PROJECT FINAL REPORT

Grant Agreement number: 262887

Project acronym: MALAREO

Project title: Earth Observation in Malaria Vector Control and Management

Funding Scheme: Collaborative project

Period covered: **from** 01/02/2011 **to** 31/01/2013

Name of the scientific representative of the project's co-ordinator[1], Title and Organisation:

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1 Structure of the report

In addition to the periodic report for the last period of the project, this report is the final report, submitted within 60 days after the end of the project.

This final report comprises:

- A final publishable summary report which includes:
  - an executive summary,
  - a summary description of project context and objectives,
  - a description of the main S&T results,
  - the potential impact (including the socio-economic impact of the project) and the main dissemination activities and exploitation of results/foregrounds,
- A plan for the use and dissemination of foreground, to spread awareness,
- A report covering the wider societal implications of the project, in the form of a questionnaire, including gender equality actions, ethical issues, efforts to involve other actors.

2 Publishable summary

2.1 Summary description of MALAREO context and objectives

The World Malaria Report 2011 (World Health Organization, WHO) estimated 216 million malaria cases worldwide, of which approximately 81% or 174 million cases were reported in the African Region. There were an estimated 655.000 deaths caused by malaria, of which 91% were in Africa. Around 86% of malaria deaths were children under 5 years of age. In 2008, the Roll Back Malaria (RBM) partnership prepared a Global Malaria Action Plan (GMAP) in line with the 2010 targets of the UN Secretary General. A global strategy outlined the goal to have a substantial and sustained reduction in the burden of malaria in the near and mid-term (2015), and the eventual global eradication of malaria in the long term.

Geographic Information Systems (GIS), Earth Observation (EO), spatial modelling and spatial statistics play a crucial role to plan malaria vector control. MALAREO is a mixed European-African consortium that aims to build GIS, EO and spatial statistics capacities and implement the use of (new) EO products within the malaria vector control and management programmes in Southern Africa.

The project is focusing on the cross-border region of southern Mozambique, eastern Swaziland, and north-eastern South Africa. The region is largely undeveloped, this being exacerbated by the fact that it falls within a malaria area. Increased anti-malarial drug resistance and the lack of a malaria control programme in the past (mainly in south Mozambique) have contributed to this impeded development. The three countries in the MALAREO study area are in different stages of malaria control, which causes different conditions for the use of EO products.
Figure 1 illustrates the different epidemiological milestones for malaria elimination as defined by the World Health Organization (WHO). South Africa is currently in the pre-elimination stage of malaria control. Swaziland is currently in the elimination stage of malaria control and is aiming for elimination of local malaria cases by 2015. Mozambique is currently in the control stage of malaria control.

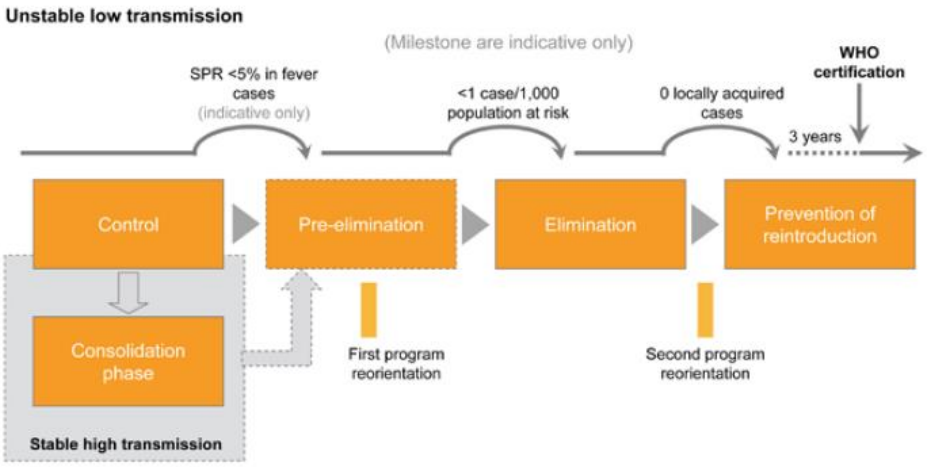

Figure 1: Epidemiological milestones.
Source: "Malaria Elimination: A Field Manual for Low and Moderate Endemic Countries". World Health Organization, 2007. (Slide Positivity Rate (S.P.R.) = Total positive x 100 / Total slides examined).

2.2 Description of the work performed and the main results achieved

Figure 2 shows the MALAREO project scheme. In a first phase, a user survey was conducted to gather information on the current capacity needs and user requirements from malaria researchers and malaria control programmes in the MALAREO study area. Existing capacity and user requirements were analysed and compared with state-of-the-art requirements. A capacity gap analysis identified and prioritized required capacities. This outcome is the basis for defining the EO monitoring solutions and the required capacity building. During the project lifetime, progress should be made in Research and Development of new EO products as well as in capacity building of basic and advanced skills, where the latter should be linked to the specific EO applications developed in MALAREO.

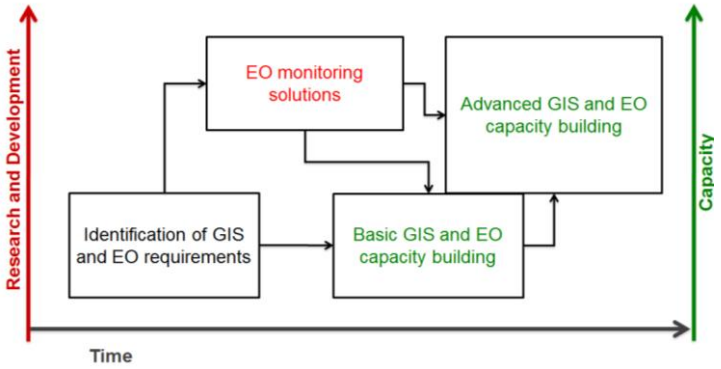

Figure 2 : Scheme of MALAREO project approach

2.2.1 Identification of GIS and EO requirements

End-user surveys conducted in the study area of MALAREO have shown high interest for linking EO with epidemiology as well as for EO products directly supporting the Malaria Control Programmes (MCP) in their daily work. Following these user requirements, MALAREO is addressing two different applications of earth observation (see **Figure 3**), i.e. EO applications to support malaria epidemiological studies and EO applications to directly support malaria vector control. Epidemiological EO applications mainly address parameters that are suitable to predict the environmental conditions for the vectors. These parameters are used to produce malaria risk maps. EO applications that directly support malaria control aim at providing relevant geo-data that optimize planned vector control measures, which is a new field for EO applications.

The skills of staff were interrogated against the state-of-the-art of EO applications and statistical modelling for malaria vector control. The existing capacity of the surveyed institutions were assessed and categorized into different skills groups. The results showed divergent training needs, but clearly indicate the need to start with introductory training themes. GIS, remote sensing and spatial statistical modelling courses are given at increasing level, focusing on a stable group of trainees following a series of courses going from introductory to advanced level.

2.2.2 EO products monitoring solutions

Based on the user requirements and the state-of-the-art of EO applications for malaria, the products to be developed are categorized into two fields of EO applications, i.e. EO applications for epidemiology and EO applications for supporting the MCP's – as explained below. There is a thematic overlap between these two applications, whereby some products will be used as input for the epidemiological modelling as well as for the direct support of the National Malaria Control Programmes (see **Figure 3**).

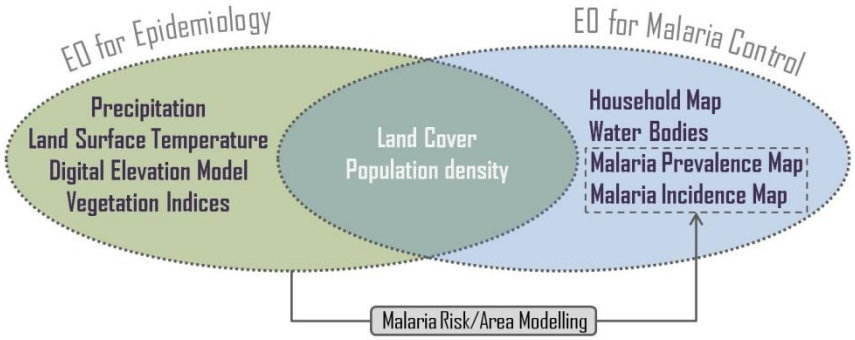

Figure 3: General MALAREO overview of parameters derived from remote sensing for the two EO applications (Epidemiology and malaria control management).

MALAREO developped 10 different map types ; household map, image base map, land cover maps, water bodies maps, distance-to-land cover maps, potential vector breeding site maps, habitat foci maps and population density maps. In addition, existing remote sensing derived products are combined with MALAREO products for Malaria risk modeling using an Bayesian statistical modeling approach. Such additional existing data were Collection-5 MODIS (Moderate Resolution Imaging Spectroradiometer) Land Surface Temperature (LST) & Emissivity data from the Land Processes Distributed Active Archive Center (LP DAAC, NASA) and rainfall estimate (RFE) data with 8km spatial resolution that was derived from the FEWS NET Africa Data Portal. **Figure 4** shows the MALAREO products at a glance.

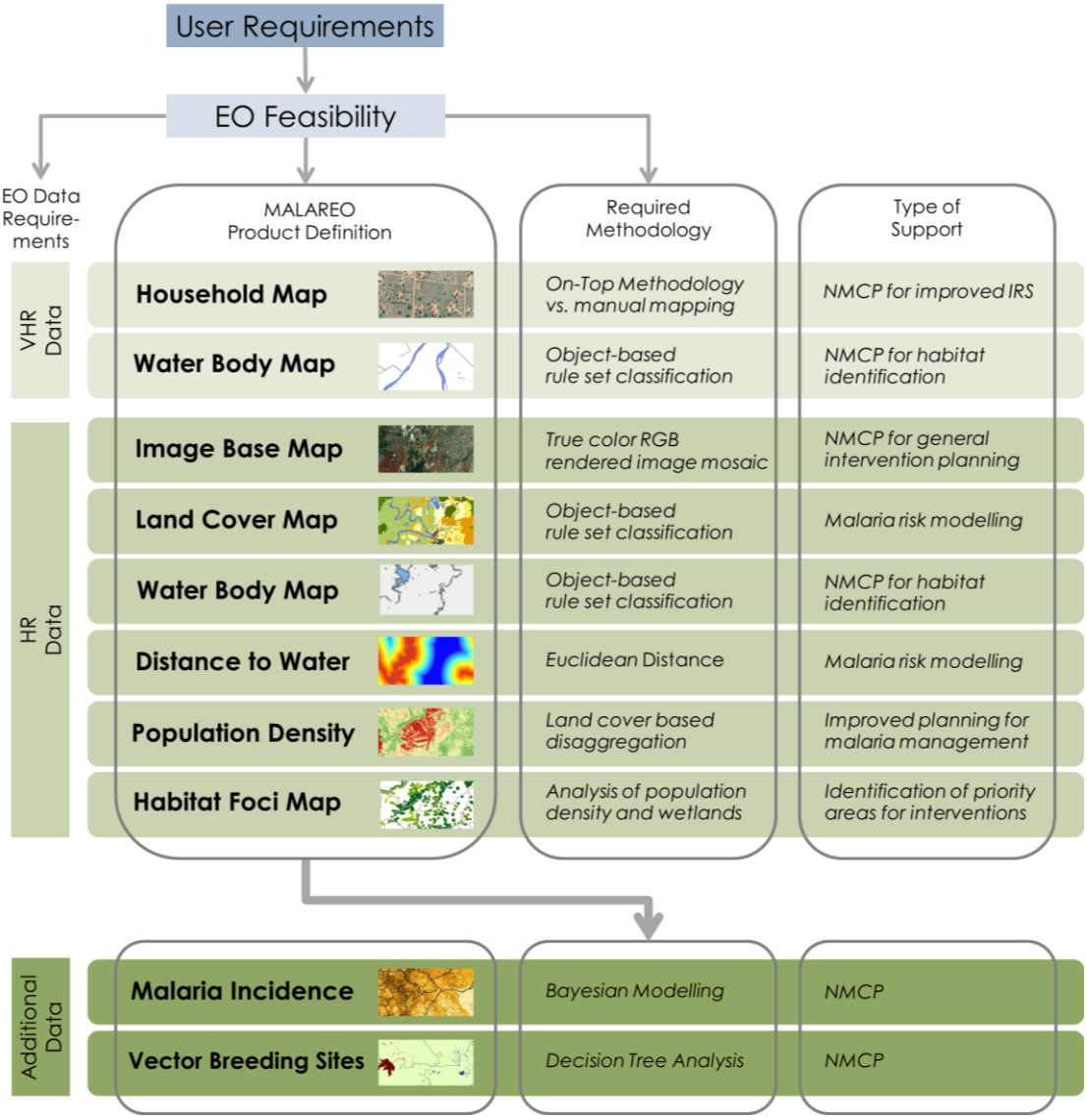

Figure 4: MALAREO product description

Household mapping

Detailed household maps derived from VHR EO data are required to support NMCPs when preparing their control measures. An approach for an automated house/hut detection based on VHR data is developed and tested by the use of object-based image information and/or textural parameters of panchromatic and multispectral bands.

Beside the free image service Bing Maps was tested for its use for house mapping. All houses in the VHR sites were manually digitized for a direct comparison to the results of the automated VHR data analysis.

Image base maps

End-users stated that even the HR base images would add value to the Programs. Since free image services such as Google Earth etc. do not provide high resolution imagery for the whole project area, true color RGB RapidEye image mosaics were generated and rendered to georeferenced JPG-files and provided to the NMCPs for being used in a GIS. Hardcopy base maps of the study area can assist

the program managers of the NMCP that are not familiar with GIS. Printed maps have therefore been delivered to the programme managers of the NMCP in DIN A0 format.

HR land cover mapping

25,000 km^2 high resolution RapidEye data are classified according to malaria-relevant land covers using an object-oriented approach. 11 land cover classes have been differentiated; Flowing water, Standing water, Wetland, Forest/Woodland, Bush-Shrubland, Grassland/Savanna, Bare soil/rock, Settlement/Infrastructure, Roads/Tracks, Large-scale Agriculture and Subsistence Farming (see **Figure 5**).

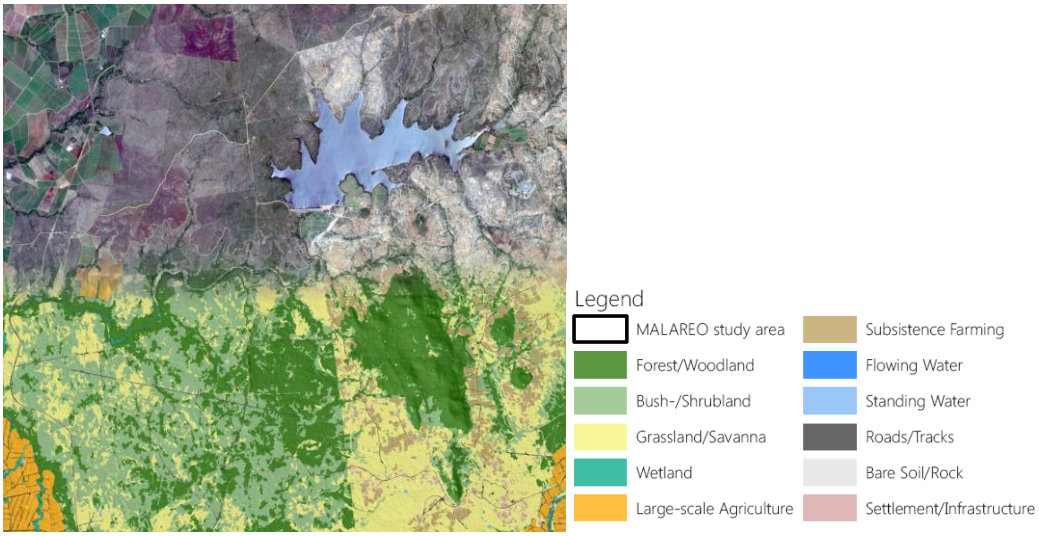

Figure 5: Land Cover mapping

Water body mapping & Distance to water map

Even small water bodies are playing an important role as larval breeding sites for malaria vectors. The identification of water bodies are thus a direct indicator for malaria risk and the distance to water is a major determinant for Bayesian modelling of malaria incidence. Remote sensing was used to identify water bodies over large rural areas. The higher the resolution of the data, the more small water bodies can be detected.

Population distribution mapping

Depending on the needs of the Bayesian modeling of the malaria risk, modelling of population distribution can be done. A population density map links demographic data from statistical sources with land use information derived from EO data. A combination of the AfriPop dataset and the settlement/Infrastructure class produced an enhancement AfriPop population map. This map will also be very useful for the NMCP program manager.

Mapping of potential breeding sites

The reference data set of vector breeding sites identified in the entomological survey from Swaziland and the HR water body map was combined to generate probability maps of the presence of breeding sites in larger areas. A statistical approach, whereby multi-temporal LST and RFE data were used in combination with 8 HR distance-to-land cover layers and a DEM in the decision tree software See5 (RuleQuest Research Pty. Ltd., NSW, Australia) was applied. The decision tree learning algorithm is a commercial decision tree and rule induction engine and classifies the data by the use of independent variables. The training data was generated from the entomological sample points as derived from field data through zonal statistics in ArcGIS 10.1. In total, following 18 environmental

variables were used to analyse parameters that describe the existence of potential vector breeding sites:

- Altitude (DEM, 30m spatial resolution)
- Eight distance-to-land cover layers (5m spatial resolution)
- Four 8-day averages of the LST for the 4 week period prior/during the entomological survey (1km spatial resolution)
- 24-day average of the LST for the 3 week period prior to the entomological survey (1km spatial resolution)
- Four dekadal (10-day) rainfall estimates for the 4 week period prior/during the entomological survey (8km spatial resolution)

These 5 selected relevant features from this training data set, provided a decision tree or rule set for classification and gave the classification accuracy based on training data. In this case, the analysis was performed using all samples as training data. The land cover information on standing water and wetlands from the high resolution land cover map were afterwards used to apply the final ruleset from the See5 analysis, in order to classify the remotely sensed water bodies and wetlands in the whole malarious area of Swaziland according to their potential to be vector breeding sites.

Malaria risk modeling

It is the aim of MALAREO to improve Bayesian modelling results by using improved input data. Major improvements can be achieved by using medium to high resolution data for as well land cover classification and identification of water bodies, as for vegetation indices and elevation. This was achieved by the use of high resolution RapidEye data, medium resolution MODIS data and by the use of the ASTER Global Digital Elevation Model with 30m spatial resolution.

MALAREO MapBook

All these EO products are gathered into the MALAREO MapBook (see **Figure 6**). This map book was distributed to all MALAREO end-users. Based on a variety of thematic maps, the management of integrated vector control, including the planning of indoor residual spraying (IRS), the distribution of insecticide treated nets (ITN) or larvaciding, can be substantially improved and can result in more effective vector control measures. All geo-data were provided to the NMCs to implement the data in their data management systems. The use of these data for the work of the NMCPs and the use of this map book was also part of the capacity building done in MALAREO.

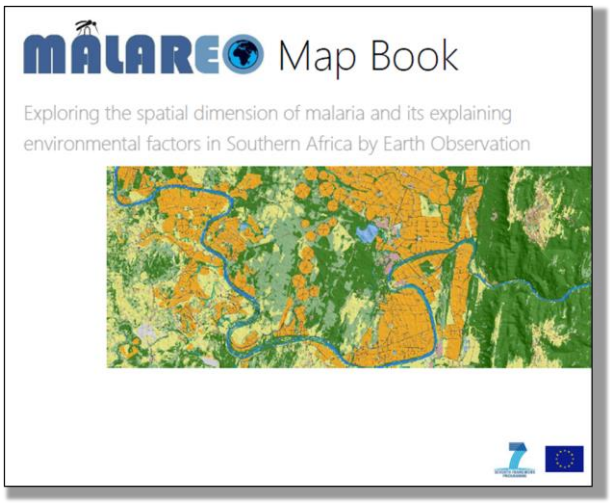

Figure 6 : Front page of the MALAREO mapbook

2.2.3 Capacity building

One of the main objectives of the project was also to train the end-user community from countries affected by malaria in the use of GIS and the application of EO products. This will enhance local malaria combating techniques and abilities. Three separate courses were organized from basis to advanced level, spread across the duration of the project. They were incremental in nature, starting with fundamental interface training and theoretical knowledge in GIS and RS, moving onto applied skills in GIS and mapping epidemiology and finally onto analysis, modelling and map production using real world data. **Table 1** gives a summary of the 3 MALAREO training sessions.

Table 1 : Summary of MALAREO Training sessions completed

Training	Contents	Level	Period
Course 1: Introduction to GIS	Spatial querying, join and editing, geo-processing, produce maps, short intro to RS	Basics	February 2012
Course 2: Advanced GIS & Introductory remote sensing	Adv. Spatial temporal analysis, introduction to Remote Sensing and Statistics	Intermediate	September 2012
Course 3: Spatial statistics for malaria epidemiology	Results and methodology behind RS Products, Advanced epidemiological Statistics, Use & integration of participant data	Advanced	January 2013

The three training sessions were organized at the Howard College Campus of the University of KwaZulu-Natal in Durban, South-Africa. Participants came from different provincial MCP's in South-Africa, Swaziland, Mozambique and NMCP's from Madagascar, Botswana, Angola, Sudan and the African Centre of Meteorological Applications in Niger.

The ultimate goal was to enable the participants to utilize their own data collected in the field and enable them to produce spatial products in GIS which would be useful to track, monitor and combat malaria more effectively. The envisaged outcome was to train a core group to a moderate/high level of competency in GIS, Remote sensing and spatial statistics, giving them sufficient knowledge and ability to train their colleagues afterwards.

At the end of the training sessions, all participants received a DVD (as well as hard copies) with the training materials; the exercises and the lectures. All these presentations and documents are available on the MALAREO website.

2.3 The potential impact and use of the results

A Final Demo Event with the end-users from the South African National Malaria Control Programme was held in South-Africa in January 2013. This meeting gave a good impression on the actual and potential future impact of the MALAREO work. The developed MALAREO EO products have been presented. The end-users emphasized the benefit of these EO products for malaria control, since these products will greatly improve planning of malaria control measures and will complement the followed approach of linking environmental and epidemiological data, which is a first step towards an early warning system for malaria.

Three training sessions were organized throughout the second period of the project. The feedback on the organized courses was very positive. As the course was using open-source GIS software, it can be expected that the built-up capacity will result in immediate positive impact on the functioning and organisation of the MCP's.

MALAREO is in a good position to positively impact the use of EO and GIS for malaria vector control in the region and contribute to an operational use of spatial products at local level in the fight against malaria. However it is already clear that follow-up after the MALAREO project will be required; both in terms of continuation of the work in the project area as well as extension of the project approach to other areas.

MALAREO will hopefully contribute to a better integration and awareness of EO solutions in local and national MCP's, and build on the fundaments of an EO monitoring cell that support the MCP's in their fight against malaria. Additionally, the project results should advance the state-of-the-art on malaria research and build progress towards an operational use of EO products and solutions supporting malaria vector control.

2.4 MALAREO partners

The consortium is well equipped and highly skilled to achieve the MALAREO project objectives. It is a good mixture of SME's, universities and administrations uniting remote sensing experts with epidemiology experts and public health specialists from 3 European partners and 3 Southern African partners.

Project partners are the Medical Research Council and the University of KwaZulu-Natal from South-Africa, the National Malaria Control Program of Swaziland, Remote Sensing Solutions from Germany and the Swiss Tropical and Public Health Institute from Switzerland. The project coordinator is EUROSENSE (Belgium).

The consortium works in very close collaboration with the local end-users: the Malaria Control Programmes of South-Africa, Swaziland and Mozambique.

2.5 MALAREO website

Figure 7: Project website address: http://www.malareo.eu

2.6 MALAREO logo

MALAREO

EO in Malaria Vector Control and Management

Figure 8: Project logo

3 Use and dissemination of foreground

This section describes the dissemination measures, including any scientific publications relating to foreground. Its content will be made available in the public domain thus demonstrating the added value and positive impact of the project on the European Union.

3.1 Scientific (peer reviewed) publications

The following table lists all scientific (peer reviewed) publications relating to the foreground of the MALAREO project.

TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers[2] (if available)	Is/Will open access[3] provided to this publication?
1	MALAREO - Earth Observation in Malaria Vector Control and Management	Bauwens Ides	"Let's embrace Space"	Volume 2	Space Research and Development Unit in the European Commission's Directorate-General for Industry and Enterprise	European Union	2012	pp 232-241	http://ec.europa.eu/enterprise/policies/space/research/publications/index_en.htm	yes
2	MALAREO – Earth Observation to support Malaria control in southern Africa	Bauwens Ides	2012 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)	July 22–27, 2012	The Institute of Electrical and Electronics Engineers, Inc.	Munich, Germany	2012	pp7252-7255	http://ebookbrowse.com/bauwens-franke-gebreslasie-2011-earth-observation-to-support-malaria-control-insouthern-africa-pdf-d394764646	yes

[2] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[3] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

3.2 Dissemination activities

The following table lists all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

	TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES					
NO.	Type of activities[4]	Title	Date	Place	Type of audience[5]	Countries addressed
1	*Website*	*EUROSENSE kicks off two new FP7 projects: MALAREO & REDDINESS*	*1 April 2011*	*EOMAG! http://eomag.eu/*	*Scientific Community, Industry*	*European countries*
2	*Website*	*EUROSENSE kicks off two new FP7 projects: MALAREO & REDDINESS*	*1 April 2011*	*EUROSENSE http://www.eurosense.com*	*Scientific Community, Industry*	*European countries*
3	*Website*	*Earth Observation in Malaria vector control and management*	*1 April 2011*	*UN-SPIDER newsletter http://www.un-spider.org/about/newsletter*	*Scientific Community, Industry*	*European countries*
4	*Presentation + flyer*	*EO in malaria vector and control management*	*12/05/2011*	*FP7 Space Conference, Budapest (Hungary) – Space research brochure*	*Scientific Community, Industry*	*European countries*
	Presentation +flyer	*EO in malaria vector and control management*	*12-14 June 2012*	*GEOSS, Boulder Colorado, USA*	*Scientific Community, Industry*	*International*
5	*Abstract + poster*	*Earth Observation in Malaria Vector*	*03/10/2011*	*7th Tropical Medicine & International Health*	*Scientific Community,*	*European countries*

[4] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[5] A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias ('multiple choices' is possible.

		Control and Management		*conference, Barcelona (Spain)*	*Industry*	
6	*Presentation*	*Preliminary results of the end-user survey*	*01/10/2011*	*Information systems for epidemic preparedness and response workshop, Nelspruit (South-Africa)*	*Scientific Community, Industry*	*International*
7	*Presentation + flyer*	*MALAREO – EO in malaria vector control*	*12-12/12/2011*	*GMES Global Land Workshop, Lisbon (Portugal)*	*Scientific Community, Industry*	*European countries*
8	*Workshop*	*MALAREO – Introduction to GIS, Open-source, practical manual*	*04-10/02/2012*	*Introductory GIS course organized by MALAREO in UKZN, Durban (South-Africa)*	*Scientific Community, Industry*	*International*
9	*User Conference*	*MALAREO-User Conference*	*04-10/02/2012*	*User Conference organized by MALAREO in UKZN, Durban (South-Africa)*	*Scientific Community, Industry*	*International*
10	*Press release*	*RapidEye Imagery Contributes to African Malaria Control Project*	*13/03/2012*	*http://www.giscafe.com/*	*Scientific Community, Industry*	*European countries*
11	*Presentation + flyer*	*MALAREO – Earth Observation to support Malaria Control in Southern Africa*	*26-27/07/2012*	*IGARSS12, Munich (Germany)*	*Scientific Community, Industry*	*European countries*
12	*Workshop*	*MALAREO – Intermediate GIS and Introduction to Remote Sensing Practical manual*	*24-28/09/2012*	*Intermediate GIS and Introduction to Remote Sensing course organized by MALAREO in UKZN, Durban (South-Africa)*	*Scientific Community, Industry*	*International*
13	*Presentation + flyer + Poster*	*MALAREO – EO in malaria vector control*	*4-6/11/2012*	*GeONG 2012, Chambery (France)*	*Scientific Community, Industry*	*European countries*
14	*Presentation + flyer*	*MALAREO – EO in malaria vector control*	*14-16/11/2012*	*Let's Embrace Space, 2nd FP7 Space conference, Larnaca (Cyprus)*	*Scientific Community, Industry*	*European countries*
15	*Social media*	*Demo of MALAREO products and model*	*20/11/2012*	*LinkedIn groups :* *- Global Public health* *- Malaria no More* *- Malaria World News*	*Scientific Community, Industry*	*International*

				- Roll back malaria Partnership *- The Global fund to Fight AIDS, Tuberculosis and Malaria* *- World Health Organization*		
16	*Website*	*Demo of MALAREO products and model*	*12/12/2012*	*Roll back Malaria – Calendar of events*	*Scientific Community, Industry*	*International*
17	*Website*	*Demo of MALAREO products and model*	*17/12/2012*	*Roll back Malaria, weekly bulletin*	*Scientific Community, Industry*	*International*
18	*Workshop*	*MALAREO – Spatial statistics for malaria epidemiology practical manual*	*14-18/01/2013*	*Spatial Statistics for malaria epidemiology course organized by MALAREO in UKZN, Durban (South-Africa)*	*Scientific Community, Industry*	*International*
19	*Presentation + flyer*	*Demo of MALAREO products and model*	*14-18/01/2013*	*Final Demo Event organized by MALAREO in UKZN, Durban (South-Africa)*	*Scientific Community, Industry*	*International*

4 Report on societal implications

A General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	262887
Title of Project:	Earth Observation in Malaria Vector Control and Management
Name and Title of Coordinator:	Clotilde de Montpellier, Program Manager

B Ethics

1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	**No**
2. Please indicate whether your project involved any of the following issues (tick box) :	***YES***
RESEARCH ON HUMANS	
• Did the project involve children?	**No**
• Did the project involve patients?	**No**
• Did the project involve persons not able to give consent?	**No**
• Did the project involve adult healthy volunteers?	**No**
• Did the project involve Human genetic material?	**No**
• Did the project involve Human biological samples?	**No**
• Did the project involve Human data collection?	**No**
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	**No**
• Did the project involve Human Foetal Tissue / Cells?	**No**
• Did the project involve Human Embryonic Stem Cells (hESCs)?	**No**
• Did the project on human Embryonic Stem Cells involve cells in culture?	**No**
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	**No**
PRIVACY	
• Did the project involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, and political opinion, religious or philosophical conviction)?	**No**
• Did the project involve tracking the location or observation of people?	**No**
RESEARCH ON ANIMALS	
• Did the project involve research on animals?	**No**
• Were those animals transgenic small laboratory animals?	**No**
• Were those animals transgenic farm animals?	**No**
• Were those animals cloned farm animals?	**No**
• Were those animals non-human primates?	**No**
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	**No**
• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	**Yes**
DUAL USE	
• Research having direct military use	**No**
• Research having the potential for terrorist abuse	**No**

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator	1	1
Work package leaders	3	2
Experienced researchers (i.e. PhD holders)	2	2
PhD Students	2	2
Other		

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**0**
Of which, indicate the number of men:	

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?

● Yes
○ No

6. Which of the following actions did you carry out and how effective were they?

		Not at all effective				Very effective
✓	Design and implement an equal opportunity policy	○	○	○	○	✓
✓	Set targets to achieve a gender balance in the workforce	○	○	○	○	✓
❑	Organise conferences and workshops on gender	○	○	○	○	○
❑	Actions to improve work-life balance	○	○	○	○	○
○	Other:					

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

✓ No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

○ Yes- please specify

⊙ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

○ Yes- please specify

⊙ No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

⊙ Main discipline[6]: Medical Sciences

⊙ Associated discipline[6]: Health Sciences (epidemiology)

○ Associated discipline[6]:

G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*

⊙ Yes
○ No

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

○ No

⊙ Yes- in determining what research should be performed

○ Yes - in implementing the research

○ Yes, in communicating /disseminating / using the results of the project

[6] Insert number from list below (Frascati Manual).

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	○ ✓	Yes No

12. Did you engage with government / public bodies or policy makers (including international organisations)

○	No
○	Yes- in framing the research agenda
○	Yes - in implementing the research agenda
✓	Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

⦿	Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
○	Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
○	No

13b If Yes, in which fields?

Agriculture		Energy		Human rights	
Audiovisual and Media		Enlargement		Information Society	
Budget		Enterprise		Institutional affairs	
Competition		Environment		Internal Market	
Consumers		External Relations		Justice, freedom and security	
Culture		External Trade		Public Health	
Customs		Fisheries and Maritime Affairs		Regional Policy	
Development Economic and Monetary Affairs		Food Safety		Research and Innovation	
		Foreign and Security Policy		Space	
Education, Training, Youth		Fraud		Taxation	
Employment and Social Affairs		Humanitarian aid		Transport	

13c If Yes, at which level?

- ⊙ Local / regional levels
- ⊙ National level
- ○ European level
- ○ International level

H Use and dissemination

14. How many Articles were published/accepted for publication in peer-reviewed journals?	**2**
To how many of these is open access[7] provided?	**2**
How many of these are published in open access journals?	**2**
How many of these are published in open repositories?	
To how many of these is open access not provided?	**0**
Please check all applicable reasons for not providing open access:	
❑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[8]: ……	

15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*		**0**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	**0**
17. How many spin-off companies were created / are planned as a direct result of the project?		**0**
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	❑	In small & medium-sized enterprises
❑	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	☒	None of the above / not relevant to the project
❑	Difficult to estimate / not possible to quantify		

[7] Open Access is defined as free of charge access for anyone via Internet.
[8] For instance: classification for security project.

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	*Indicate figure:*
Difficult to estimate / not possible to quantify	☒

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

○ Yes ⊙ No

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Yes ⊙ No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

☒	Press Release	☒	Coverage in specialist press
❑	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	❑	Coverage in national press
❑	Radio coverage / report	❑	Coverage in international press
☒	Brochures /posters / flyers	☒	Website for the general public / internet
☒	DVD /Film /Multimedia	☒	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	☒	English
❑	Other language(s)		

***Question F-10*:** Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]