

Rendering a Cloud



This tutorial gives a step by step approach on how to render the [Walt Disney Animation Studios Cloud Data Set](#). The VDB files contained within the download are heterogeneous volumetric cloud model containing density data. We will render this VDB data using an *Arnold Volume* and shade it using a *Standard Volume* shader. We will light the scene using a *Physical Sky* connected to the color of a *Skydome* light.

Data

- Start off by downloading the cloud volume data from the link above and unzip the contents of the file. You should see various VDB files of varying sizes, reference images and a `README.txt` file.

Arnold Volume

- Create an *Arnold Volume* and under *Filename* open the file `wdas_cloud_sixteenth.vdb`. This is the lowest resolution version of the cloud data and so will be quicker to load initially (we will replace it at the end with the full resolution VDB file).
- Increase the *Step Scale* to make the volume softer with less scattering. A step size of zero means that the voxel size will be used as the step size. A recommended value for *Step Scale* is between **10** and **20** for this dataset.



Step Scale: 1. Rollover image for 20.

Lighting

- Connect a *Physical Sky* to the color attribute of a *Skydome* light. Adjust the *Elevation* and *Azimuth* of the *Physical Sky* to get an interesting lighting effect. Alternatively, you can just rotate the *Skydome* light in the Y direction.



Elevation: 45 (default).



Elevation: 10 (sunset).

Ray Depth

- Before you start rendering the volume, increase the *Volume* ray depth in the render settings to a high value like **50** (remember to increase the *Total* ray depth to **50**). This is key to achieving the realistic cloud look as the light will bounce many times inside the volume, making it appear much brighter.



0 (default)



10



25



50

Standard Volume Shader

- Create a *Standard Volume* shader and assign it to the volume. The following attributes were adjusted to give the volume the appearance of a cloud.



Scatter Color: 0.5 (default). Rollover image for 10.

The *Scatter* slider is maxed to 1. Increasing this value above 1 is a hack and should be used with care. The number should normally be below 1 to be energy conserving.

Remember to add '**density**' to the *Scatter Color Channel*.



Transparent Depth: 1. Rollover image for 15. Controls the depth into the volume at which the transparent color is realized.

Increasing this value gives the volume a much more cloud-like appearance.

Transparency depth is unit-dependent.



Transparent Weight: 0.368. Rollover image for 0.7. Increasing this value allows for more control over the density of the cloud volume.



Density: 1. Rollover image for 4.3. Increasing this value gives the cloud volume a thicker appearance.



Anisotropy: 1 (default). Rollover image for 0.5. Anisotropy should be above 0 as clouds are quite strongly forward scattering.

Final Render Settings

Once you are happy with how the cloud is looking, you are ready for final frame rendering.

- Replace the VDB file `wdas_cloud_sixteenth.vdb` with `wdas_cloud.vdb`. Bear in mind that this is the full resolution VDB file and so will take longer to render.



'wdas_cloud_sixteenth.vdb'. Rollover image to view 'wdas_cloud.vdb'

- Once you are happy with the lighting (and shading) increase the number of *Volume Samples* for the *Skydome* light to around **5** or **6**.
- Increase *Camera (AA)* to around **5**.
- Under *Sampling* in the render settings, increase *Volume Indirect* to around **3**. This will help to remove noise from the indirectly lit areas of the volume.



Volume Indirect 2. Rollover image for 3.

- Finally, render the scene. That concludes this tutorial on how to render a VDB cloud data set.

Once you have completed this tutorial, remember to take your head out of the cloud!

