

Improving Global Land-Cover Maps with Sentinel S2GLC Project



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Abstract



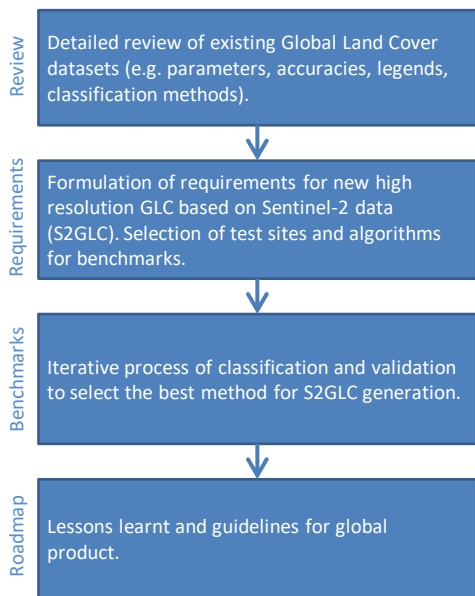
The European Space Agency (ESA) through its Scientific Exploitation of Operational Missions (SEOM) element, are funding a project entitled Sentinel-2 Global Land Cover or S2GLC for short. This project will focus on the classification of Sentinel imagery for the purpose of producing a global land cover map. The project began on February 2016 with a total duration of 2 years and is led by CBK PAN with three partner organisations. In order to maximize the output of this study, five test sites were chosen to test and validate the applied classification techniques: Italy, Germany, Namibia, Colombia, and China. Each test site covers an area approximately 200 000 km² and is found in a variety of bio-geographical locations in order to test as many different land-cover types as possible. The choices were a balance between access to good validation data, landscape variability, and the technical constraints of testing multiple classification algorithms and methodologies. The first part of this study is an extensive review of the currently available Global

Land Cover (GLC) maps and databases. **The review is ready so please ask us about it.** Our team believes that it is a perfect venue to present our review to get constructive feedback from the users of GLC databases in attendance. This review, together with feedback from the community, will influence the choices in algorithms and image processing methodologies tested within the scope of this study. The second and third parts of the study are focused on testing of the land-cover classification methodologies and validation of those methods respectively in order to produce not only the highest quality maps, e.g. accuracy >80%, but also harmonized with current GLC products. In order to achieve this complex goal, many different tests of object-oriented as well as pixel based classification approaches will be made. In parallel, advanced data collection strategies for training and validation will be investigated. While the majority of the applied land-cover classification techniques will be based on optical imagery acquired by

Sentinel-2 (S2), the team understands that this challenge can be supported globally by the Sentinel-1 SAR data. The different approaches will be benchmarked in order to understand the influence of a variety of factors on the performance of the proposed methods. Factors will include feature relevancy, the impact of atmospheric correction, the selected minimal mapping unit, seasonal changes, the incompleteness of training data, image mosaicking, and multi-temporal S2 data. The final part of the project will be aimed to make recommendations based on the research for future S2 based GLC products. The poster presents initial stages of the project, working assumptions, directions, and potential problems. The goal of this presentation is to make potential end-users aware of the on-going work and to establish professional relations with researchers willing to share their experience on this topic.

Project website: <http://s2glc.cbk.waw.pl/>

Workflow



Existing GLC databases

No.	Name	GLC pixel size	Free availability	Number of classes	MMU	Time period	Accuracy	Classification method	Organization / Authority
1	IGBP DIS (GLCC)	1km	YES	17	-	April 1992-March 1993	59,4%	unsupervised clustering	USGS, UNL, JRC
2	UMD	1°, 8km, 1km	YES	14	-	1981-1994	65%	supervised decision tree	University of Maryland
3	GeoCover-LC BaseVue 2013	30m	NO NO	13	1.4ha	1990, 2000 2013	Over 72%	Unsupervised classification	USA, MDA
4	GLC2000	1.15km	YES	22 - LCCS	-	November 1999 – December 2000	68.6%	supervised and unsupervised	JRC
5	MCD12Q1	500m	YES	17 - IGBP	-	Each year 2001-2014	75%	supervised decision-tree	NASA
6	GLCNMO (v1 and v2)	500m	YES	20 - LCCS	-	2003, 2008	78%	decision tree method	International Steering Committee for Global Mapping
7	CCI-LC 2000 2005 2010	300m 300m 300m	YES	23 - LCCS	300m	1998-2002 2003-2007 2008-2012	80% Validation in process	supervised and unsupervised	ESA: UCL, BC, UJENA, WUR, Gamma, Upavia, CRP, JRC, MOHC, LSCE, MPI-M
8	GlobCover 2005 2009	300m 300m	YES	23 - LCCS	-	2005 2009	73,1% 67,5%	supervised and unsupervised	ESA: JRC, EEA, FAO, UNEP, GOF-C-GOLD and IGBP
9	GlobLand30 2000 2010	30m 30m	YES	10	9 - 100 pixels	2000 2010	78,6% 80,3%	pixel- and object-based	NASG
10	FROM-GLC	30m	YES	9 + clouds	-	1984-2011 (74% after 2006)	72%	supervised	Tsinghua University GLC
11	GLC-SHARE	1 km ²	YES	11	-	2014	80,2%	not applicable	FAO
12	Geo-Wiki	300m	YES	10	-	2000-2012	validation not applied	On-going volunteer interpretation	IIASA, University of Applied Sciences, University of Freiburg
13	CORINE LC (European database)	≤100m	YES	44	25ha	1990, 2000, 2006, 2012	≥ 85%	visual interpretation	EEA

Test sites

Selected classification algorithms will be tested on 5 test sites (Colombia, Germany, Italy, Namibia and China).



Colombia (200 000km²)



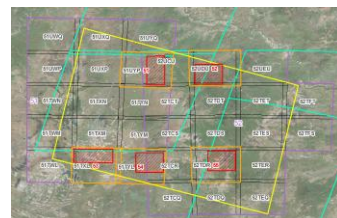
Germany (190 000km²)



Italy (160 000km²)



Namibia (220 000km²)



China (200 000km²)

Project Consortium

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