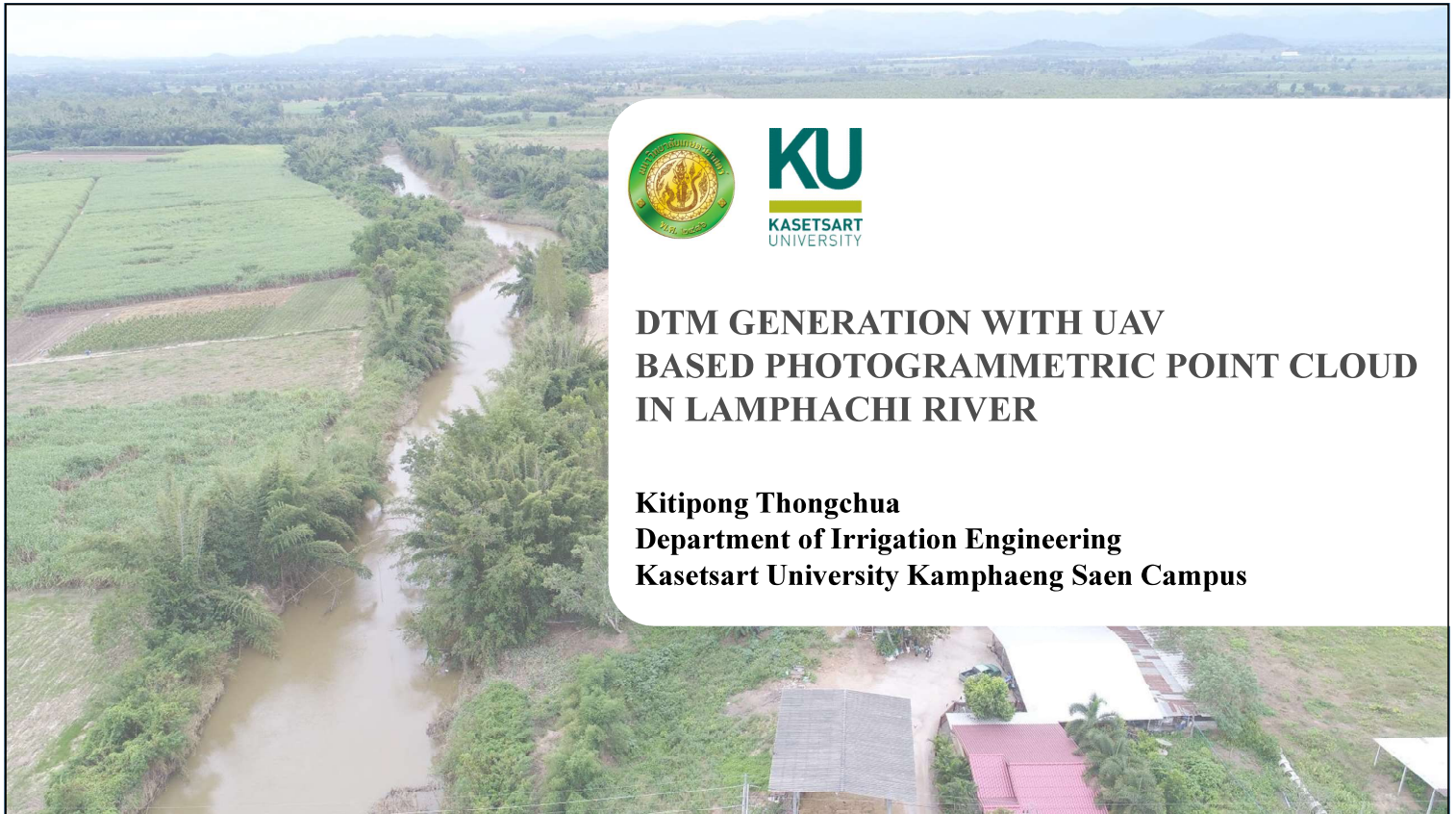




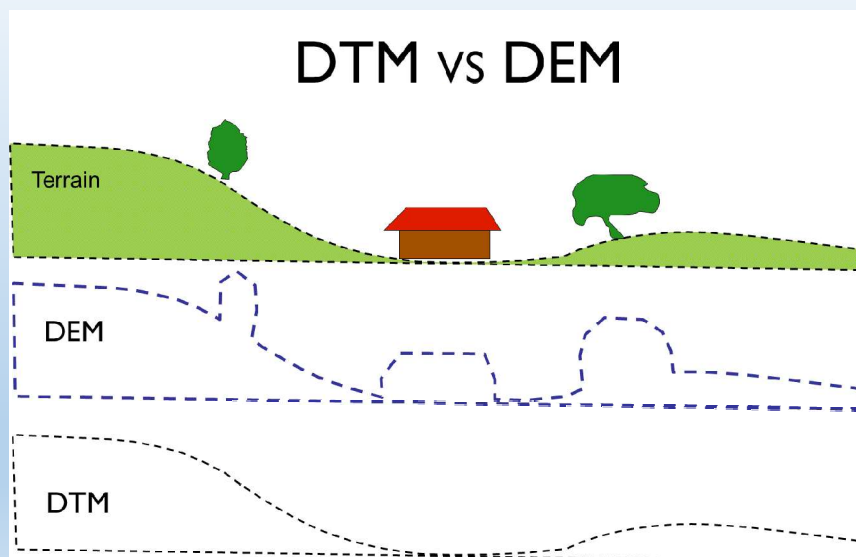
KU
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UNIVERSITY

DTM GENERATION WITH UAV BASED PHOTOGRAMMETRIC POINT CLOUD IN LAMPHACHI RIVER

Kitipong Thongchua
Department of Irrigation Engineering
Kasetsart University Kamphaeng Saen Campus

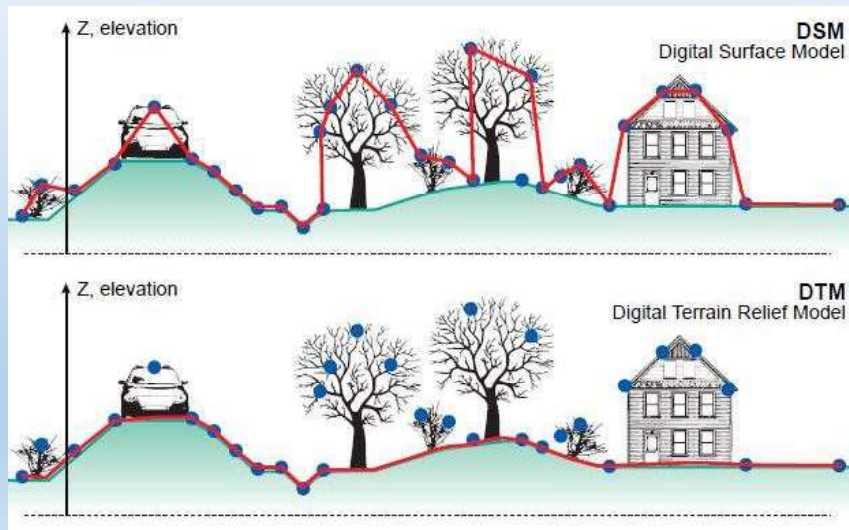
INTRODUCTION

What is the Digital Terrain Model (DTM)?



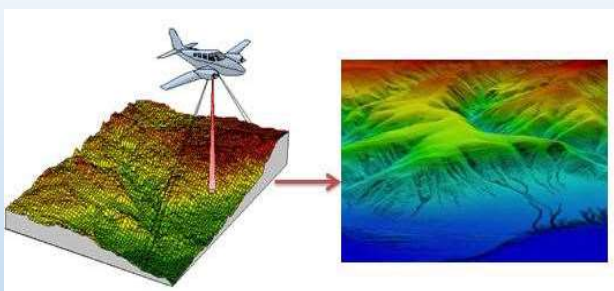
INTRODUCTION

Difference between Digital Surface Model (DSM) and Digital Terrain Models (DTM)

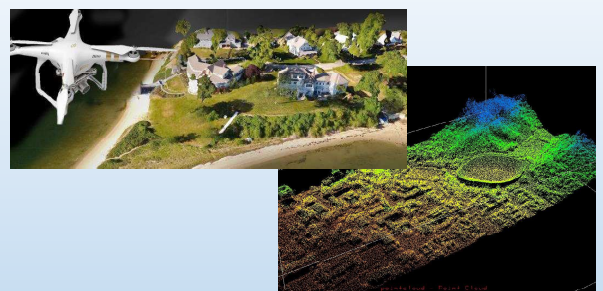


INTRODUCTION

DTM from Airborne VS DTM from UAV



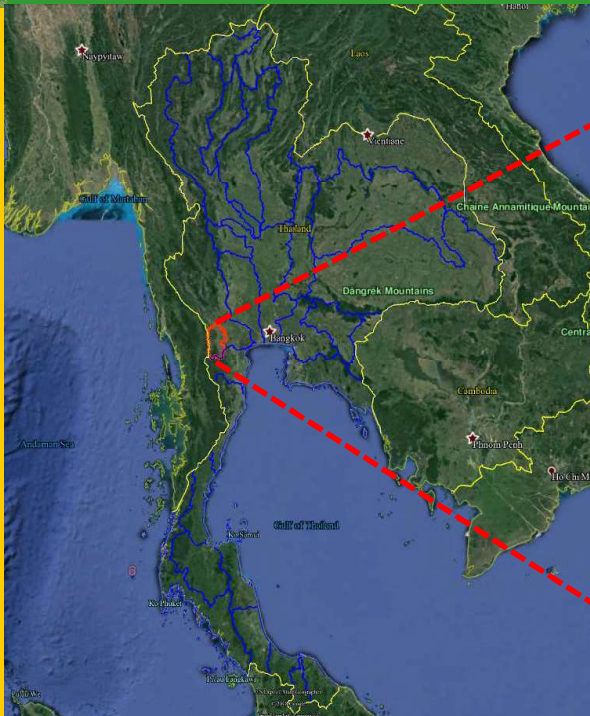
- Large area
- Expensive



- Small area
- Low-cost



STUDY AREA



STUDY AREA





STUDY AREA

3 Oct 2017



5 DEC 2017

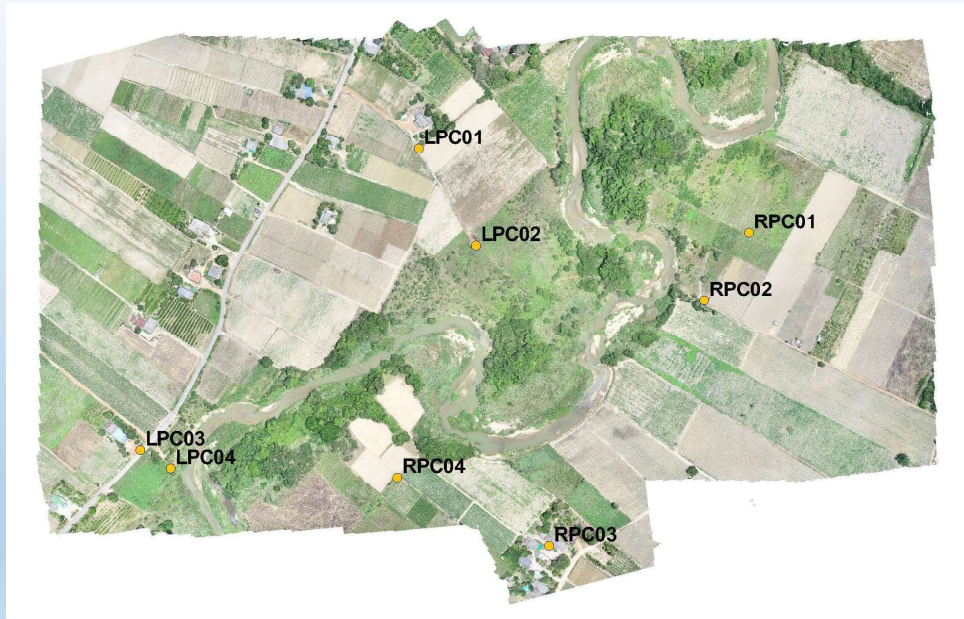


DATA





DATA



8 ground control points (GCPs).



METHODOLOGY

Agisoft PhotoScan interface showing the workflow for creating a 3D model from aerial photos.

Cameras

Camera	Longitude	Latitude	Altitude (m)	Accuracy (m)	Error (m)	Yaw (deg)	Pitch (deg)
F4 (1).JPG	99.355040	13.862025	163.190000	10.000000	3.242452	17	0.070
F4 (2).JPG	99.354987	13.862070	163.190000	10.000000	3.294687	29	0.069
F4 (3).JPG	99.354874	13.862189	163.190000	10.000000	3.137884	19	0.028
F4 (4).JPG	99.354770	13.862295	163.190000	10.000000	3.756642	23	0.052
F4 (5).JPG	99.354666	13.862399	164.190000	10.000000	4.256640	22	0.019
F4 (6).JPG	99.354600	13.862466	164.490000	10.000000	1.812772	14	0.034
F4 (7).JPG	99.354511	13.862461	164.490000	10.000000	1.533313	22	0.102
F4 (8).JPG	99.354385	13.862464	164.590000	10.000000	1.560005	15	0.062
F4 (9).JPG	99.354258	13.862468	164.490000	10.000000	1.481355		
F4 (10).JPG	99.354057	13.862468	164.490000	10.000000	1.584713		

Check points

Check points	Distance (m)	Accuracy (m)	Error (m)				
LPC01	99.352070	13.858460	43.810000	0.000000	0.004683	17	0.070
LPC04	99.351990	13.861790	38.918000	0.000000	0.06384	29	0.069
LPC05	99.353530	13.860720	39.502000	0.000000	0.032895	19	0.028
LPC06	99.354710	13.859280	39.020000	0.000000	0.017635	23	0.052
RPC02	99.354950	13.858160	38.590000	0.000000	0.010750	22	0.019
RPC03	99.356550	13.857400	41.054000	0.000000	0.009939	14	0.034
RPC08	99.356390	13.860110	38.791000	0.000000	0.157518	22	0.102
RPC09	99.358890	13.860860	38.450000	0.000000	0.133812	15	0.062

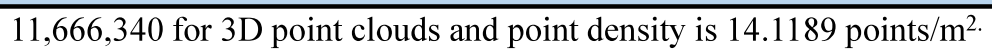
Total Error

Total Error	Distance (m)	Accuracy (m)	Error (m)	
Control points			0.077729	0.063
Check points				
Scale Error				
Total Error				
Control scale				
Check scale				

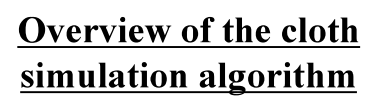
Model

Photo: 70/220 vertical, 30.04x

Photo: 70/220 vertical, 30.04x



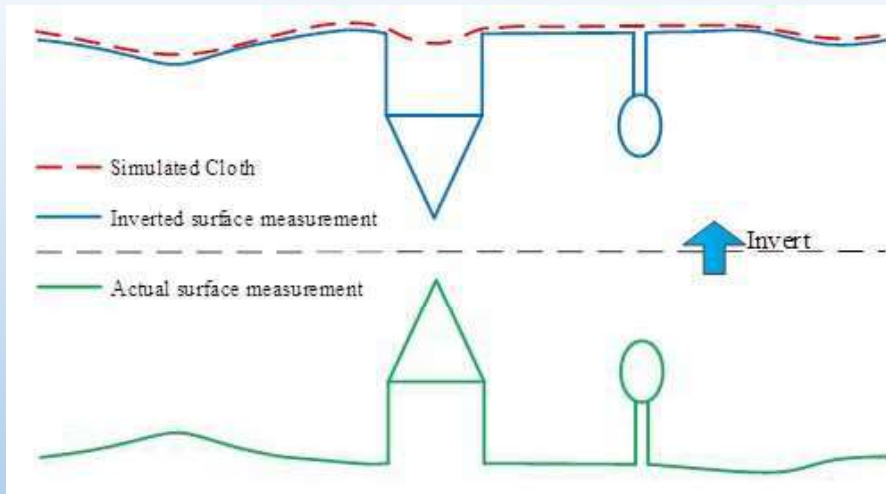
METHODOLOGY



Cloth Simulation Filter (CSF) is a tool to extract of ground points in discrete return LiDAR pointclouds



METHODOLOGY

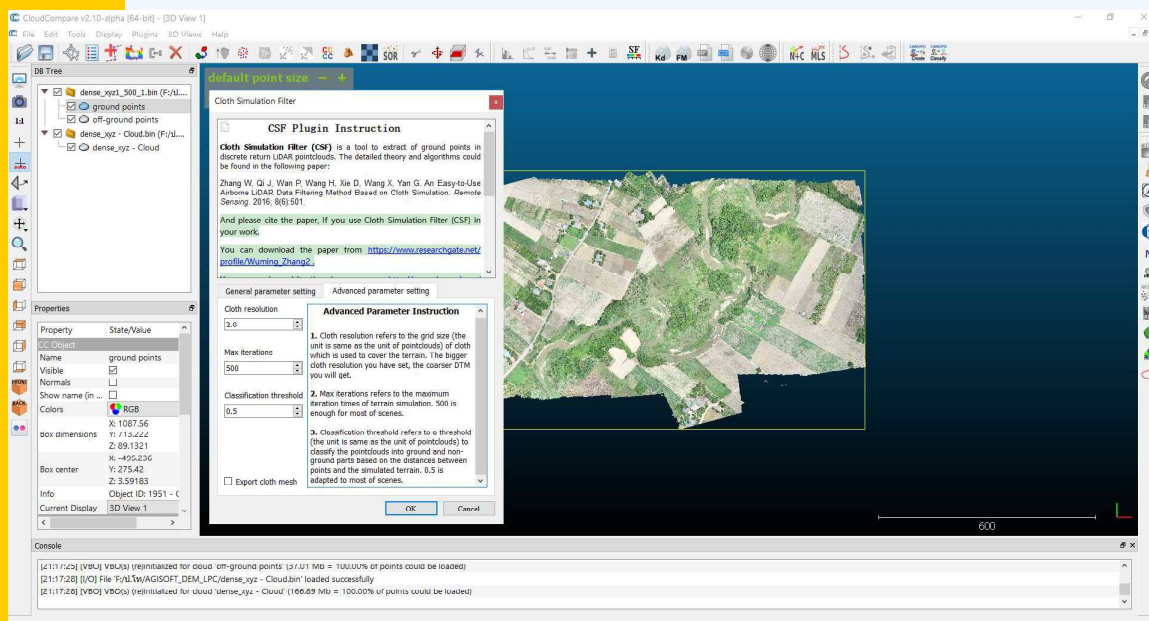


Overview of the cloth simulation algorithm

Cloth Simulation Filter (CSF) is a tool to extract of ground points in discrete return LiDAR pointclouds



METHODOLOGY

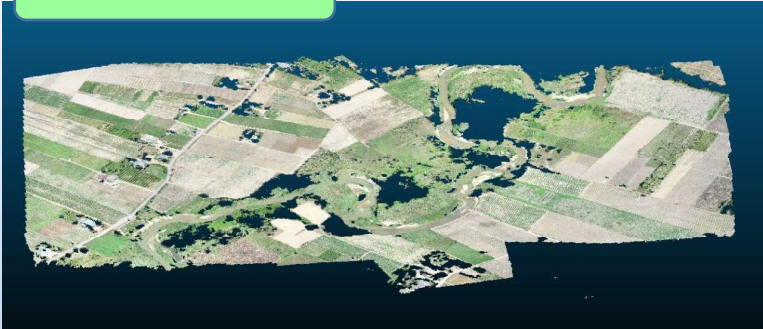


- CR (Cloth resolution) refers to the grid size
- Max iterations refers to the maximum iteration times of terrain simulation
- Classification threshold refers to a threshold (the unit is same as the unit of point clouds) to classify the point clouds into ground and non-ground



METHODOLOGY

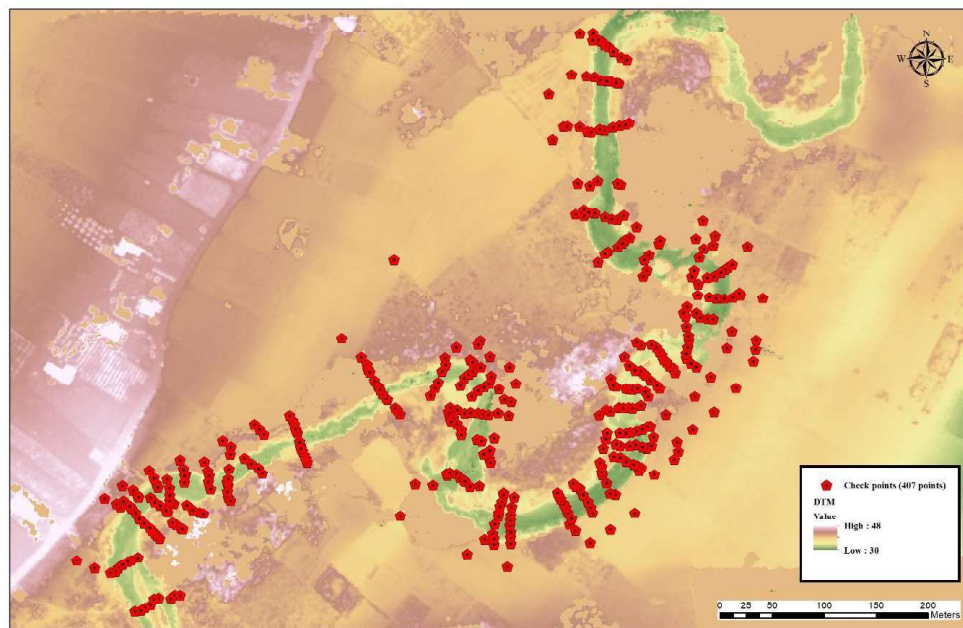
Ground Point



Non-Ground Point



RESULT





CONCLUSION

UAV based data can be used for DTM generation by photogrammetric techniques with a vertical accuracy. It can be stated that the UAV Photogrammetry can be used in engineering applications with the advantages of low-cost, time conservation, minimum field work, and competence accuracy. Moreover the created 3D model is satisfactory to realize topography with texture. On the other hand, except GCP some parameters such as weather, vibrations, lens distortions, and software directly affects the process and model accuracy.

THANK YOU