

# Volumes



Volumes are objects made of density, such as fire or clouds.



Rendering of volumes should not be confused with [Atmospheric Volume Scattering](#), which is a global effect.



Volumes can only receive indirect lighting from other emissive volumes when the [Volume Ray Depth](#) is above 0.

## Volume Formats

- Rendering volumes with HtoA only works with [OpenVDB](#) files or VDB primitives.
- You can also develop your own volume plugin with the new volume API, see [Implementing a Volume DSO](#).
- It is also possible to render [particles as volume](#), with access to particle attributes as [user data](#).
- You can also render polymeshes as volumes.

## Volume Nodes

- [Arnold Volume](#) - Arnold volume object node.
- [Standard Volume](#) - Shader that defines the volume shading properties.
- Volume Sample [RGB](#) and [Float](#) - Shaders that sample a volume channel.

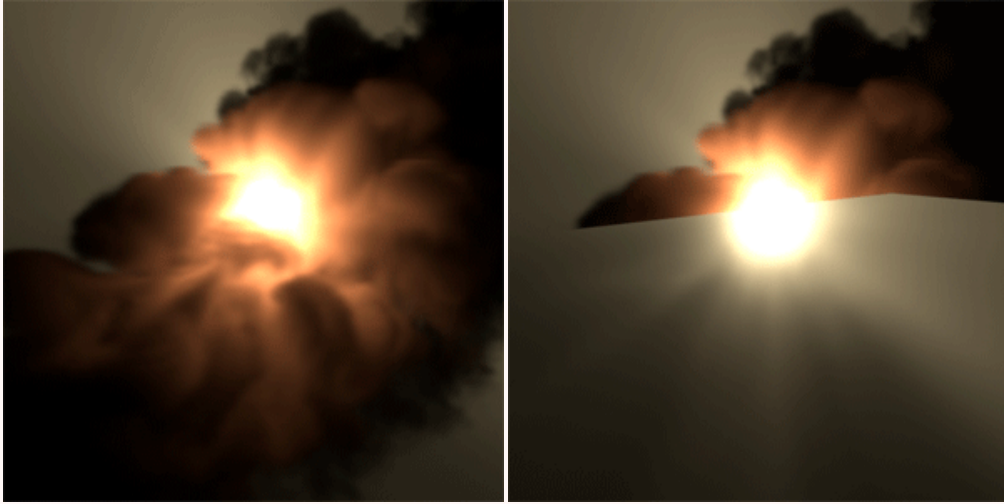
## Render Quality

Several parameters affect the overall quality of volume rendering:

- On the *Arnold ROP*: [Volume Diffuse Samples](#)
- On the *Arnold Light*: [Volume Samples](#)
- On the *Arnold Volume*: [Step Size](#)

## ! Volumes and Atmosphere Volume

Currently, *Atmosphere Volume* does not compose well against volumes. This is because atmosphere's return a single flat result that is opacity mapped on top of whatever is in the background of the pixel.



Left: floor plane geometry hidden. Right: floor plane geometry visible. Fluid renders incorrectly. Click images above to view animation.

