



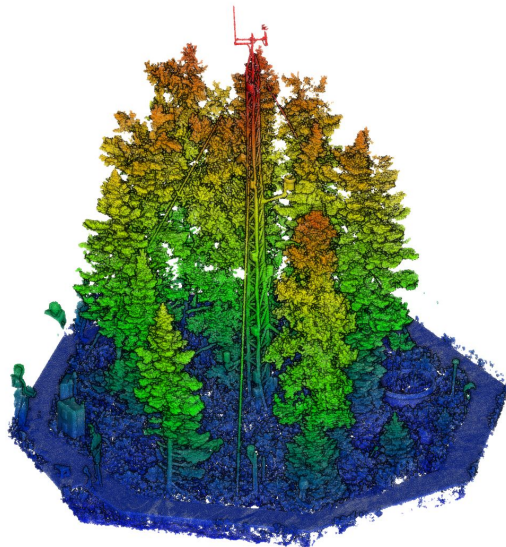
SPRUCE All Hands Meeting 2025

Lidar and Lidar-Derived Products: microtopography, surface, and vegetation datasets, 2015-2025

Josh Enterkine

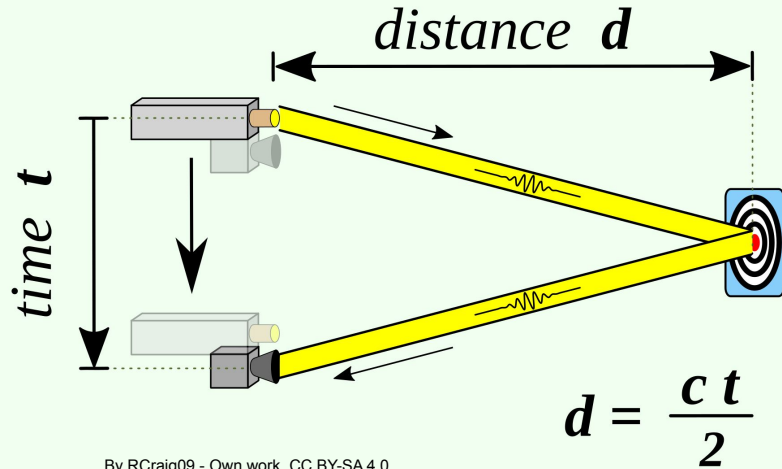
What we have been collecting

- Biannual Terrestrial Laser Scans (SPRUCE.067)
- 12 experimental plots



	Spring (pre-leafout)	Summer (peak tree growth)
		(July)
2015		
2016	x	x
2017	x	x
2018	x	x
2019	x	x
2020		x
2021	x	x
2022	x	x
2023	x	x
2024	x	x
2025	x	planned
2026	?	

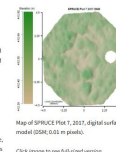
What is lidar?



By RCraig09 - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=89646954>

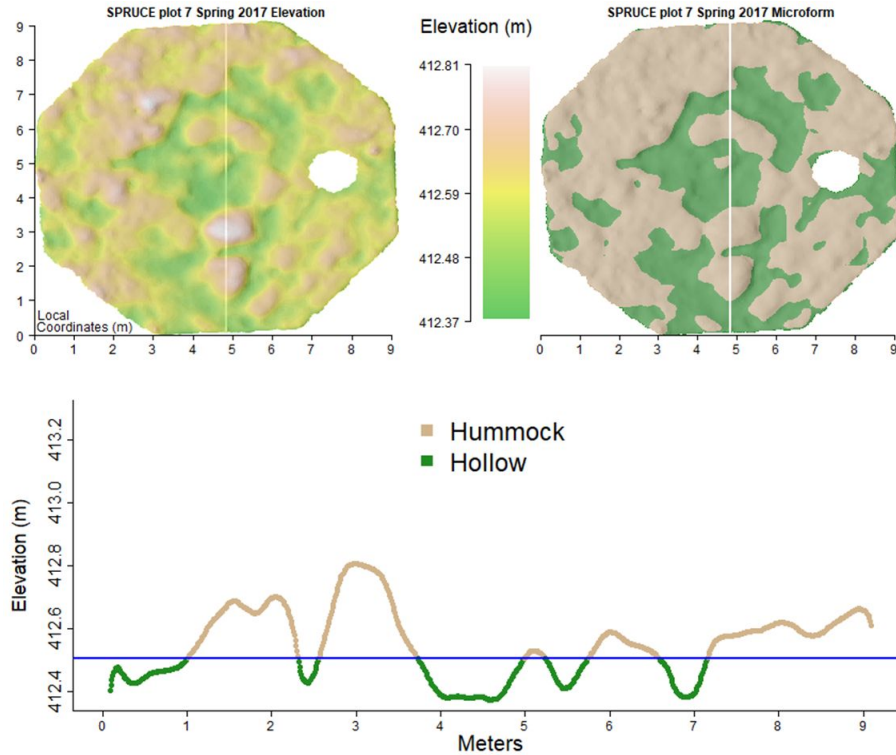


- Products available:
 - Microtopography products (SPRUCE.068)
 - 2016-2019; 2021-2025 in production

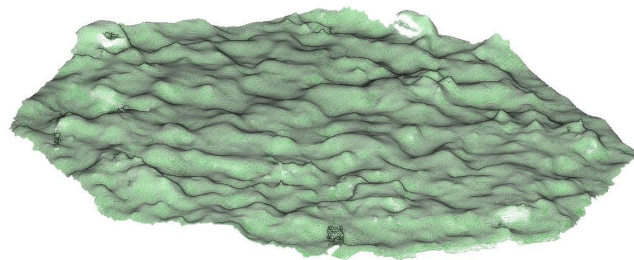
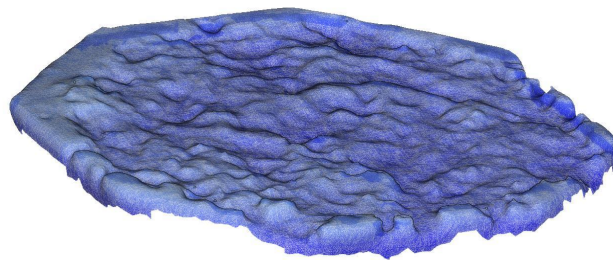
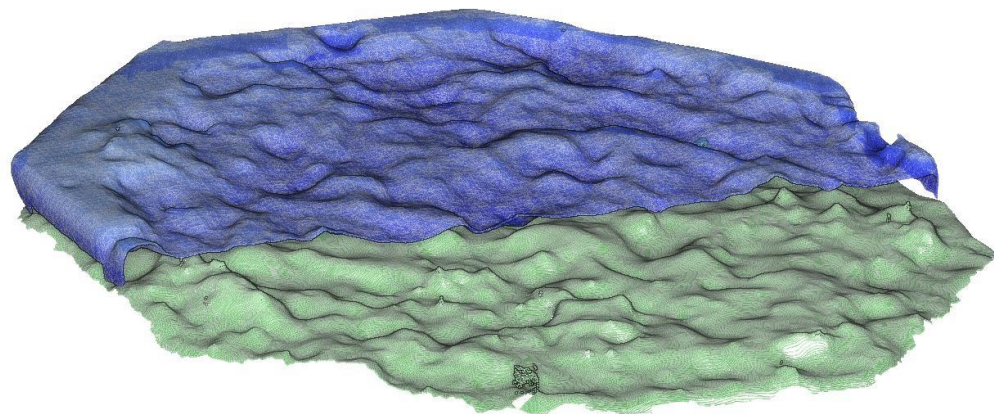


Graham, J.D., Glenn, N.F., Spaete, L.P. *et al.* Characterizing Peatland Microtopography Using Gradient and Microform-Based Approaches. *Ecosystems* 23, 1464–1480 (2020). <https://doi.org/10.1007/s10021-020-00481-z>

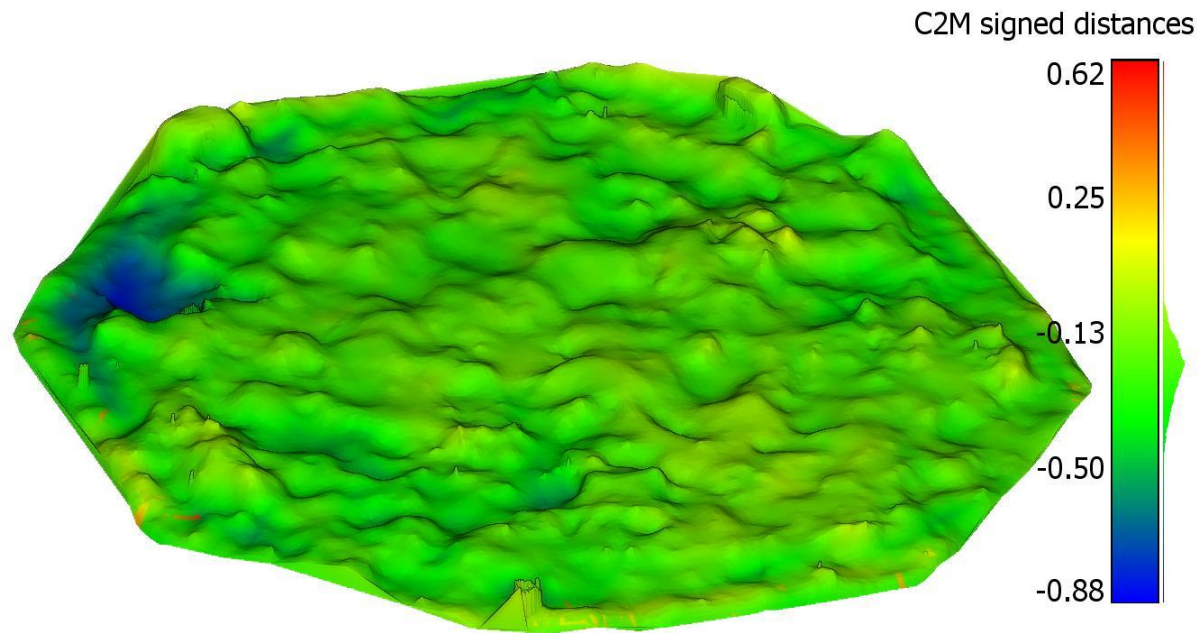
Spring Datasets



Plot 10 2016 & 2025: net loss

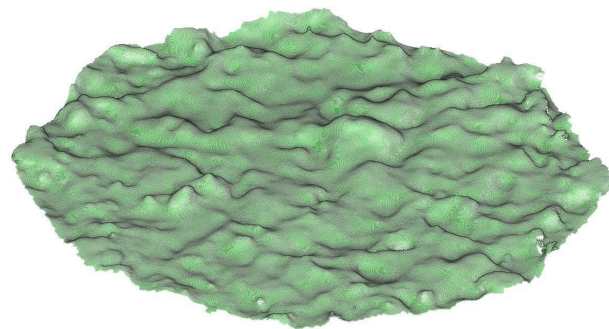
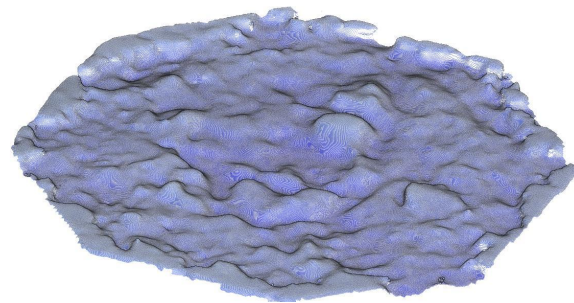
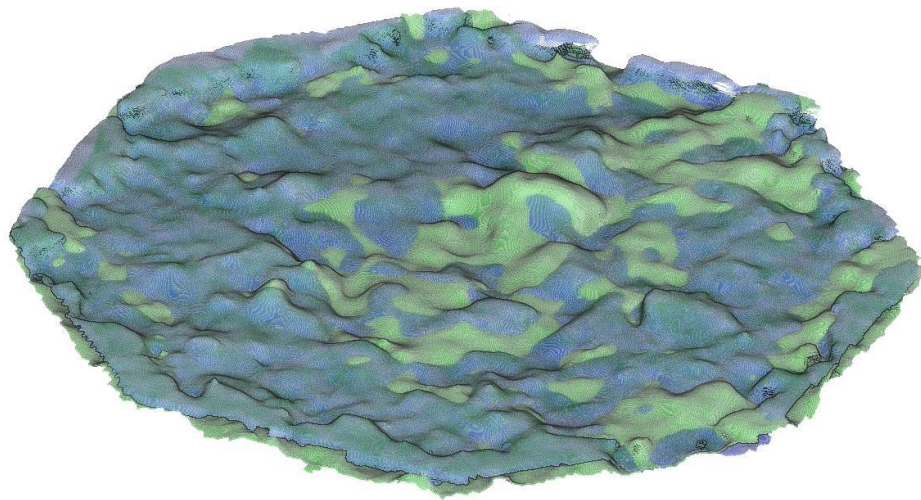


Plot 10 2016 & 2025: net loss

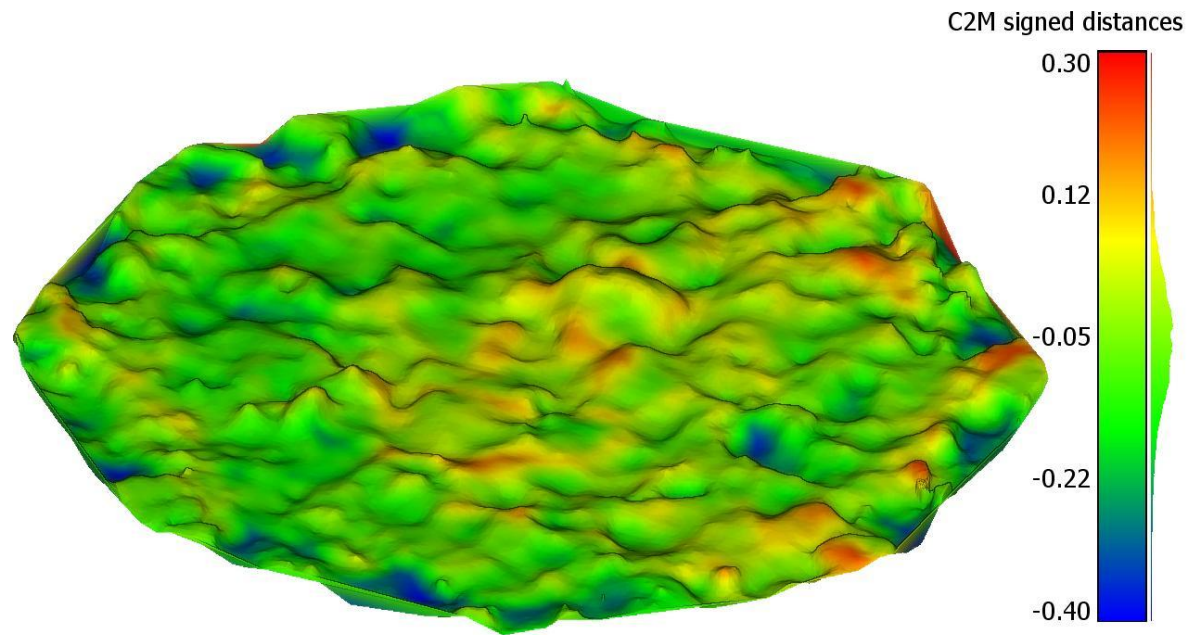


Reference: 2016, Compared: 2025

Plot 7 2016 & 2025: ?



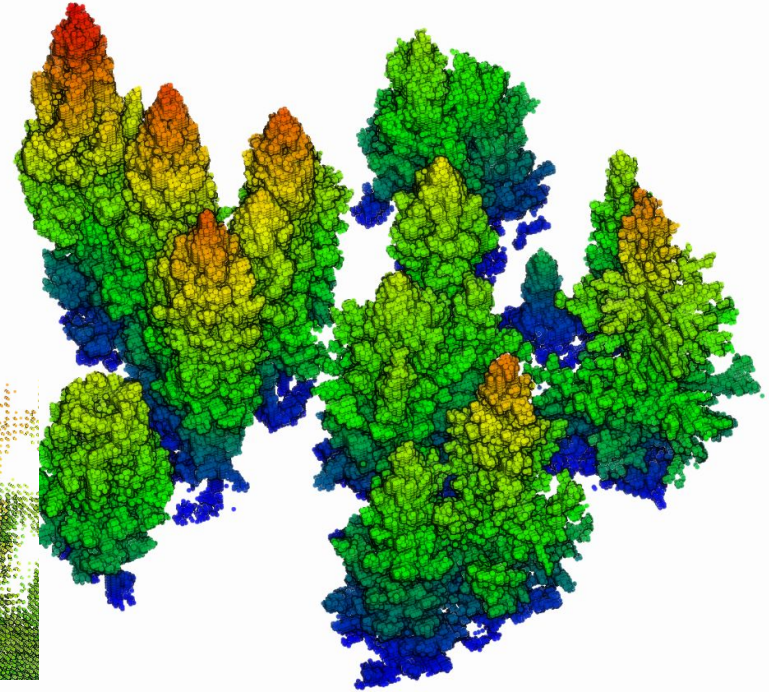
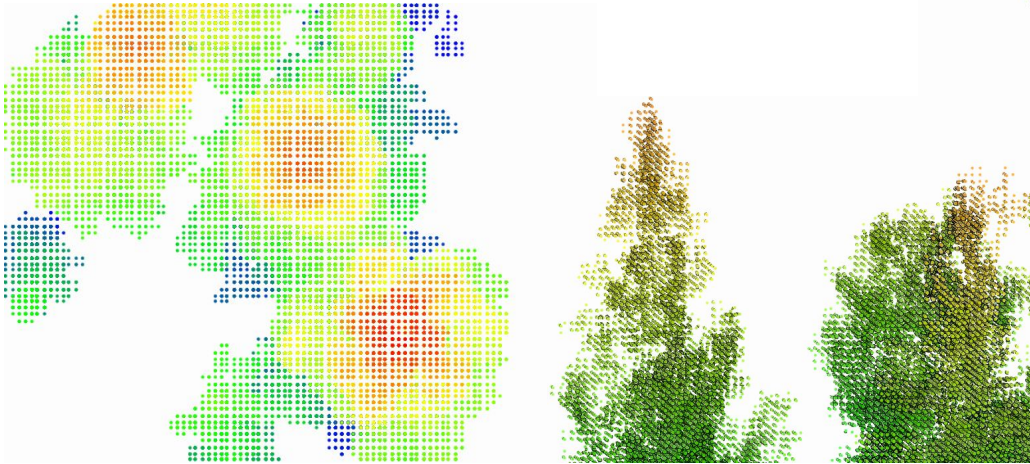
Plot 7 2016 & 2025: ?



Reference: 2016, Compared: 2025

Summer Datasets

- Products:
 - Voxelized point clouds
 - Tree heights

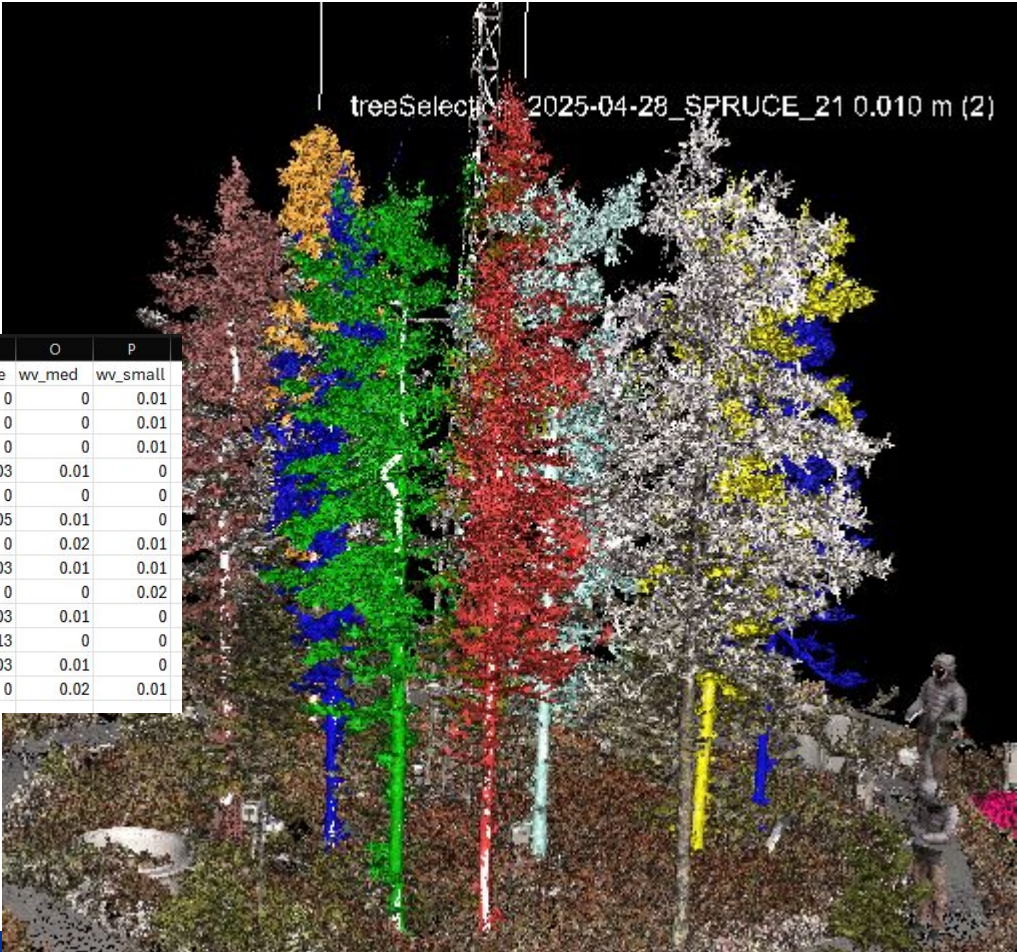




VZ-600i

RiSCAN Tree Analyzer

	D	E	F	G	H	I	J	K	L	M	N	O	P
	pt_idx	bang_avg	curv_avg	crn_area	crn_dia	dbh	max_hier	num_bran	tree_ht	tree_id	wv_large	wv_med	wv_small
251	0	70.24	2.86	0.86	1.06	0.07	2	313	5.01	23	0	0	0.01
253	1	67.58	5.71	0.77	1.03	0.07	3	307	4.51	26	0	0	0.01
254	2	67.23	4.76	2.84	2.17	0.07	3	925	6.2	15	0	0	0.01
250	3	72.04	5.19	2.97	2.56	0.11	4	1260	7.18	24	0.03	0.01	0
250	4	0	4.17	0.11	0.72	0.17	0	3	1.07	74	0	0	0
252	5	67.16	3.68	2.06	1.79	0.13	4	1057	6.97	32	0.05	0.01	0
253	6	68.14	3.9	1.69	1.87	0.09	3	812	7.74	55	0	0.02	0.01
254	7	73.98	5.98	3.04	2.1	0.11	4	1517	7.34	58	0.03	0.01	0.01
254	8	68.12	6.58	1.32	1.38	0.07	3	745	7.16	47	0	0	0.02
254	9	68.96	5.75	2.93	2.08	0.11	4	1574	7.08	77	0.03	0.01	0
255	10	45.66	3.33	2.53	1.96	0.65	1	11	3.71	76	0.13	0	0
254	11	66.6	5.53	3.72	2.4	0.11	4	1613	6.94	62	0.03	0.01	0
254	12	57.62	4.21	2.29	1.97	0.09	5	1488	7.75	60	0	0.02	0.01



Export Tree Stems



Export Format: CSV

EXPORT FORMAT SETTINGS

Name	Description
☒ LIS Average Bra...	Average branching angle of the tree
☒ LIS Average Cur...	The average curvature of the tree branches
☐ LIS Circle Comple...	Percentage of circle covered by points
☐ LIS Crown Area	The estimated tree crown area
☒ LIS Crown Dime...	The estimated tree crown diameter
☐ LIS DBH	Diameter at breast height
☐ LIS DBH Slice Hei...	Height above ground of the DBH measurement
☐ LIS Goodness of Fit	Goodness of circle fit
☐ LIS Internal Flags	Internal processing flags
☒ LIS Maximum Hie...	The maximum hierachical level detected for the t
☒ LIS Number of Br...	The total number of branches of the tree

COORDINATE SYSTEM SETTINGS

Project coordinate system (PRCS)

OUTPUT SETTINGS

File: TreeMetadata.csv

Restore default

OK

Cancel

Export Tree Stems



Export Format: CSV

EXPORT FORMAT SETTINGS

Name	Description
☐ LIS Internal Flags	Internal processing flags
☒ LIS Maximum Hie...	The maximum hierachical level detected for the t
☒ LIS Number of Br...	The total number of branches of the tree
☐ LIS Number of D...	The number of circle detections per tree
☐ LIS Points on Circle	Percentage of stem points on fitted circle
☒ LIS Tree Height	The total height of the tree
☒ LIS Tree Identifier	A unique identifier per detected tree
☒ LIS Wood Volum...	Total wood volume of the large branch diameter
☒ LIS Wood Volum...	Total wood volume of the medium branch diamet
☒ LIS Wood Volum...	Total wood volume of the small branch diameter

All

None

Invert

COORDINATE SYSTEM SETTINGS

Project coordinate system (PRCS)

OUTPUT SETTINGS

File: TreeMetadata.csv

Restore default

OK

Cancel

Help



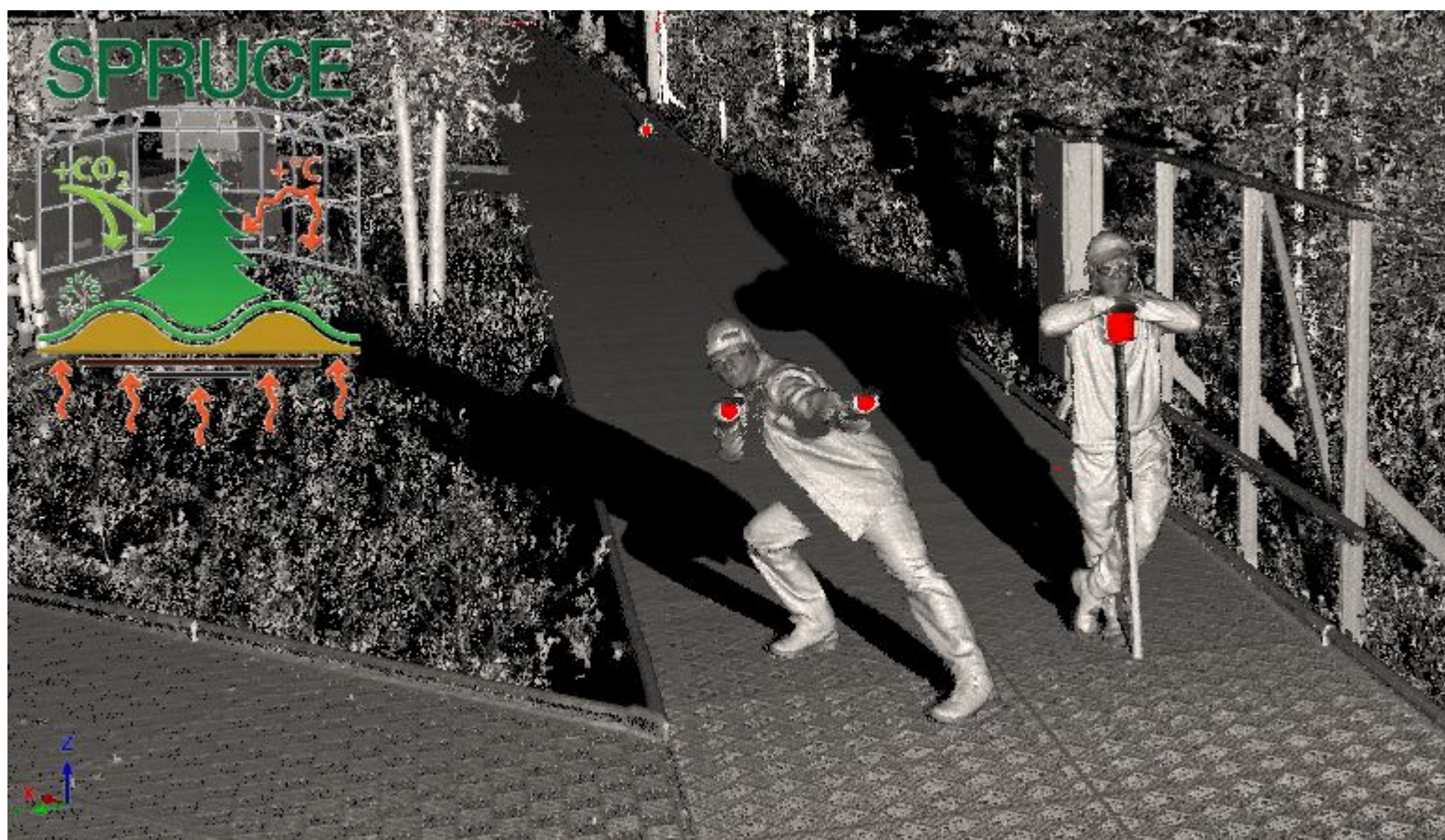
MyProject - ArcGIS Pro

SPRUCE_11_treeFootprints X

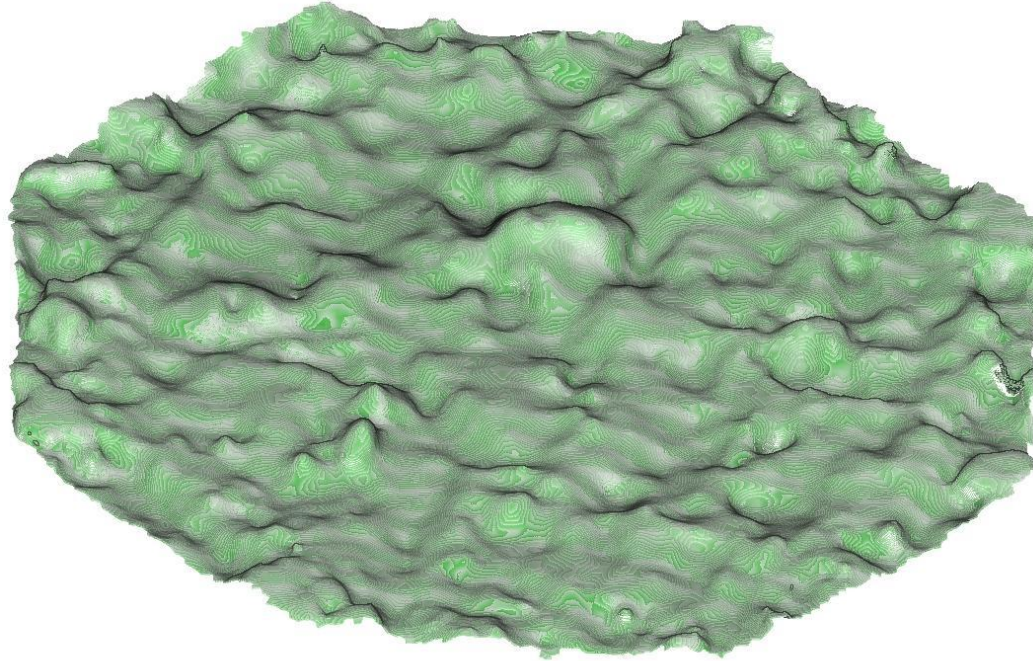
Field: Add Calculate Selection: Select By Attributes Zoom To

	FID	Shape	tree_id	dbh	tree_ht	crn_dia	crn_area
1	0	Polygon ZM	26	0.07	4.51	1.03	0.77
2	1	Polygon ZM	47	0.07	7.16	1.38	1.32
3	2	Polygon ZM	23	0.07	5.01	1.06	0.86
4	3	Polygon ZM	55	0.09	7.74	1.87	1.69
5	4	Polygon ZM	74	0.17	1.07	0.72	0.11
6	5	Polygon ZM	32	0.13	6.97	1.79	2.06
7	6	Polygon ZM	24	0.11	7.18	2.56	2.97
8	7	Polygon ZM	76	0.65	3.71	1.96	2.53
9	8	Polygon ZM	15	0.07	6.2	2.17	2.84
10	9	Polygon ZM	60	0.09	7.75	1.97	2.29
11	10	Polygon ZM	58	0.11	7.34	2.1	3.04

RiSCAN RiPANO



Questions?



SPRUCE 10	2016
SPRUCE 10	2025
SPRUCE 7	2016
SPRUCE 7	2025



2016 & 2025