

Mining in a day  
**Seminar 2015**

Novotel Hotel Balikpapan  
1 September 2015

Andy Gusty Rangga



**BRITMINDO GROUP**

Professional Mining Services



# Mining in a day

## Seminar 2015



City of Greeley Property Information Map

2008 Map - Property Information Search

7 Results: (2131 1/2) (1/2)

- 1. Ward County Assessor Data: 449104 1/2
- 2. Owner Name: NUTTY WOOD & NUTTY USA, INC
- 3. Street Address: 2131 1/2 S W
- 4. City, State, Zip: WARD, CO 80551
- 5. City Assessor: 449104 1/2
- 6. Parcel Number: 000000
- 7. City Assessor: 000000
- 8. City Assessor: 000000
- 9. City Assessor: 000000
- 10. City Assessor: 000000
- 11. City Assessor: 000000
- 12. City Assessor: 000000
- 13. City Assessor: 000000
- 14. City Assessor: 000000
- 15. City Assessor: 000000



Search

Industrial Office Land

Size / Access Requirements

Size From: 20000 sq ft

Size To: 50000 sq ft

Clear Height: 35 ft

Rail Access: Required

Maximum Distance To

Airport: 5 miles

Interstate: 5 miles

Container Terminal: 10 miles

Break-Bulk Terminal: 10 miles

Property Information

Property Name: \_\_\_\_\_

Street Name: \_\_\_\_\_

Parcel Id: \_\_\_\_\_

Close Search Search

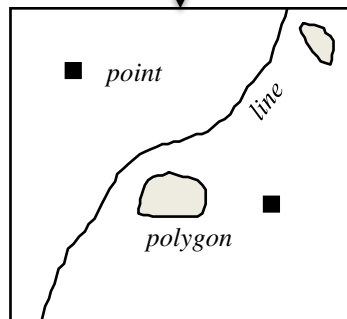


# Mining in a day

## Seminar 2015



Real World



Vector Representation

- Concessions
- Forestry Status / IPPKH
- Land Cover
- Regional Geology
- Haulroad
- Administration

	0	1	2	3	4	5	6	7	8	9
0							R	T		
1						R	R		T	
2	H					R				
3						R				
4				R	R					
5		R								
6		R	T	T		H				
7		R	T	T						
8	R									
9	R									

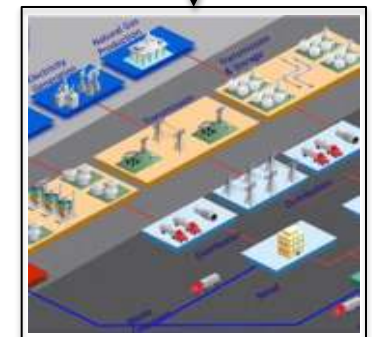
Raster Representation

- Topography
- Satellite Images
- Aerial Photo (Airborne)



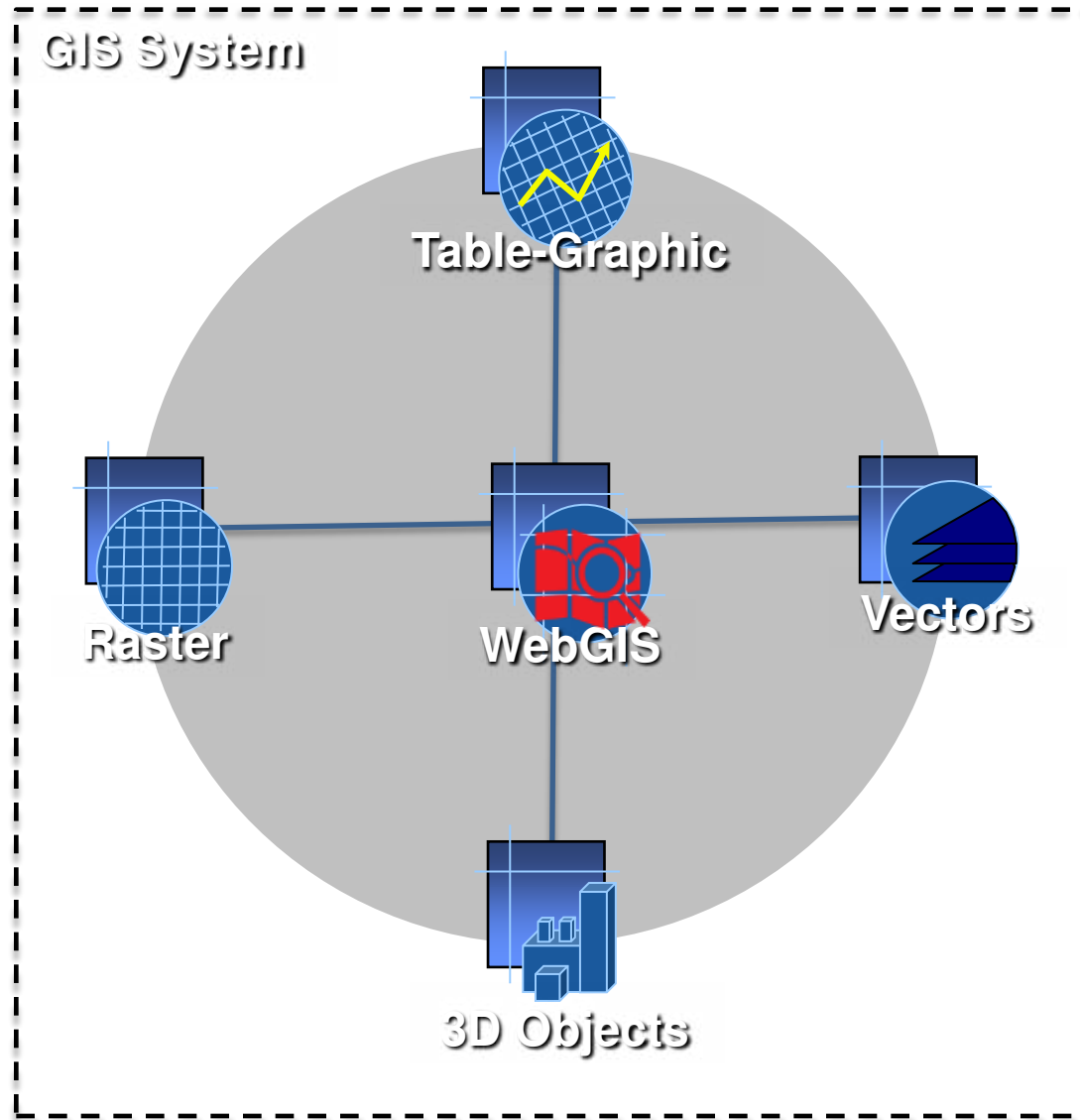
Table & Graphic

- Clean & Clear (CNC) Status
- Coal production
- Coal Export & Domestic Sales
- Coal Price
- Coal Resources & Reserves



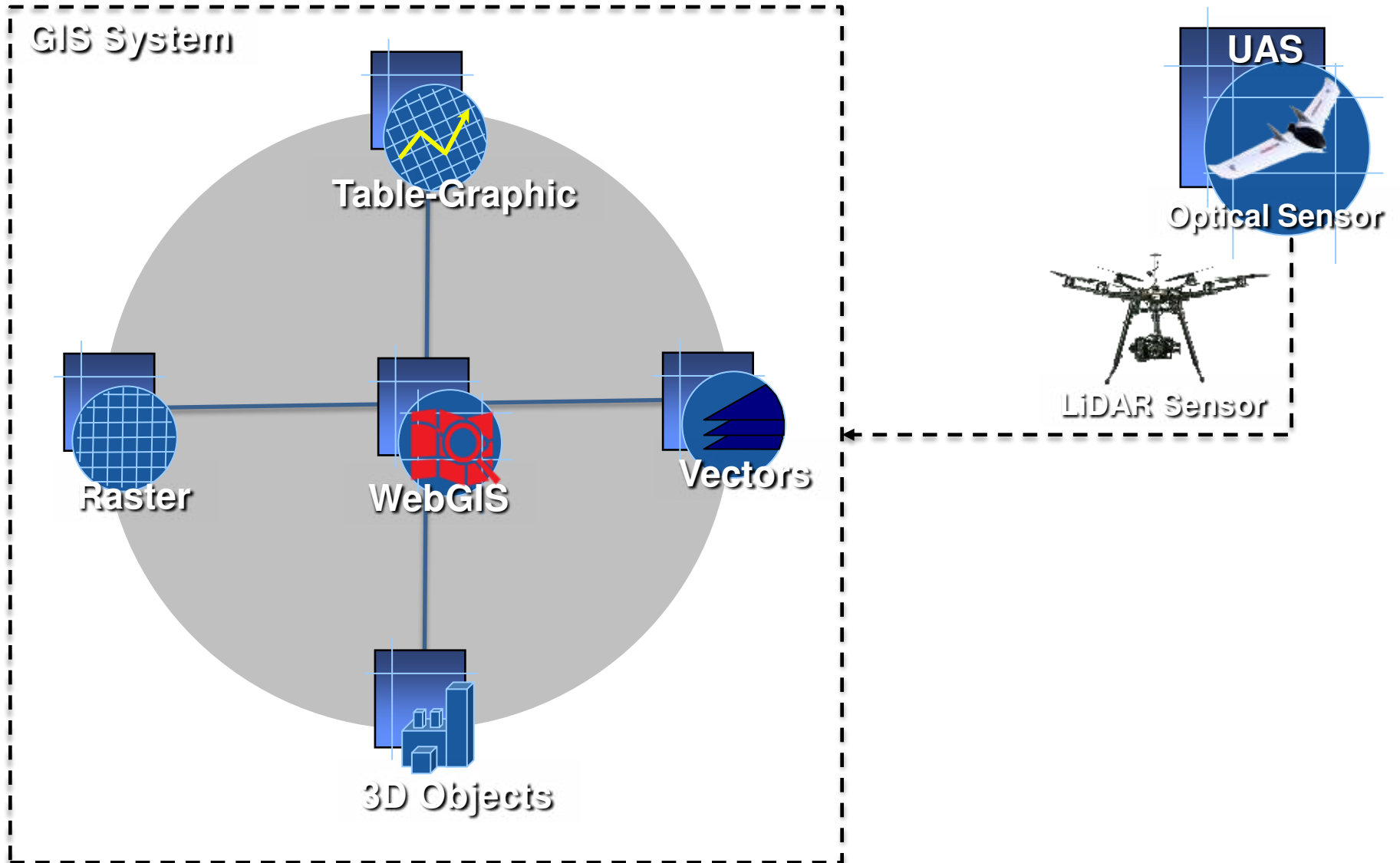
3D Objects

- Infrastructure
- Electricity
- Smelter
- Coal Plant
- Building



# Mining in a day

## Seminar 2015



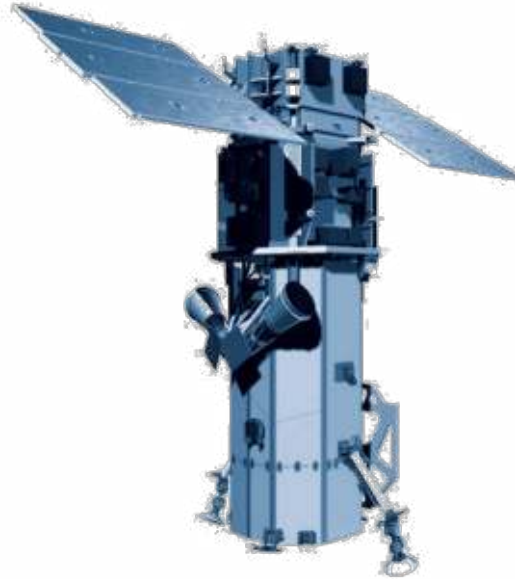
# Comparison

## Terrestrial survey



- Time consuming
- Labor cost
- High risk
- No imagery produced

## Satellite image



- Have to waiting if not available in archive
- Cloud cover & others atmospheric constraints
- 60 cm imagery resolution

## UAS

?



## The Power of UAS (Unmanned Aerial System)



- (1) Time,  
Surveying that once took days or weeks utilizing conventional surveying systems is currently conductible in only a couple of hours, with very short time
- (2) Safety,  
With UAS, we can survey areas that were previously too dangerous to be observed directly by surveyors

## UAS (Unmanned Aerial System)

(3) Cost,

The costs of one airborne LiDAR scanner is similar to *twenty* units of UAS that our company operates

(4) Accuracy,

Provides high accuracy GPS blended with Real Time Kinematic (RTK) system that mounted in the UAS





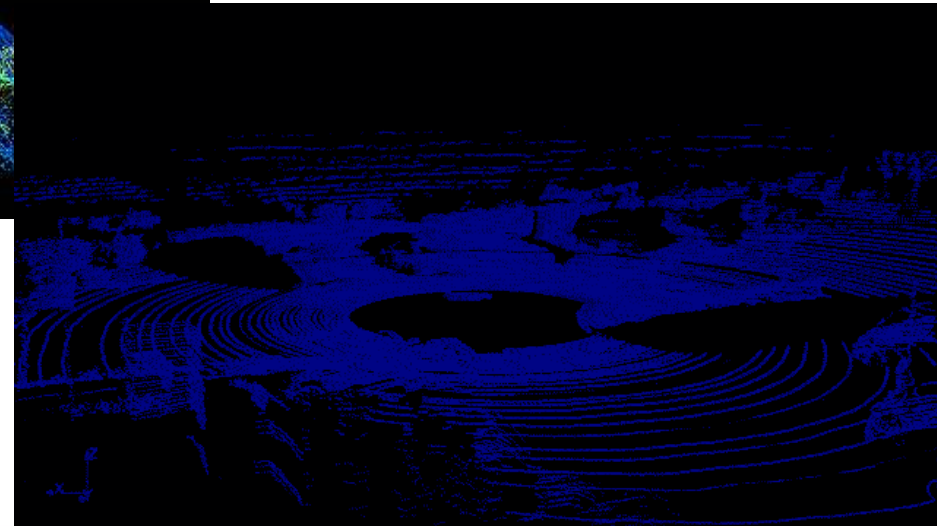
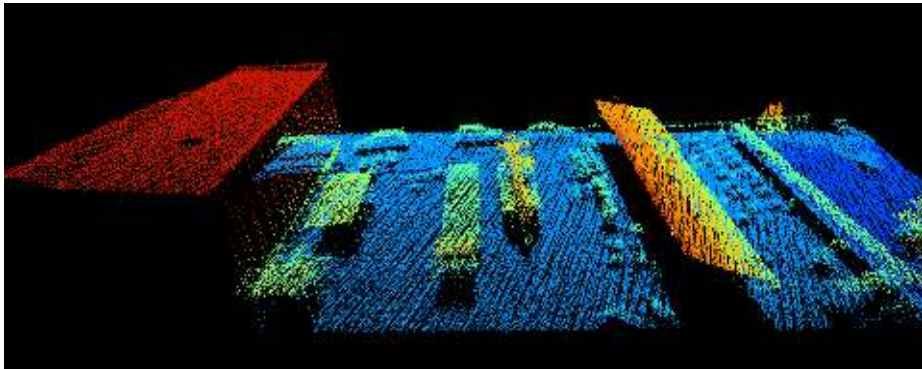
# Mining in a day

## Seminar 2015



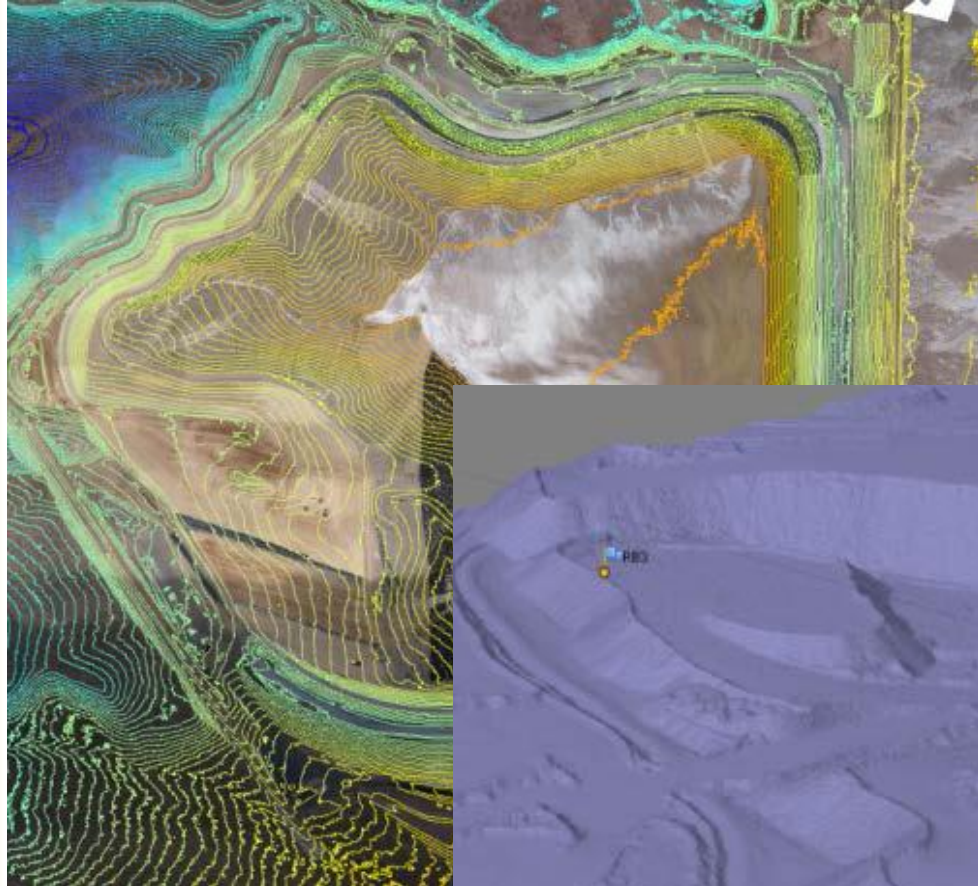
Result

Sample of UAV with LiDAR sensor  
(300,000 Points per Second - 360° Horizontal FOV)

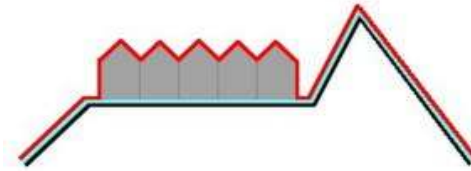




# Mining in a day

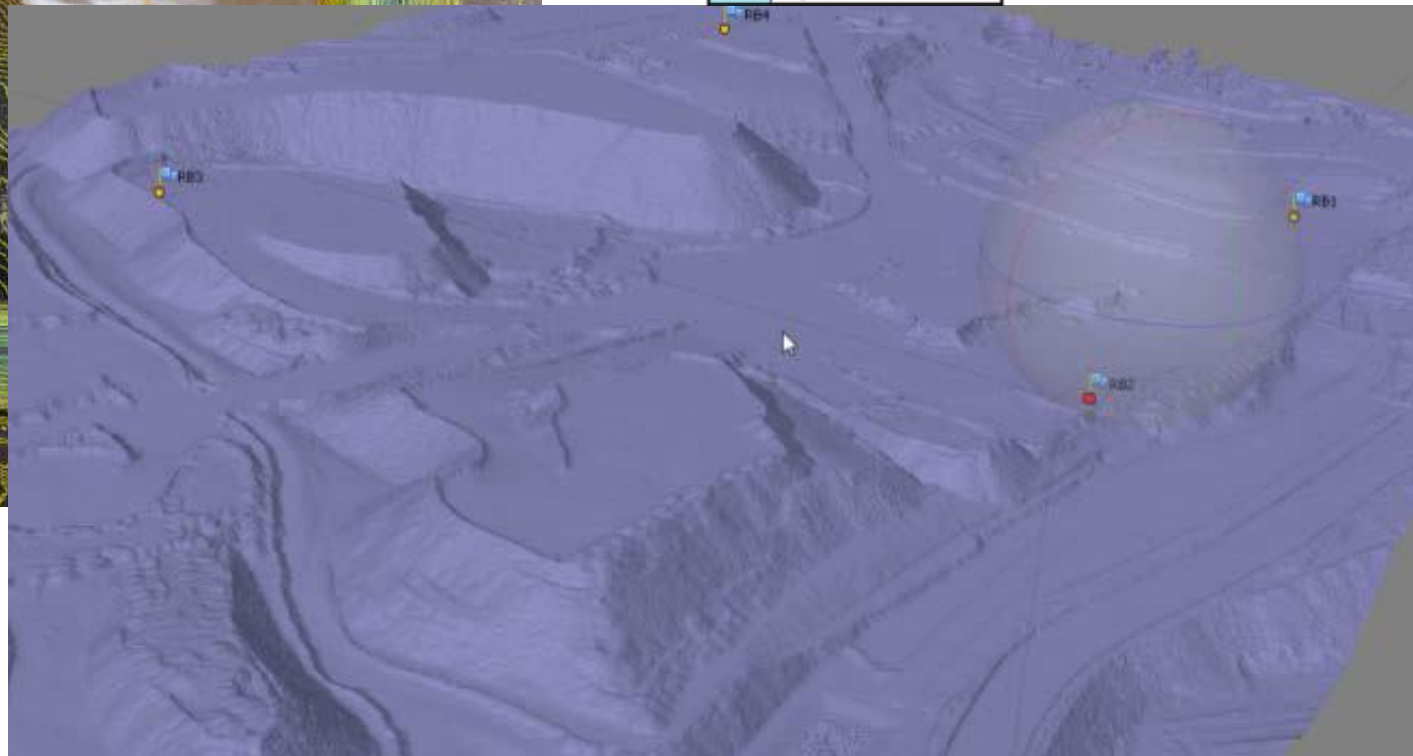
## Seminar 2015



Orthophoto  
Digital Surface Model (DSM-DTM)



	Digital Surface Model
	Digital Terrain Model



**Table 1.** Elevation comparison between terrestrial-based vs UAV-based.

No	X	Y	UAV (m)	Terrestrial (m)	Difference (m)
1	313950.2	9583286	110.0627	109.9042	0.158516
2	313867.7	9583150	102.1747	102.0564	0.118309
3	313925.2	9583248	110.6041	111	0.395859
4	313939	9583281	110.4387	110.1942	0.24453
5	313892.1	9583172	105.0292	105.1997	0.170525
6	313984.8	9583210	111.2323	111	0.232323
7	313965.4	9583291	109.4784	109.5796	0.101173
8	313827.5	9583408	87.29626	87.49712	0.200859
9	313878.9	9583158	102.8614	103.245	0.383583
10	313925.2	9583248	110.6041	111	0.395859
11	313916.9	9583327	106.34	106.3681	0.028122
12	313770.8	9583319	101.606	101.6643	0.058327
13	313913.6	9583347	104.989	104.9234	0.065636
14	313756.6	9583261	101.537	101.6031	0.066147
15	313859.4	9583318	106.126	106.2806	0.15464
16	313971.9	9583368	105.502	105.6598	0.157753
17	313907.7	9583267	110.513	110.6995	0.186478
18	313801.5	9583170	99.418	99.22723	0.190773
19	313793.4	9583221	104.646	104.8824	0.236389
20	313878.4	9583143	101.358	101.1	0.257988

Sources :

ISPRS International Journal of Geo-Information

ISSN 2220-9964

[www.mdpi.com/journal/ijgi/](http://www.mdpi.com/journal/ijgi/)

Title :

**Low-cost UAV (Unmanned Aerial Vehicle) for environmental monitoring of mine activities**

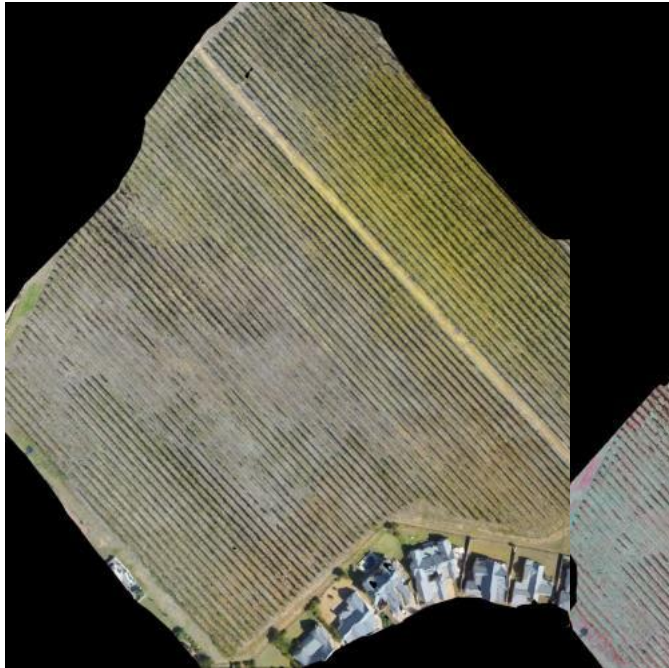
Location :

**Coal Mining Operation IAC (Indoasia Cemerlang)- PT Britminindo**

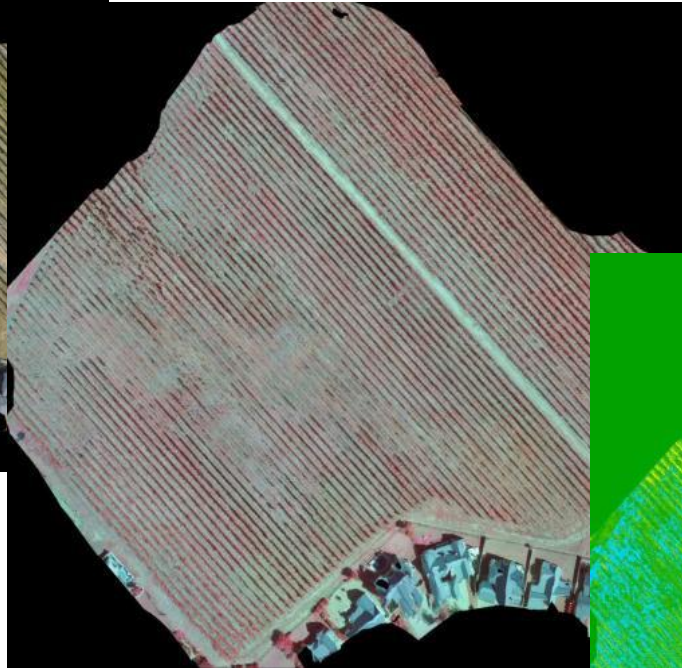
Author :

**Fatwa Ramdani , Ph.D, Andy Gusty Rangga, Brenden Duffy, Putri Setiani Ph.D**

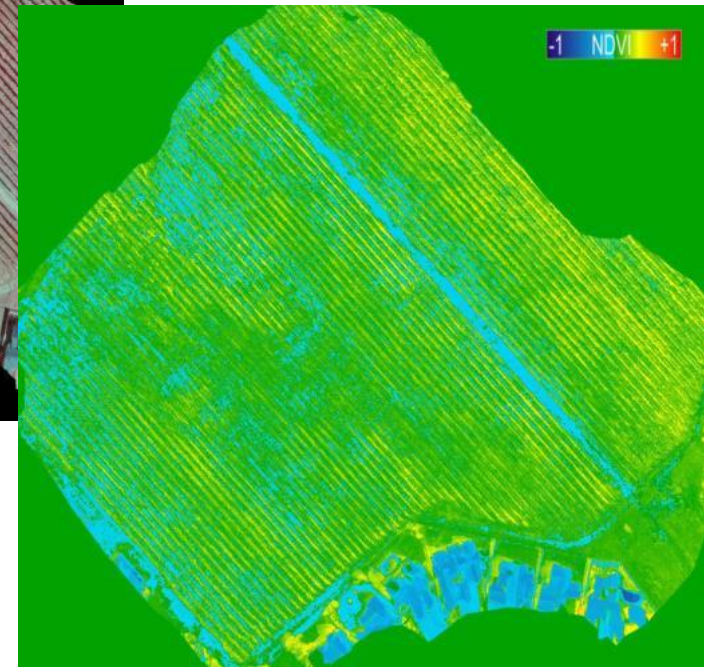
Vegetation application



Visible RGB



False color

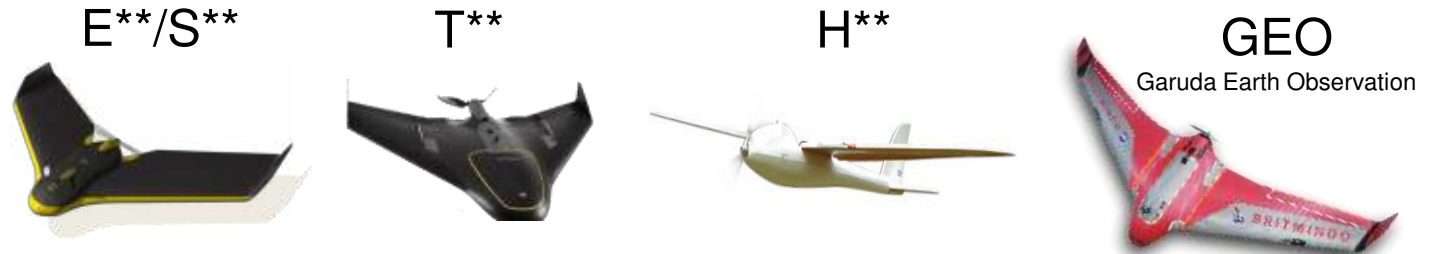


NDVI

The screenshot displays the 'Oil Palm Tree Counting Software' interface. The main window shows a satellite image of an oil palm plantation with a selected area. Below the image, the text 'Tree Count : 4392' is displayed. The software has a menu bar with 'File', 'Option', and 'About'. A 'Result' window is open, showing the same image with a white selection box. To the right, an 'Advance Setting' panel includes:

- Threshold Value:**
  - H: Lower 30, Upper 100
  - S: Lower 100, Upper 255
  - V: Lower 100, Upper 255
- Morphological Operation:**
  - Closing Iteration: 0
  - Opening Iteration: 6
- Blob Analysis:**
  - Minimum Size: 5
  - Minimum Size: 90

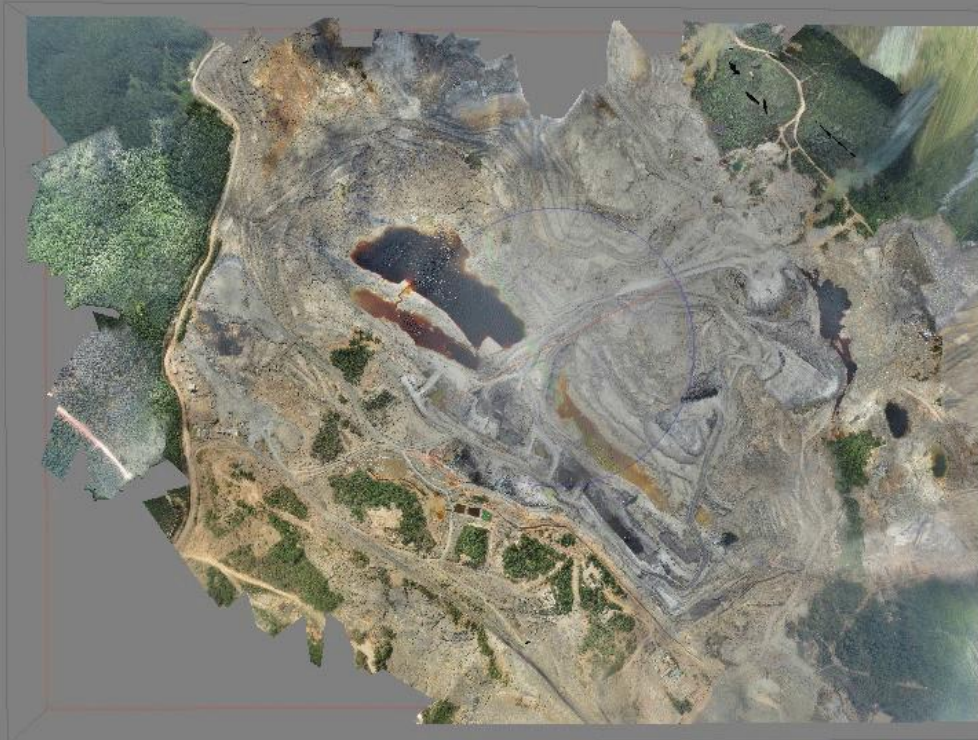
At the bottom of the software window, there are 'Select Area' and 'Count' buttons, and coordinates 'X : 8 Y : 354'.



	E**/S**	T**	H**	GEO Garuda Earth Observation
<b>Technology</b>	Airframe: Foam	Airframe: Foam	Airframe: Carbon Fiber	Airframe: Foam coated with 3D Fiber Carbon Vinyl
	Camera: 18.2 MP RGB or IR only	Camera: 24 MP RGB only	Camera: 24 MP RGB & IR	Camera: 24 MP RGB & IR with gimbal
	Flight time: 45 m	Flight time: 50 m	Flight time: 90 m	Flight time: up to 2 hr
	Communication range: 3 km	Communication range: 50 km	Communication range: unknown	Communication range: 4-50 km
<b>Environment</b>	low condition	low to high	low to medium	low to extrim
<b>Price</b>	~USD 45,000 (single camera)	~USD 65,000 (single camera)	~USD 80,000 (single camera)	USD 28,050 (single camera)
				USD 38,500 (dual camera)
<b>Others</b>	waiting time	waiting time	waiting time	Ready app. 2 weeks
				LiDAR sensor in multicopter
				Airspeed and air temperature sensor

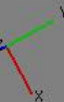


## Geospatial data derived from UAS (Natural Colour)



RGB-Natural Colour,  
Real Time Video - FPV  
DSM-DTM

Faces: 77,853, vertices: 39,758





## Geospatial data derived from UAS (IR) – NDVI Result

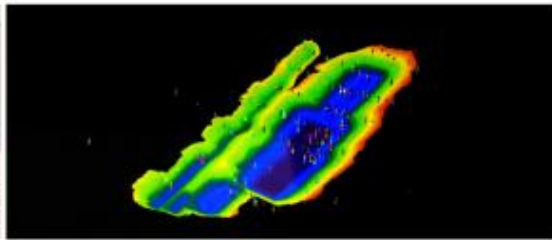






Coal Mine Site at Banjarmasin, South Kalimantan, 1cm resolution

# Thank You



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