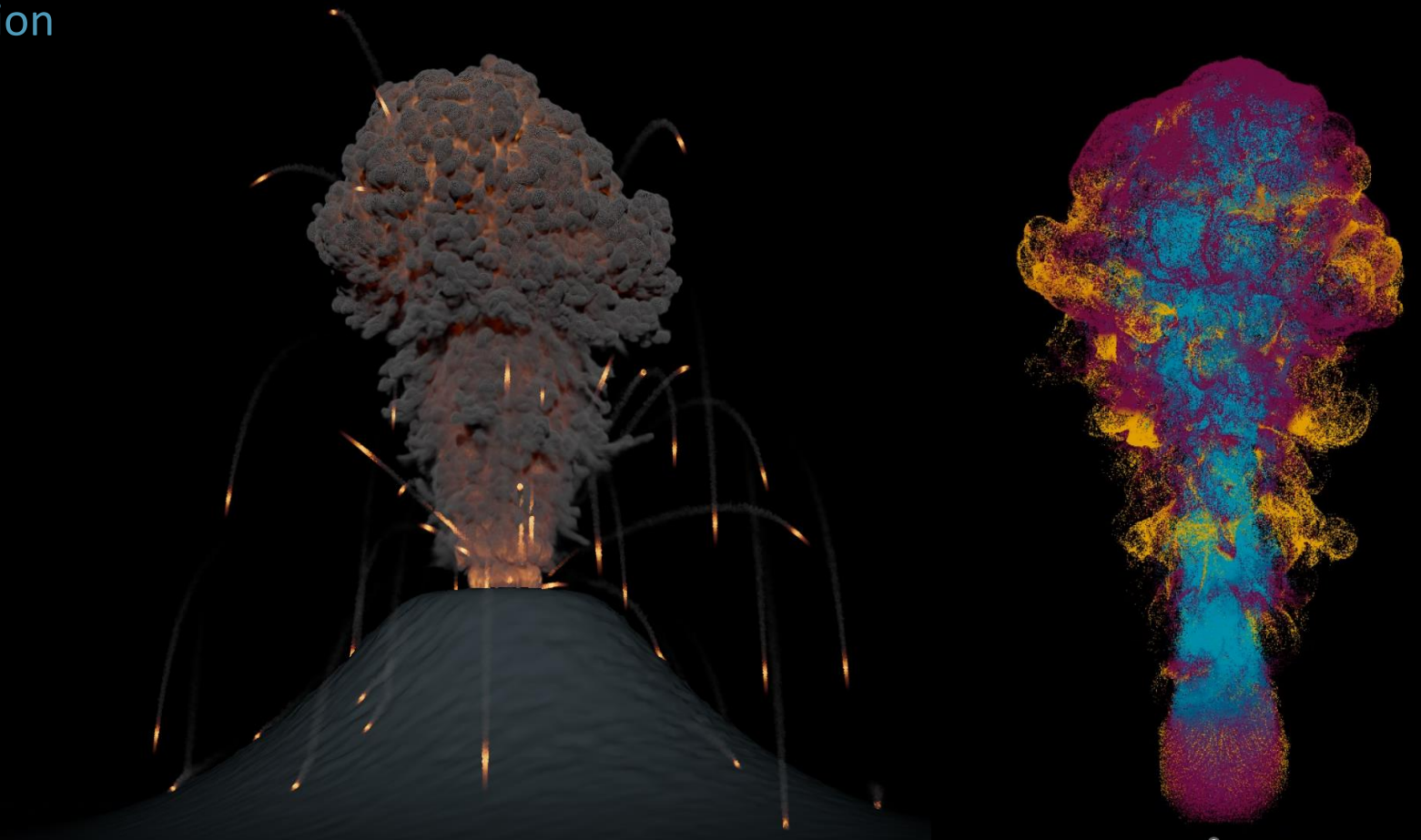


Bifrost Workshop

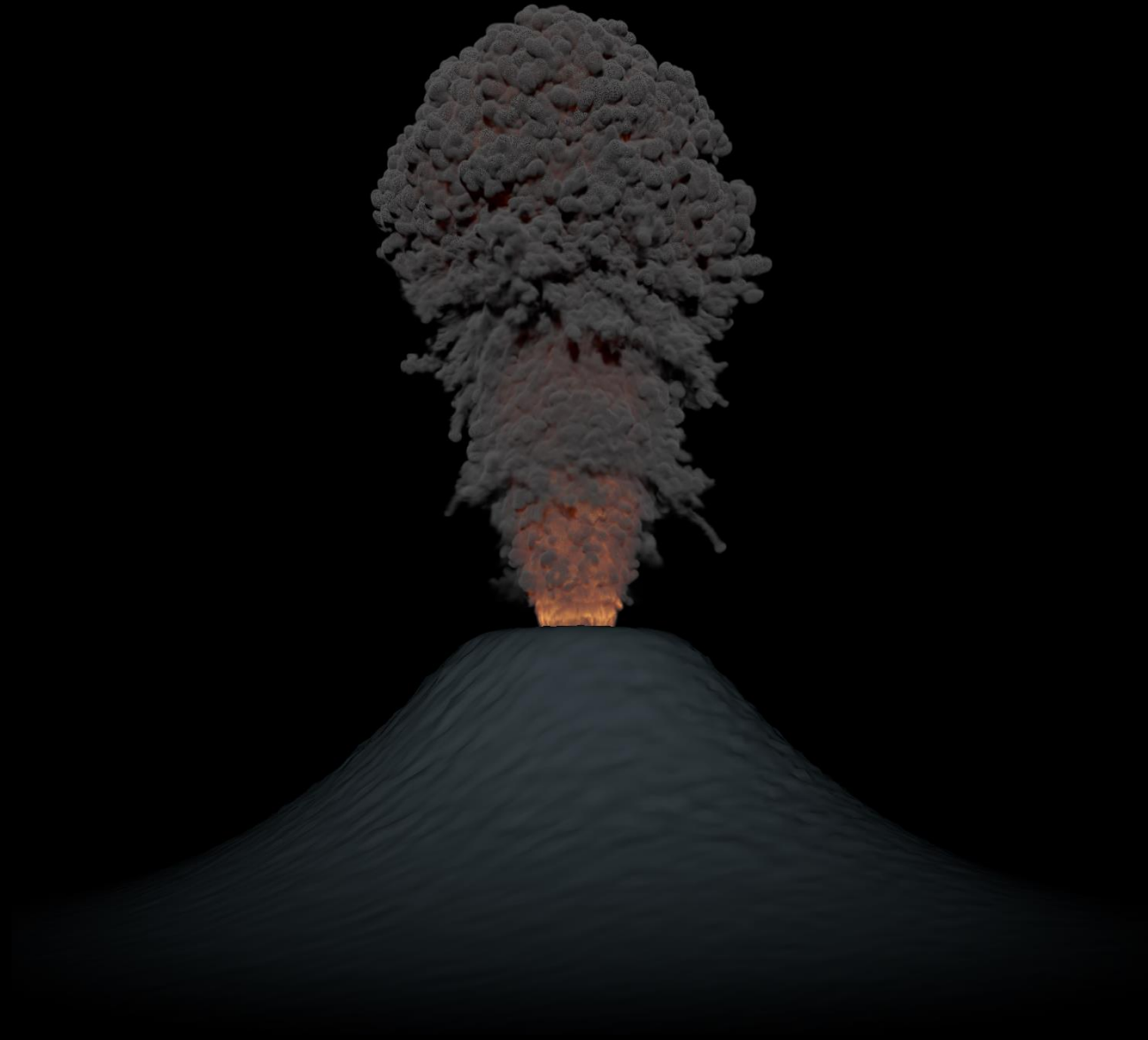
Lesson 6

Simulation Part II

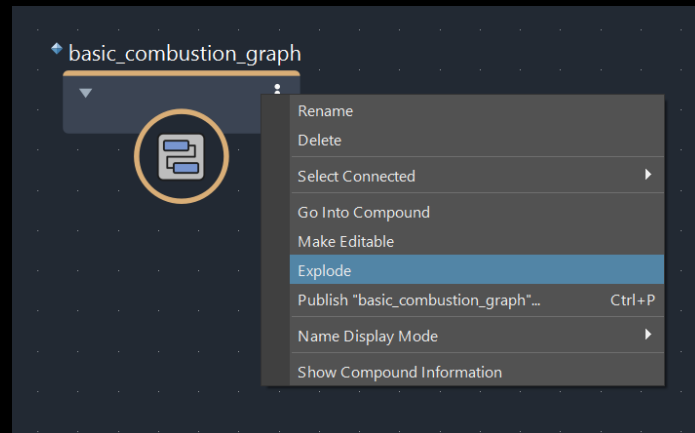
- Explosion
- Volume-driven particle simulation
- Particle-driven aero simulation



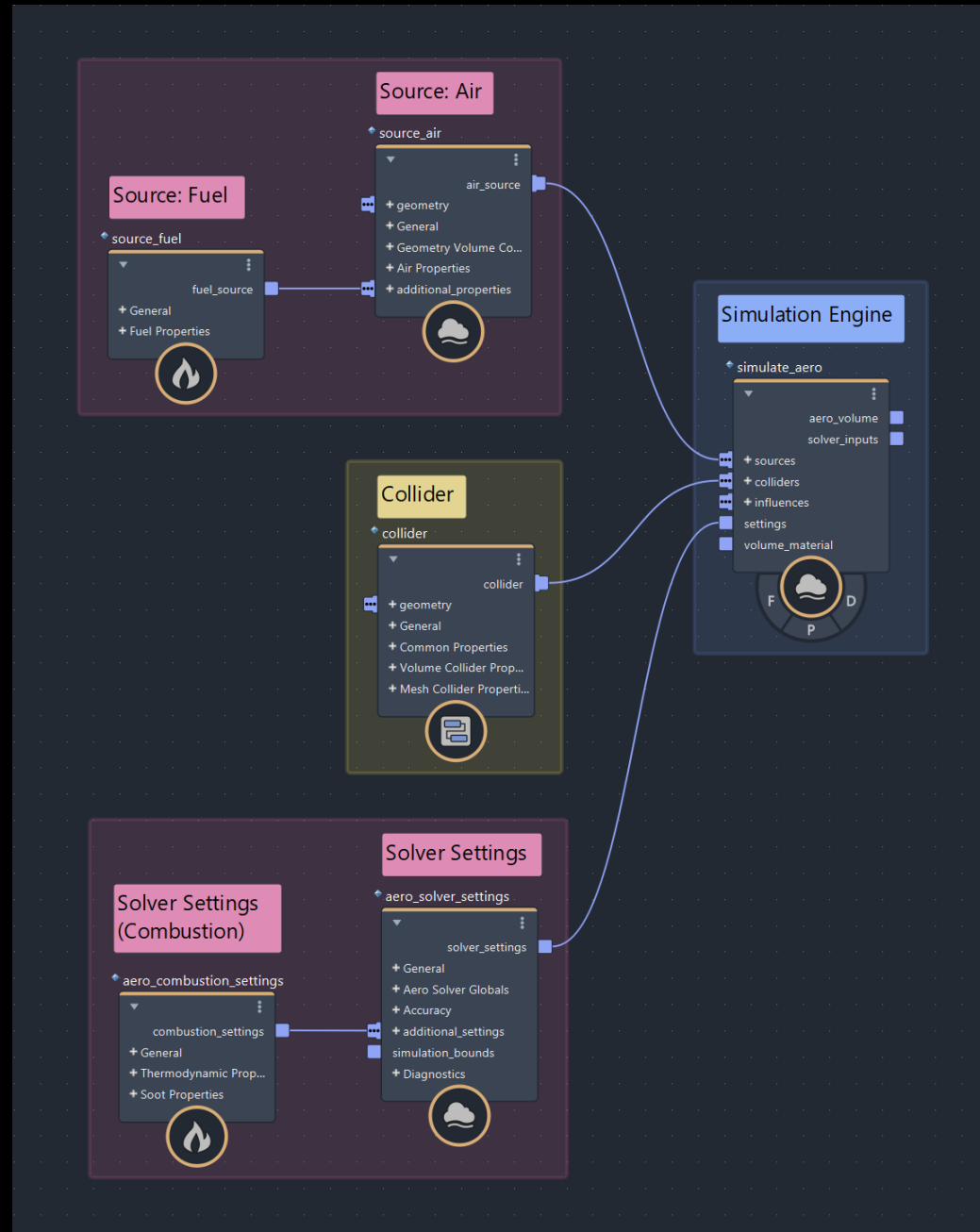
Explosion



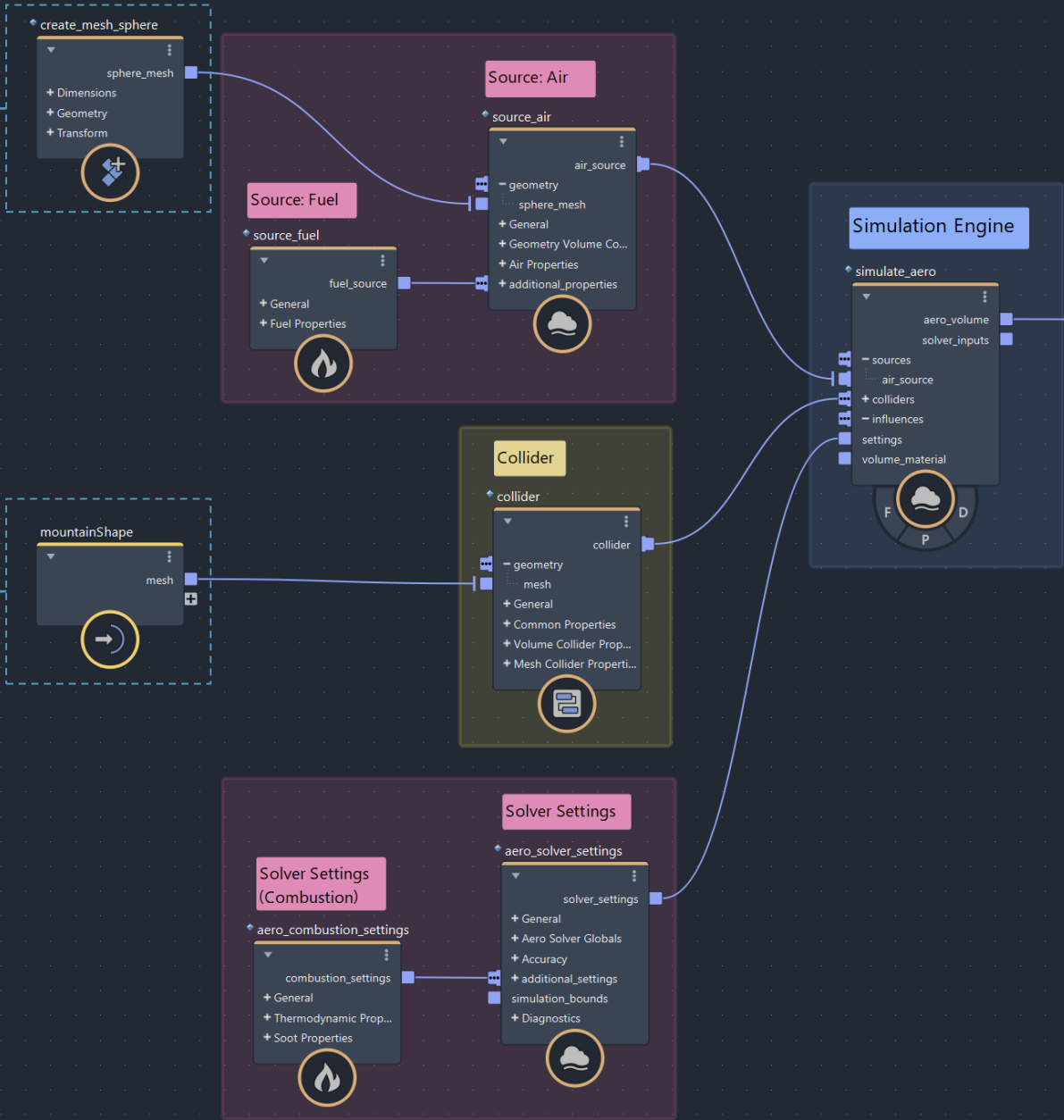
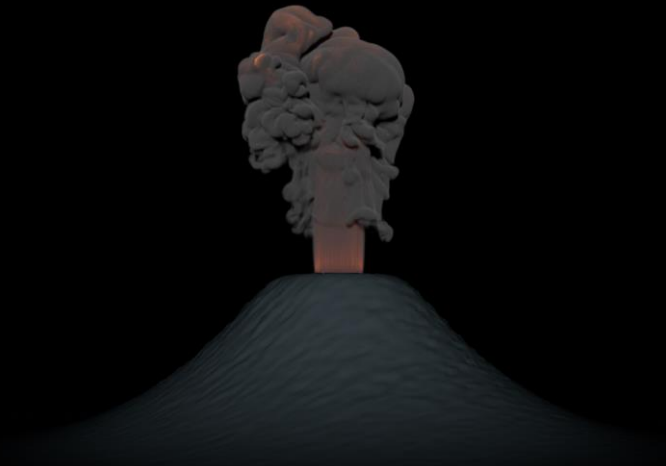
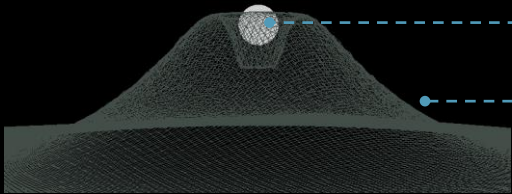
Explosion



Start with a “basic_combustion_graph”



Explosion



Explosion

To prevent crashing, start with a low resolution for both geo and fluid detail sizes, such as 0.1, and gradually decrease the number to achieve the desired look.

Aero Solver Globals

Ambient Temperature

20

Temperature Diffusion

0

Style

fluffy

Simulation Speed

1

Enable Buoyancy

☒

Buoyancy

0

-0.5

0

Kinematic Viscosity

0

Velocity Smoothness

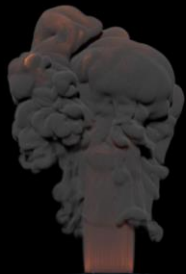
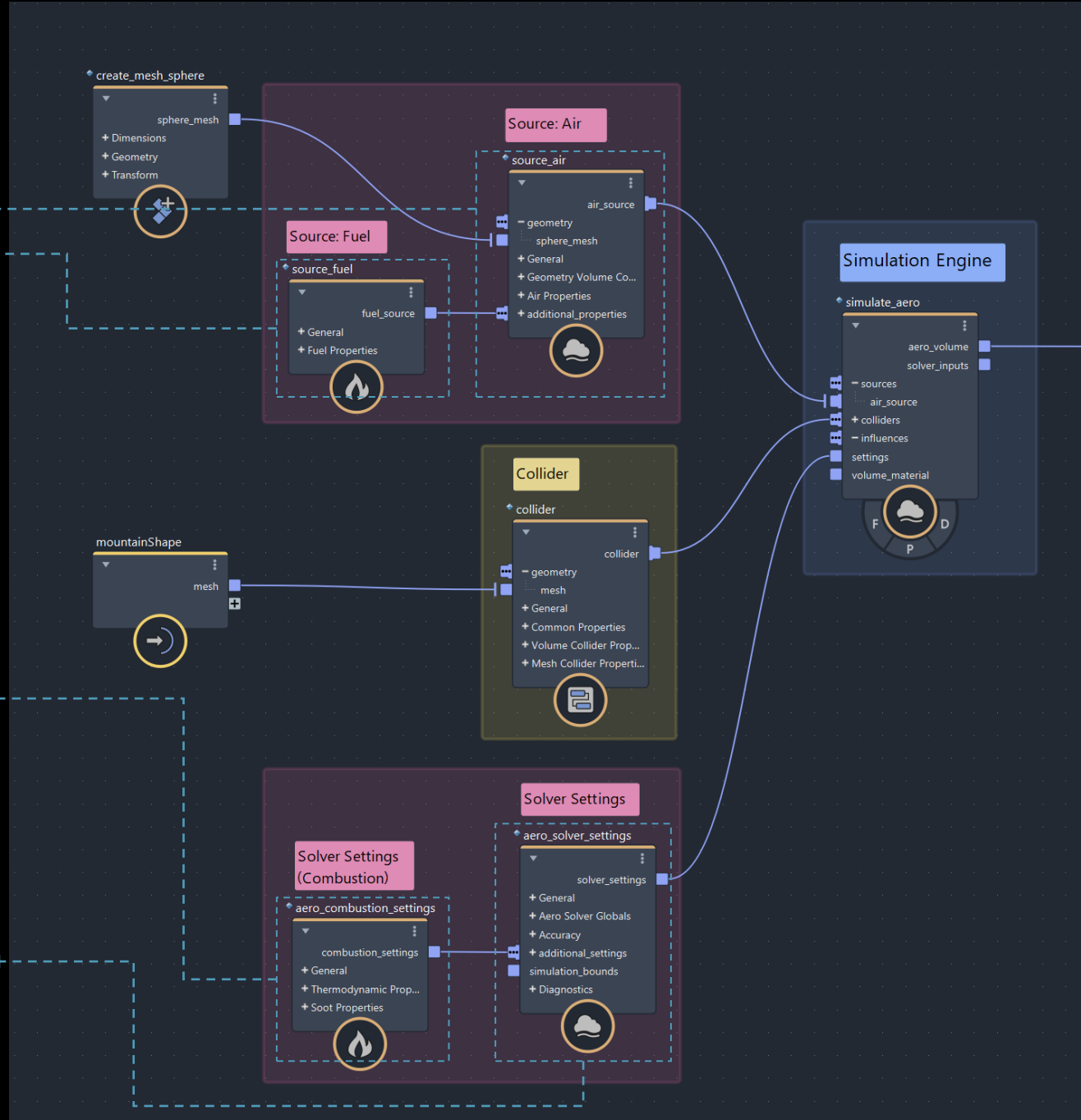
0

Kill Voxel Fog Threshold

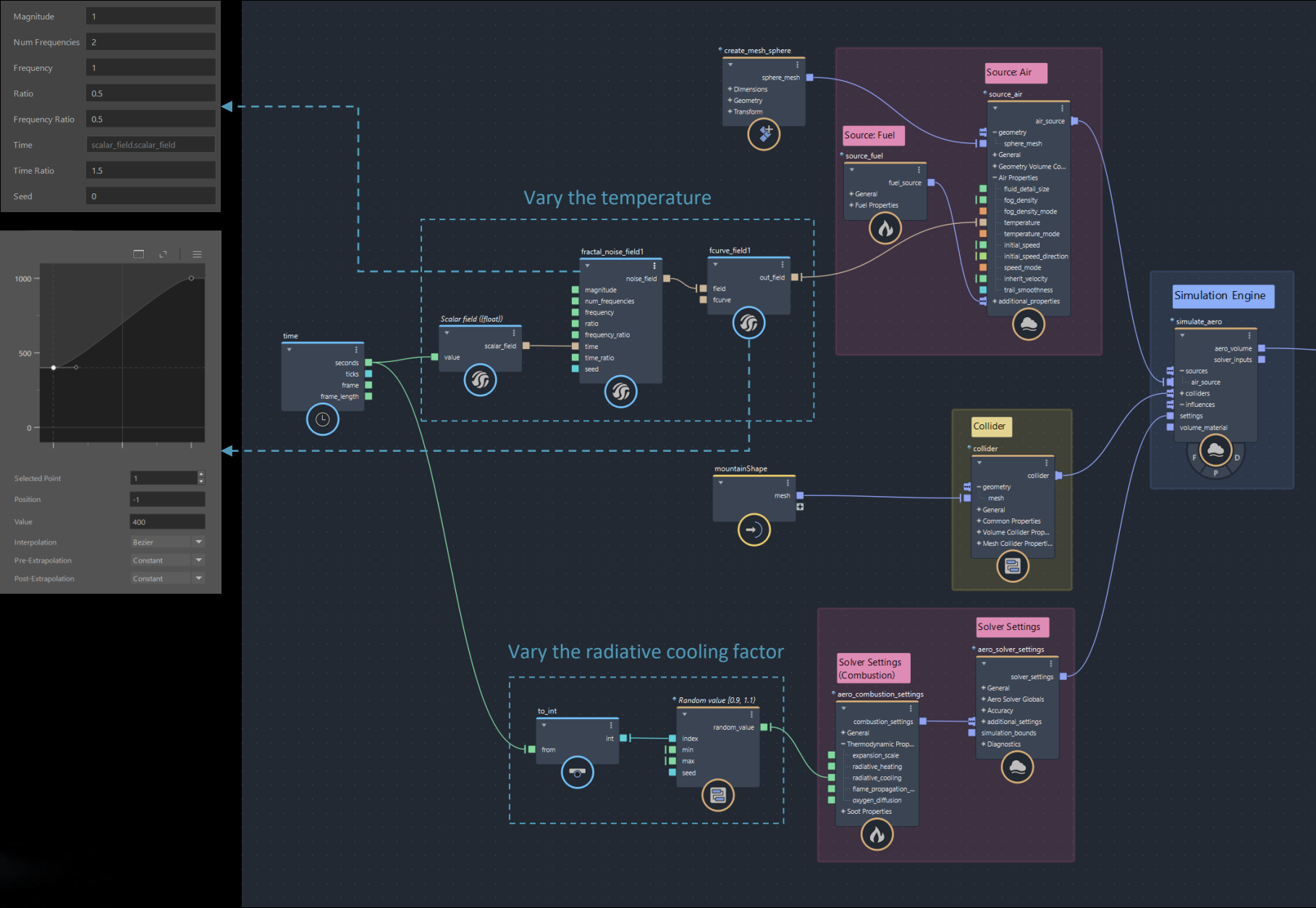
0.01

Scene Units In Meters

1



Explosion



Explosion

"aero_pyroclastic_influence"
adds details that resemble the
pyroclastic details in volcanic
plumes and large explosions. It
outputs two influences: drag
and vorticity.



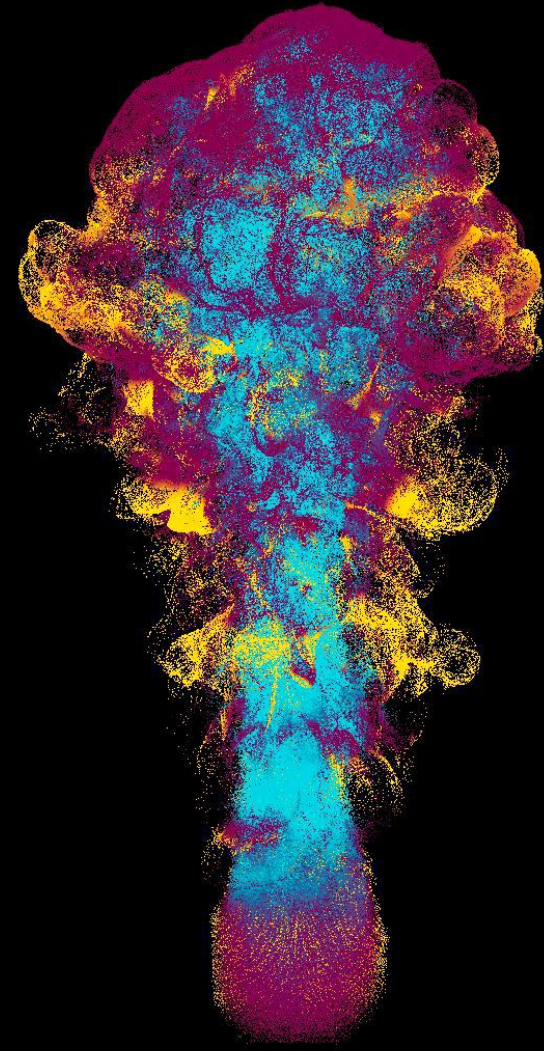
"aero_einstein_influence"
creates a secondary turbulence field by multiplying the existing velocity field with a turbulence field. It retains the overall shape and behavior of the simulation while adding disturbances including both fine and coarse turbulences.

General		—
Enable	<input checked="" type="checkbox"/>	
Drag		—
Drag	0.7	
Frequency	40	
Num Frequencies	1	
Vorticity		—
Vorticity	1	
Min Fog Density	0	
Max Fog Density	0.9	
Static Noise Dampening	2.5	

General		—
Enable	<input checked="" type="checkbox"/>	
Master Magnitude	2.5	
Turbulence		—
Fine Turbulence	0.75	
Fine Turbulence Speed	1	
Coarse Turbulence	0.03	
Coarse Turbulence Speed	0.25	
Frequency Scale	1	
Vorticity		—
Vorticity	0.5	
Velocity Threshold	20	

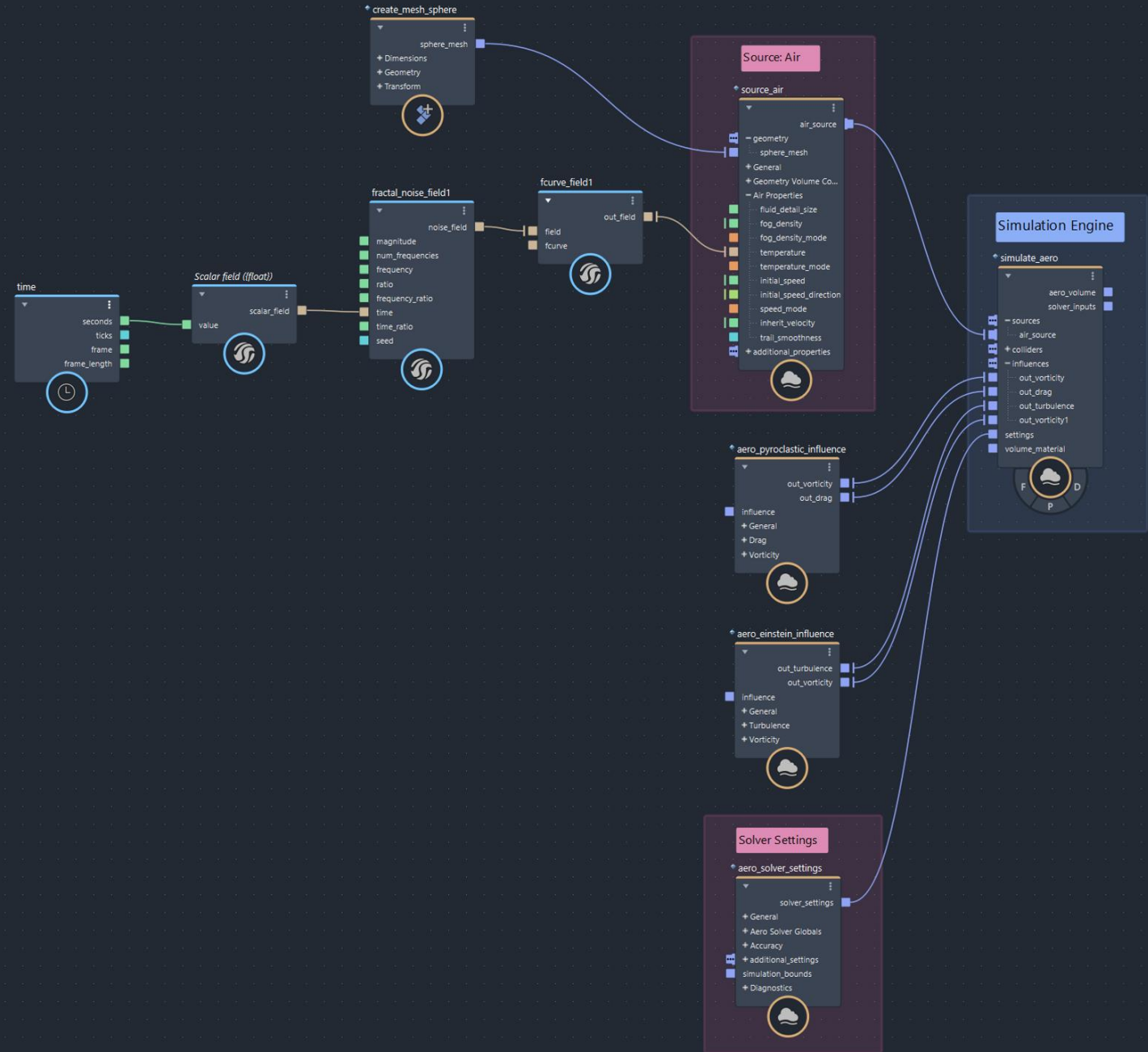
Add influences

Volume-driven particle simulation

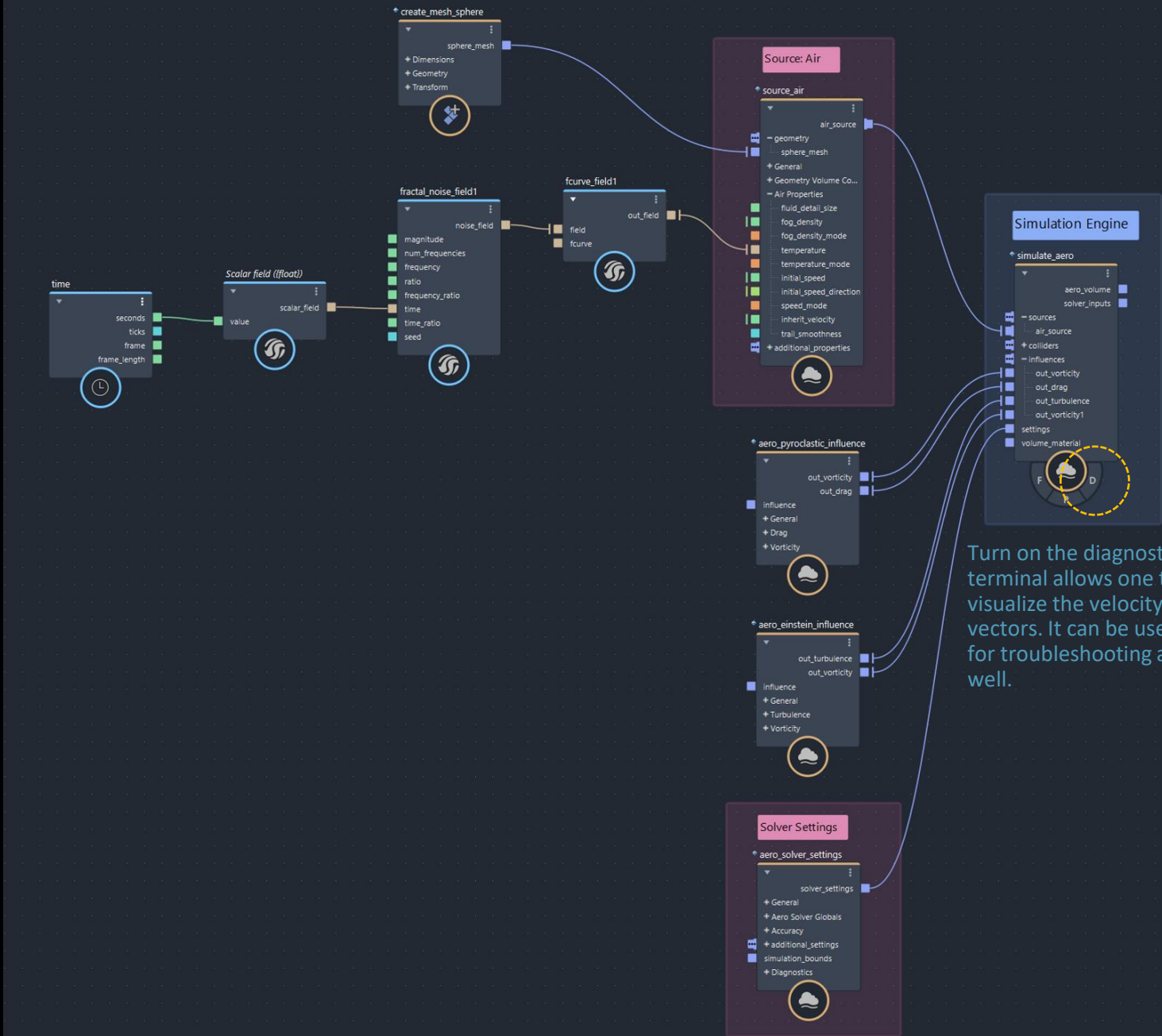
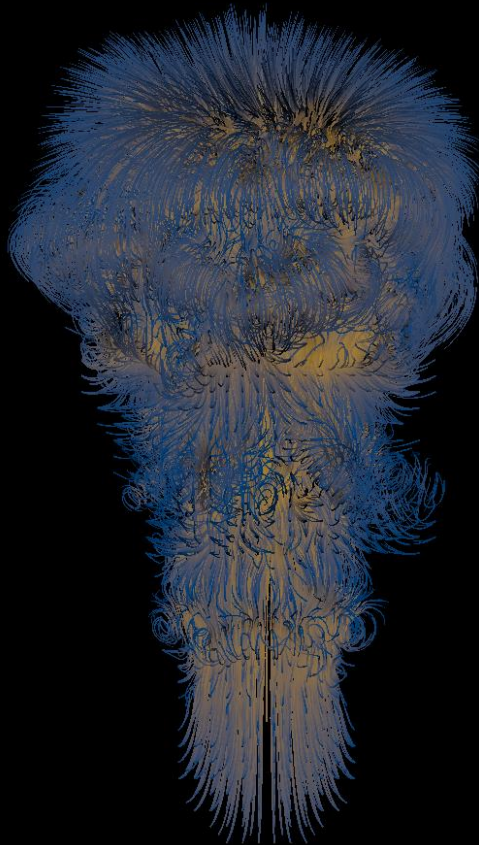


Volume-driven particle simulation

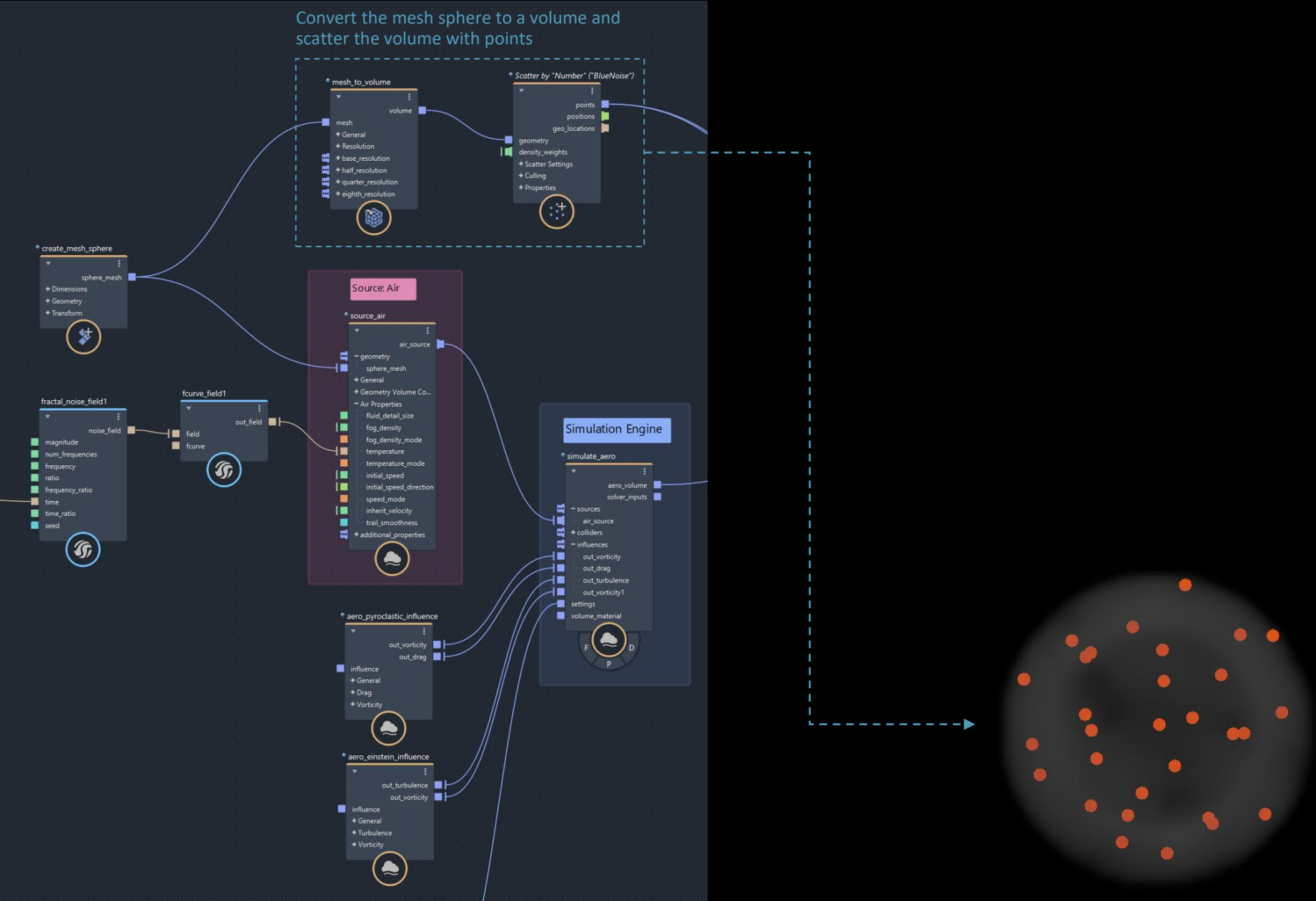
Start with the aero simulation graph similar to the one in the explosion example (remove the combustion and collider). The **voxel velocity** of this volume will be used to drive the movement of the particles.



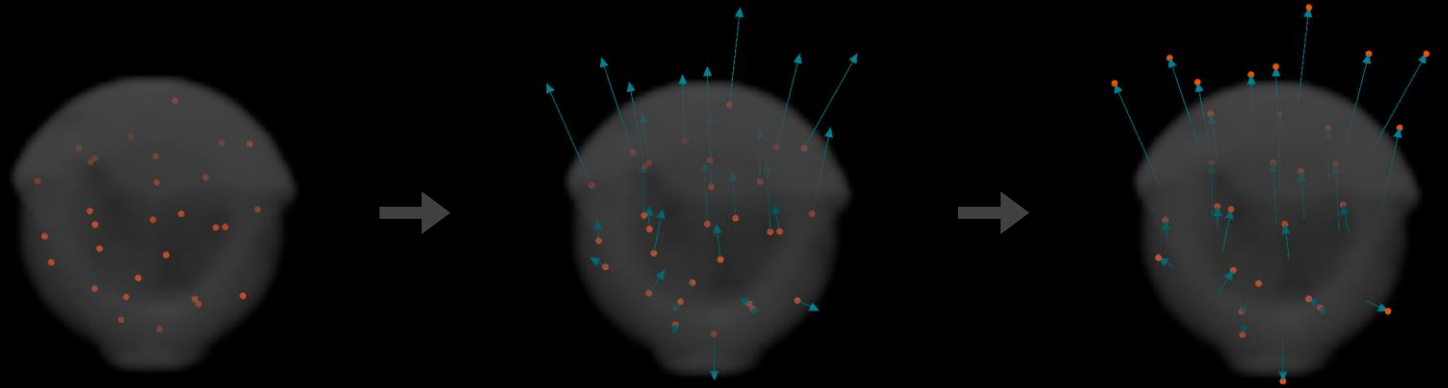
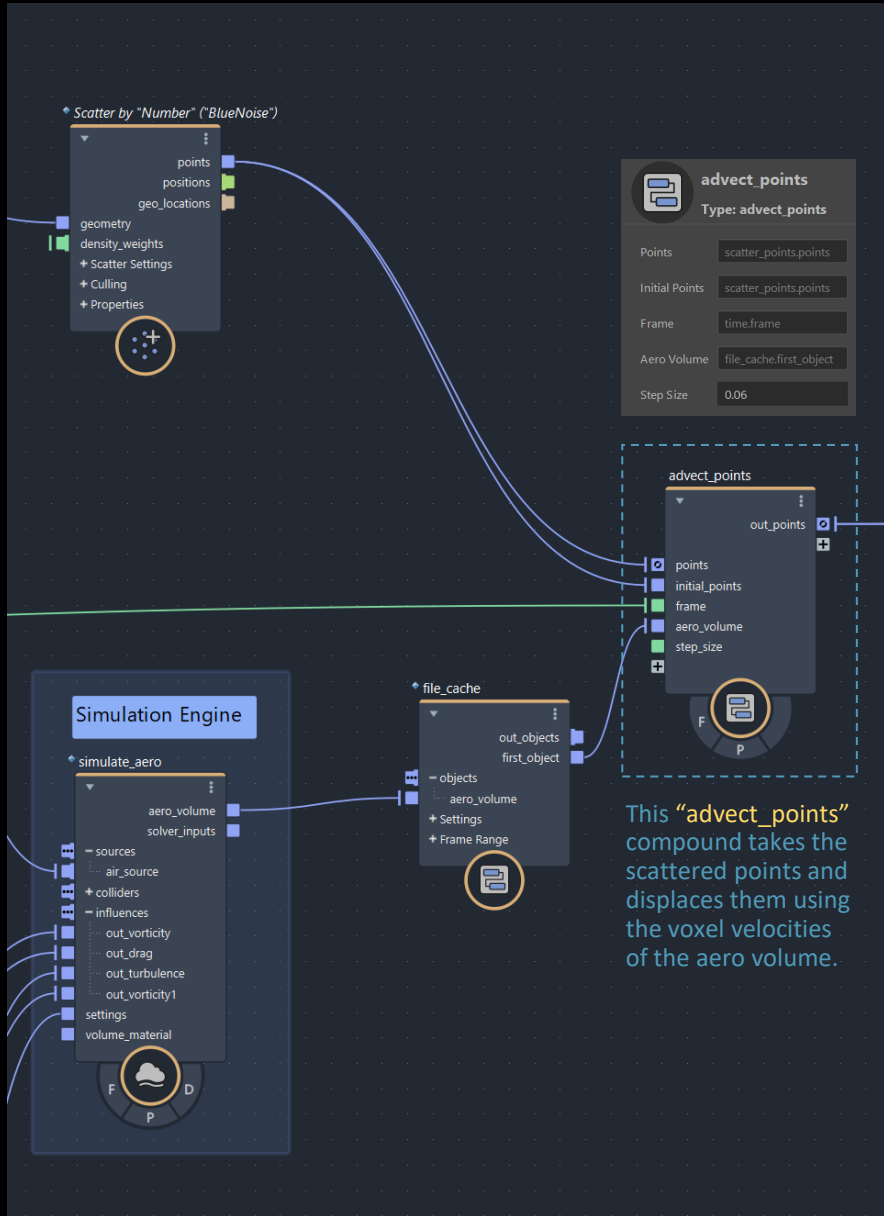
Volume-driven particle simulation



Volume-driven particle simulation

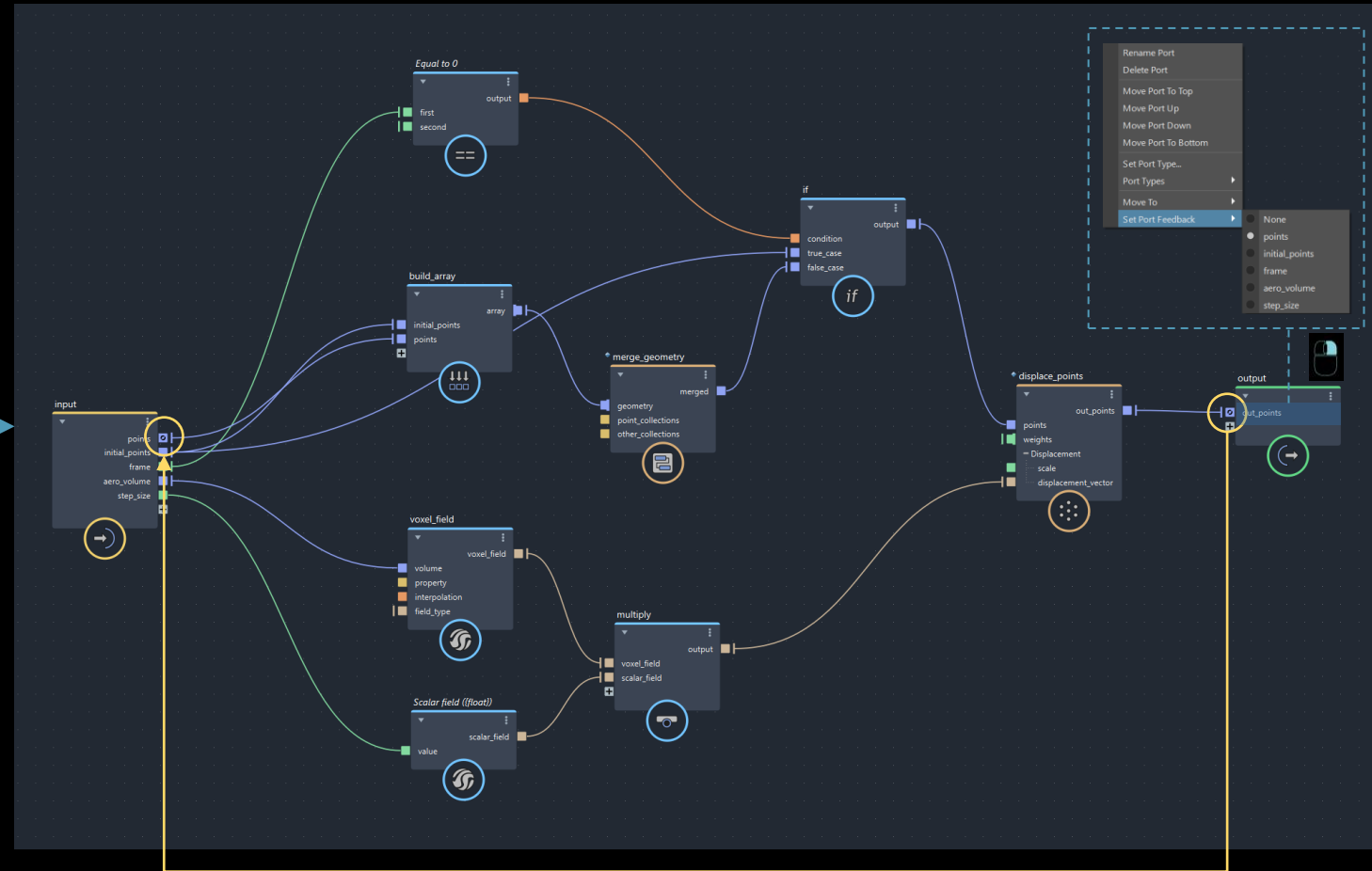
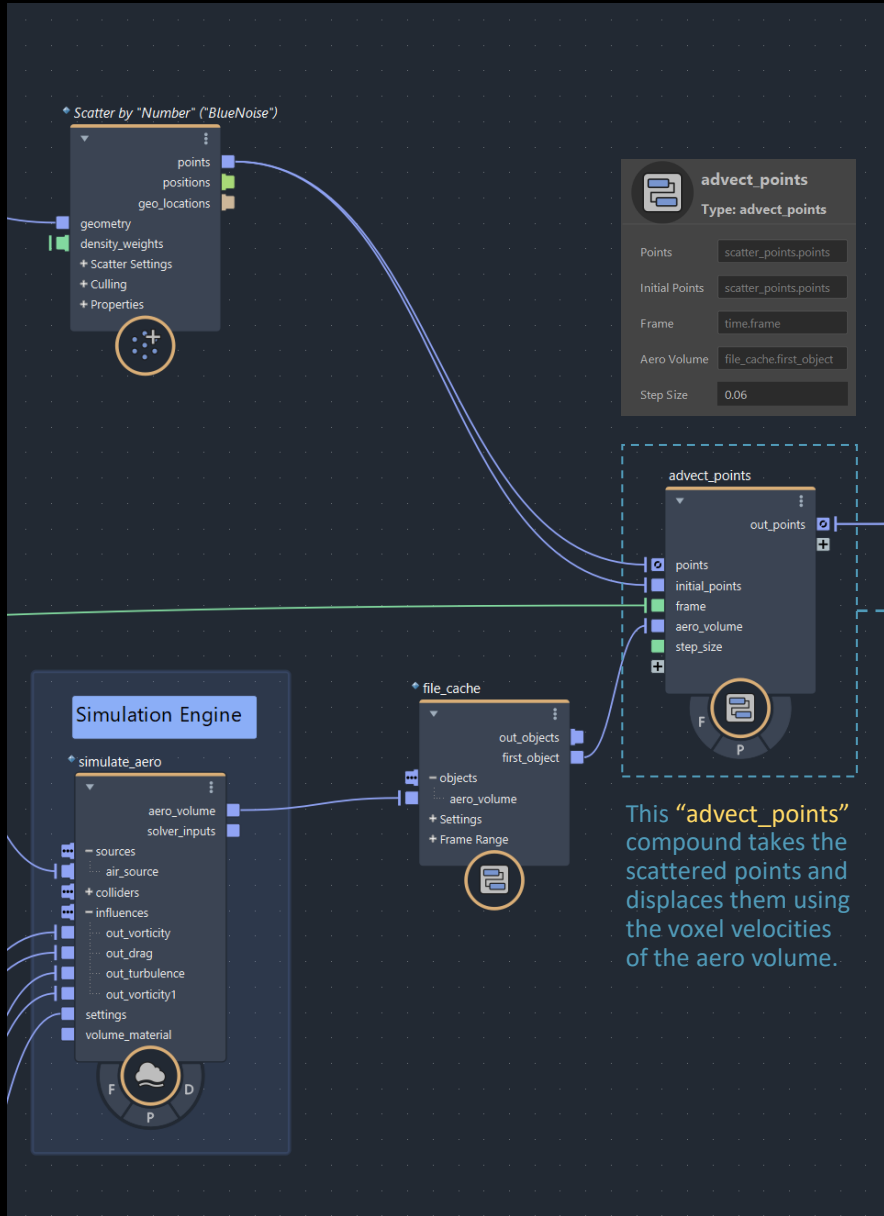


Volume-driven particle simulation



Volume-driven particle simulation

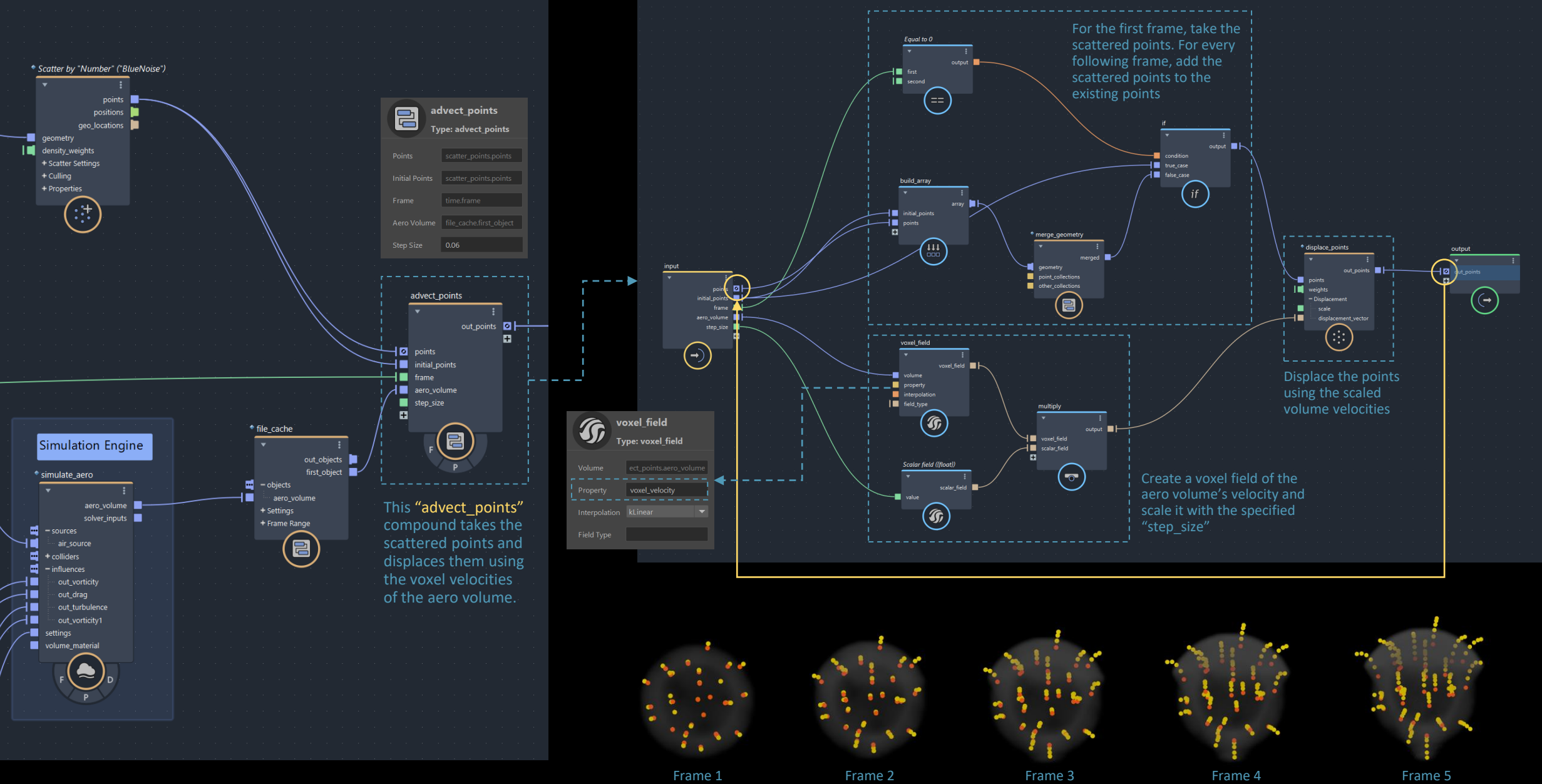
Inside “advect_points” compound



Set the **port feedback** of “out_points” to be “points” so that for every frame the output points will be used as the input points for the next frame.

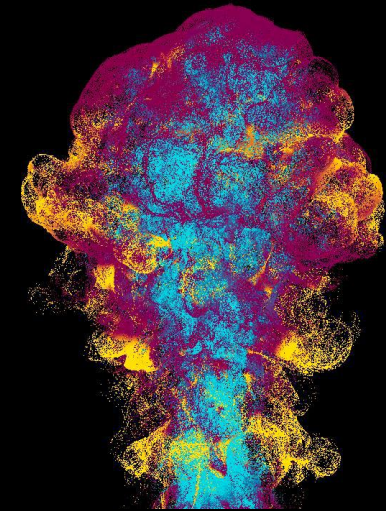
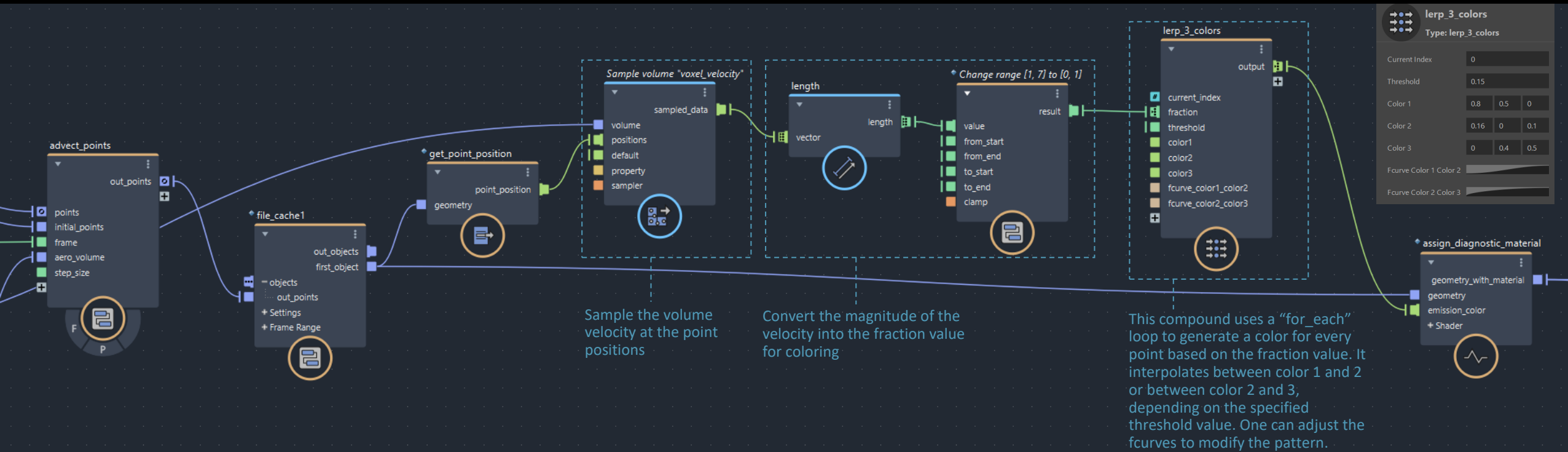
Volume-driven particle simulation

Inside “advect_points” compound

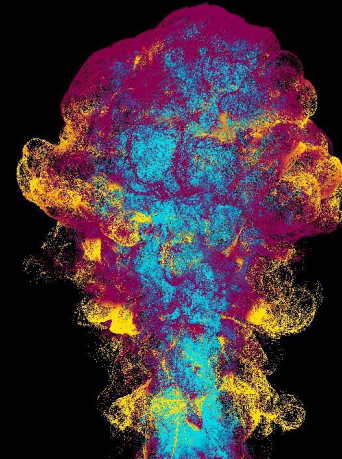
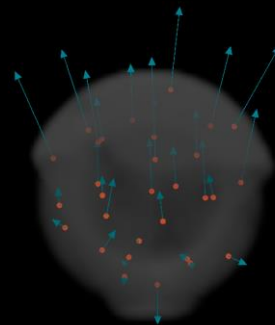
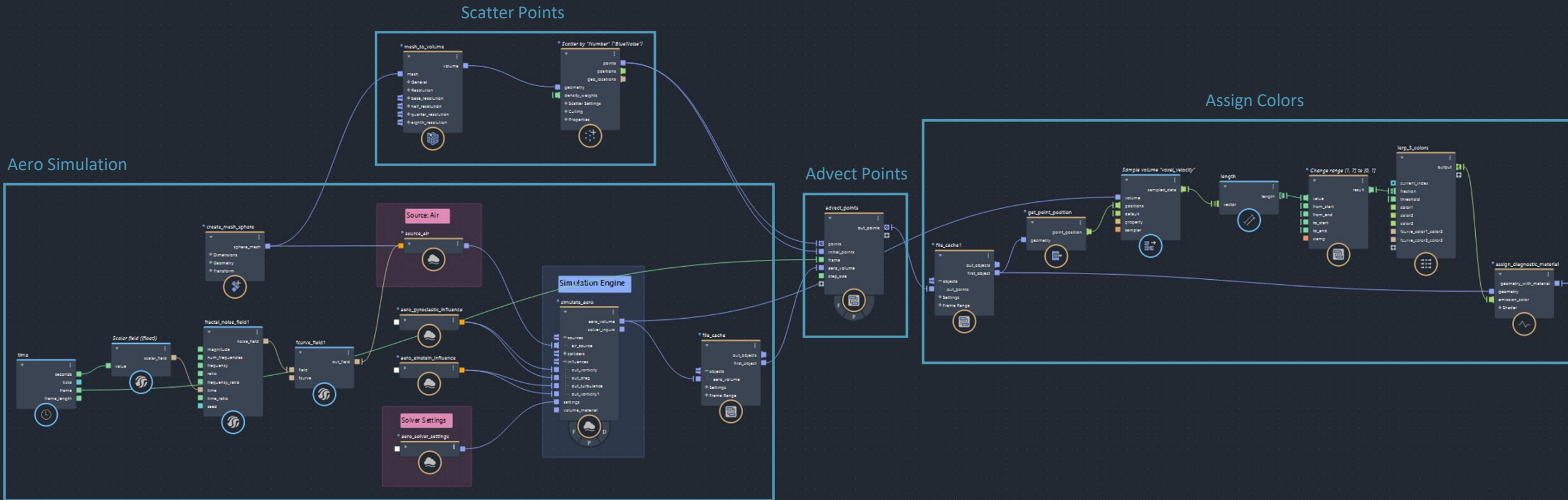


Volume-driven particle simulation

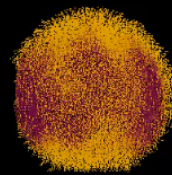
Color the points based on velocities



Volume-driven particle simulation

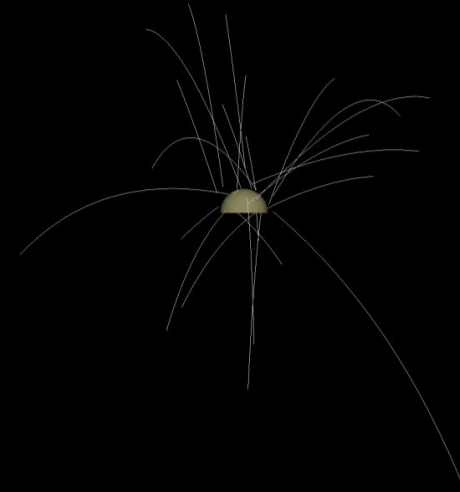
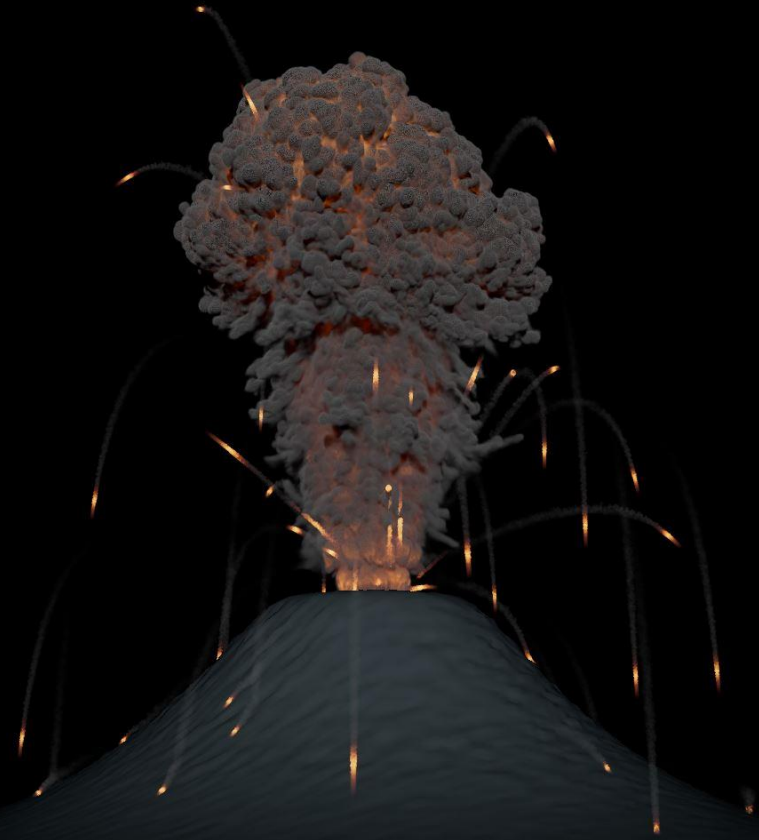


Volume-driven particle simulation



Volume-driven Particles Video

Particle-driven aero simulation

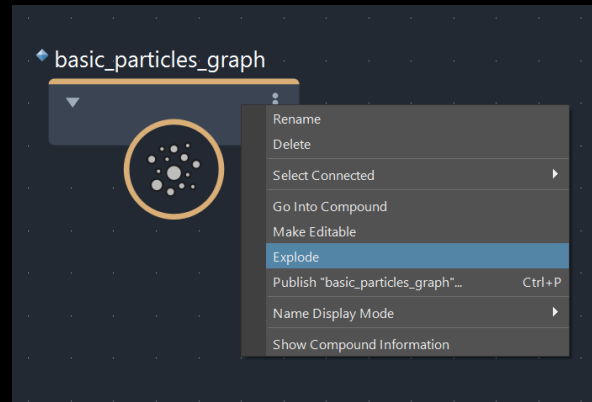


Particle Simulation

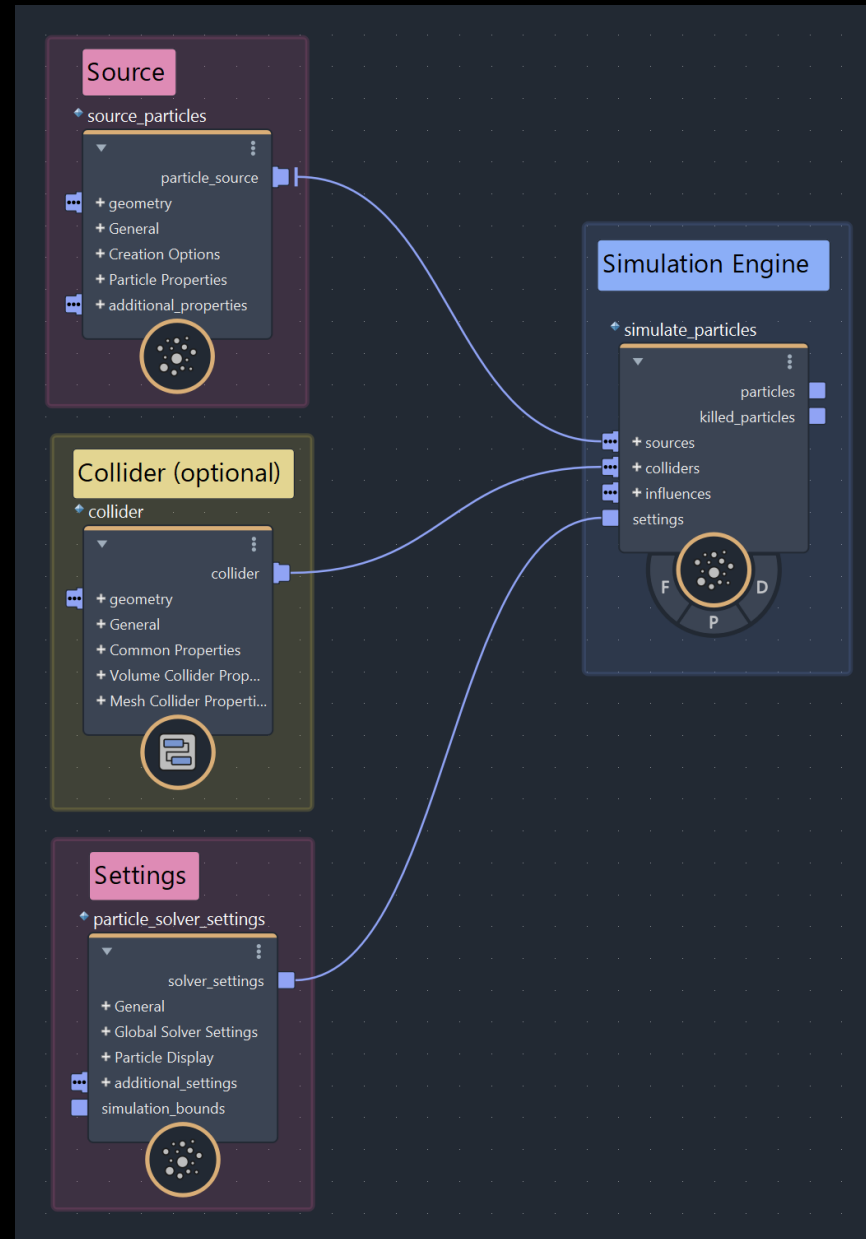


Aero Simulation

Particle-driven aero simulation

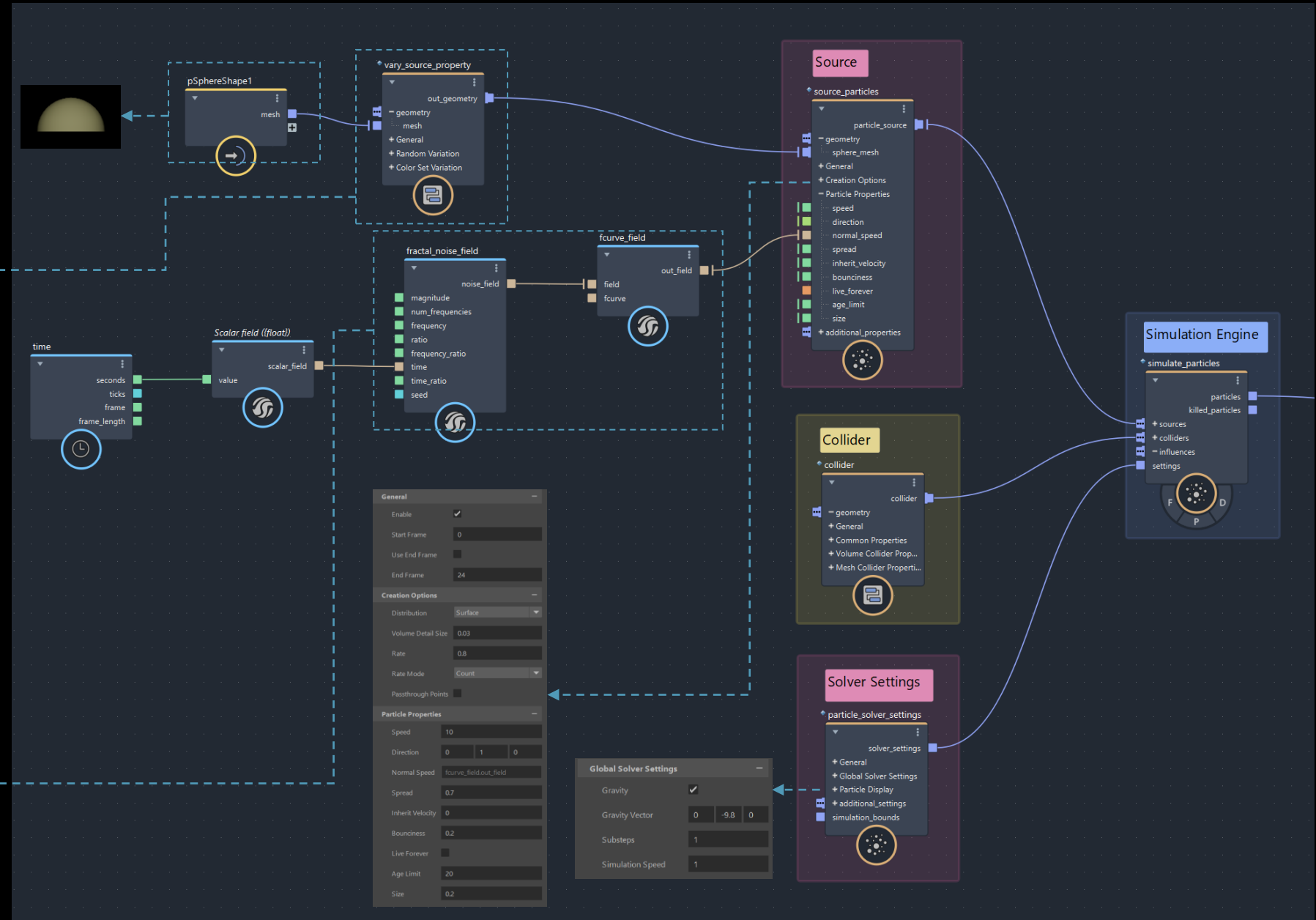
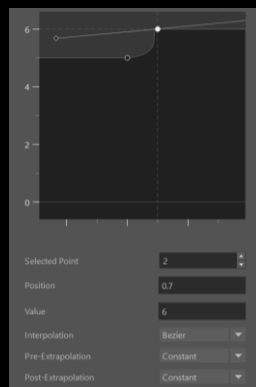
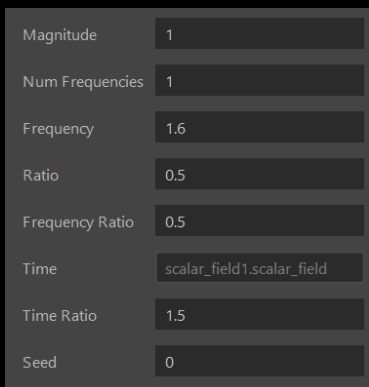
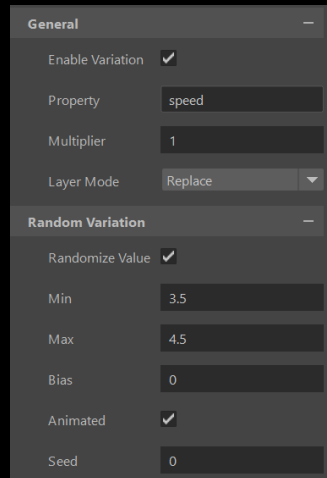


Start with a "basic_particles_graph"



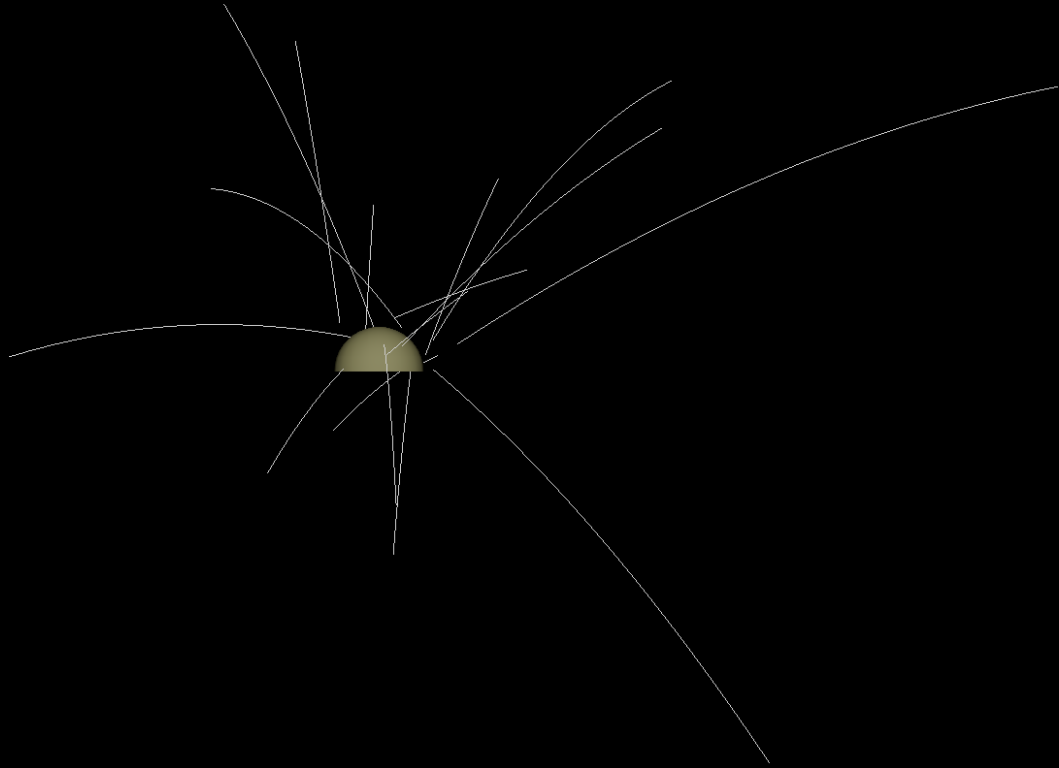
Particle-driven aero simulation

- Add “vary_source_property” to vary the initial speed of the particles
- Use a combination of “fractal_noise_field” and “fcurve_field” to vary the emission speed along the geometry normal

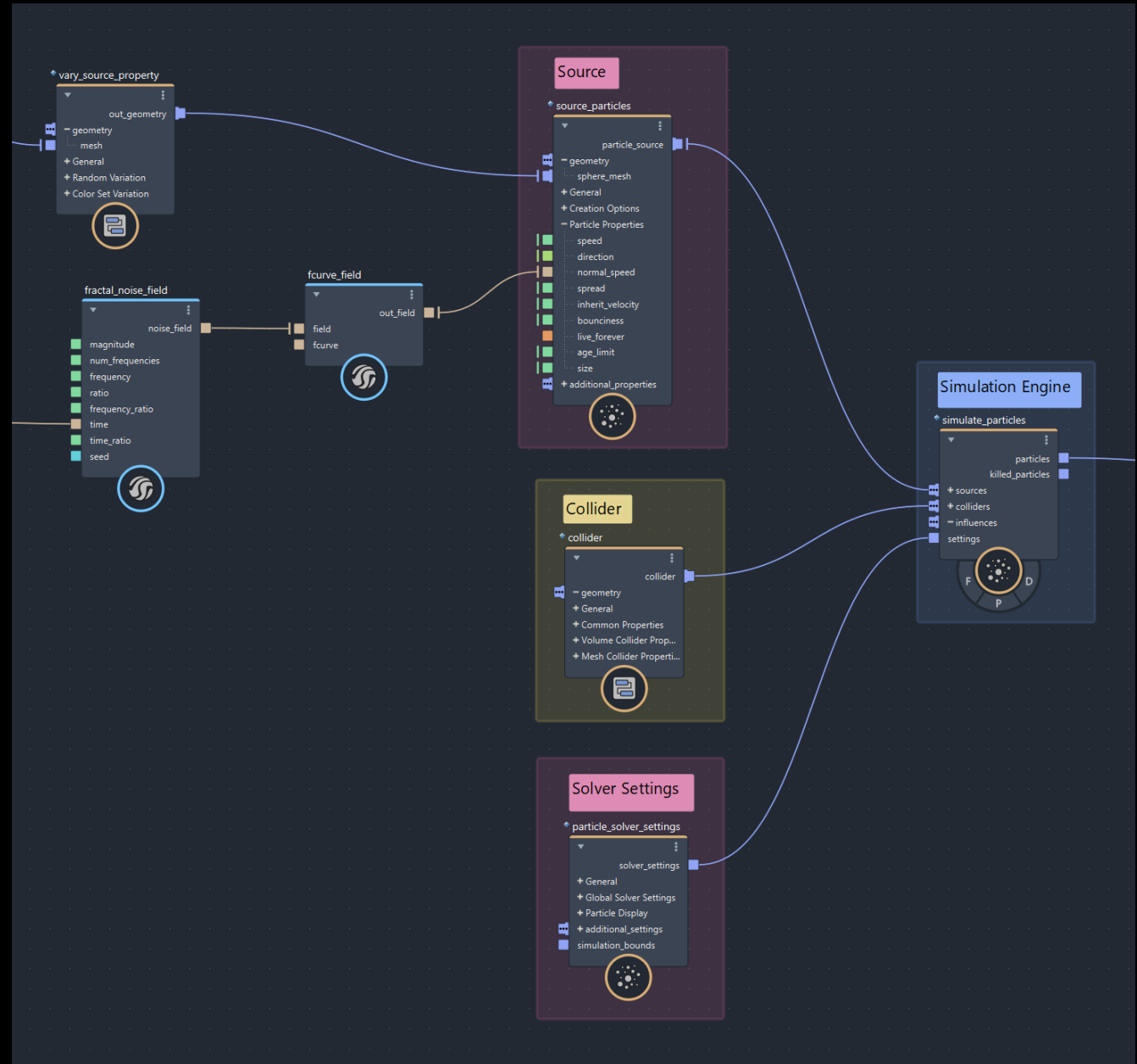


Particle-driven aero simulation

- Normal speed and gravity will result in a projectile motion of the particles



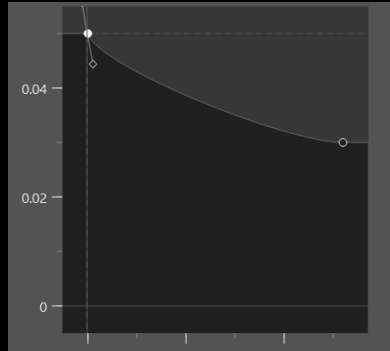
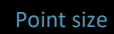
*White curves are trajectories of the particles



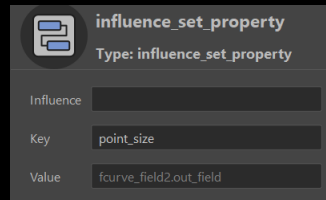
Particle-driven aero simulation

Add influences:

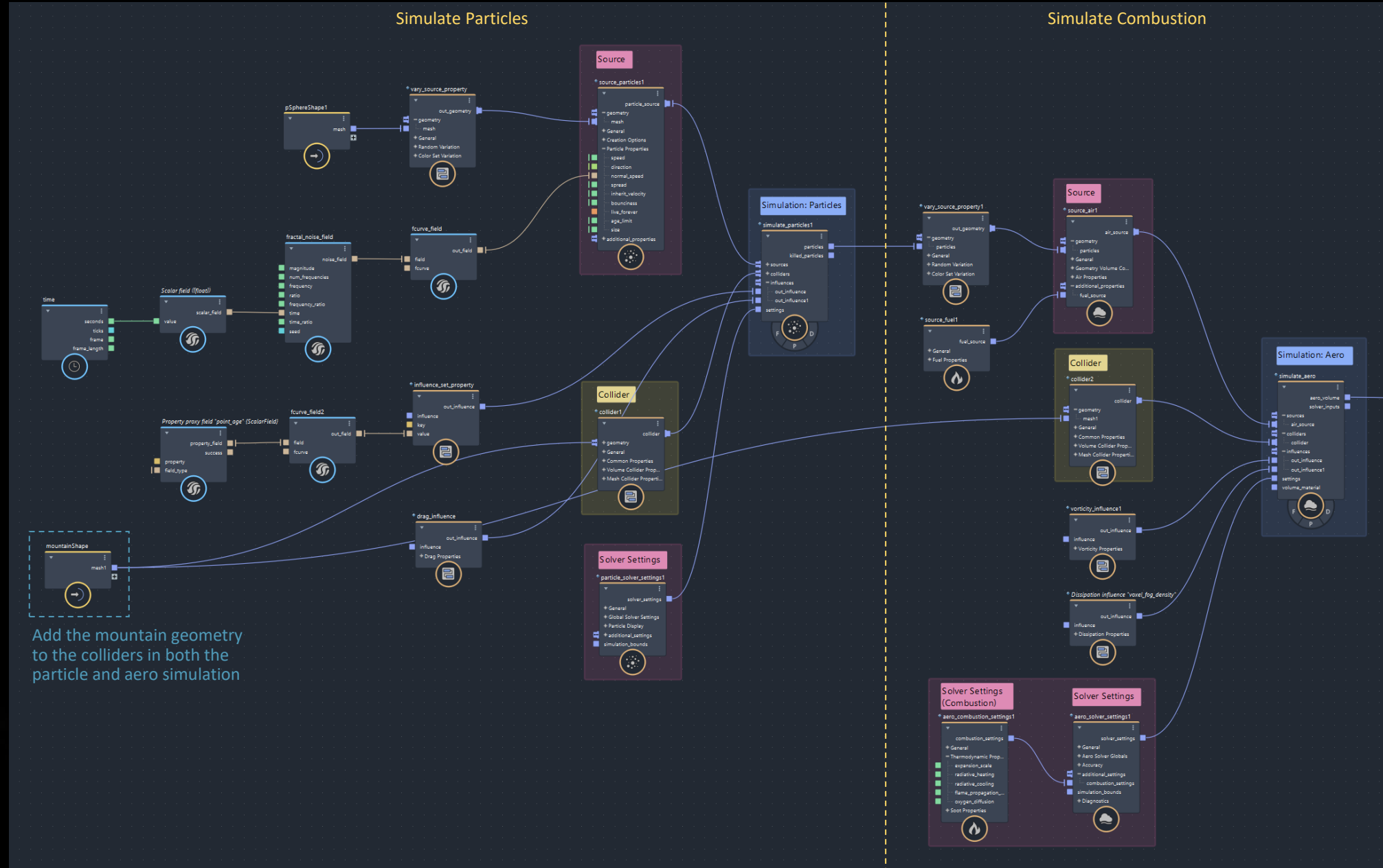
- Use a combination of “property_proxy_field”, “influence_set_property” and “fcurve_field” to set the point size so that it is inversely proportional to the point age.

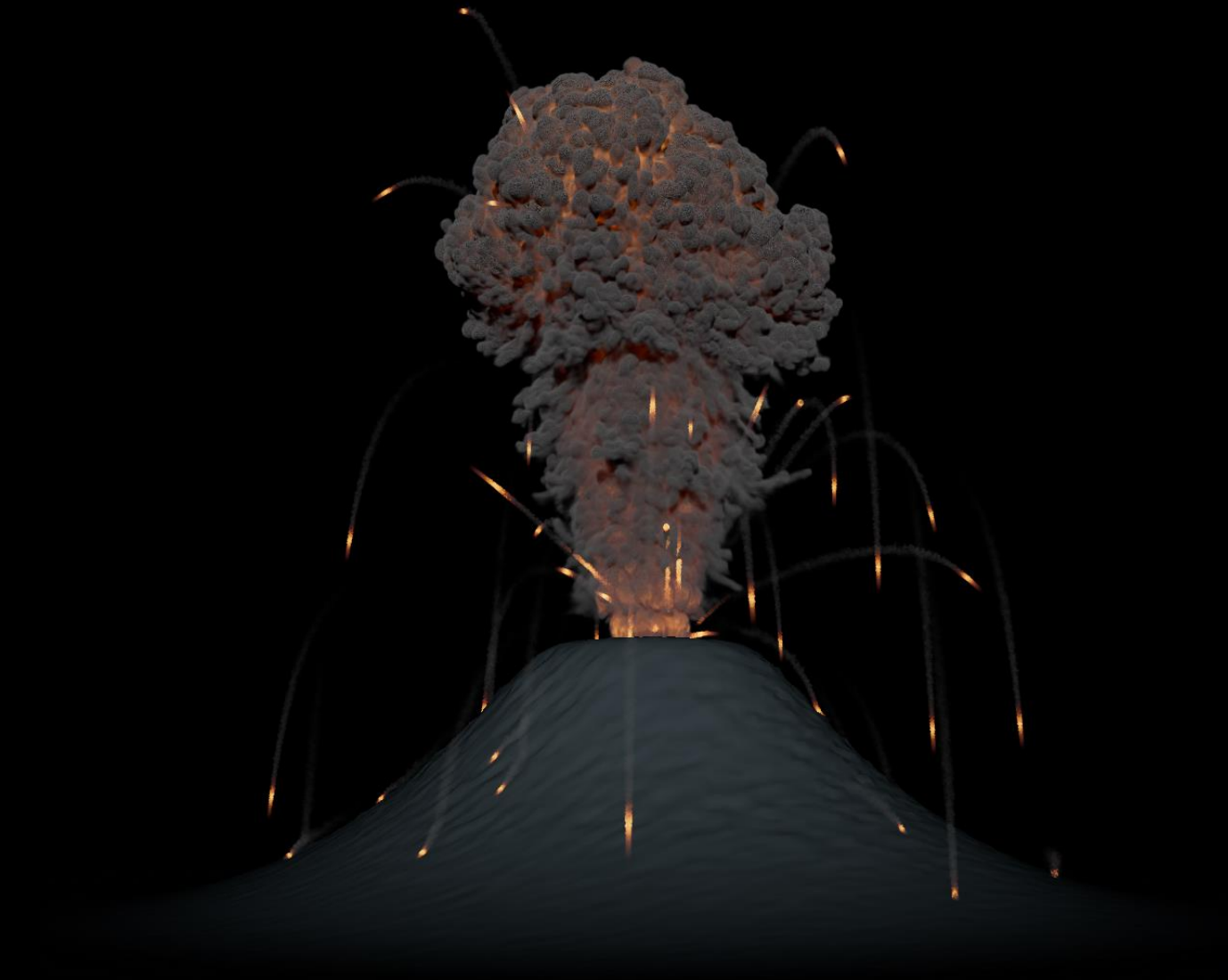


Point age

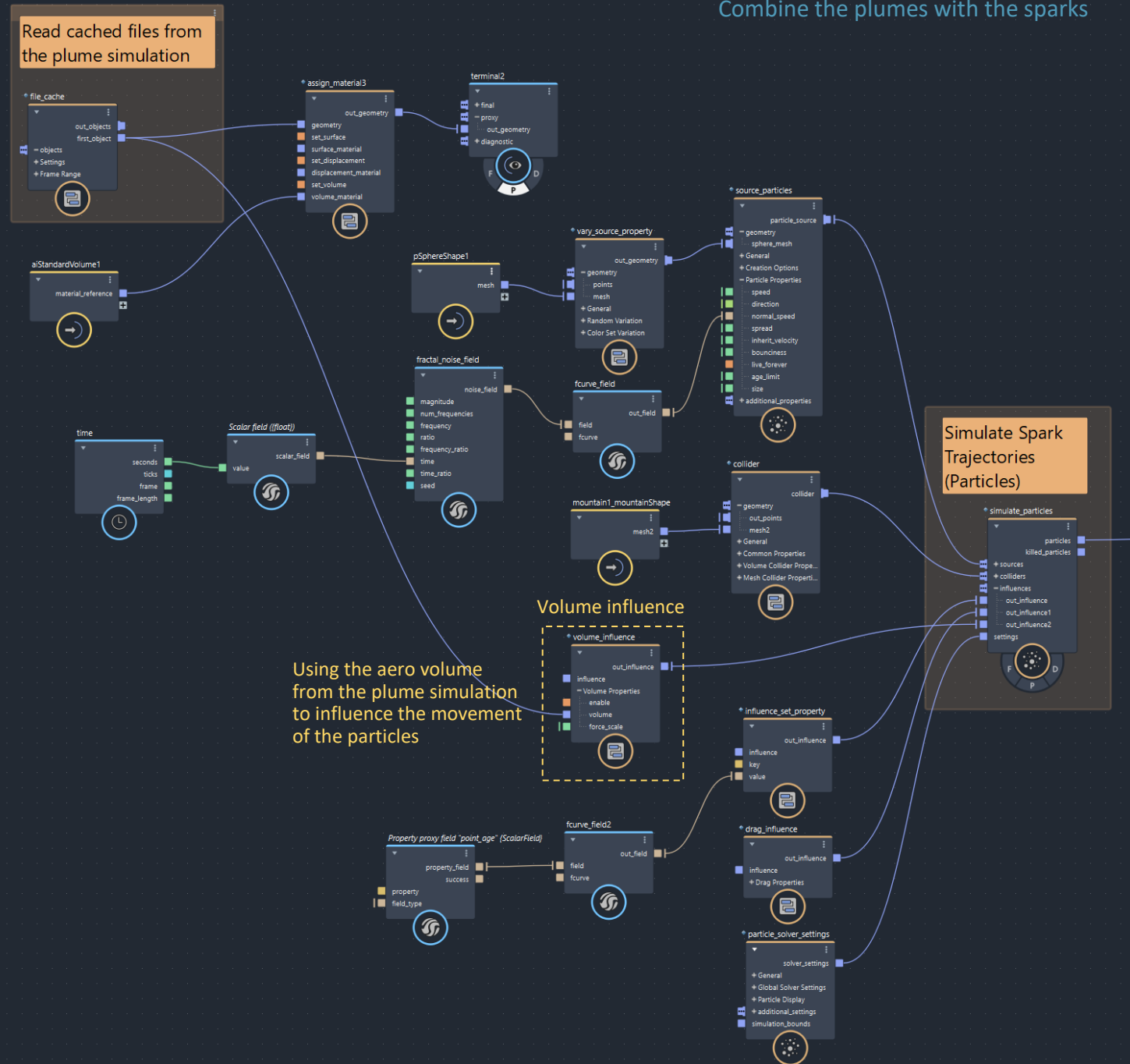
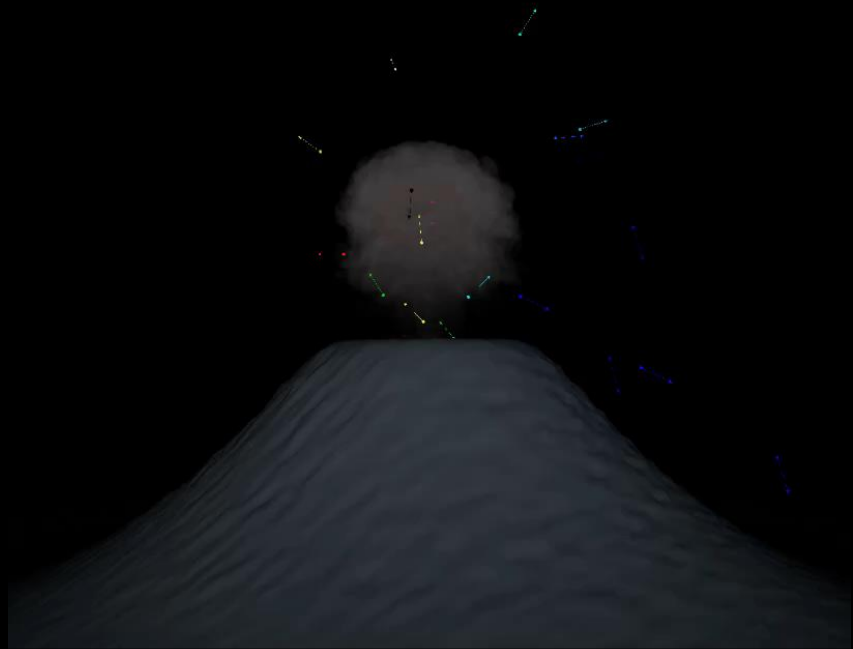


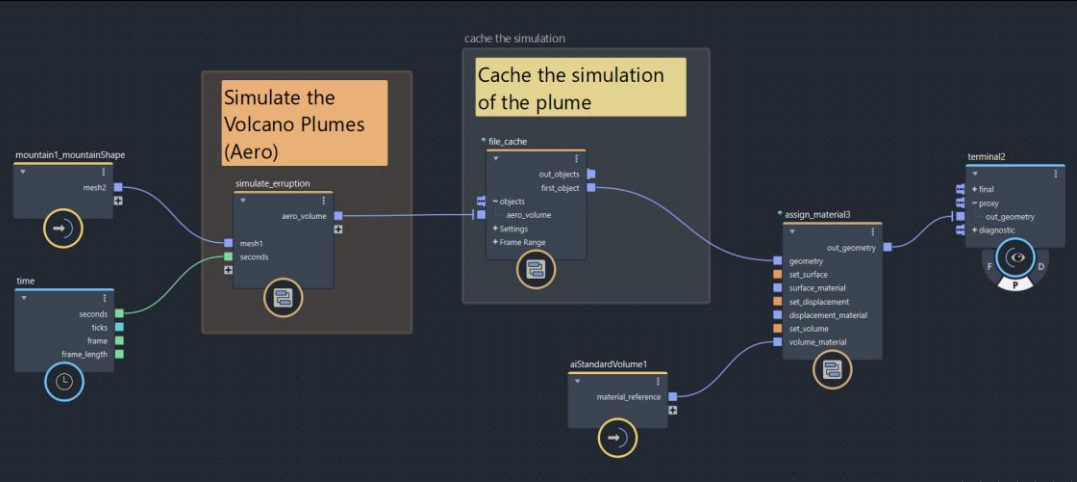
Particle-driven aero simulation





Particle-driven aero simulation





Step 1: Simulate the volcano plumes and cache the simulation

Step 2: Use the volume of the cached plume simulation to influence the simulation of the sparks

