STMS Scientific Report

Short Term Scientific Mission (STSM)

ES1309-Innovative optical Tools for proximal sensing of

ecophysiological processes (OPTIMISE)

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The structure and biomass productivity of dry forest in Ecuador and spatial temporal variations during the phenomenon of the Niño Southern Oscillation (ENSO) (20015-2016)

Background

The aim of this Short Term Scientific Mission (STSM) at Laboratory of Geo-information Science and Remote Sensing of Wageningen University and Research Centre is learning Unmanned Aerial Systems (UAS) techniques to retrieve biophysical variables of vegetation canopy, establishment of protocols for the validation of remote sensing satellite observations and developing of multisource based approaches for the characterization of vegetation structure and functioning.

Propose of the visit

The research proposed to be conducted during the STSM includes three main tasks 1) Developing UAV techniques for deriving structural and functional variables of vegetation canopy 2) Establishing protocols for the validation of remote sensing satellite products from UAV retrievals, and 3) Developing multisource based approaches for characterizing dry forest structure and functioning with due attention to ENSO effects.

Description of work plan development during the visit

In the following work plan summarizes the research were conducted during the STORM:

a) Developing over UAV techniques for deriving structural and functional variables of vegetation canopy.

Were evaluated the UAV images collected by the candidate and the host centre in previous experimental campaigns and applying techniques for deriving structural and functional variables of vegetation canopy.

-   Employed different methods for image processing and analysis of UAV time series
-   Evaluation of different techniques for deriving structural and functional variables over dry forests.

b) Establishing protocols for the validation of models and remote sensing satellite products based on the use of UAV retrievals.

Work over techniques for the validation of ecological models and remote sensing satellite observations based on the use of UAV techniques.

c) Developing innovative approaches for combining multisource data for the assessment of dry forest

We worked in approach for statistical relation of UAS images, field measurements, models, and remote sensing satellite data for improving the spatio-temporal characterization of dry forests in Ecuador during the phenomenon of the Niño Southern Oscillation (ENSO) (20015-2016).

Description of main result obtained

We obtained a first approach of the characterization of variables biophysical and structure spatial of dry forest and the change in function of different rain levels from UAVs and satellite images data. Also the fit of statistical model between data field, UAVs and satellite images for generate models for monitoring and study of biomass productivity, this analysis suggested other field data for improve the estimations with techniques of remote sensing. This were very important for improve the protocols of take field data in my thesis PhD.

In the graphic one we may see the semivariogram of biophysical variable LAI taken in field , in this graphic we may see the LAI spatial structure in area study. In this spherical model semivariogram there are a 60 % of variability of LAI is possible explain for the spatial structure.
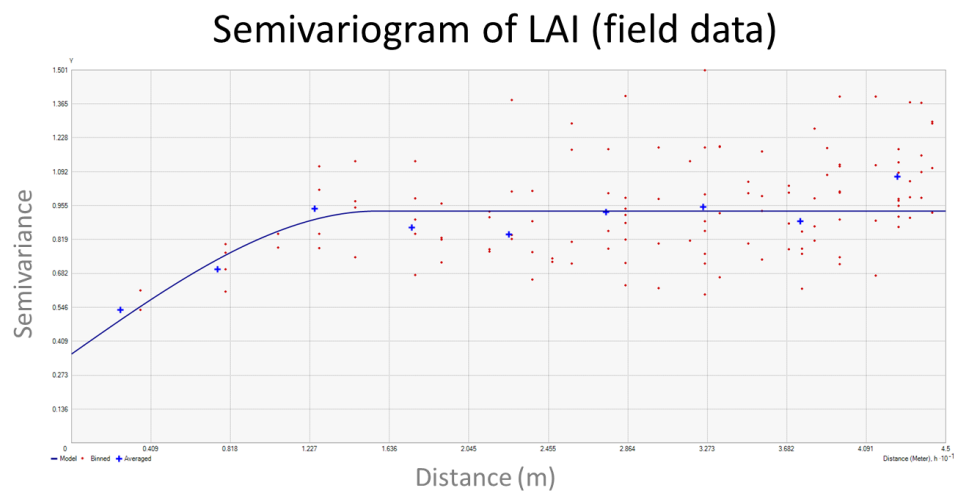
Graphic 1. Semivariogram with field data of LAI

The graphic 2 show the maps of NDVI calculated with multispectral camera tetracam ADC micro and a map of LAI estimated with relation between LAI field data and NDVI.
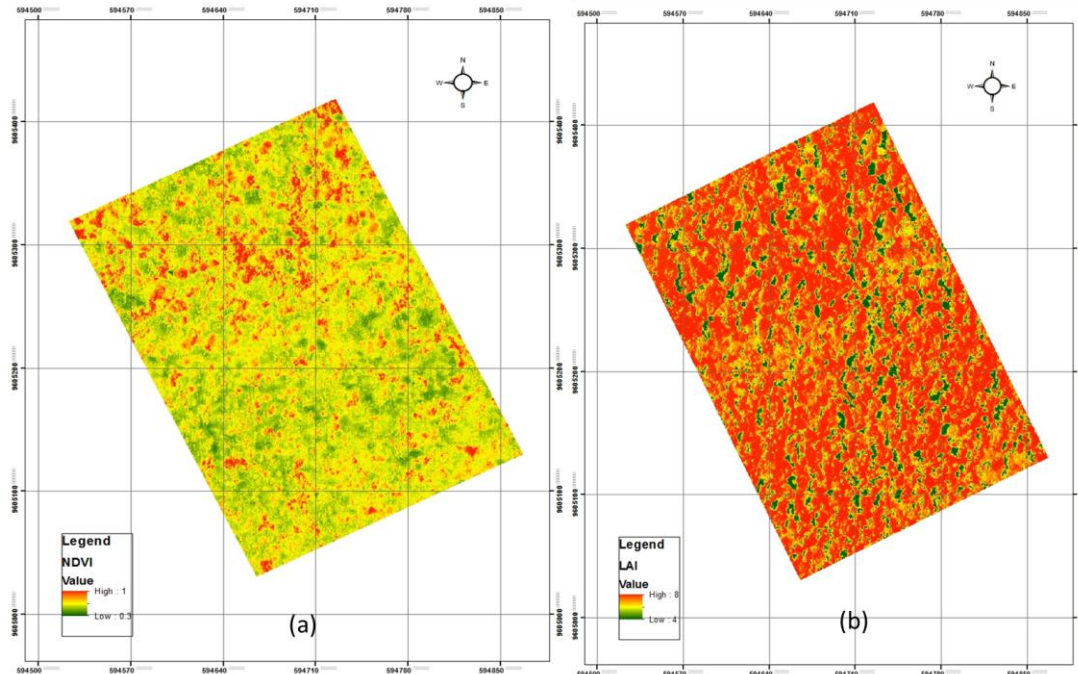
Graphic 2. a) Map of NDVI in area study b) Map of LAI estimated with statistical model fit between NDVI and field data LAI.

Future collaboration with host institution

With a agree cooperation and support in my PhD thesis by Dr. Lammert Kooistra, this project have started the collaboration between CREAF and Laboratory of Geo-information Science and Remote Sensing of Wageningen University.

Publications/articles resulting or to result from the STSM

During STSM we have obtained result prelims and assessment of the data set. However for a publication is necessary more data, these data will be taken it in the future.

Other comments

I would like to greatly thank the Cost Office, Dr. Lammert Kooistra and my supervisor Dr. Aleixandre Verger for giving me this opportunity.