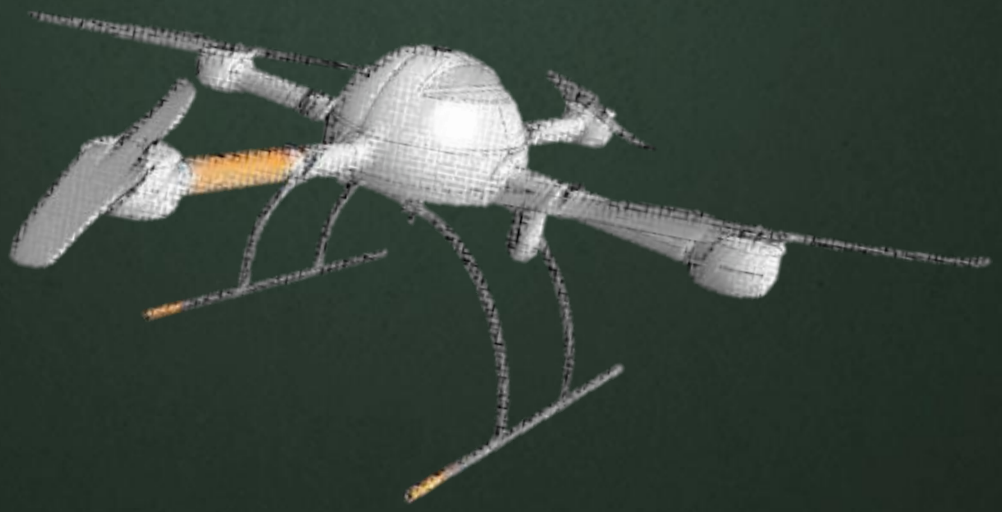
PROJETOCADAF

CARBON DYNAMICS OF AMAZONIAN FOREST



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CARBON DYNAMICS OF AMAZONIAN FOREST

The use of quad-copter drone in obtaining remote sensing data for CFI

Utilizando um quadricóptero *drone* para obter dados de sensoriamento remoto para o IFC

Palestrante: Carlos Celes

carlosceles@yahoo.com.br

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VANT/*UAV*
Zangão/*drone*
Aeromodelos

INCT SEC

Figure 1. The multi-rotor UAV platform used within this study. The laser scanner on-board this system is an Ibeo LUX automotive scanner.

Wallace et al. (2012, XXII ISPRS Congress,)

MD4-1000

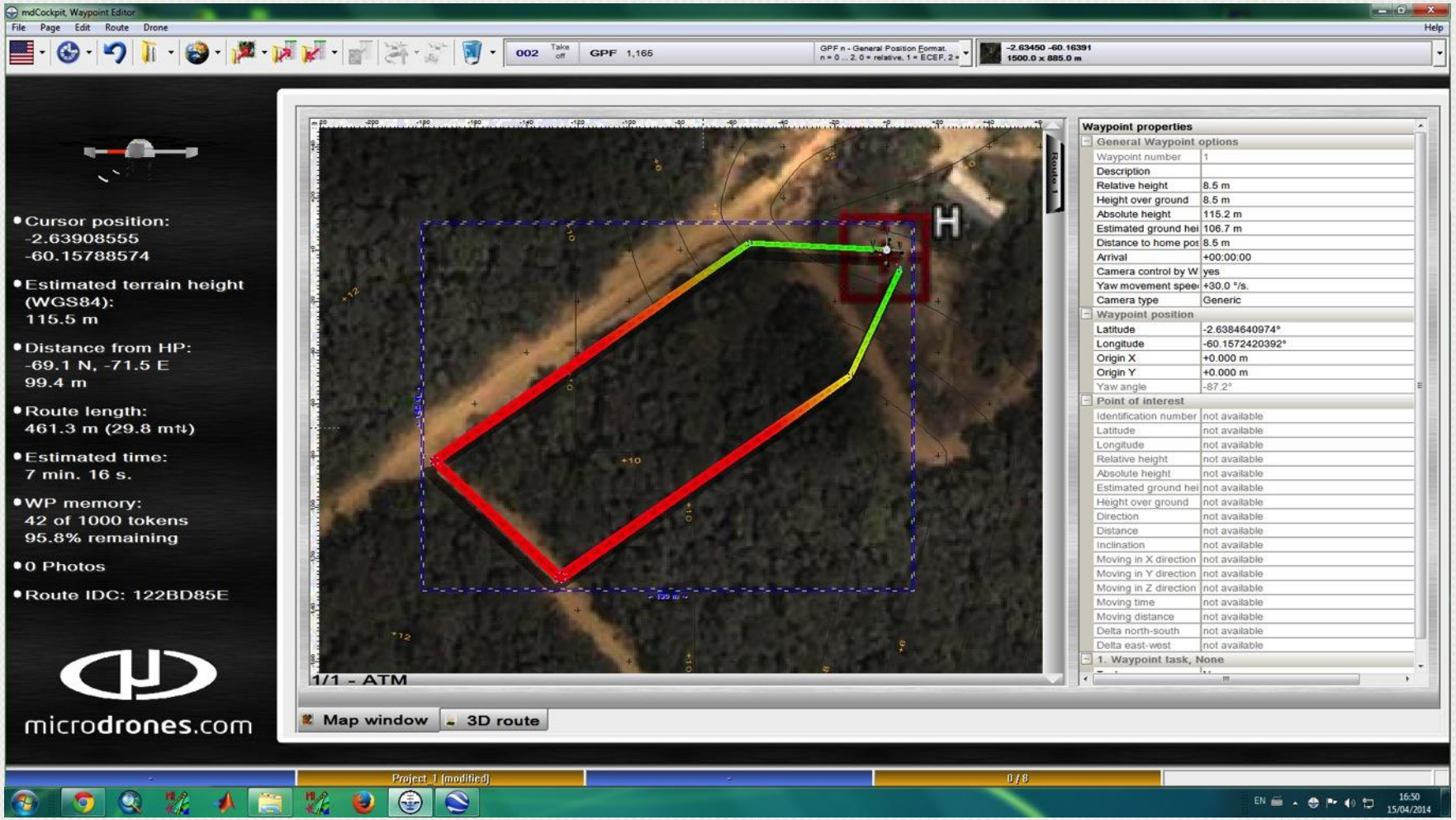
Dr. Takahiro Endo

microdrones.com

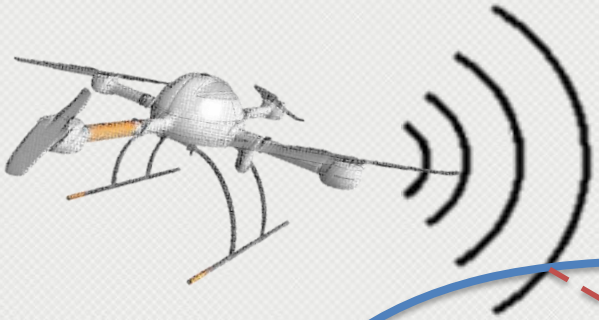
http://microdrones.com

- ✓ *Baixo custo de manutenção, operação*
- ✓ *Até 88 minutos*
- ✓ *Resiste a chuva, vento e a poeira*
- ✓ *Temperatura de -20 a +50 °C*
- ✓ *Corpo todo em fibra de carbono*
- ✓ *Fácil operação*

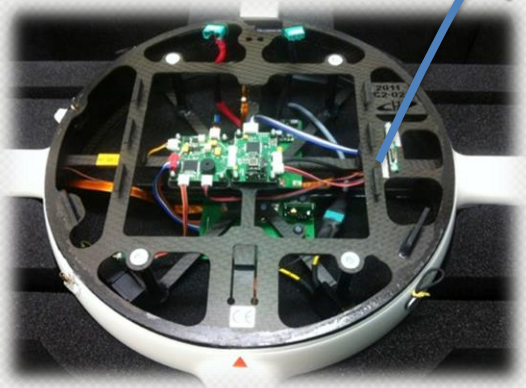
Plano de voo

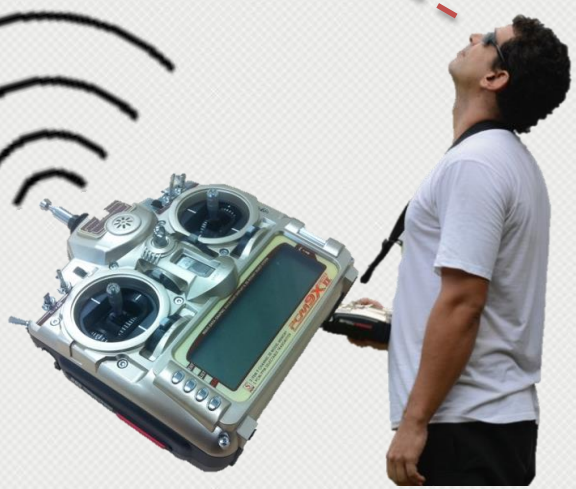

mdCockpit, Waypoint Editor
File Page Edit Route Drone
Help
Cursor position:
-2.63908555
-60.15788574
Estimated terrain height (WGS84):
115.5 m
Distance from HP:
-69.1 N, -71.5 E
99.4 m
Route length:
461.3 m (29.8 m↕)
Estimated time:
7 min. 16 s.
WP memory:
42 of 1000 tokens
95.8% remaining
0 Photos
Route IDC: 122BD85E
microdrones.com
Waypoint properties
General Waypoint options
Waypoint number 1
Description
Relative height 8.5 m
Height over ground 8.5 m
Absolute height 115.2 m
Estimated ground hei 106.7 m
Distance to home pos 8.5 m
Arrival +00:00:00
Camera control by W yes
Yaw movement spee +30.0 °/s.
Camera type Generic
Waypoint position
Latitude -2.6384640974°
Longitude -60.1572420392°
Origin X +0.000 m
Origin Y +0.000 m
Yaw angle -87.2°
Point of interest
Identification number not available
Latitude not available
Longitude not available
Relative height not available
Absolute height not available
Estimated ground hei not available
Height over ground not available
Direction not available
Distance not available
Inclination not available
Moving in X direction not available
Moving in Y direction not available
Moving in Z direction not available
Moving time not available
Moving distance not available
Delta north-south not available
Delta east-west not available
1. Waypoint task, None
1/1 - ATM
Map window
3D route
Project 1 (modified)
0 / 8
16:50
15/04/2014

Operação em campo



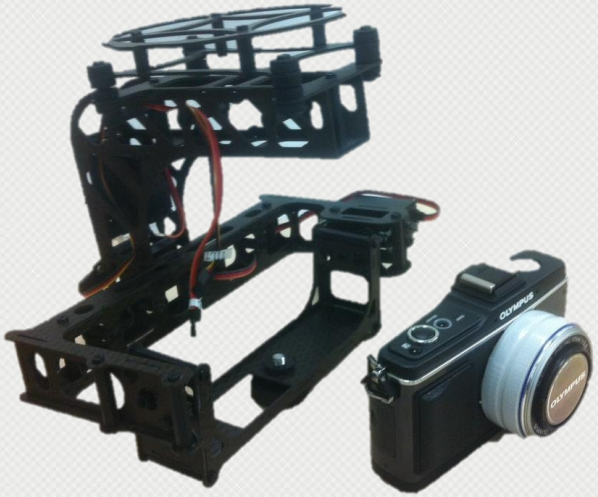
Co-Piloto





Piloto

Câmera digital



Sequência de Fotos da Câmera Digital

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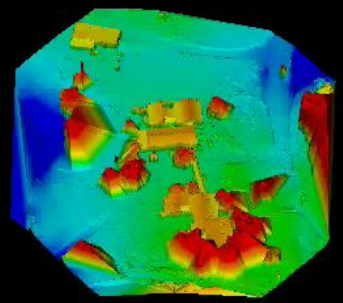
PIX4D Simply powerful

Quick Terrain Modeler™



- ✓ *Modelagem 3D, volume*
- ✓ *Clareira, sombra, textura,*
- ✓ *Dendrologia: fenologia,*
- ✓ *Dendrometria, indentificação*
- ✓ *Hidrologia, monitoramento*
- ✓ *Séries temporais*

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Sensor a Laser

SICK
Sensor Intelligence.
sick.com

LD-MRS

- ✓ *4 planos*
- ✓ *Campacto, 1 kg.*
- ✓ *Resistente às condições externas, IP 69K*
- ✓ *Temperatura de -40 a +70 °C*

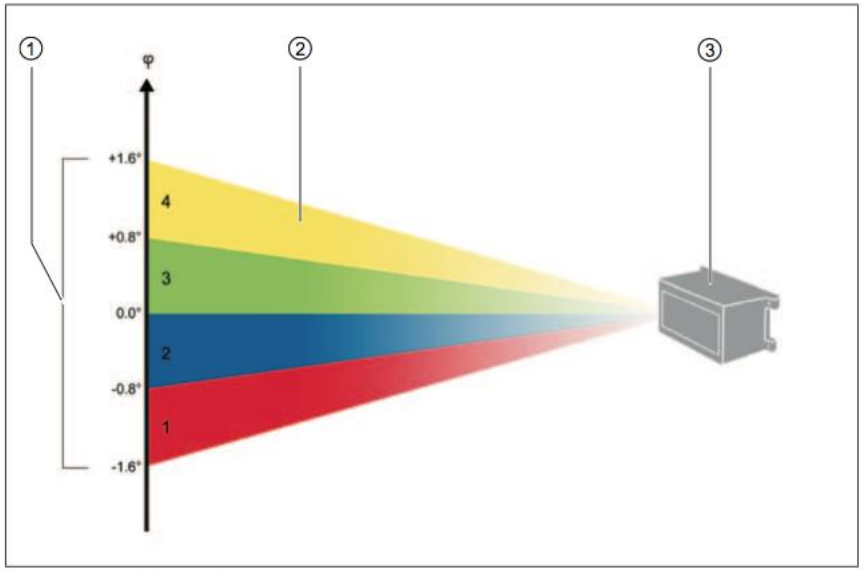


Fig. 3-5: Principle of the scan planes, colour-coded

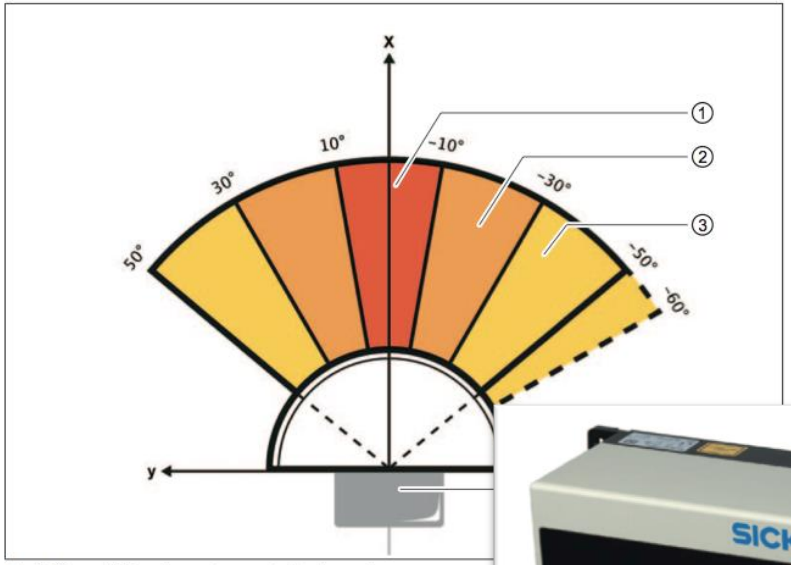


Fig. 3-10: Different angular resolution by sector

Fig. 3-19: Reference image

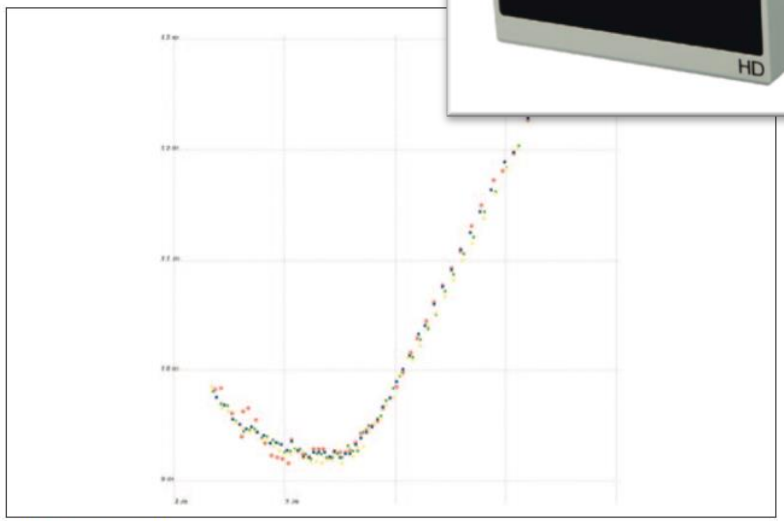
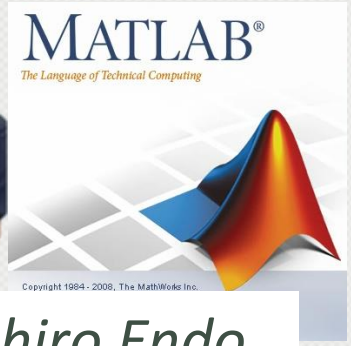


Fig. 3-20: Scan data

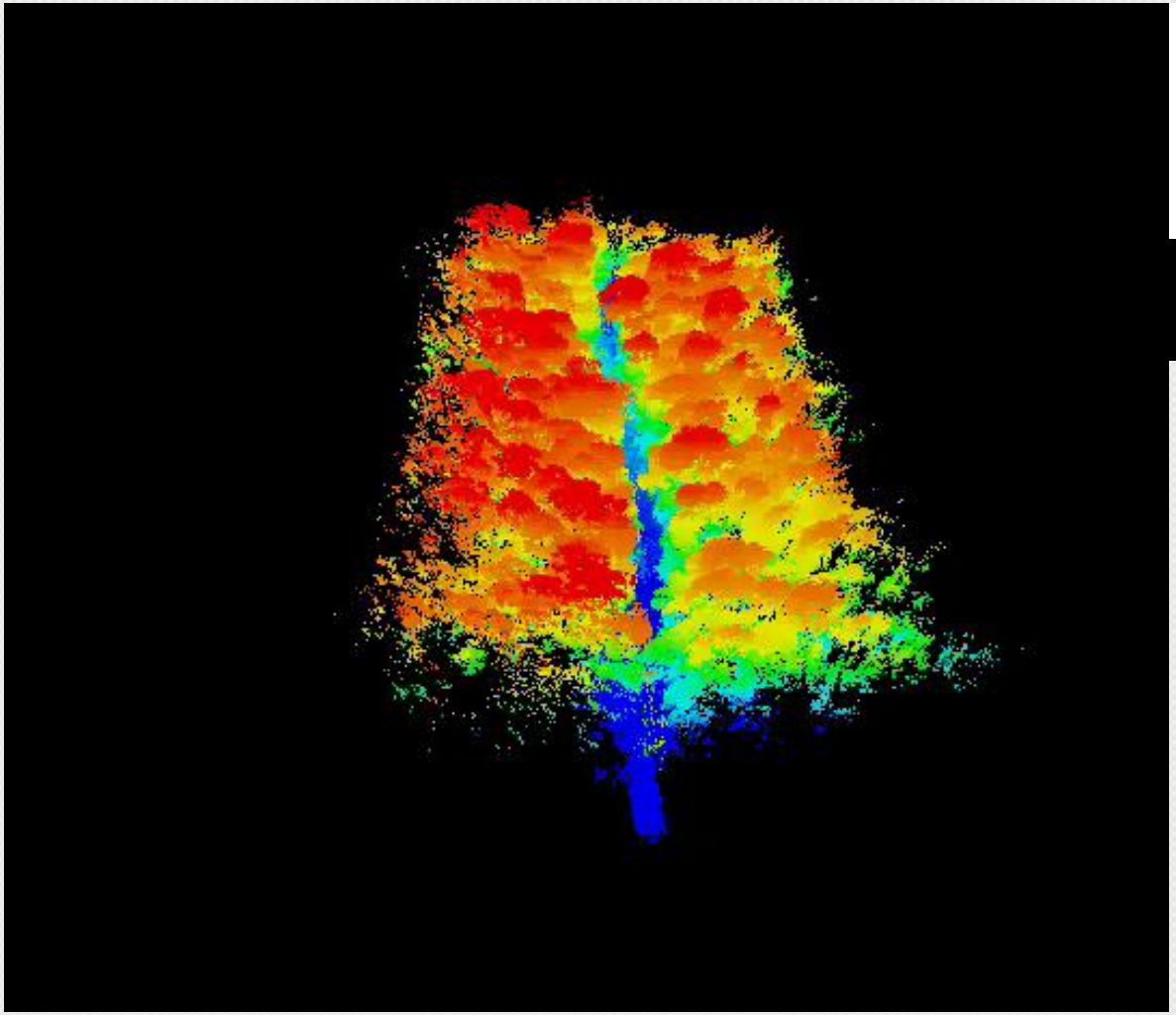
LiDAR (Light Detection And Ranging)



Dr. Takahiro Endo

XYZalvo = f(XYZgps, yaw, pitch, roll, AngLaser, Distância)

Nuvem de pontos

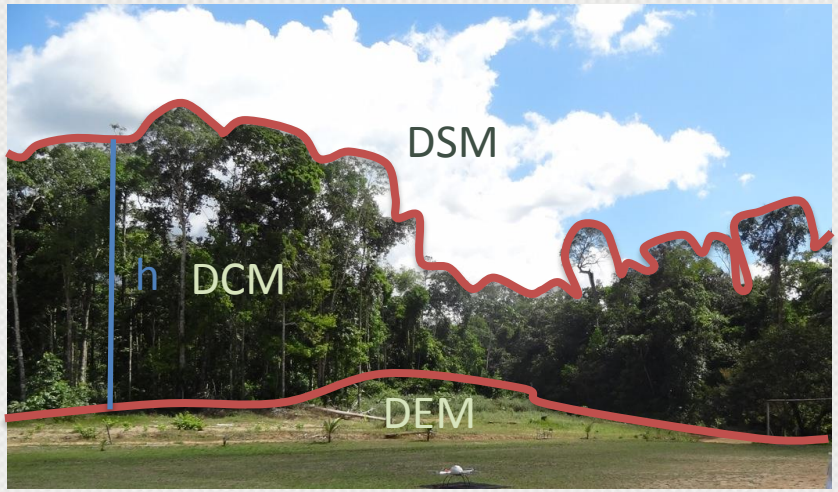


Quick Terrain Modeler™

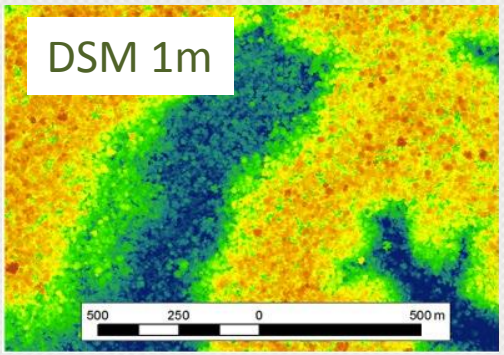
Resolução espacial:
20 pontos/m²

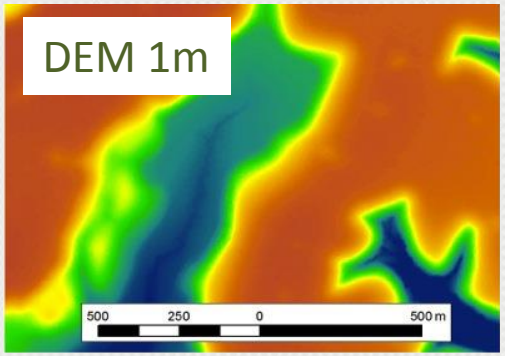
Cobertura de imageamento
80 m x 500m

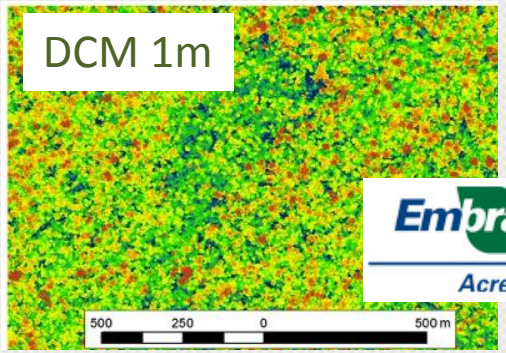
Processamento Nuvem de Pontos



D - Digital
M - Modelo ou Mapa
E - Elevação
S - Superfície
C - Altura do Dossel (*Canopy*)







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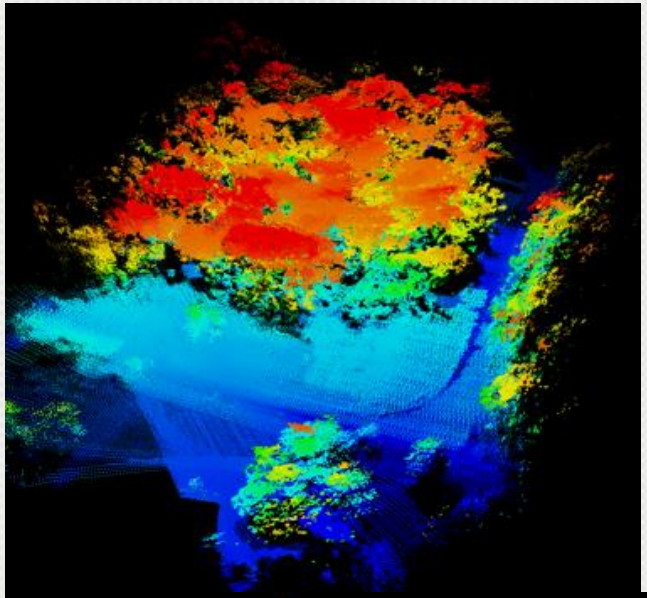

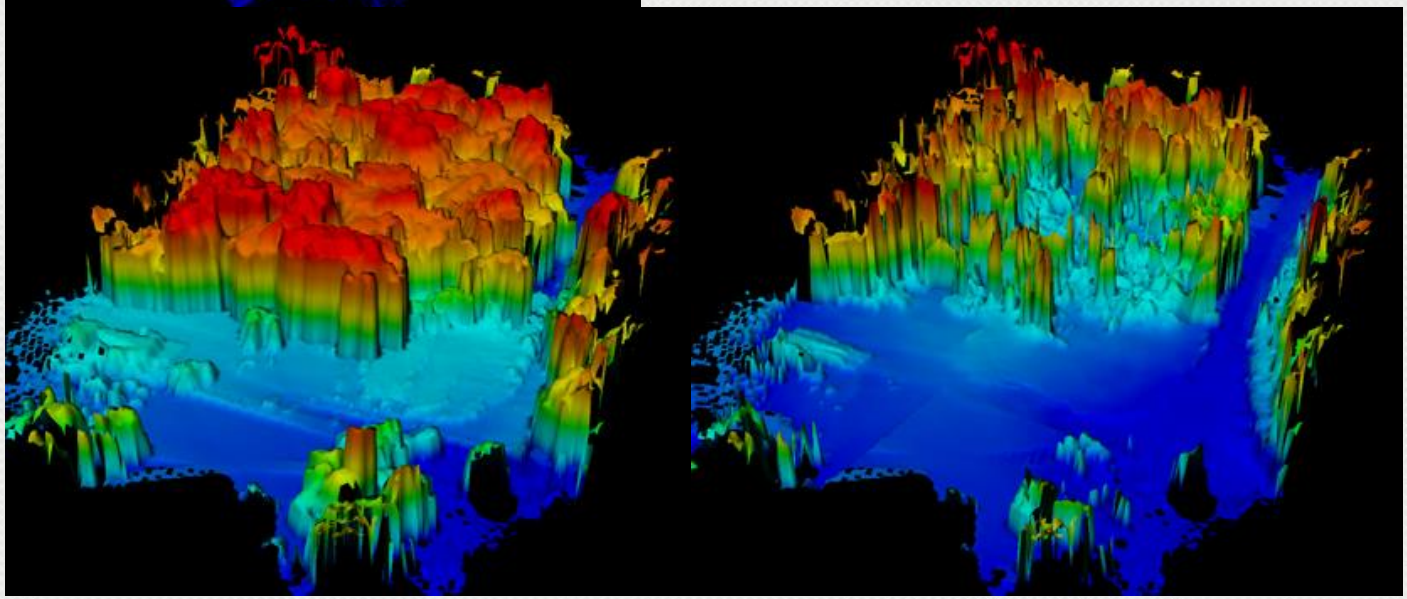

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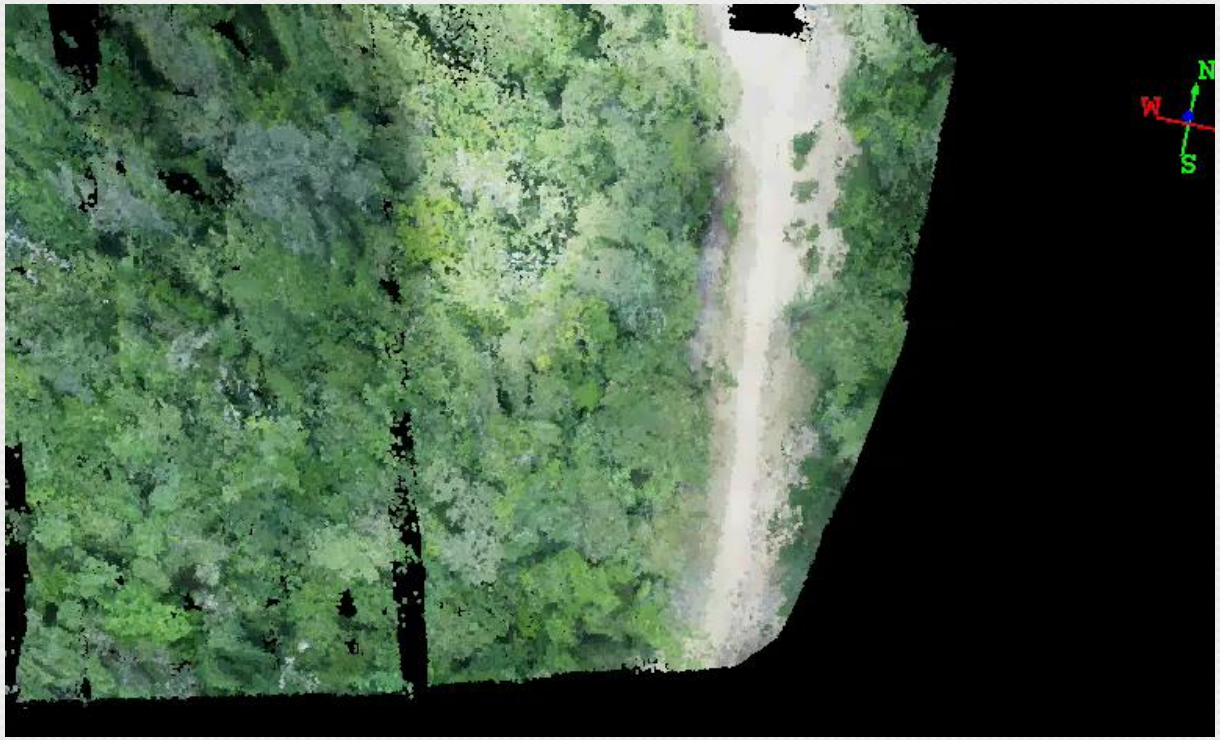
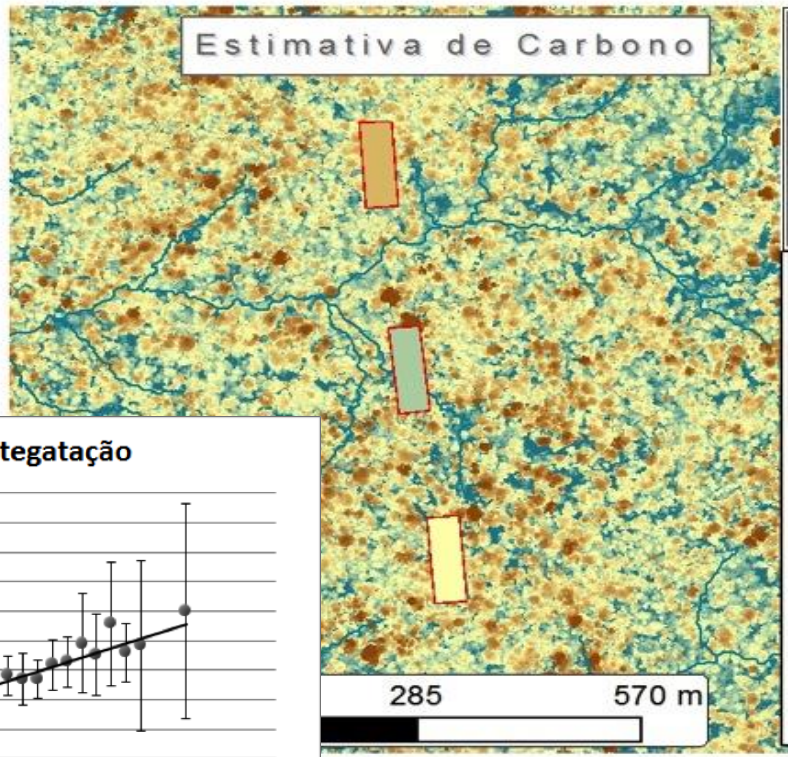


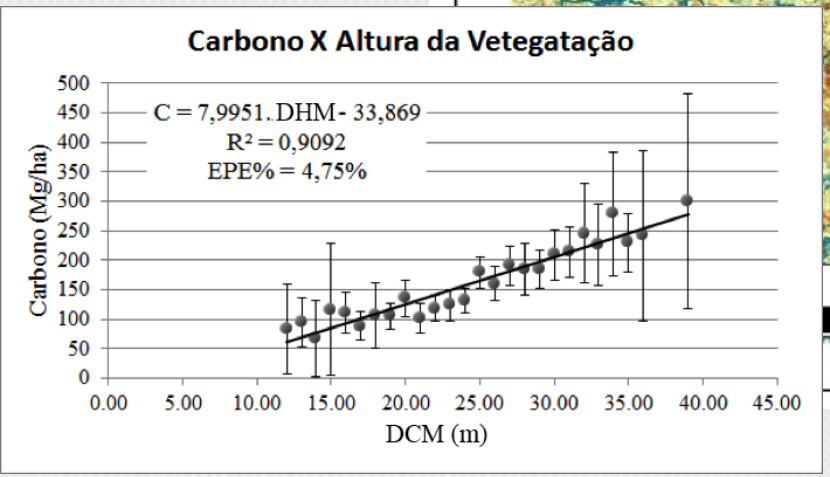
- ✓ ***Métricas do LiDAR***
- ✓ *Alturas*
- ✓ *Modelos, imagem*
- ✓ *Densidade de área superficial*
- ✓ *Perfil vertical da vegetação*
- ✓ *Tamanho, volume, área de copa*
- ✓ *Proporção de clareira*
- ✓ *Estimativas, carbono*
- ✓ *Estudo em séries temporais*

Quick Terrain Modeler™

LiDAR Avião e Campo - DUCKE

Embrapa Acre





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II Curso de Geotecnologia Aplicado ao Inventário Florestal - IIGeoIF

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Muito obrigado!!!