Supplementary S2

Results of overall tree detection (F-score) and stand basal area estimation

Table S4. Posterior predicted F-score and 95% HDI by dense point cloud generation quality, filtering mode, and software after collapsing across other model factors.

Software	Quality	Filtering Mode	F-score Median	HDI Low	HDI High
METASHAPE	lowest	aggressive	0.09	0.03	0.19
		moderate	0.13	0.05	0.26
		mild	0.18	0.06	0.34
		disabled	0.18	0.07	0.34
	low	aggressive	0.30	0.13	0.49
		moderate	0.38	0.20	0.60
		mild	0.47	0.26	0.68
		disabled	0.46	0.26	0.68
	medium	aggressive	0.43	0.23	0.65
		moderate	0.53	0.31	0.74
		mild	0.60	0.39	0.80
		disabled	0.59	0.39	0.80
	high	aggressive	0.49	0.29	0.71
		moderate	0.58	0.37	0.78
		mild	0.65	0.44	0.83
		disabled	0.64	0.43	0.82
	ultra high	aggressive	0.51	0.31	0.73
		moderate	0.60	0.40	0.80
		mild	0.66	0.46	0.84
		disabled	0.66	0.46	0.84
OPENDRONEMAP	lowest	aggressive	0.32	0.15	0.53
		moderate	0.30	0.14	0.50
		mild	0.31	0.14	0.52
		disabled	0.31	0.14	0.51
	low	aggressive	0.34	0.16	0.55
		moderate	0.32	0.15	0.52
		mild	0.33	0.16	0.54
		disabled	0.32	0.14	0.52
	medium	aggressive	0.35	0.17	0.56
		moderate	0.32	0.15	0.53
		mild	0.32	0.15	0.53
		disabled	0.32	0.15	0.52
	high	aggressive	0.52	0.31	0.74

		moderate	0.49	0.28	0.70
		mild	0.49	0.28	0.70
		disabled	0.48	0.28	0.70
	ultra high	aggressive	0.60	0.40	0.80
		moderate	0.58	0.37	0.78
		mild	0.58	0.37	0.78
		disabled	0.56	0.35	0.77
PIX4D	low	moderate	0.45	0.25	0.67
		mild	0.50	0.29	0.72
		disabled	0.50	0.29	0.72
	medium	moderate	0.53	0.32	0.74
		mild	0.56	0.35	0.77
		disabled	0.56	0.35	0.77
	high	moderate	0.53	0.32	0.74
		mild	0.56	0.35	0.77
		disabled	0.56	0.34	0.76
	ultra high	moderate	0.54	0.33	0.76
		mild	0.57	0.36	0.78
		disabled	0.56	0.35	0.77

Table S5. Posterior predicted F-score and 95% HDI by dense point cloud generation quality and software after collapsing across other model factors.

Software	Quality	F-score Median	HDI Low	HDI High
METASHAPE	ultra high	0.61	0.40	0.82
	high	0.59	0.38	0.80
	medium	0.54	0.32	0.76
	low	0.40	0.20	0.63
	lowest	0.15	0.05	0.28
OPENDRONEMAP	ultra high	0.59	0.37	0.80
	high	0.50	0.28	0.72
	medium	0.33	0.15	0.55
	low	0.33	0.15	0.55
	lowest	0.32	0.14	0.53
PIX4D	ultra high	0.55	0.32	0.77
	high	0.54	0.31	0.76
	medium	0.54	0.32	0.77
	low	0.47	0.25	0.70

Table S6. Posterior predicted F-score and 95% HDI by dense point cloud filtering mode and software after collapsing across other model factors.

Software	Filtering Mode	F-score Median	HDI Low	HDI High
METASHAPE	aggressive	0.35	0.14	0.60
	moderate	0.43	0.20	0.69
	mild	0.51	0.26	0.76
	disabled	0.50	0.26	0.75
OPENDRONEMAP	aggressive	0.44	0.21	0.70
	moderate	0.42	0.19	0.68
	mild	0.42	0.19	0.67
	disabled	0.41	0.18	0.67
PIX4D	moderate	0.46	0.21	0.71
	mild	0.50	0.25	0.75
	disabled	0.49	0.25	0.75

Table S7. Posterior predicted difference in F-score (i.e. contrast) and 95% HDI between software by dense point cloud generation quality after collapsing across other model factors. High F-Score values (approaching one) indicate high UAS tree detection accuracy and, as such, a contrast (i.e. difference) in F-Score that is positive (difference>0) implies that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is positive was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was greater than zero.

Quality Contrast	Median Difference F-score	HDI Low	HDI High	Pr(diff>0)
OPENDRONEMAP - METASHAPE				
ultra high	-0.02	-0.15	0.10	34%
high	-0.09	-0.21	0.04	8%
medium	-0.20	-0.32	-0.07	0%
low	-0.07	-0.19	0.06	13%
lowest	0.17	0.05	0.29	100%
PIX4D - METASHAPE				
ultra high	-0.06	-0.20	0.07	18%
high	-0.05	-0.19	0.08	21%
medium	0.00	-0.13	0.14	51%
low	0.06	-0.07	0.20	83%
PIX4D - OPENDRONEMAP				
ultra high	-0.04	-0.18	0.10	29%
high	0.03	-0.10	0.17	70%
medium	0.20	0.06	0.33	100%
low	0.13	0.00	0.27	97%

Table S8. Posterior predicted difference in F-score (i.e. contrast) and 95% HDI between dense point cloud generation quality by software after collapsing across other model factors. High F-Score values (approaching one) indicate high UAS tree detection accuracy and, as such, a contrast (i.e. difference) in F-Score that is positive (difference>0) implies that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is positive was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was greater than zero.

Quality Contrast	Median Difference F-score	HDI Low	HDI High	Pr(diff>0)
METASHAPE				
ultra high - high	0.02	-0.08	0.12	63%
ultra high - medium	0.07	-0.03	0.17	92%
ultra high - low	0.20	0.09	0.30	100%
ultra high - lowest	0.46	0.32	0.57	100%
high - medium	0.05	-0.04	0.15	86%
high - low	0.18	0.08	0.28	100%
high - lowest	0.44	0.30	0.56	100%
medium - low	0.13	0.03	0.23	99%
medium - lowest	0.38	0.25	0.51	100%
low - lowest	0.25	0.13	0.37	100%
OPENDRONEMAP				
ultra high - high	0.08	-0.02	0.18	94%
ultra high - medium	0.24	0.13	0.34	100%
ultra high - low	0.24	0.14	0.35	100%
ultra high - lowest	0.26	0.15	0.36	100%
high - medium	0.16	0.06	0.27	100%
high - low	0.16	0.06	0.27	100%
high - lowest	0.18	0.07	0.28	100%
medium - low	0.00	-0.09	0.10	51%
medium - lowest	0.01	-0.09	0.12	62%
low - lowest	0.01	-0.08	0.12	62%
PIX4D				
ultra high - high	0.01	-0.11	0.12	54%
ultra high - medium	0.01	-0.11	0.12	55%
ultra high - low	0.07	-0.04	0.19	89%
high - medium	0.00	-0.11	0.12	51%
high - low	0.06	-0.05	0.18	87%
medium - low	0.06	-0.05	0.18	87%

Table S9. Posterior predicted difference in F-score (i.e. contrast) and 95% HDI between dense point cloud filtering mode by software after collapsing across other model factors. High F-Score values (approaching one) indicate high UAS tree detection accuracy and, as such, a contrast (i.e. difference) in F-Score that is positive (difference>0) implies that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is positive was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was greater than zero.

Quality Contrast	Median Difference F-score	HDI Low	HDI High	Pr(diff>0)
METASHAPE				
disabled - mild	-0.01	-0.09	0.08	44%
disabled - moderate	0.06	-0.02	0.15	94%
disabled - aggressive	0.15	0.05	0.25	100%
mild - moderate	0.07	-0.01	0.16	95%
mild - aggressive	0.15	0.05	0.25	100%
moderate - aggressive	0.08	0.00	0.17	97%
OPENDRONEMAP				
disabled - mild	-0.01	-0.09	0.08	44%
disabled - moderate	-0.01	-0.09	0.08	45%
disabled - aggressive	-0.03	-0.12	0.06	26%
mild - moderate	0.00	-0.08	0.08	51%
mild - aggressive	-0.02	-0.11	0.07	31%
moderate - aggressive	-0.02	-0.11	0.06	30%
PIX4D				
disabled - mild	0.00	-0.09	0.09	49%
disabled - moderate	0.03	-0.05	0.12	78%
mild - moderate	0.03	-0.05	0.13	79%

Table S10. Posterior predicted basal area (BA) percentage error (bias) and 95% HDI by dense point cloud generation quality, filtering mode, and software after collapsing across other model factors.

Software	Quality	Filtering Mode	BA Percentage Error Median	HDI Low	HDI High
METASHAPE	lowest	aggressive	-69%	-104%	-35%
		moderate	-54%	-88%	-19%
		mild	-42%	-78%	-9%
		disabled	-40%	-75%	-6%
	low	aggressive	-44%	-79%	-10%
		moderate	-26%	-61%	8%
		mild	-14%	-50%	20%
		disabled	-11%	-45%	24%
	medium	aggressive	-24%	-59%	10%

		moderate	-7%	-41%	29%
		mild	3%	-31%	38%
		disabled	6%	-27%	42%
	high	aggressive	-13%	-47%	22%
		moderate	2%	-31%	39%
		mild	12%	-23%	46%
		disabled	14%	-21%	48%
	ultra high	aggressive	-8%	-43%	26%
		moderate	6%	-28%	41%
		mild	16%	-19%	50%
		disabled	17%	-18%	51%
OPENDRONEMAP	lowest	aggressive	-33%	-67%	1%
		moderate	-36%	-70%	-2%
		mild	-36%	-71%	-2%
		disabled	-36%	-71%	-2%
	low	aggressive	-33%	-67%	2%
		moderate	-34%	-69%	0%
		mild	-34%	-68%	1%
		disabled	-34%	-69%	1%
	medium	aggressive	-31%	-66%	3%
		moderate	-33%	-67%	2%
		mild	-34%	-70%	0%
		disabled	-34%	-69%	0%
	high	aggressive	-8%	-44%	25%
		moderate	-12%	-47%	22%
		mild	-13%	-46%	22%
		disabled	-13%	-48%	21%
	ultra high	aggressive	1%	-34%	35%
		moderate	-3%	-37%	33%
		mild	-4%	-40%	29%
		disabled	-5%	-40%	29%
PIX4D	low	moderate	-9%	-44%	26%
		mild	-2%	-38%	32%
		disabled	1%	-34%	36%
	medium	moderate	2%	-32%	37%
		mild	7%	-28%	41%
		disabled	9%	-25%	45%
	high	moderate	5%	-30%	39%
		mild	9%	-25%	45%

		disabled	11%	-22%	47%
	ultra high	moderate	7%	-27%	42%
		mild	11%	-24%	46%
		disabled	12%	-23%	46%

Table S11. Posterior predicted basal area (BA) absolute percentage error (precision) and 95% HDI by dense point cloud generation quality, filtering mode, and software after collapsing across other model factors.

Software	Quality	Filtering Mode	BA Abs. Percentage Error Median	HDI Low	HDI High
METASHAPE	lowest	aggressive	62%	23%	117%
		moderate	48%	18%	88%
		mild	42%	15%	78%
		disabled	39%	15%	73%
	low	aggressive	38%	15%	71%
		moderate	27%	10%	50%
		mild	24%	9%	44%
		disabled	22%	8%	41%
	medium	aggressive	25%	9%	48%
		moderate	18%	6%	34%
		mild	17%	6%	31%
		disabled	16%	6%	29%
	high	aggressive	21%	8%	39%
		moderate	16%	6%	30%
		mild	15%	6%	28%
		disabled	14%	6%	27%
	ultra high	aggressive	19%	7%	36%
		moderate	15%	6%	28%
		mild	14%	6%	26%
		disabled	13%	5%	24%
OPENDRONEMAP	lowest	aggressive	40%	15%	77%
		moderate	41%	15%	78%
		mild	39%	15%	74%
		disabled	35%	14%	67%
	low	aggressive	38%	15%	74%
		moderate	38%	14%	71%
		mild	35%	13%	66%
		disabled	31%	12%	58%
	medium	aggressive	35%	13%	67%
		moderate	34%	13%	64%

		mild	34%	12%	62%
		disabled	30%	12%	56%
	high	aggressive	19%	7%	37%
		moderate	20%	8%	37%
		mild	20%	7%	37%
		disabled	18%	7%	33%
	ultra high	aggressive	14%	5%	27%
		moderate	15%	6%	28%
		mild	15%	6%	28%
		disabled	13%	5%	24%
PIX4D	low	moderate	23%	8%	42%
		mild	20%	8%	37%
		disabled	18%	7%	34%
	medium	moderate	16%	6%	30%
		mild	15%	5%	28%
		disabled	14%	5%	26%
	high	moderate	14%	5%	27%
		mild	13%	5%	25%
		disabled	13%	5%	24%
	ultra high	moderate	14%	5%	26%
		mild	13%	5%	24%
		disabled	12%	5%	23%

Table S12. Posterior predicted basal area (BA) absolute percentage error (precision) and 95% HDI by dense point cloud generation quality and software after collapsing across other model factors.

Software	Quality	BA Abs. Percentage Error Median	HDI Low	HDI High
METASHAPE	ultra high	15%	5%	29%
	high	16%	5%	31%
	medium	19%	6%	36%
	low	27%	9%	51%
	lowest	46%	16%	89%
OPENDRONEMAP	ultra high	14%	5%	27%
	high	19%	7%	37%
	medium	32%	11%	62%
	low	34%	11%	65%
	lowest	38%	13%	75%
PIX4D	ultra high	14%	4%	27%
	high	14%	4%	28%
	medium	16%	5%	32%

	low	21%	7%	42%

Table S13. Posterior predicted basal area (BA) absolute percentage error (precision) and 95% HDI by dense point cloud filtering mode and software after collapsing across other model factors.

Software	Filtering mode	BA Abs. Percentage Error Median	HDI Low	HDI High
METASHAPE	aggressive	28%	8%	59%
	moderate	22%	7%	45%
	mild	20%	5%	41%
	disabled	19%	5%	39%
OPENDRONEMAP	aggressive	26%	7%	53%
	moderate	26%	7%	54%
	mild	25%	7%	52%
	disabled	23%	6%	47%
PIX4D	aggressive	20%	5%	46%
	moderate	19%	5%	40%
	mild	17%	4%	36%
	disabled	16%	4%	34%

Table S14. Posterior predicted difference in basal area (BA) absolute percentage error (i.e. contrast) and 95% HDI between software by dense point cloud generation quality after collapsing across other model factors. Lower absolute percentage error values mean that UAS values better match field measurements and, as such, a contrast (i.e. difference) in absolute percentage error that is negative (difference<0) indicates that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is negative was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was less than zero.

quality	median difference BA abs. percentage error	HDI low	HDI high	Pr(diff<0)
OPENDRONEMAP - METASHAPE				
ultra high	-1%	-9%	8%	60%
high	2%	-6%	13%	26%
medium	13%	-1%	34%	2%
low	7%	-8%	27%	13%
lowest	-7%	-34%	15%	77%
PIX4D - METASHAPE				
ultra high	-1%	-10%	7%	66%
high	-2%	-12%	6%	73%
medium	-2%	-13%	8%	72%
low	-5%	-21%	9%	81%
PIX4D - OPENDRONEMAP				

ultra high	0%	-9%	9%	55%
high	-5%	-16%	5%	87%
medium	-16%	-37%	-1%	99%
low	-12%	-33%	3%	96%

Table S15. Posterior predicted difference in basal area (BA) absolute percentage error (i.e. contrast) and 95% HDI between dense point cloud generation quality by software after collapsing across other model factors. Lower absolute percentage error values mean that UAS values better match field measurements and, as such, a contrast (i.e. difference) in absolute percentage error that is negative (difference<0) indicates that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is negative was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was less than zero.

Quality Contrast	Median Difference BA Abs. Percentage Error	HID Low	HDI High	Pr(diff<0)
METASHAPE				
ultra high - high	-1%	-10%	7%	66%
ultra high - medium	-3%	-14%	5%	82%
ultra high - low	-11%	-27%	0%	99%
ultra high - lowest	-30%	-62%	-8%	100%
high - medium	-2%	-12%	7%	71%
high - low	-10%	-25%	1%	98%
high - lowest	-29%	-60%	-8%	100%
medium - low	-8%	-22%	3%	94%
medium - lowest	-27%	-57%	-6%	100%
low - lowest	-18%	-45%	-1%	99%
OPENDRONEMAP				
ultra high - high	-5%	-16%	3%	90%
ultra high - medium	-18%	-39%	-3%	100%
ultra high - low	-20%	-42%	-4%	100%
ultra high - lowest	-24%	-50%	-6%	100%
high - medium	-13%	-32%	0%	99%
high - low	-15%	-35%	-1%	100%
high - lowest	-19%	-42%	-2%	100%
medium - low	-2%	-20%	15%	63%
medium - lowest	-5%	-29%	14%	74%
low - lowest	-3%	-24%	17%	67%
PIX4D				
ultra high - high	-1%	-9%	8%	56%
ultra high - medium	-2%	-12%	7%	73%
ultra high - low	-8%	-21%	3%	96%

high - medium	-2%	-11%	7%	69%
high - low	-7%	-21%	3%	95%
medium - low	-5%	-18%	5%	88%

Table S16. Posterior predicted difference in basal area (BA) absolute percentage error (i.e. contrast) and 95% HDI between dense point cloud filtering mode by software after collapsing across other model factors. Lower absolute percentage error values mean that UAS values better match field measurements and, as such, a contrast (i.e. difference) in absolute percentage error that is negative (difference<0) indicates that the left hand side (L.H.S.) setting is more accurate than the right hand side (R.H.S.) setting of the contrast and vice versa. The probability (Pr) that the contrast is negative was calculated from the posterior predictive distribution as the proportion of the posterior distribution where the contrast was less than zero.

Quality Contrast	Median Difference BA Abs. Percentage Error	HID Low	HDI High	Pr(diff<0)
METASHAPE				
disabled - mild	-1%	-10%	6%	67%
disabled - moderate	-3%	-13%	5%	80%
disabled - aggressive	-9%	-26%	1%	98%
mild - moderate	-1%	-11%	7%	67%
mild - aggressive	-8%	-24%	2%	96%
moderate - aggressive	-6%	-22%	3%	93%
OPENDRONEMAP				
disabled - mild	-2%	-14%	6%	75%
disabled - moderate	-3%	-15%	6%	80%
disabled - aggressive	-3%	-16%	8%	74%
mild - moderate	-1%	-12%	10%	59%
mild - aggressive	0%	-13%	12%	54%
moderate - aggressive	0%	-11%	13%	48%
PIX4D				
disabled - mild	-1%	-9%	6%	62%
disabled - moderate	-2%	-12%	4%	80%
mild - moderate	-2%	-11%	6%	71%