FMAP – A MONITORING SYSTEM TO SUPPORT GUATEMALAN FORESTRY MANAGEMENT PROGRAMMES

Paula Marti, Chloe Brillatz, Pritimoy Podder, David Petit

Deimos Space UK Ltd
paula.marti@deimos-space.com

Abstract

In Guatemala, forests cover 34% of the country and their illegal exploitation is a concern to the Guatemalan government. They are now embracing digital technologies to improve forest monitoring processes and encourage pooling of information between stakeholder agencies. The FMAP (Forestry Management and Protection) project is part of the International Partnership Programme co-funded by the UK Space Agency and aims to support the Guatemalan agencies by providing remote sensing data and derived information.

The Guatemalan partner institutions for FMAP include the National Forestry Institute (INAB), the National Council of Protected Areas (CONAP) and the Ministry of Agriculture (MAGA).

INAB and CONAP currently run a set of programmes to promote the recovery, restoration, management and production of the Guatemalan forests. The incentive programme to encourage the planting of trees has been very successful, resulting in more than 30,000 locations being registered. These areas are spread all over the country and present a challenge for CONAP and INAB to send field workers to check that the plantations meet all necessary requirements for the incentive programme.

Introduction

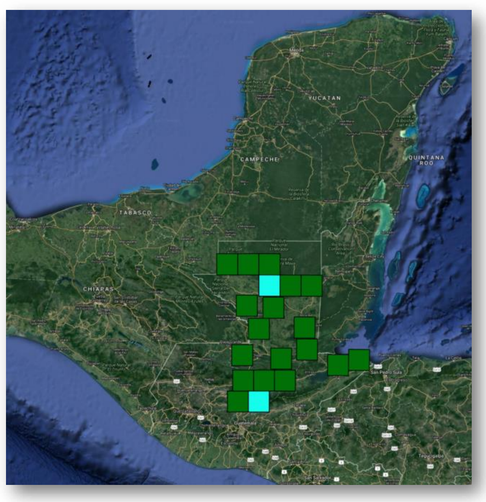
The FMAP project focuses on evaluating how Sentinel-2 data can be used to detect if certain conditions for the incentive programme are not met in an area or if that the area is not being used as intended. By monitoring growth, change and vegetation we aim to deliver early warnings to INAB and CONAP.

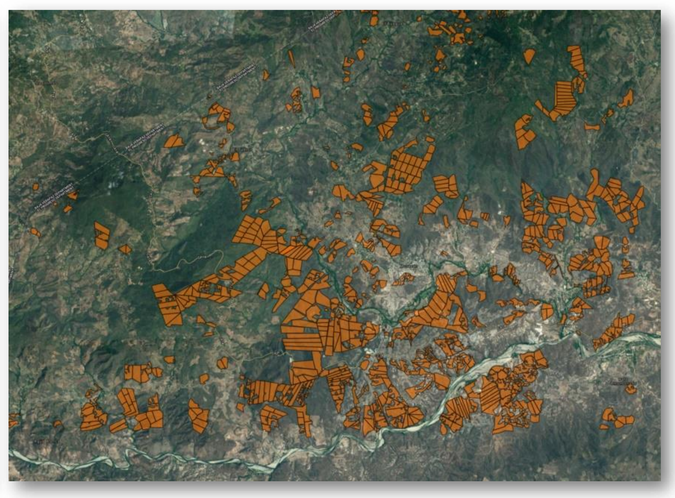
Methods

- Gather data from different years.
- Carry out change detection using NDVI to find areas of change but also individual trees being logged.
- Study the potential to monitor tree growth using Chlorophyll to determine age.

Objective

- 20 areas (green) = 30,000 incentive locations
- *Initial study* in 2 priority areas (blue) = 2,000 locations to monitor (orange)

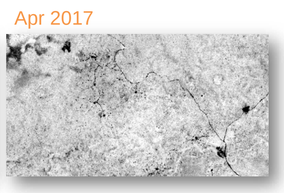




Detection of logging of single trees

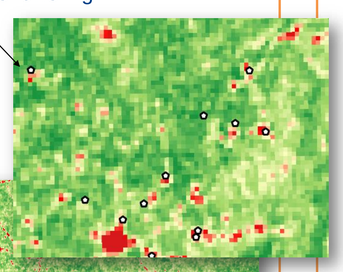
Feb 2017

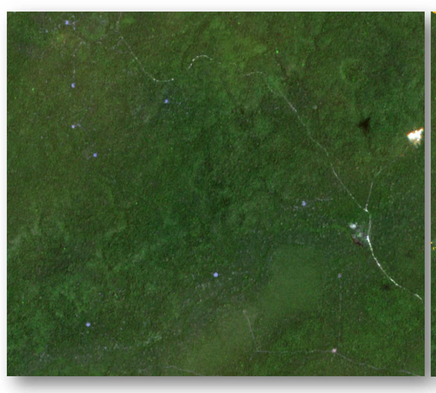
Apr 2017

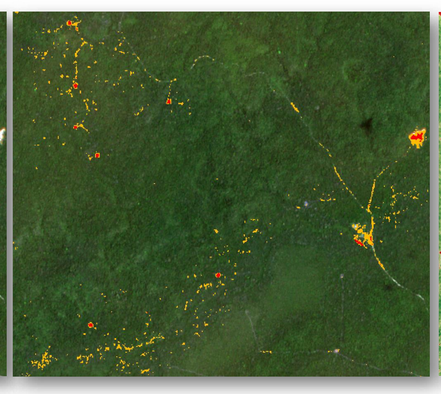


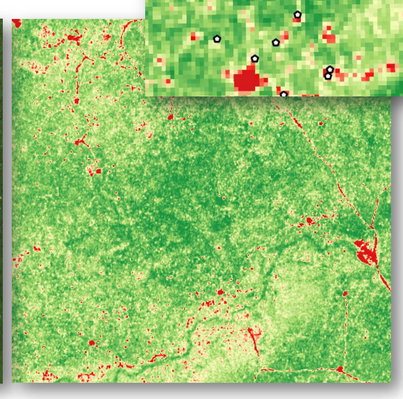
Change detection:
- In red big openings created to pile up logs
- In orange paths and smaller openings (trees)

Comparing NDVI vs ground data shows high correlation





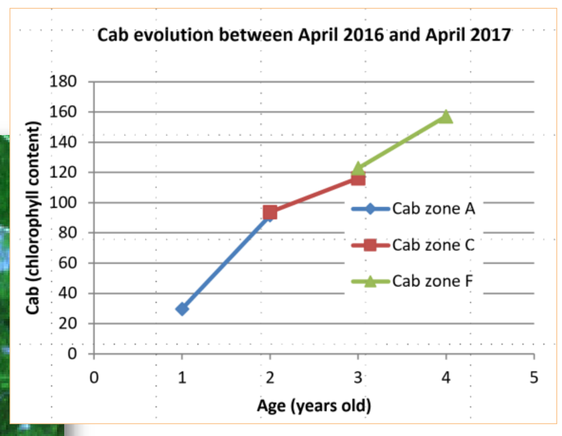




Age of trees based on Chlorophyll content (Cab)

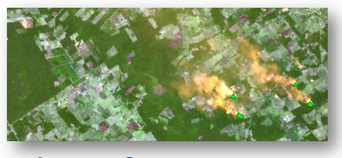
The three areas highlighted had trees planted 2, 3 and 4 years ago.

The Cab was calculated for each area for 2016 and 2017. The correlation of Cab vs age is shown.



Discussion

Early analysis shows interesting results regarding change detection and age monitoring.



Next steps require the analysis of longer time-series across the year in different seasons and the creation of algorithms to detect events such as fires.

The processes will then be automated and made operational.

Conclusion

Analysis of Sentinel-2 data allows the detection of areas where individual trees are being logged, when the tree height is comparable to the Sentinel-2 resolution.

Parameters such as NDVI and Cab can be used to monitor the growth of the trees in incentive locations so that anomalies can be raised to INAB and CONAP.

Project members: