

## Satellite Monitoring for Forest Management (SMFM) Project

Project Reference no: 1231131  
Monthly progress summary: December 2018  
Project month no: 25  
Submitted by: LTS international  
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### Main progress:

#### 1 Project planning and analysis

The SMFM consultant consortium (LTS, UoE) organised a one-day internal team meeting in Edinburgh, Scotland on December 21, 2018. Objective was to brief team members that did not participate in the Nairobi workshop on progress, findings and decisions. In addition, the team jointly assessed the status quo of the SMFM tool development and planned for upcoming training inputs, initiating tool testing by partner countries, participation in global events and discussed status and format of project deliverables. In addition, minimum requirements for a potential 3<sup>rd</sup> partner country were discussed, as were and potential candidate countries. This included reviewing activities over the next 6 months and making updates to the workplan.

The SMFM team contributed to the preparation of a workshop report that was prepared and circulated by the World Bank in December.

### Technical update:

#### 2.1 Design new or enhanced satellite EO methods to address requirements and gaps

Development of the SMFM EO tools has mainly focussed on improvements and adjustments to SMFM Tool 1 – 3 and on a first prototype of Tool 4.

##### **SMFM Tool 1a/1b:**

Following the ESA announcement of making pre-processed L2A data available, the team has updated the download tool to allow optional specification of L2A data. Towards the end of the month tool 1 was deployed onto the F-TEP platform for further testing and development. Tool 1 is fully operational.

##### **SMFM Tool 2:**

The ALOS mosaic download script has been rewritten to improve usability and reliability. In addition, refinements to the calibration script, including an improved command line interface, better rasterization of shapefiles, and easier to understand outputs have been implemented.

Tool 2 is otherwise fully functional and exists in Python and Linux command line versions. A basic version is expected to be deployed onto the F-TEP platform in January 2019.



### **SMFM Tool 3:**

There was no major development of and improvement of Tool 3 during this month but updates and improvements to allow access via cloud platforms will be the next imminent steps.

Tool 3 will benefit enormously if pre-processing of the Sentinel archive imagery for Mozambique and Zambia will still be completed by ESA during the project lifetime. Development and ultimately usability of the tool will greatly be enhanced as processing time will be reduced by approx. factor 100.

### **SMFM Tool4:**

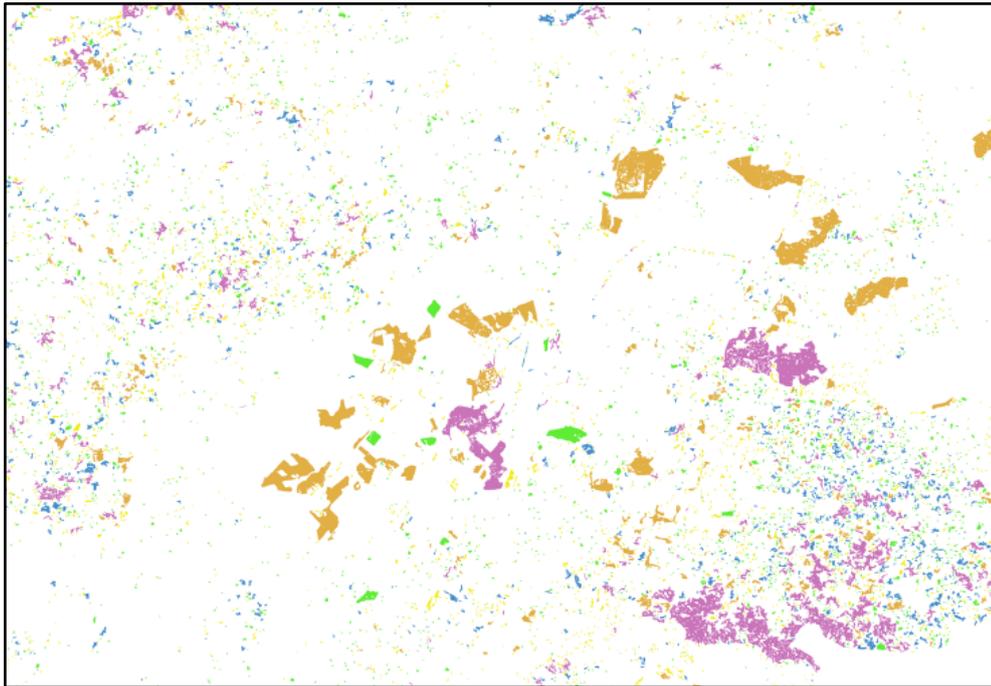
Most of the development work during December focussed on producing a prototype of Tool 4 for identifying the activities causing forest change. To test the approach, the team has prepared forest change maps around major cities of southern Africa, where rapid forest changes results from a range of activities, including small-scale and large-scale agriculture, charcoal production, plantation forestry, infrastructure, and mining.

These forest change maps were generated using the SMFM Tool 2, which has the advantage of being able to produce forest change maps rapidly, delivering information on both the extent and the intensity of change events. It was possible to identify around 300,000 individual change events based on connected pixels. For each event a range of features that might relate to the activity causing them were calculated. These included area size, change intensity, and shape metrics.

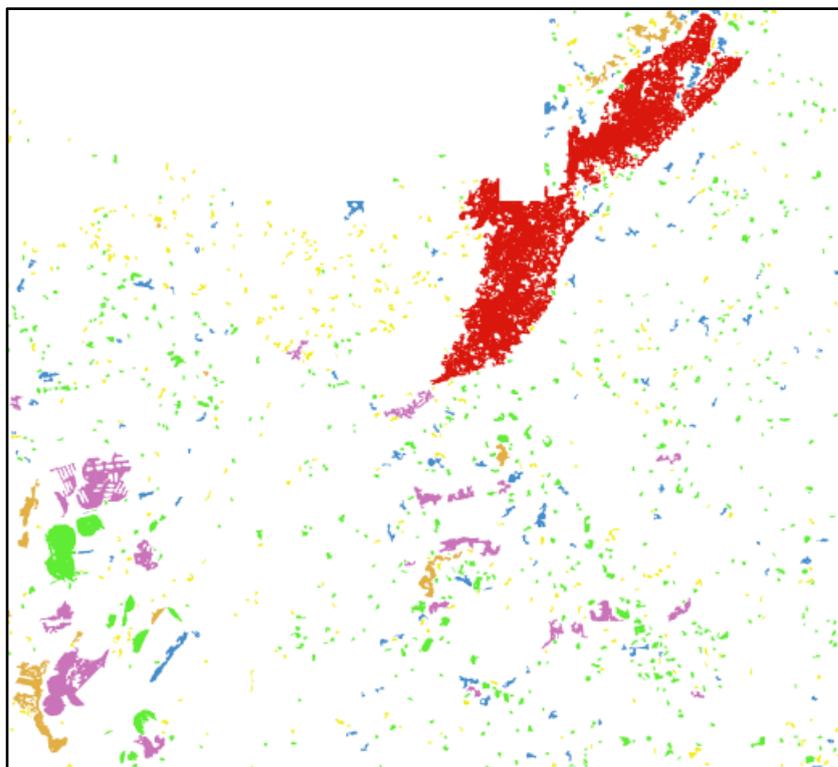
An unsupervised hierarchical classification was applied to identify clusters of change types. This approach does not require training data to generate classes, an advantage where data on change activities are difficult to acquire. So far, 6 potential classes of change have been identified. To test this assumption, the change type classes will be labelled based on a combination of field data and high-resolution imagery. This will serve as a proof-of-concept for the final version of Tool 4.

Initial outputs are shown below:





*Fig 1: In this location near Dar Es Salaam, changes associated with plantation forestry largely belong to the 'orange' change class. The 'purple' change class is a mixture of plantation forestry, and agriculture. The smaller 'blue' and 'green' classes are largely associated with small-scale agriculture.*



*Fig 2 The 'red' class in this area near Lusaka is the result of charcoal production, and the 'purple' and 'green' classes are mostly associated with agriculture.*

## Initial testing of cloud platforms

### Forestry-TEP:

Direct exchange with the F-TEP team continued during December and it was again confirmed that the SMFM has a priority project status and could help the team to elaborate and test their cost / pricing scheme with a real-world example. The F-TEP team again stressed that the platform will continue to be under development until at least October 2019.

The next video conference with the F-TEP team on technical issues is scheduled to be held on January 17, 2019.

### **4.3 Implement at least two training events; including SSKE**

Following the Nairobi workshop and the visit to the RCMRD in Nairobi, the consultant team would suggest making use of RCMRD facilities for the upcoming tool trainings in 2019. Instead of having separate trainings in each partner country, the team prefers bringing partner country teams together at the RCMRD facilities for two more trainings; one on application of Tools 1&2 and another one on the combined use of Tools 3&4.

The first training is expected to be carried out in February 2019, with the second one following actual progress in development of Tool 3 and 4 prototypes in April or latest May 2019.

Using RCMRD facilities and involving their experts would bring a number of advantages:

- Instead of only one training event per country, both partner country teams can benefit from two training events.
- Bringing the two partner countries (again) together in one training location can enhance the direct exchange and collaboration.
- Involving RCMRD will further expose this regional institution to the SMFM approaches and tools, which could strengthen the project's SSKE efforts.
- Potentially exposing seconded staff and trainees from other East and South African countries at the RCMRD may help disseminating the SMFM tools.
- RCMRD's hosting country Kenya is also interested in further exposure to the SMFM tools.

In addition, the team plans for two short university lectures at Eduardo Mondlane University in Maputo (UEM) and at the University of Zambia (UNZA) in Lusaka, as suggested and discussed during the country workshops in February 2018. These one-week lectures are likely to take place towards June or July 2019, once the main tool development work is over.



## Issues and potential bottlenecks:

- 2.1** The ongoing development of the F-TEP and of the CREODIAS platforms continues to be a key concern for the SMFM development team. This means that there may be unforeseen issues with the running of the tools that are out of the control of the project.

This situation is likely to continue throughout the remaining time of the SMFM project, as the F-TEP development will continue until October 2019. The LTS team will and have working closely with the F-TEP developers to help to reduce the potential risk.

- 3.3** Delays may be caused with the co-development of the tools if partner countries do not participate and engage, as expected / planned.

This will lead to the project having to continue to develop the tools but with a lesser impact on the co-development and capacity building side of project work.

