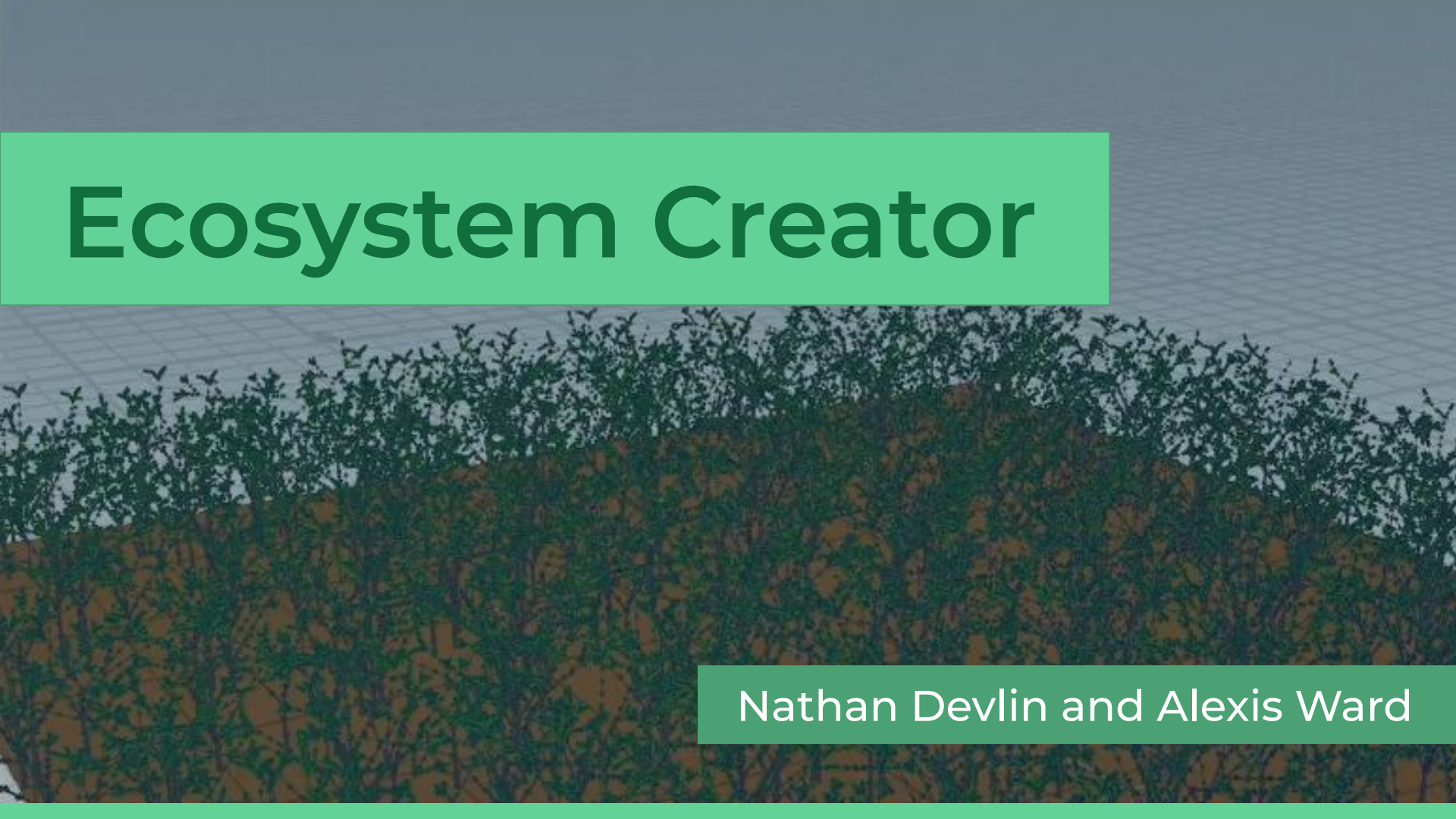
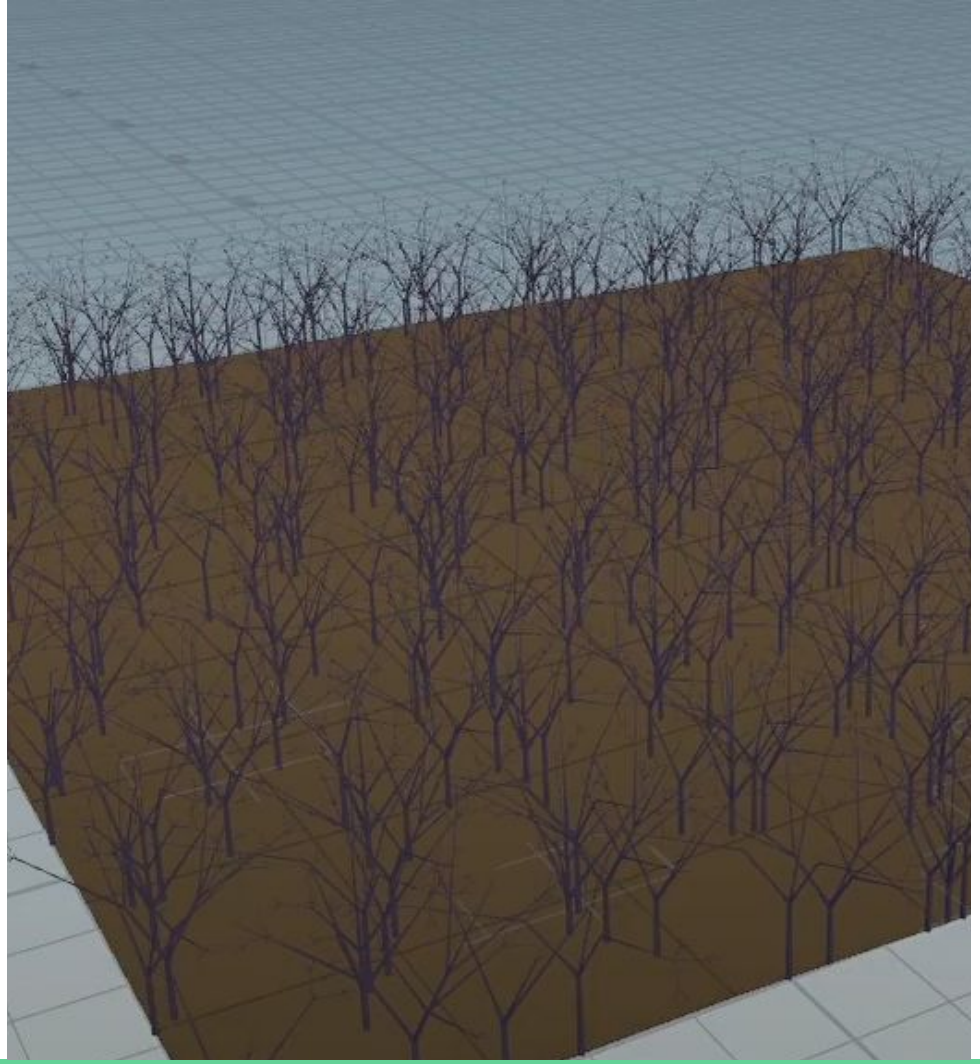
Ecosystem Creator



Nathan Devlin and Alexis Ward

Objective

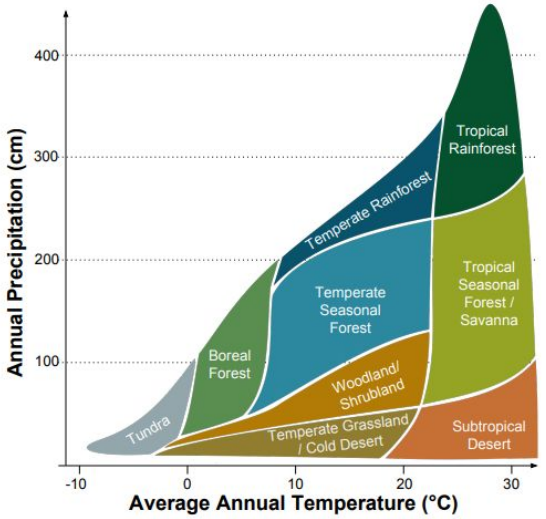
- Create a large-scale environment builder with self-aware growth
- Mindful of ecological constraints and preferences of plants
- Plants are procedurally placed through the scene
- Divided into three scales of abstraction to work down to a branch level

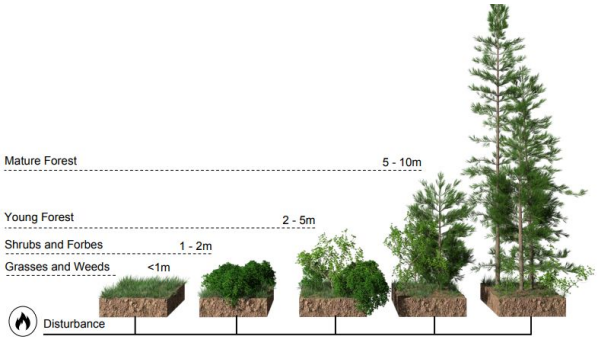


Features and Capabilities

Capability:

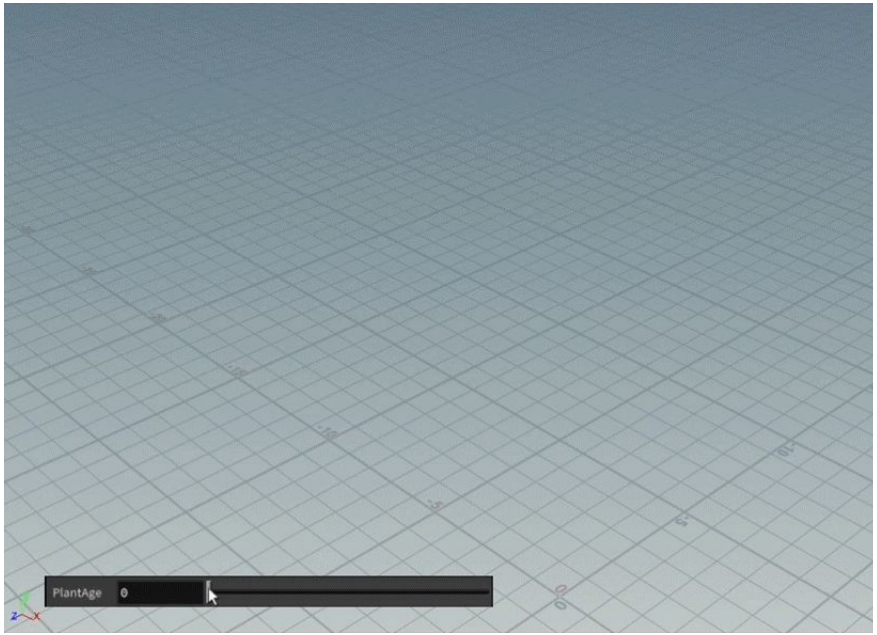
- Inputs: Temperature, Rainfall, Topography, Branch Modules, Plant types, time
- Output: A natural plant ecosystem consisting of simple plant models defining branch positions, lengths, and diameters
- Can represent widely different terrains like desert, rainforest, etc.





Technical Approach

- Based on ***Synthetic Silviculture: Multi-scale Modeling of Plant Ecosystems***
  - By Miłosz Makowski, Torsten Hadrich, Jan Scheffczyk, Dominik L Michels, Soren Pirk, and Wojtek Pałubicki of *Adam Mickiewicz University*, *KAUST*, and *Google Brain*
  - Accepted to **SIGGRAPH 2019**
- This paper applies principles from ecology and forestry to the modeling of natural landscapes.
  - Uses the inputs from the previous slide to grow plants from base models into full trees.
  - Trees **react** on a branch level **to their environment**
    - Grow faster with light and space
    - Are stunted if growing conditions are poor
  - Allows for a progression of plant species over time as conditions change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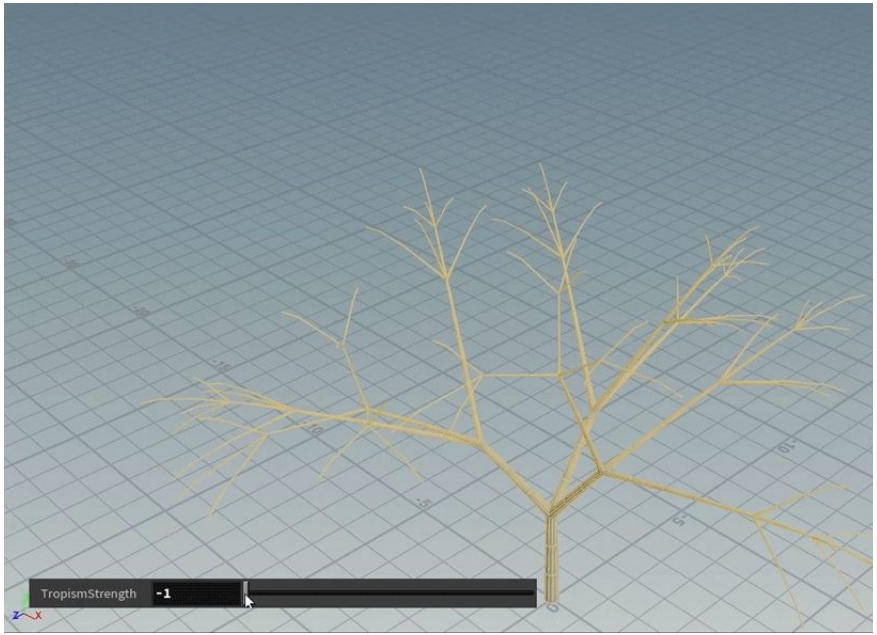
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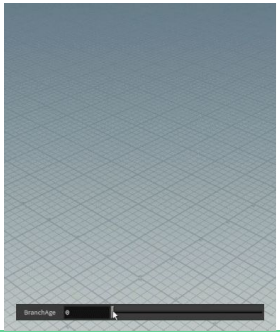
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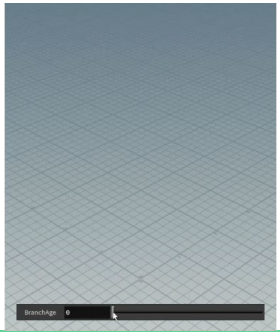
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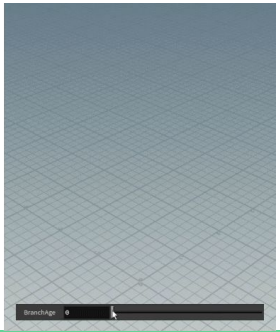
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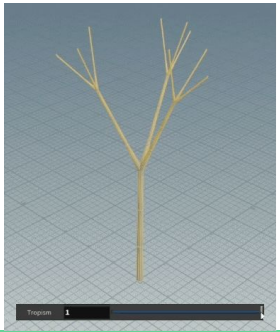
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Tropism
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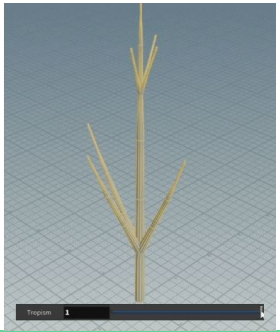
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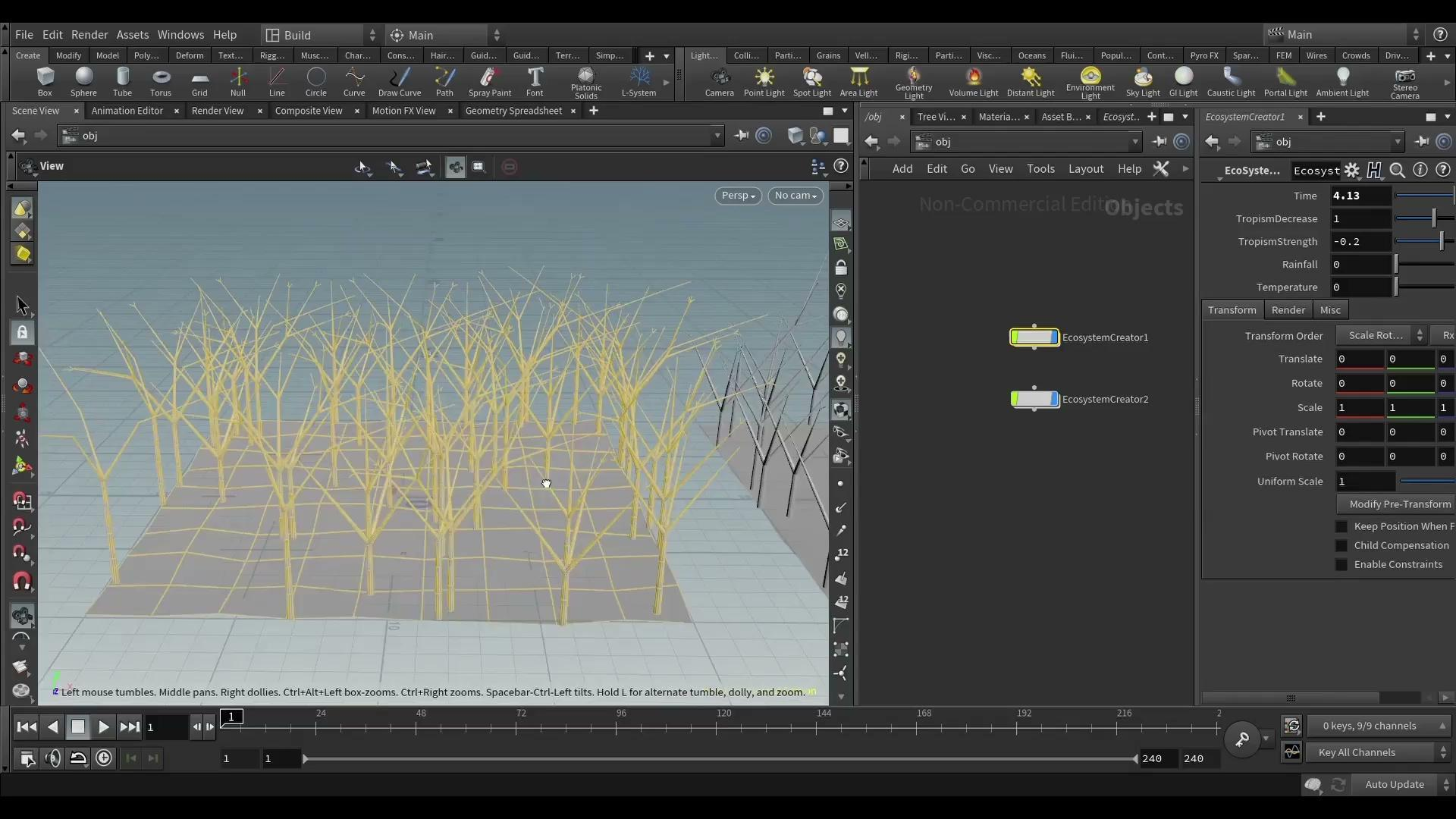
Results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Animation Editor
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Composite View
Motion FX View
Geometry Spreadsheet
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Materia...
Asset B...
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Ecosyst
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Scale 1 1 1
Pivot Translate 0 0 0
Pivot Rotate 0 0 0
Uniform Scale 1
Modify Pre-Transform
Keep Position When P
Child Compensation
Enable Constraints
0 keys, 9/9 channels
Key All Channels
Auto Update