Supplementary S1

UAS Image Acquisition and SfM and Point Cloud Processing

Table S1. Full UAS data collection parameters for the six study sites.

Site	Altitude (m AGL)	Forward Overlap (%)	Side Overlap (%)	Flight Speed (m sec-1)
Kaibab High Density	97	90	90	3
Kaibab Low Density	99	90	90	4
Manitou	90	90	90	4
Black Hills High Density	80	90	85	4
Black Hills Low Density	80	90	85	4

Table S2. SfM image alignment algorithm processing parameterization.

Image Alignment Parameter	Setting
METASHAPE	
Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Keypoint limit	40,000
Tie point limit	4,000
Guided image matching	No
Adaptive camera model fitting	Yes
OPENDRONEMAP	
Matcher Neighbors	60
Minimum Features to Extract per Image	40,000
Radiometric Calibration	none
PIX4D	
Keypoint Image Scale	Original
Target Number of Keypoints	40,000
Rematch	Automatic
Point Cloud Densification	
Image Scale	Multiscale
Minimum Number of Matches	3

Table S3. Mapping of Pix4D and OpenDroneMap dense cloud generation parameterization options to the Metashape settings. Within Pix4D, the "Image Scale" setting most closely corresponds to the dense cloud quality while the "Point Density" setting represents the filtering mode. Within OpenDroneMap, the "Feature Quality" setting most closely corresponds to the dense cloud quality while the "Point Cloud Quality" setting represents the filtering mode.

	METASHAPE	OPENDRONEMAP	PIX4D
Dense Cloud Quality			
ultra high	ultra high	ultra	original
high	high	high	half
medium	medium	medium	quarter
low	low	low	eighth
lowest	lowest	lowest	
Filtering Mode			
aggressive	aggressive	lowest	
moderate	moderate	low	low
mild	mild	medium	optimal
disabled	disabled	high	high

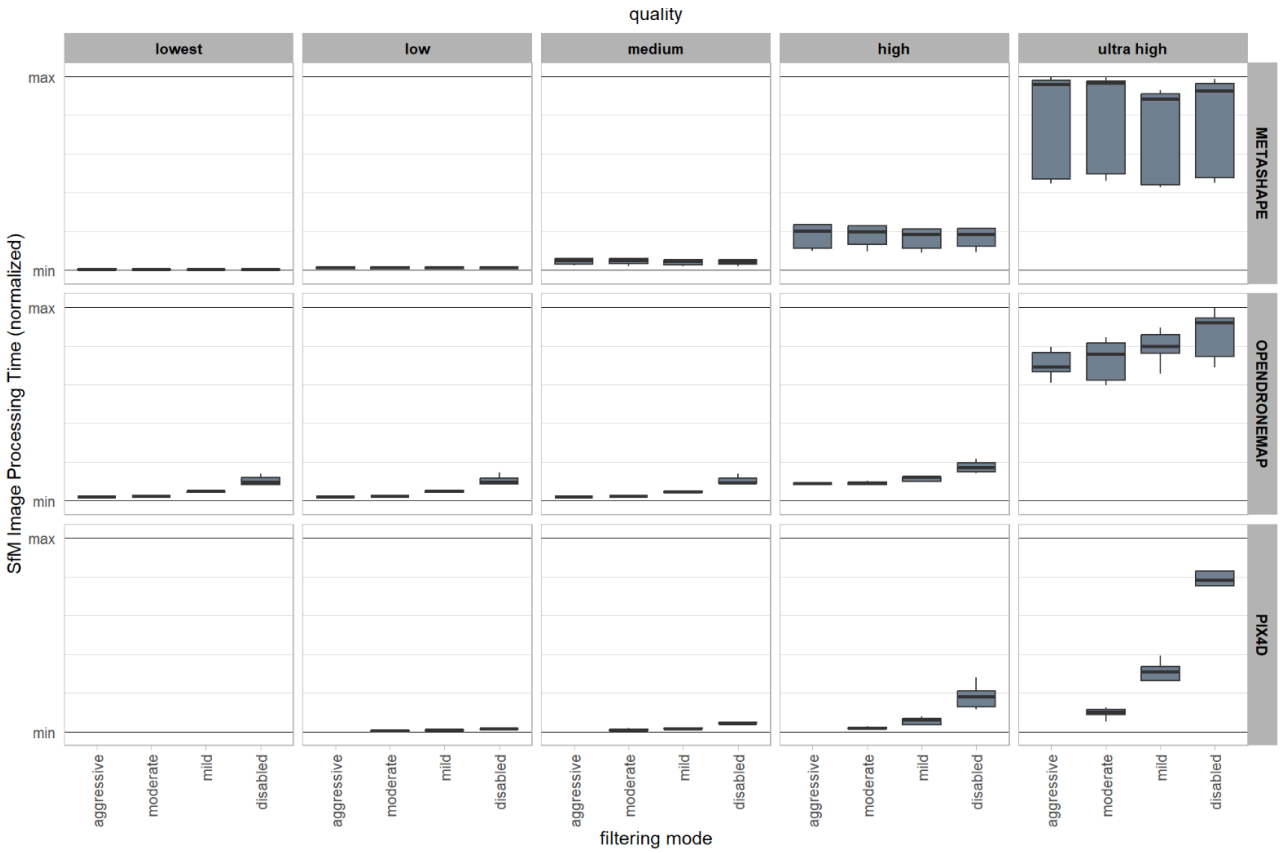


Figure S1. Summary statistics of dense point cloud generation time reported as the relative time to generate the dense point cloud compared to the maximum for each software. Each boxplot summarizes the distribution of the data from five study sites for each software (rows), quality setting (columns), and filtering mode (x-axis) combination. The reported times were relativized as each software was available on computer systems with differing hardware, but still allows for assessment of how algorithm parameters influence time.

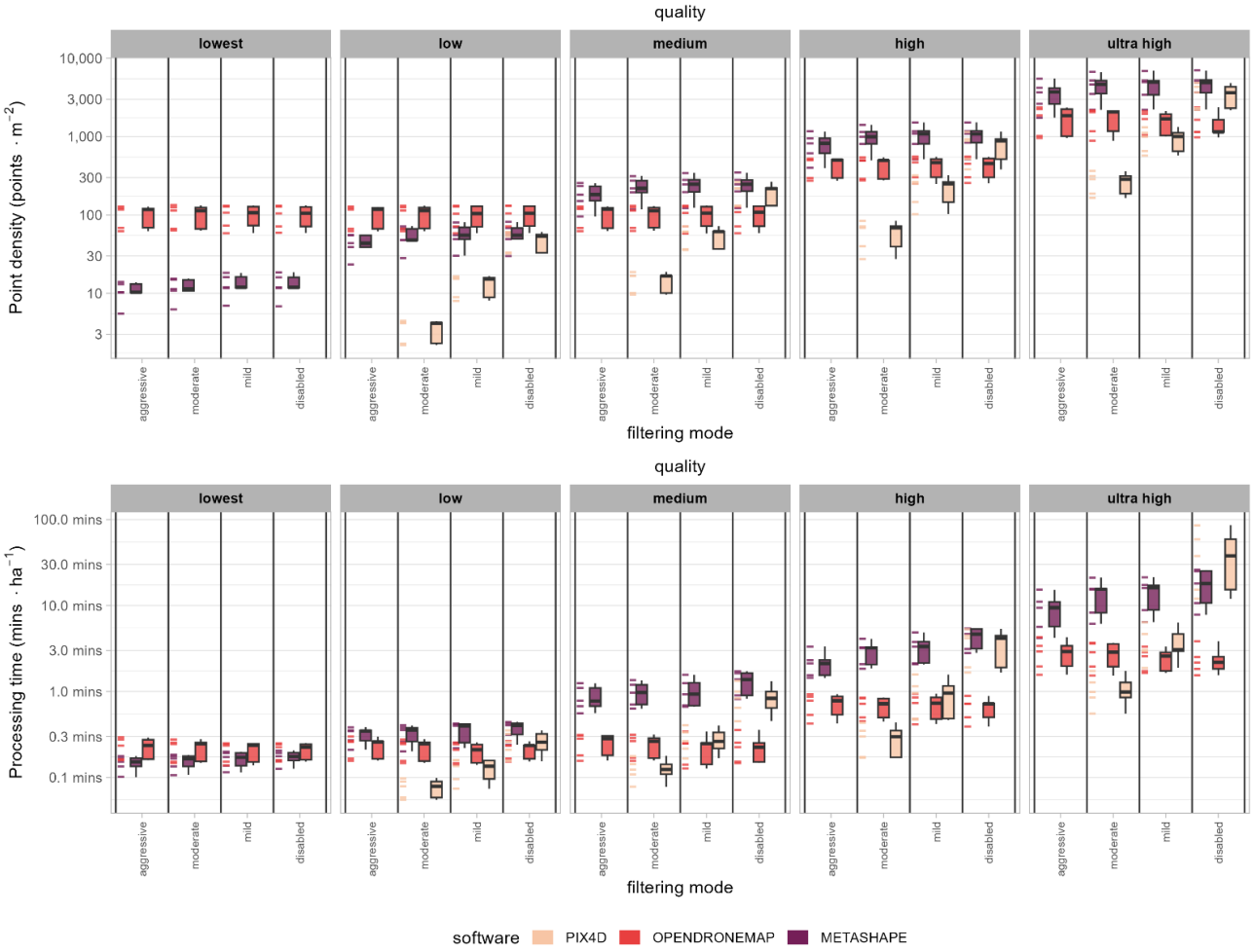


Figure S2. Summary statistics of point cloud density measured in points per m^2 (top panel) and point cloud processing time measured in minutes per ha (bottom panel) to perform tree detection and DBH estimation. Note the logarithmic scale used on each y-axis. Each boxplot summarizes the distribution of the data, shown in the rug on the left-hand-side of each cell, from five study sites for each software (colors), quality setting (columns), and filtering mode (x-axis) combination.