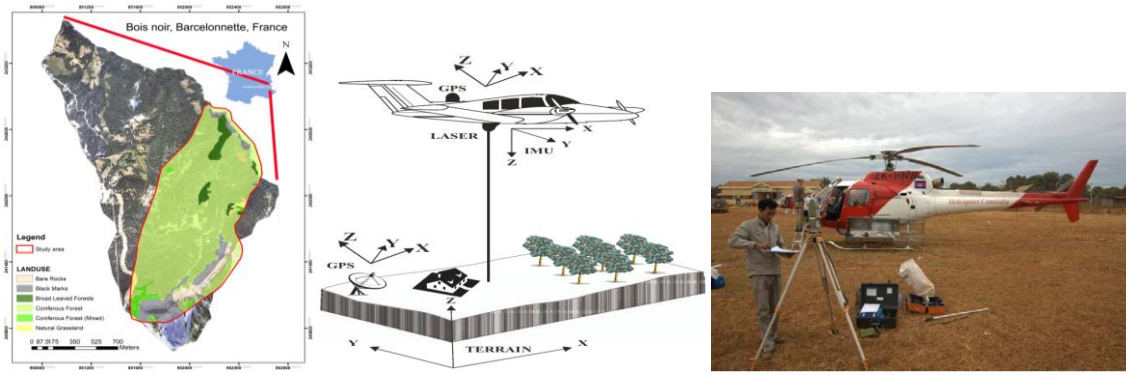
Research on (FORAGES)

Forest Agriculture and Environment in the Spatial Sciences

Airborne Lidar data for mapping biomass/carbon of temperate forest of Barcelonnette, France, using canopy volume and its surface area

Problem: Forest covers nearly one-third of the earth's land surface and accounts for almost half its terrestrial carbon pool. UNFCCC has considered the need to reducing carbon emissions from deforestation and forest degradation (REDD) as one of the central efforts to combat climate change. Due to size, inaccessibility of the forest resources, quantification of the carbon cycle components in both space and time leans heavily on remote sensing, GIS and spatial and modeling.

Method: Using very high density (164 points/m^2) points cloud Lidar airborne data and object oriented classification can map individual trees canopy and tree height. High relationships are exist between DBH, tree height derived from Lidar, crown diameter, canopy size and canop volume surface area. When biomass can be estimated using alometric equation, a relationship between biomass and canopy size can be established with resionable accuracy. Therefore, biomass and consequently carbon can be mapped.



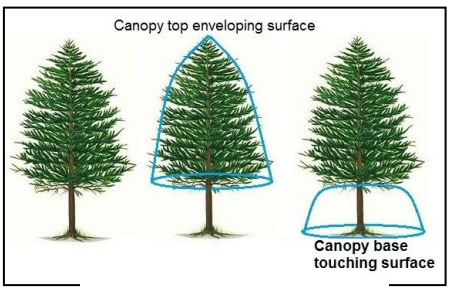
Research objective

The main objective of this proposed research is to model and map carbon stock using Airborne Lidar data in mapping biomass/carbon of temperate forest of Barcelonnette, France, using canopy volume and volume surface area

The Study Area:

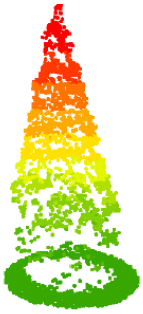
Bois noir (Black Wood) forest is situated in Barcelonnette basin in the south French Alps. The area is characterized by irregular topography with slope gradient ranging between 10° and 35°, having 92 % of forest cover of the total surface area and consisting predominantly *Pinus uncinata* with some deciduous trees.

LIDAR Airborne: The active remote sensing LiDAR data and aerial photographs for the study area were acquired under snow-free conditions using a helicopter flying at an altitude of 300 m above the ground. An airborne hand-held laser scanner from the Helimap Company was used during the Airborne LiDAR Scanning (ALS) campaign. This scanner has been developed specifically for the mapping over mountainous forested areas. A RIEGL VQ-480 laser scanner with a pulse repetition rate of up to 300 kHz was used to record the LiDAR data. Spatial positioning was done using a Topcon Legacy GGD capable of tracking GPS and GLONASS positioning satellites. The orientation of the aircraft was determined using the iMAR FSAS inertial measurement unit (IMU). In order to increase the point density seven flight lines were flown resulting in resultant mean density of 164 points/m^2. The aerial photographs of 30 cm resolution were co-captured with the LiDAR data.

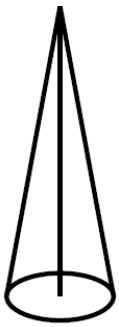


Vinod Kumar 2012

Wrapped surface



Point cloud



Model

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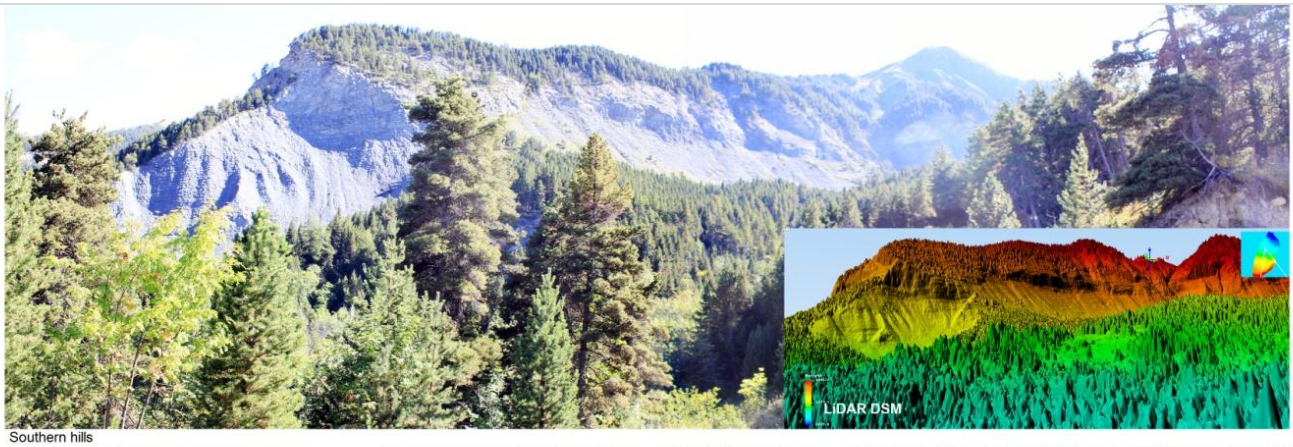

Southern hills

Setting base station and rover set for differential GPS

Taking total station reading

Trees along forest road

***Pinus uncinata* plantation**

Tree gaps

Research group