference can have some influence in the Forest and Savannas/shrublands results. The visual inspection over the

Landsat images from the three years analyzed, for each study area, shows that there is an increase in Savanna-woodland which seems to be related with the conversion of forest areas. The main changes occurred in the two decades seems to be directly related to the expansion and dynamics of Cropland/bare soil. This is relevant mainly in Huambo, where the values increase substantially. This trend is not observed in global maps where this class decreases in area. The best index of agreement is obtained by the GLC2000 land cover product for Guinea-Bissau and IGBP for Huambo in assessing the aggregated area and spatial extent of the land cover classes. However, in general Guinea-Bissau shows higher values of spatial accuracy (between 51.9% and 77.9%) than Huambo (between 39.6% and 53.5%) which can be related with the landscape structure. The degrees of accuracy seem to be strongly dependent on the landscape type: structured with large contiguous patches in Guinea-Bissau and less unstructured and scattered small patches in Huambo. In more heterogeneous and fragmented regions, the coarse spatial resolution maps present more errors and uncertainties. Is the case of the Huambo province located in a very mountainous region, with steep slopes, it is more difficult to produce high quality classifications than in Guinea-Bissau with a mostly flat land surface. Mapping land cover using coarse spatial resolution data can be a challenge due to landscape structure, because it can be more detailed than the resolution of the sensor (Jung et al., 2006). It is important to note that there are sharp differences between MODIST and MODISAT maps, maybe due to the combination of data sources.

6. CONCLUSIONS

This study has attempted to validate five global land cover datasets using three land cover maps derived from Landsat data as reference data and comparatively assess the agreement and mapping uncertainties between them. For that, a legend harmonization was done in order to minimize differences due to thematic class definitions. Nevertheless, the comparative analysis reveals that there are varying levels of discrepancies between the maps which suggests caution to the users when using one particular dataset, especially if several dates from different sources are employed in land cover change analysis. This is not a surprise, since global maps use diverse approaches and data from different satellite sensors with varying degrees of raw data corrections and manual manipulation during the classification process (Jung et al., 2006). Also, errors can be introduced due to the variable definition of classes.

This work aims to highlight the similarities and differences between datasets, and consequently their strengths and weaknesses, for two specific regions in Africa in order to help users to select the most appropriate dataset for their applications. Users can use areas where data have higher accuracy values and look for complementary information in disagreement areas. Intends, also, to highlight the need of producing land cover datasets using high resolution or medium to high resolution data, together with auxiliary data in order to improve the confidence on land cover information.

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