

Tree Descriptions from Remotely Sensed Data

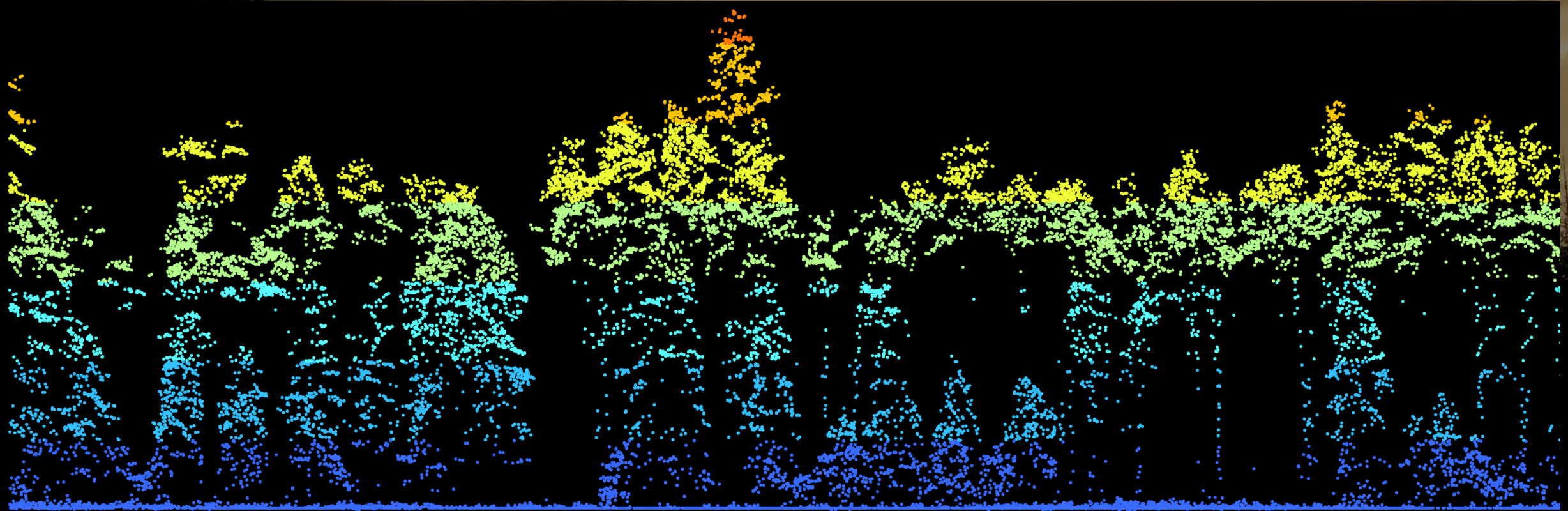


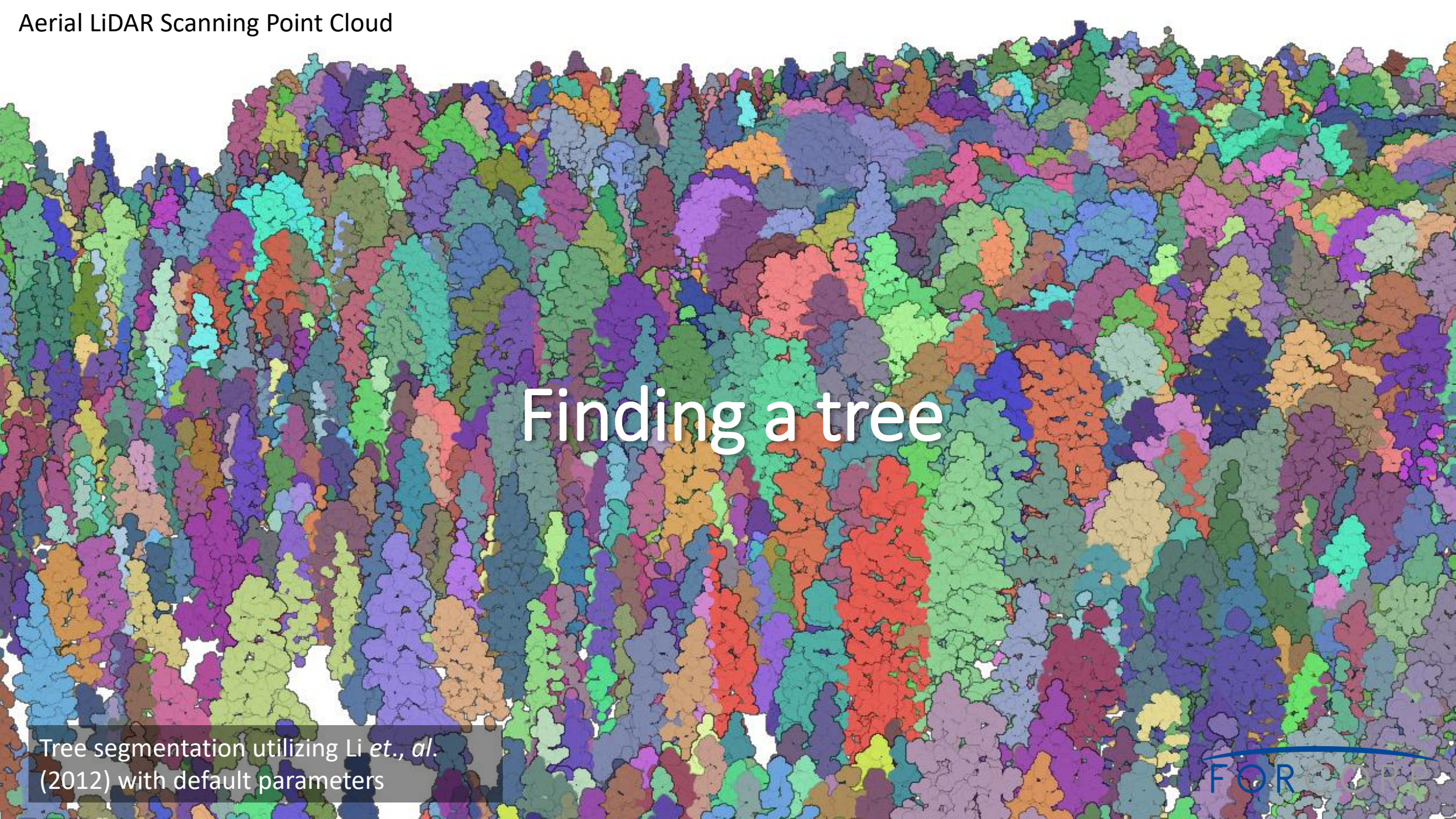
Nick Parayko Images



Presenter: David Campbell, MScF, RPF

Seeing the Trees through the Forest



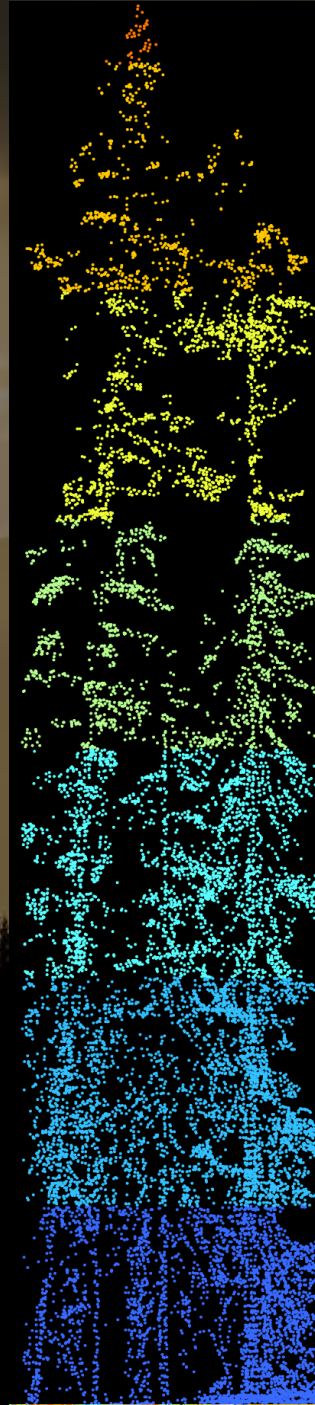
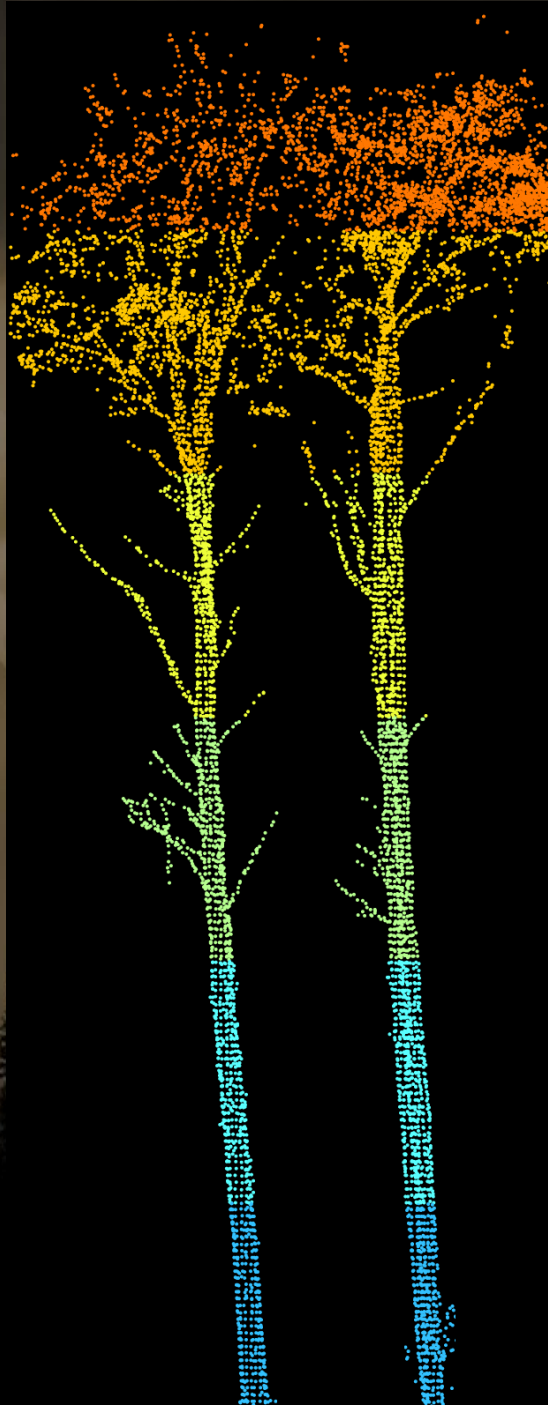
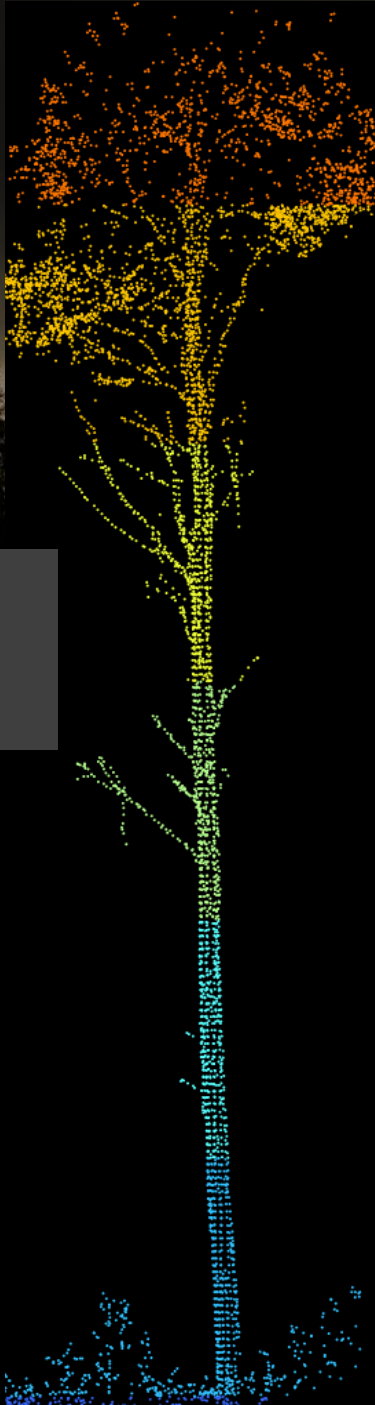


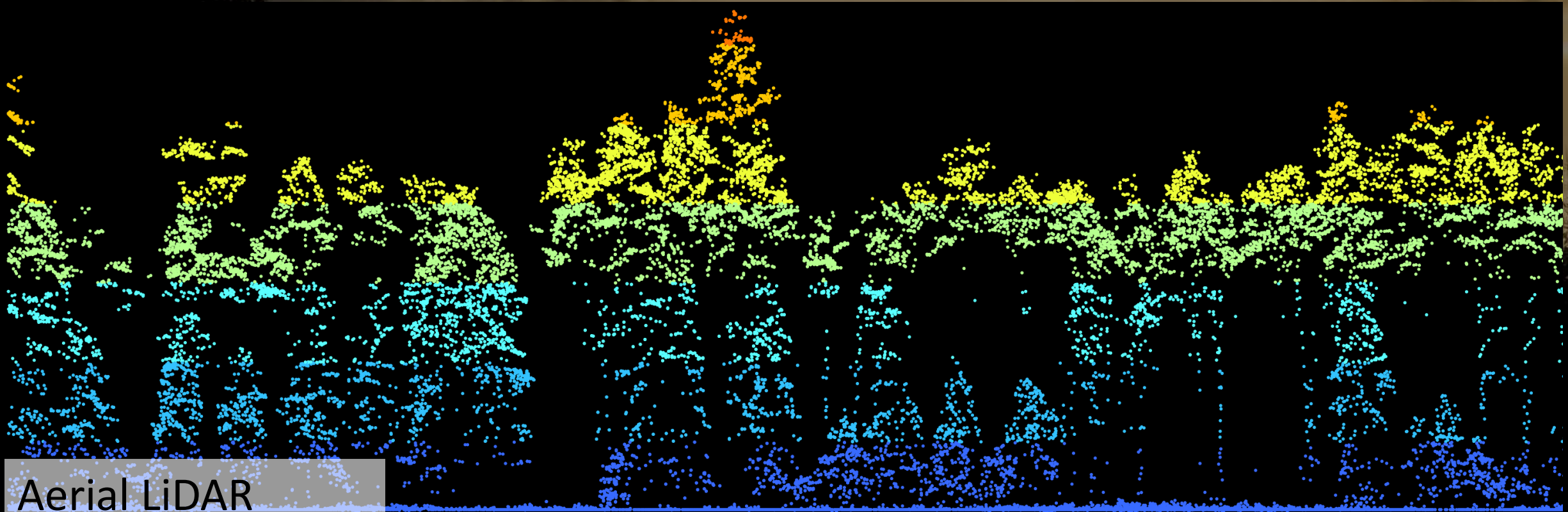
Finding a tree

Tree segmentation utilizing Li *et. al.* (2012) with default parameters

Terrestrial LiDAR

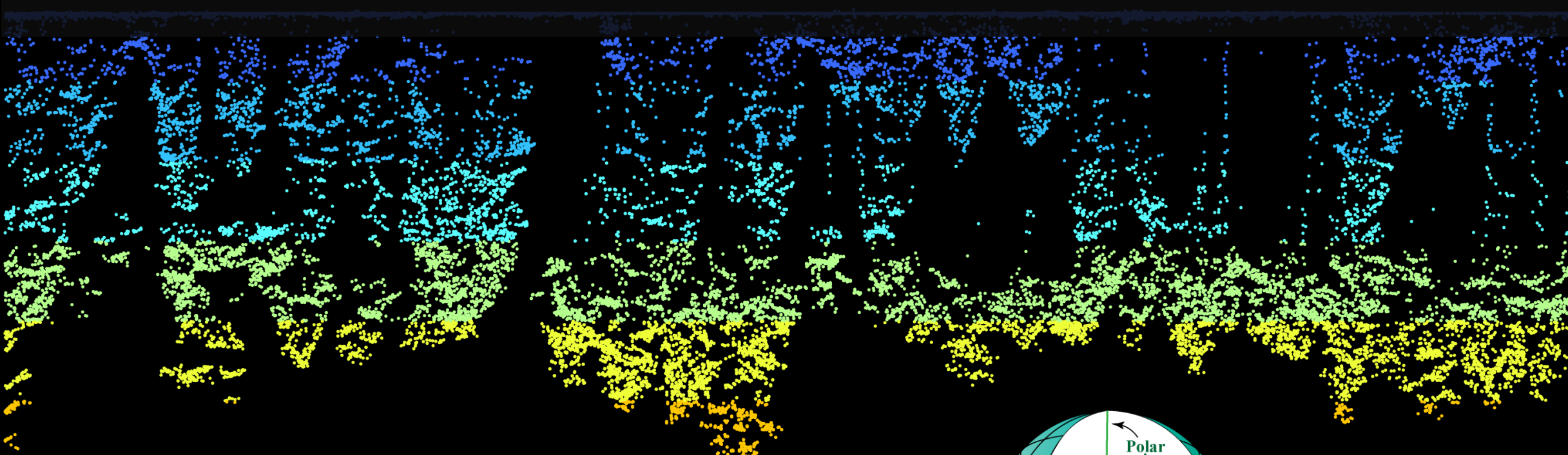
- Tree Profiles



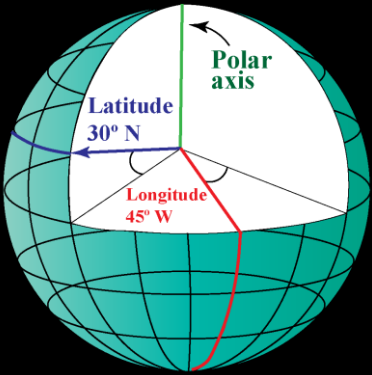


Aerial LiDAR

- Tree Profiles

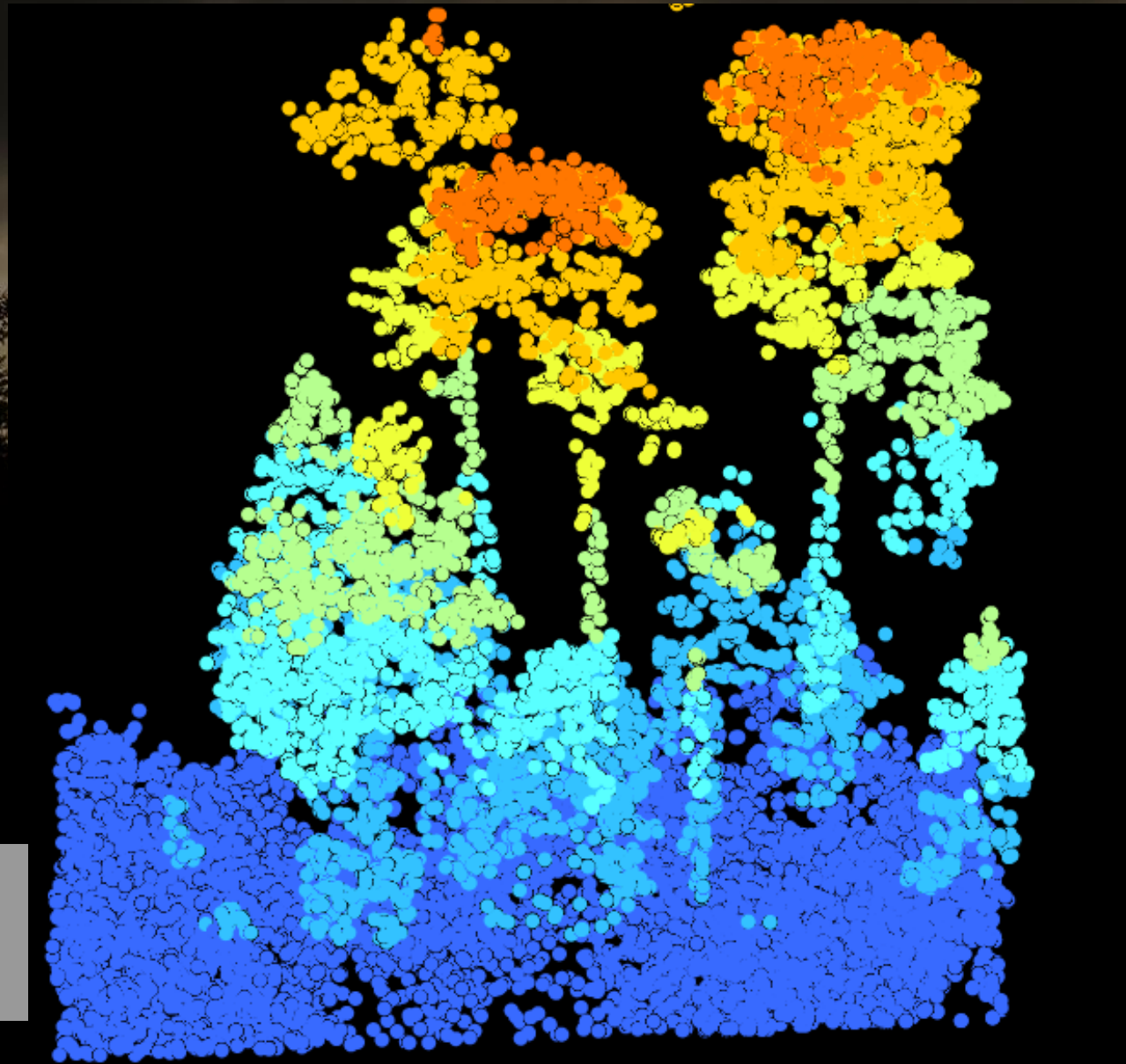


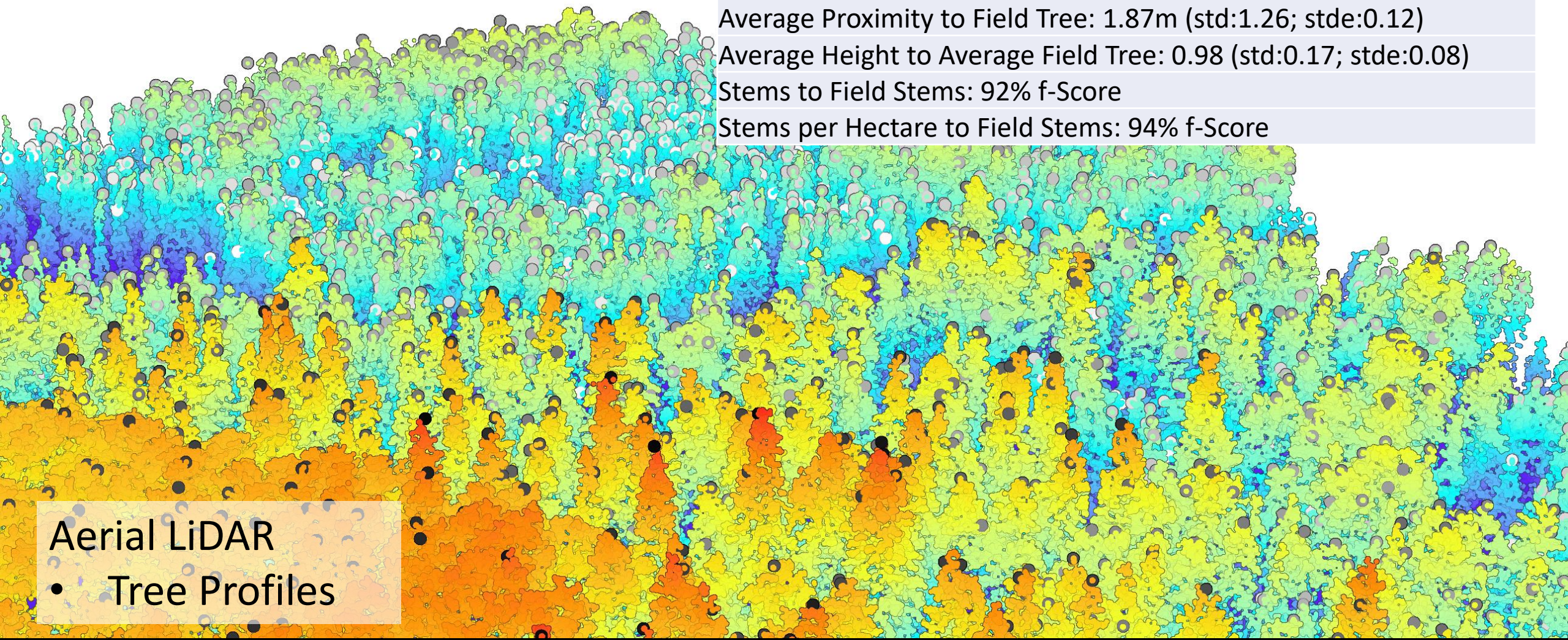
• Aerial LIDAR
Tree Profiles



Aerial LiDAR

- Tree Profiles





Average Proximity to Field Tree: 1.87m (std:1.26; stde:0.12)

Average Height to Average Field Tree: 0.98 (std:0.17; stde:0.08)

Stems to Field Stems: 92% f-Score

Stems per Hectare to Field Stems: 94% f-Score

Aerial LiDAR
• Tree Profiles

Pine



Fir



White Spruce



Black Spruce



Larch



Birch



Poplar



Aspen





Vertical Plane



Moving on the horizontal plane creates vertical cross sections

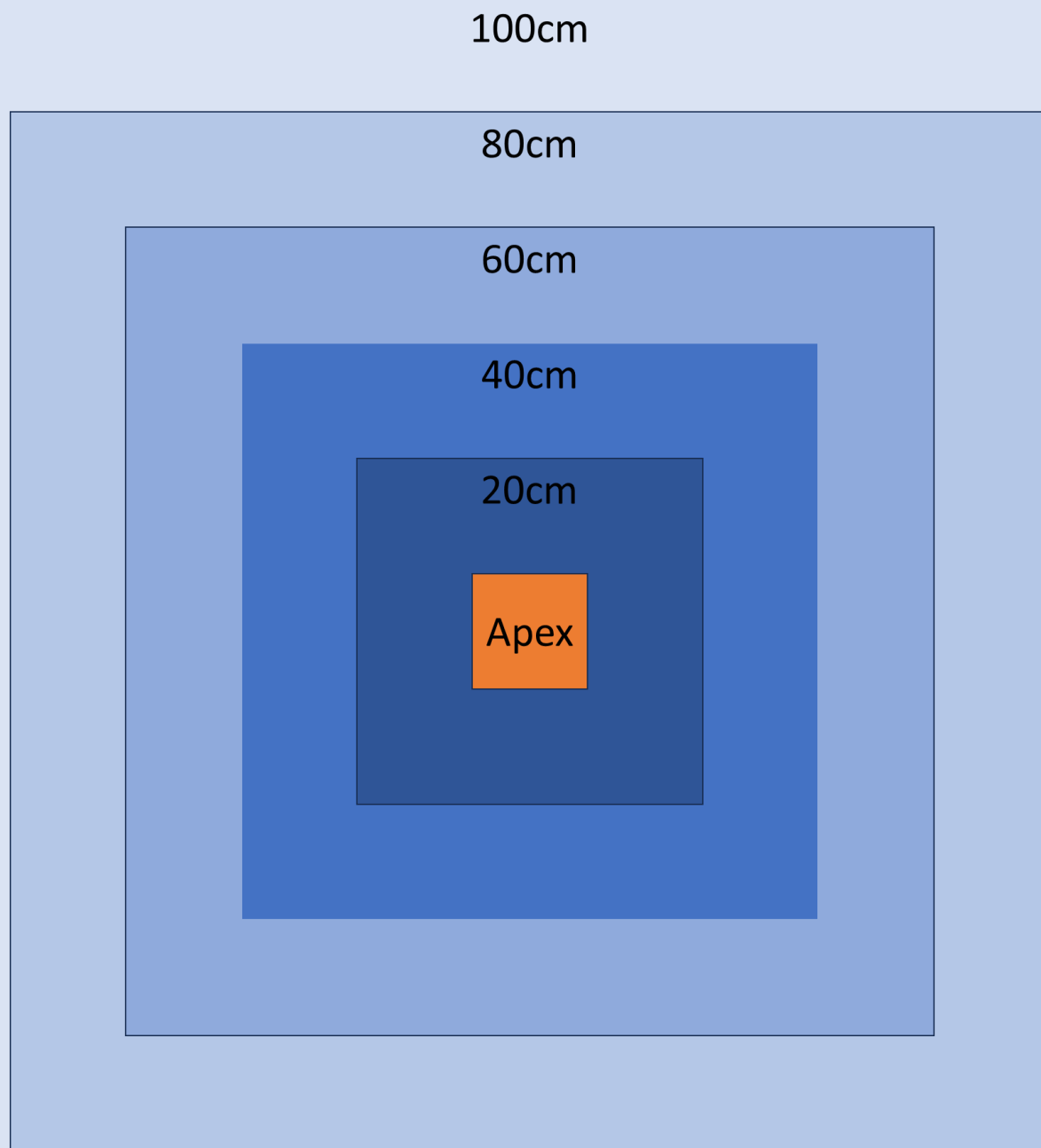
Moving on the vertical plane creates horizontal cross sections

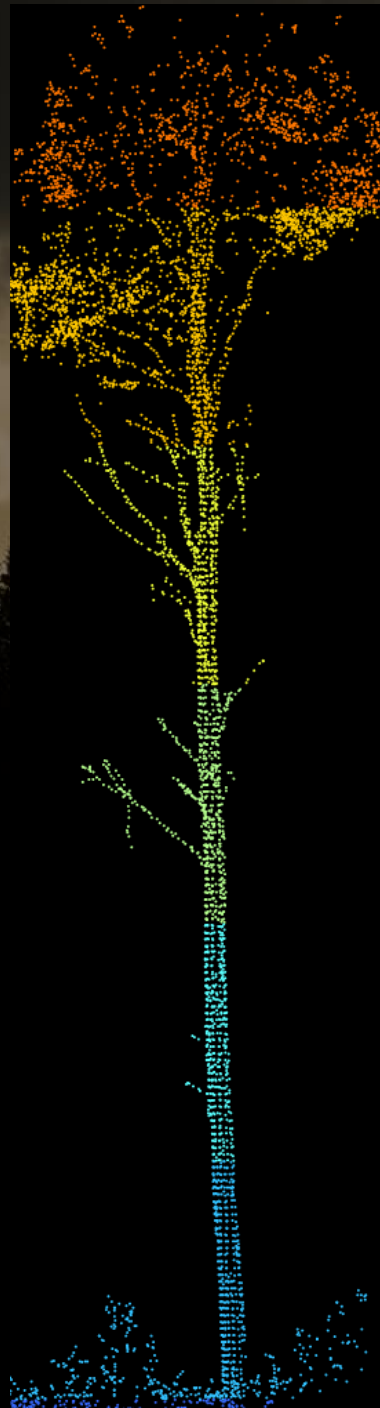
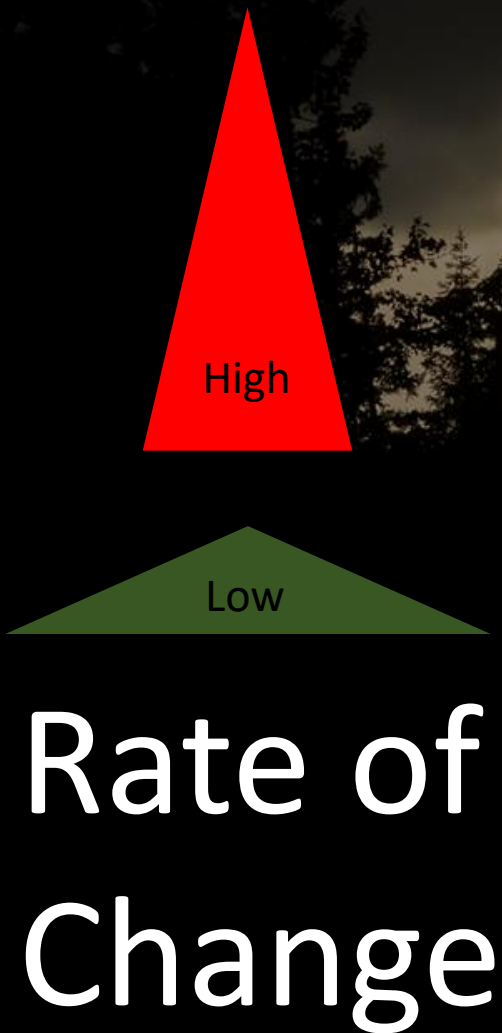


Horizontal Plane

Side Profile

Top-Down Profile

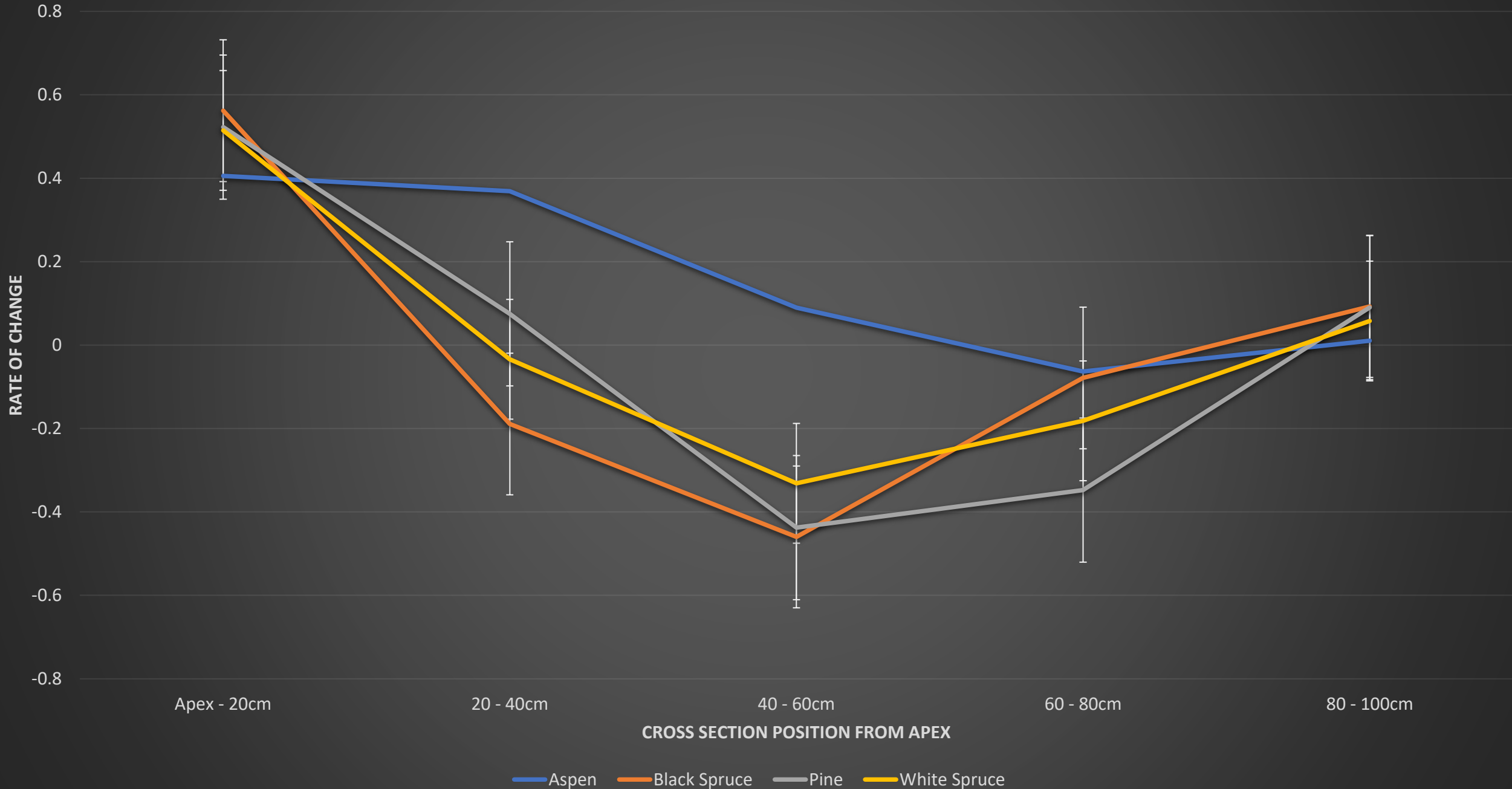




Magnitude of the
Rate describes the
shape

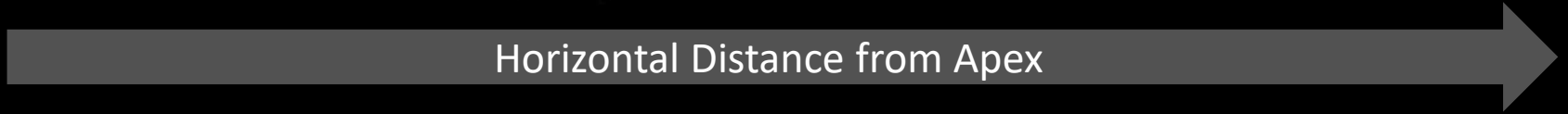
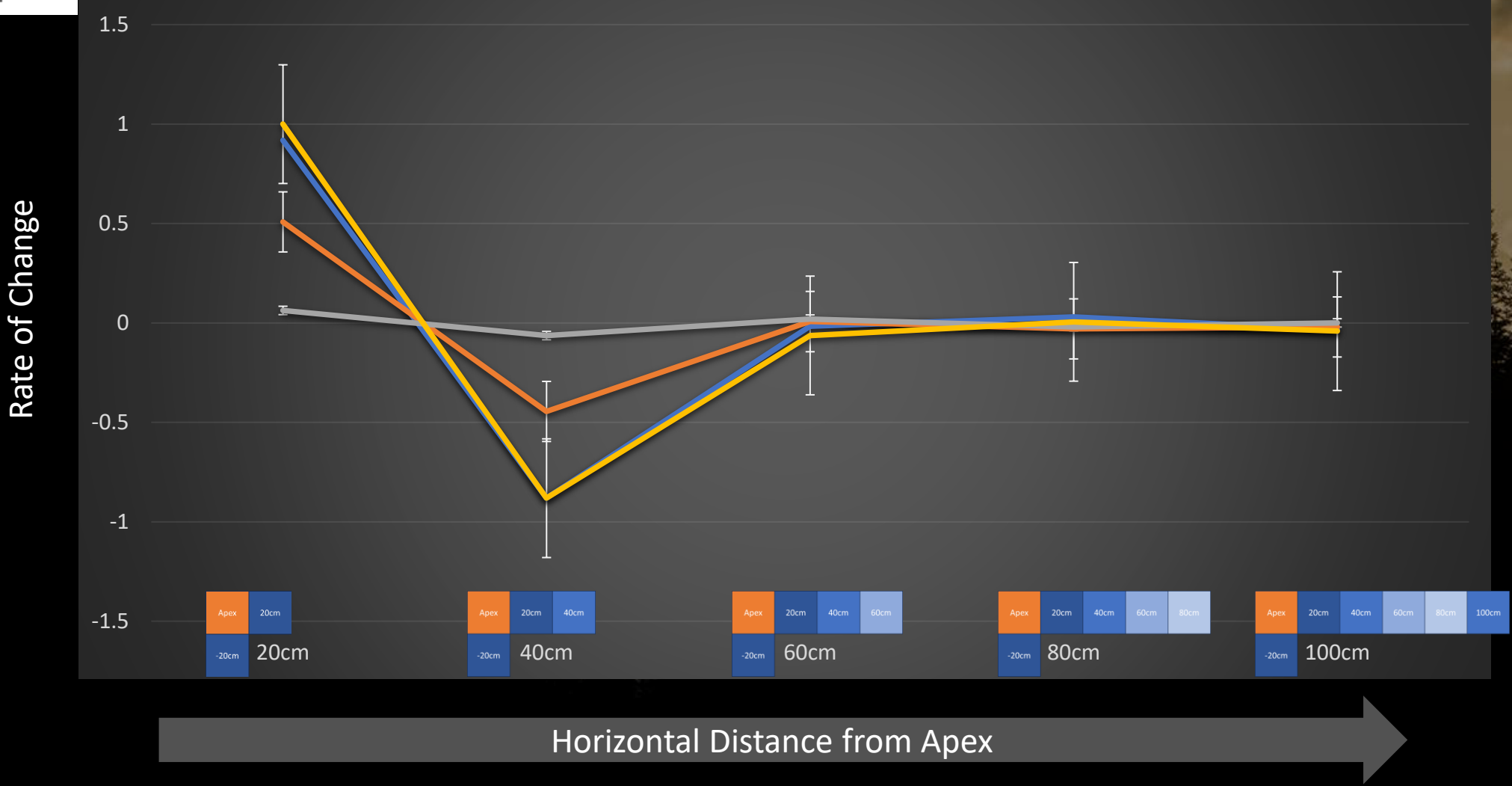
- Number of Returns
- Density of Returns
- Intensity of Returns
- Visible Light (RGB)
- NiR
- ...

Moving Down Vertically, Taking Horizontal Cross Sections



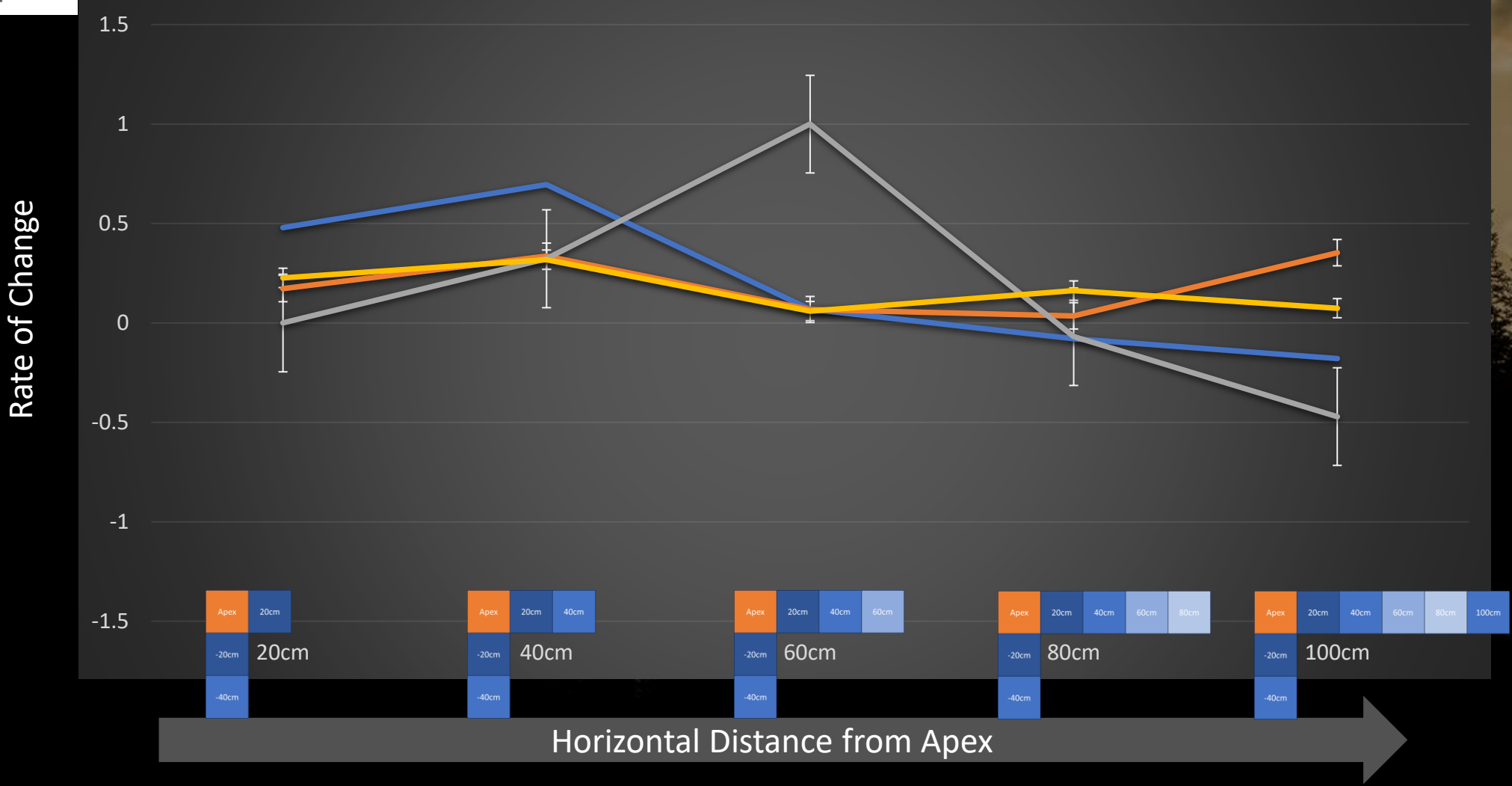
- Aspen
- Black Spruce
- Pine
- White Spruce

Vertical Distance from Apex 20cm



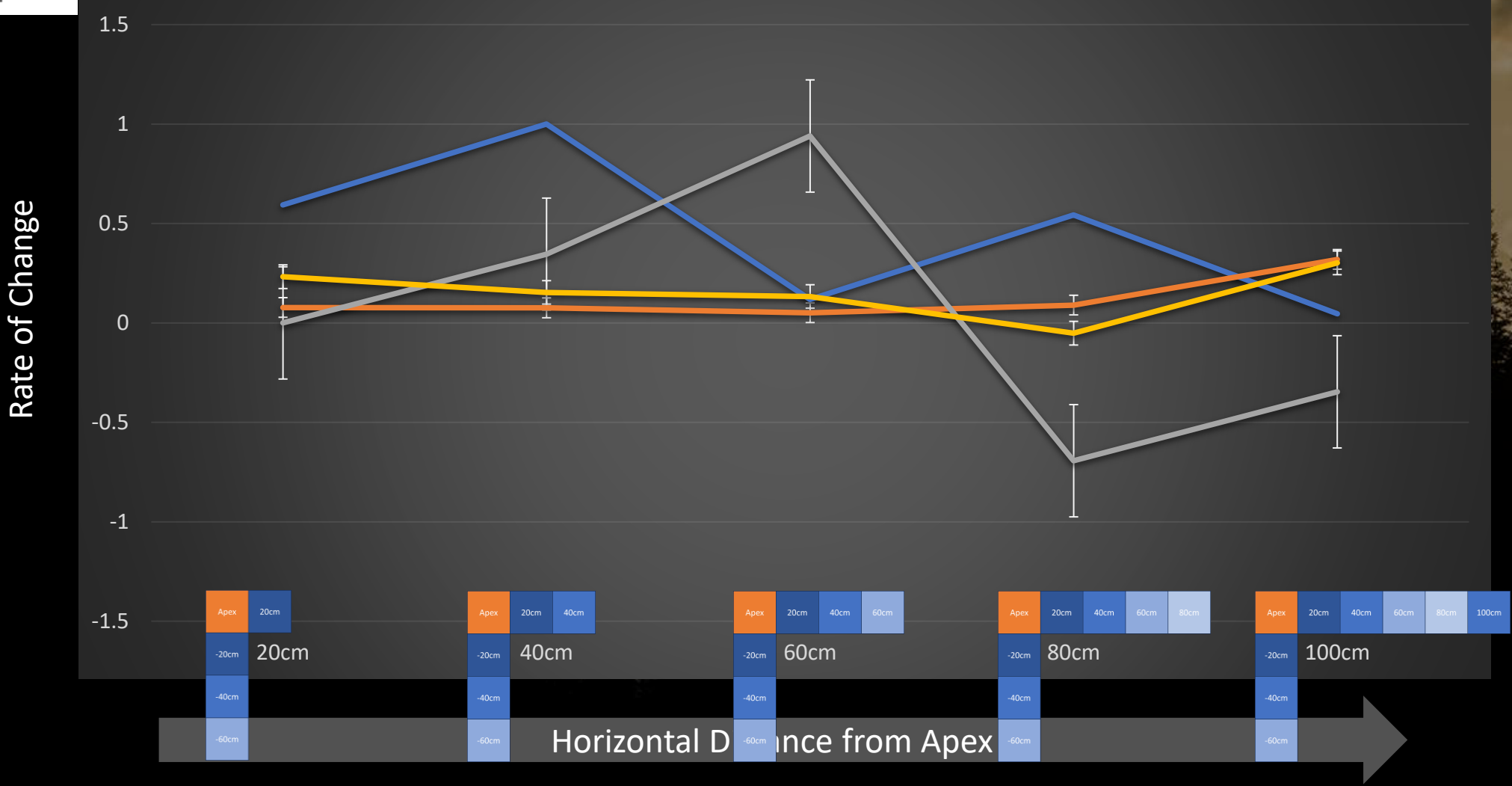
- Aspen
- Black Spruce
- Pine
- White Spruce

Vertical Distance from Apex 40cm



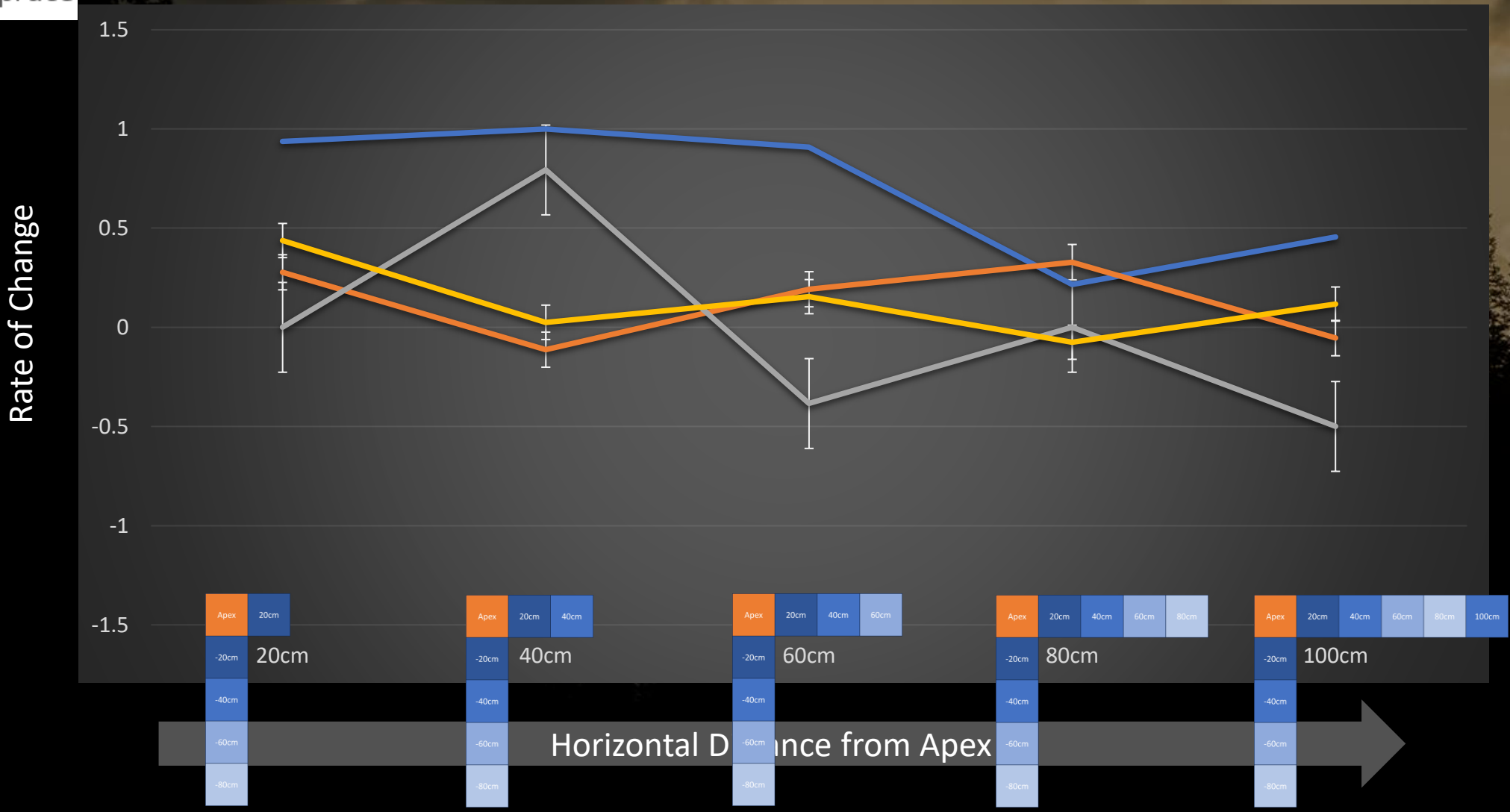
- Aspen
- Black Spruce
- Pine
- White Spruce

Vertical Distance from Apex 60cm



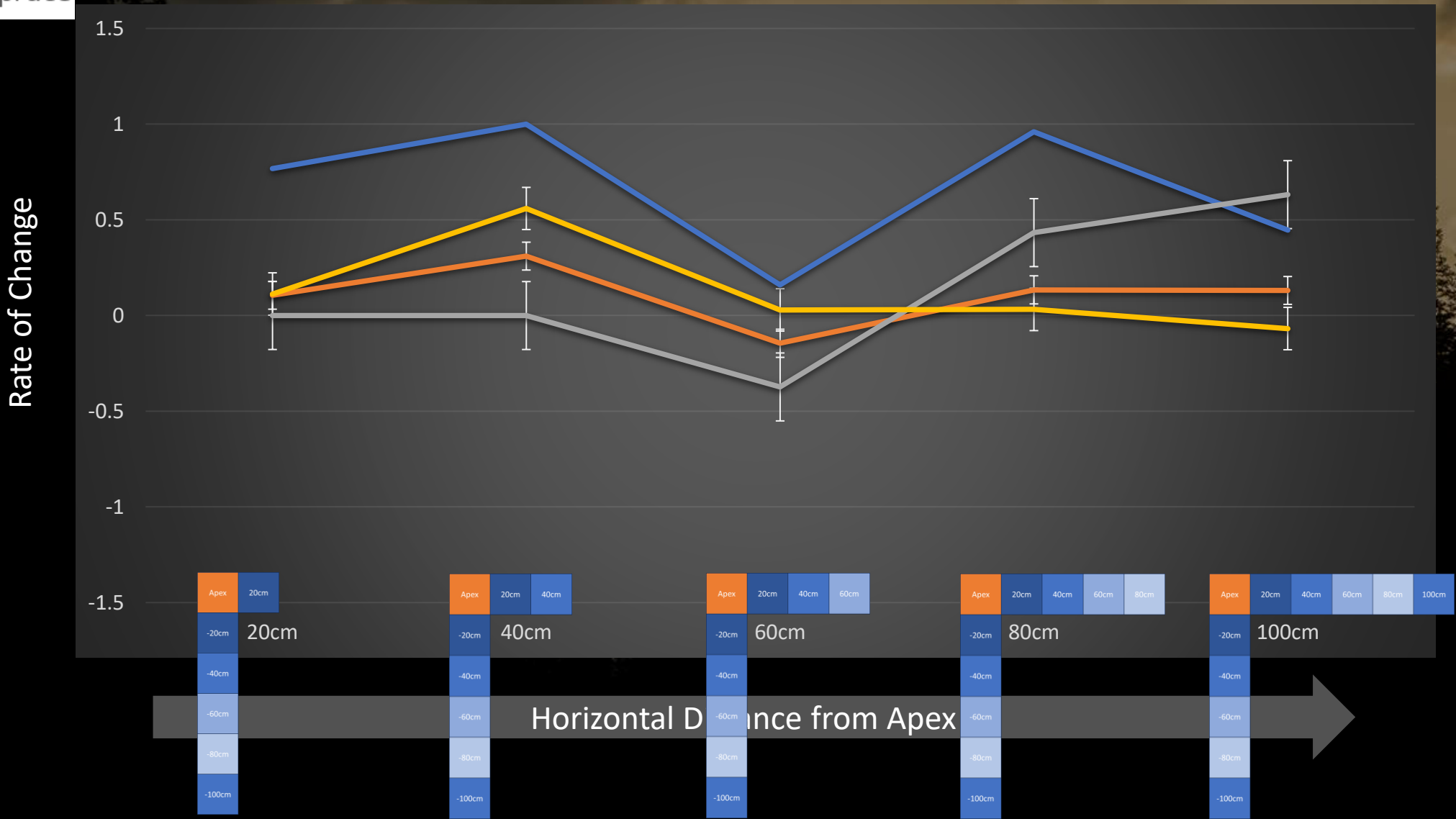
- Aspen
- Black Spruce
- Pine
- White Spruce

Vertical Distance from Apex 80cm

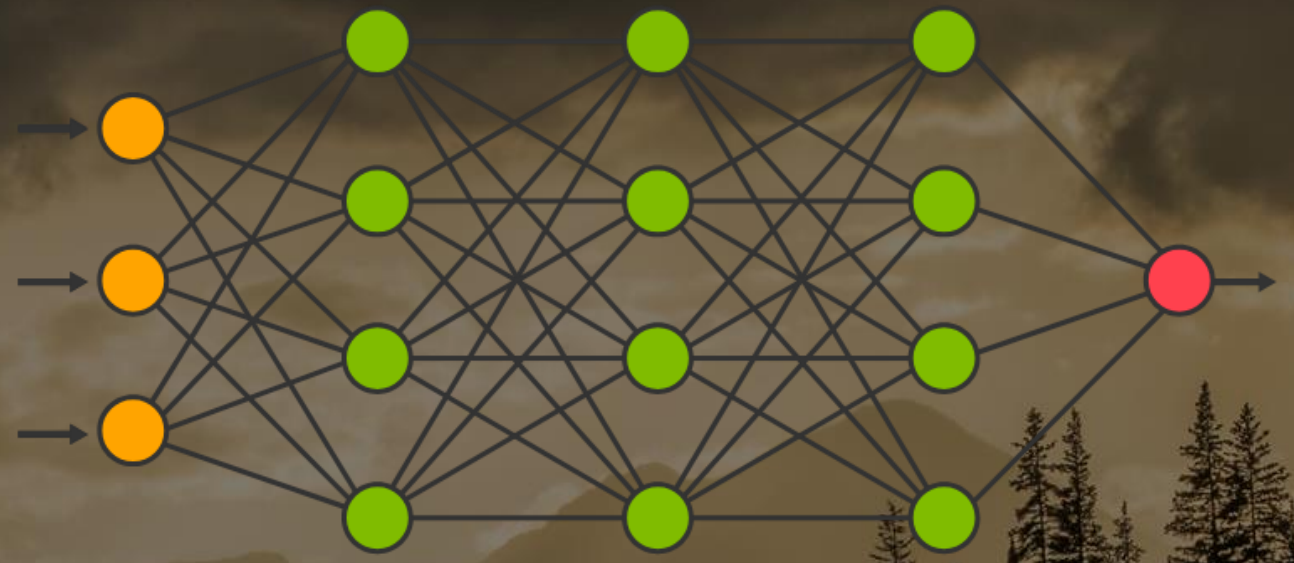


- Aspen
- Black Spruce
- Pine
- White Spruce

Vertical Distance from Apex 100cm

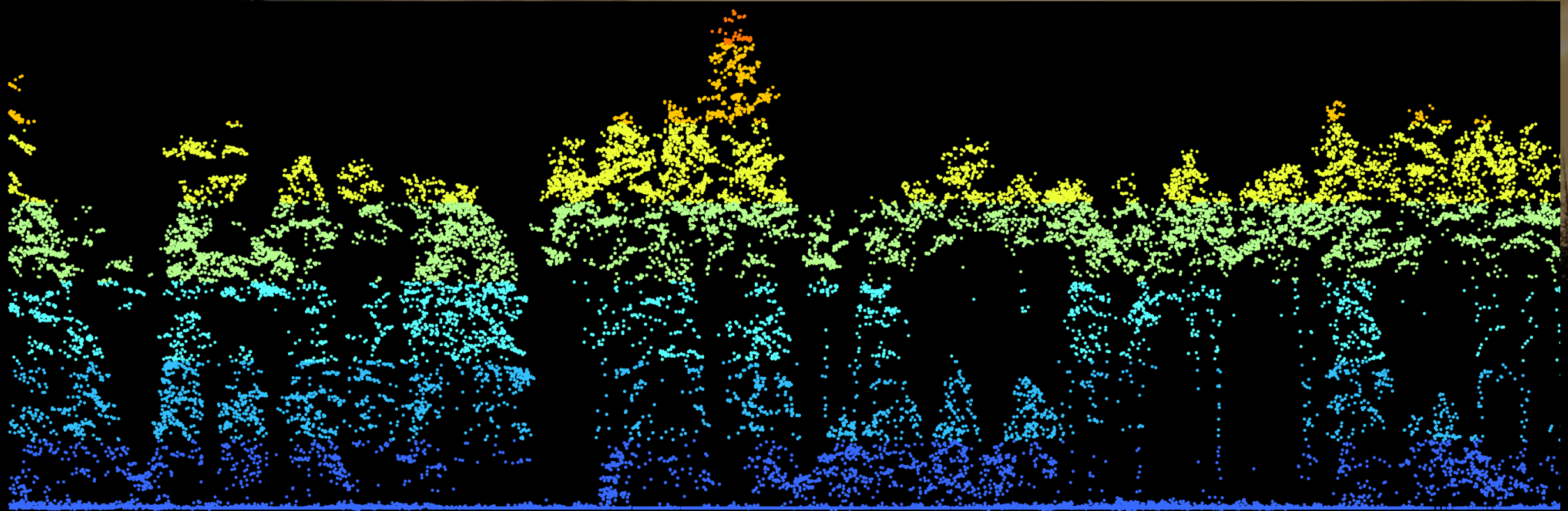


>4,500
Features

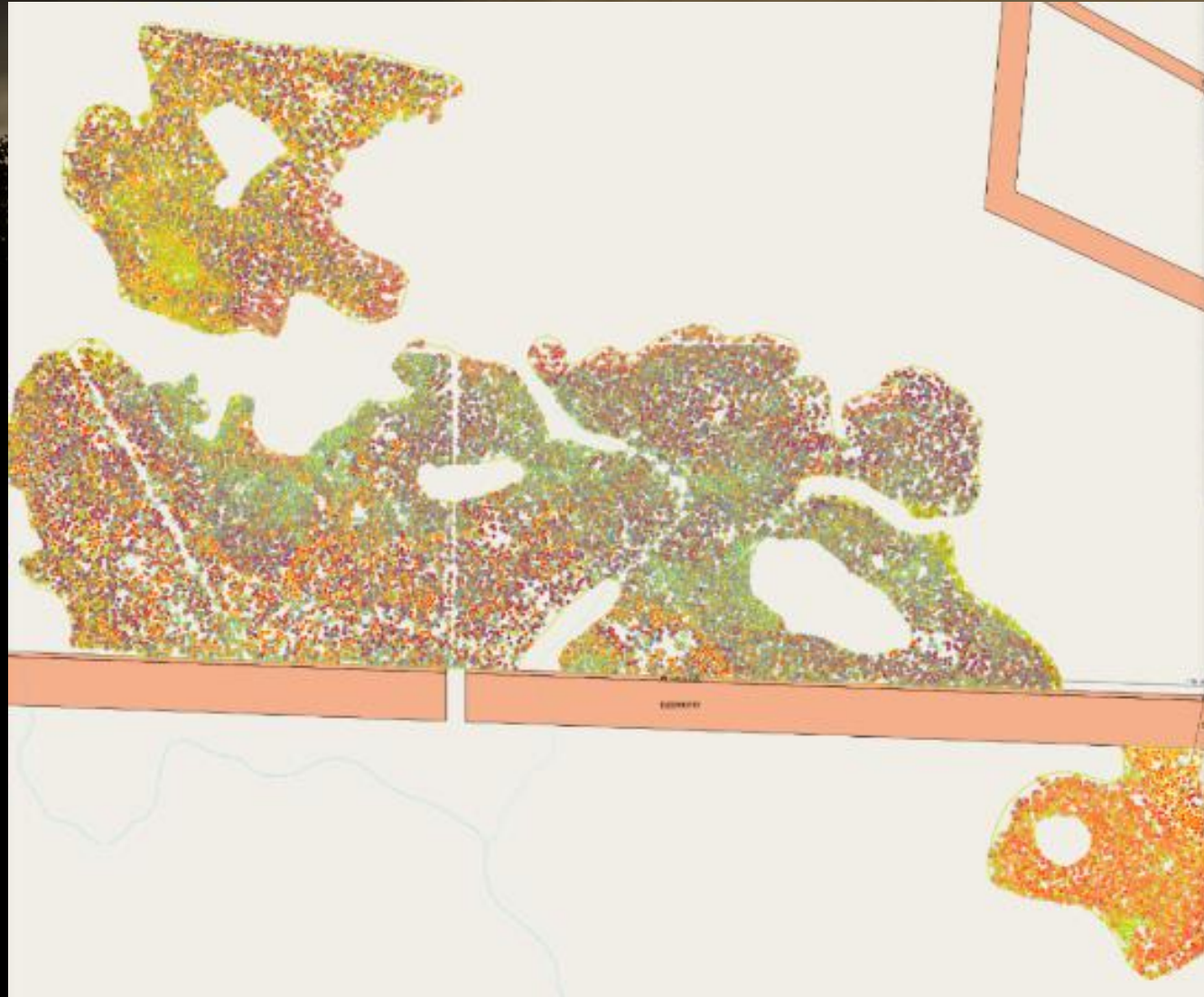


Species to Field Species: f-Score 91%
Aspen misclasses to Pine
Pine misclasses to Spruce

Seeing the Trees through the Forest



Seeing the Forest through the Trees



SW - White spruce ✕ Height (m) ▾ DBH (cm) ▾ >= 12' ✕ Log Small End Diameter (inch) ▾ Piece Size ▾

Merchandizing Metrics (FI000004-FORCORP) ⚙️ 📄 🗑️ ✕

Type	Total	8ft	10ft	12ft	14ft	16ft	18ft	20ft
Saw Log Volume (m³)	1,728		1	11	37	739	150	790
Average Saw Log Volume (m³/log)	0.15		0.07	0.09	0.1	0.14	0.16	0.17
Logs	11,352		12	125	350	5,324	928	4,613
Average Log Length (m)	4.8		3.2	3.6	4	4.5	4.9	5.1
Average Small End Diameter (cm)	16		14	15	15	16	16	16

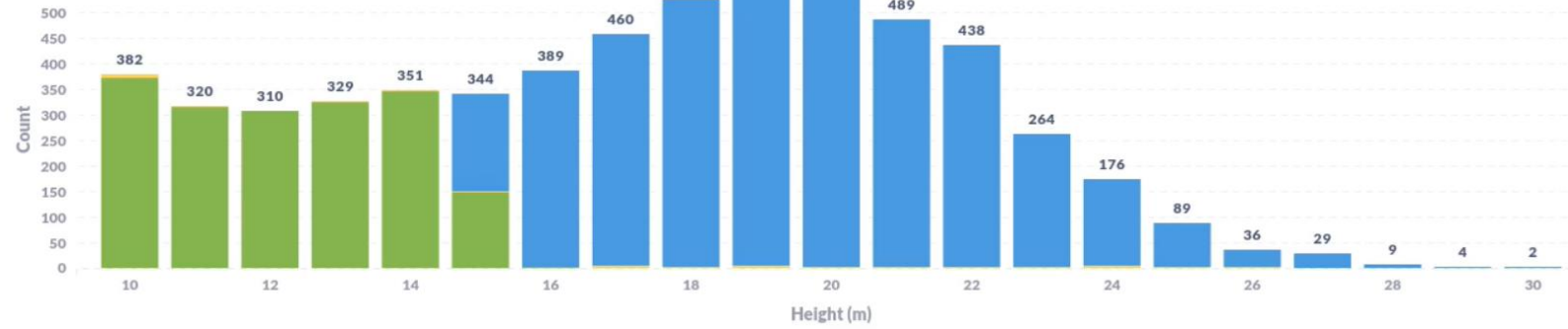


Inventory Metrics (FI000004-FORCORP)

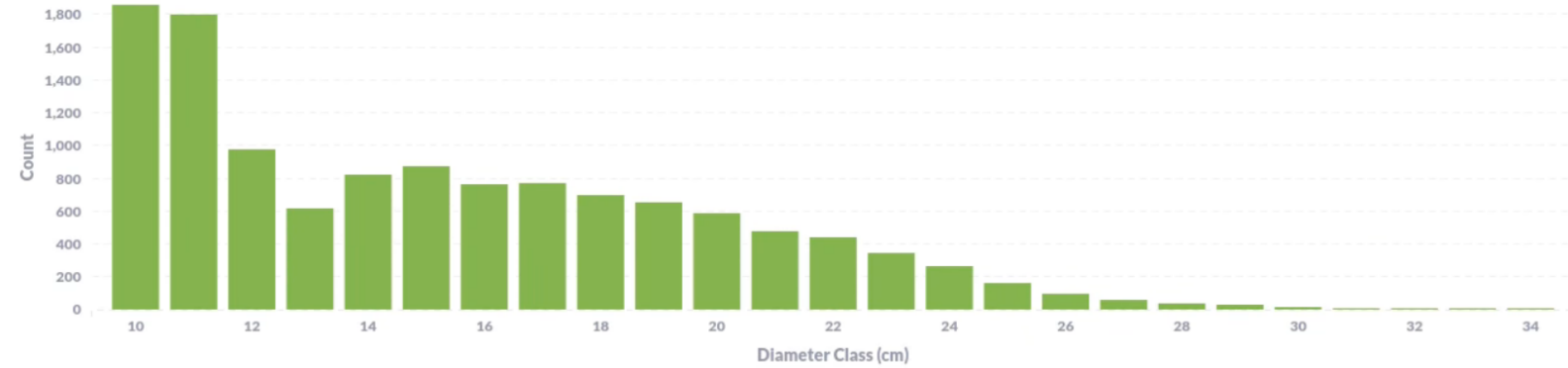
Type	Total	Con	Dec	PL	SW
Gross Volume (m³)	1,746	1,746	0		1,746
Gross Volume (m³) Per Hectare	258	258	0		258
Merchantable Volume (m³)	1,624	1,624	0		1,624
Merchantable Volume (m³) Per Hectare	240	240	0		240
Stems	4,151	4,151	0		4,151
Stems Per Hectare	614.21	614.21	0		614.21
Average Height (m)	20	20	0		20
Average Dbh (cm)	25	25	0		25
Average Piece Size (trees/m³)	3.16	3.16	0		3.16

Stem Count By Height

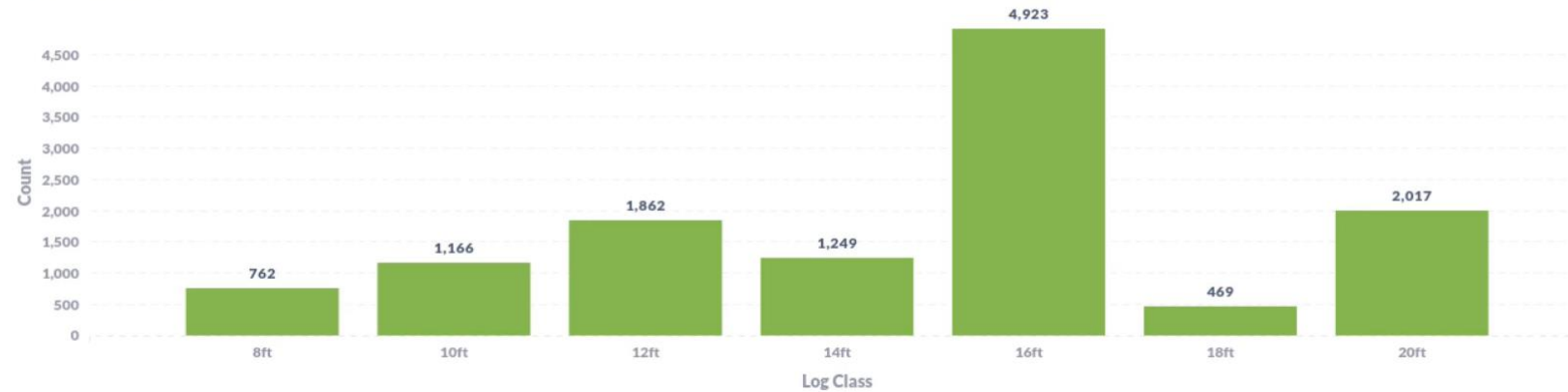
● Black Spruce ● Trembling Aspen ● White Spruce



Log Count By Diameter



Log Count By Length





Terrestrial Laser Scan of scrub Aspen at
Jumping Pound Demonstration Forest

Passing the Torch

Happy
Retirement



Ted Gooding
1997 - 2023

A scenic landscape featuring a range of mountains in the background, partially obscured by a layer of mist or low clouds. The sky is filled with soft, golden light, suggesting a sunrise or sunset. In the foreground, the dark silhouettes of evergreen trees are visible against the lighter background.

Thanks Collaborators and
Open-Source Community