Physically Based Precomputed Atmospheric Scattering

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Abstract

In this project we will implement radiative transport equation and precompute radiance for all view points, view directions and sun directions. We started our exploration of atmospheric rendering by experimenting with state-of-the-art real-time atmospheric rendering implementation provided by Bruneton et. al. described in detail in their 2008 Eurographics paper[1]. Their method renders the atmosphere in real time from any viewpoint from ground level to outer space, while taking Rayleigh and Mie multiple scattering into account. Also their method reproduces many effects of the scattering of light, such as the daylight and twilight sky color and aerial perspective for all view and light directions, or the Earth. Since we are not restricted to providing real-time solution for radiative transport we will attempt to implement a more physically accurate solution that would not be limited by some of the assumptions made by Bruneton et. al. for performance reasons. Figure 1, Figure 2, Figure 3, Figure 4.

References

[1] Éric Bruneton and Fabrice Neyret. Precomputed atmospheric scattering. *Comput. Graph. Forum*, 27(4):1079–1086, June 2008. Special Issue: Proceedings of the 19th Eurographics Symposium on Rendering 2008.

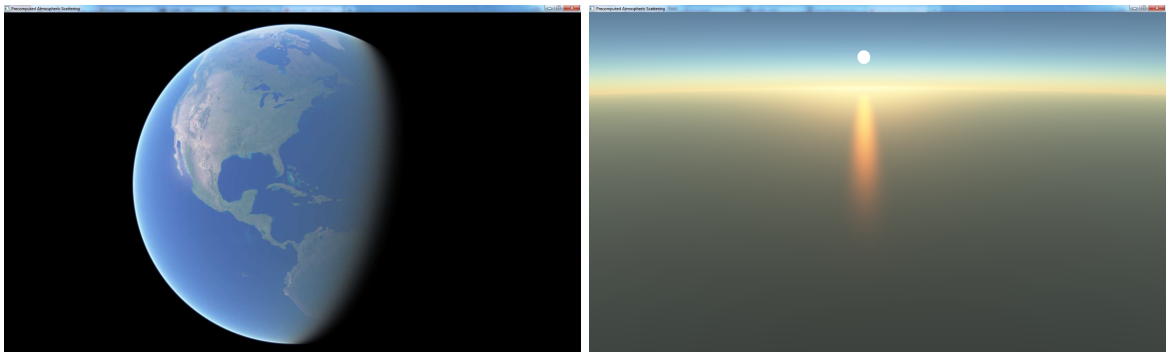

Figure 1: View of Earth from space and view from inside the atmoshpere at high altitude.

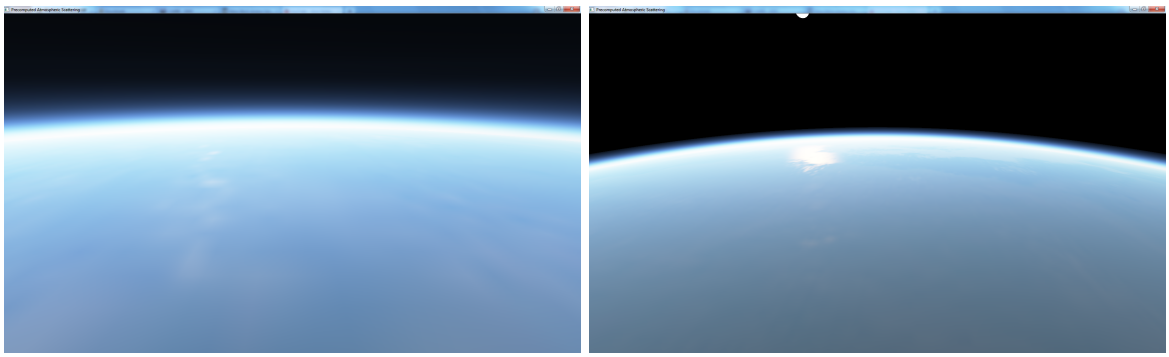

Figure 2: Views from space at the edge of the atmosphere.

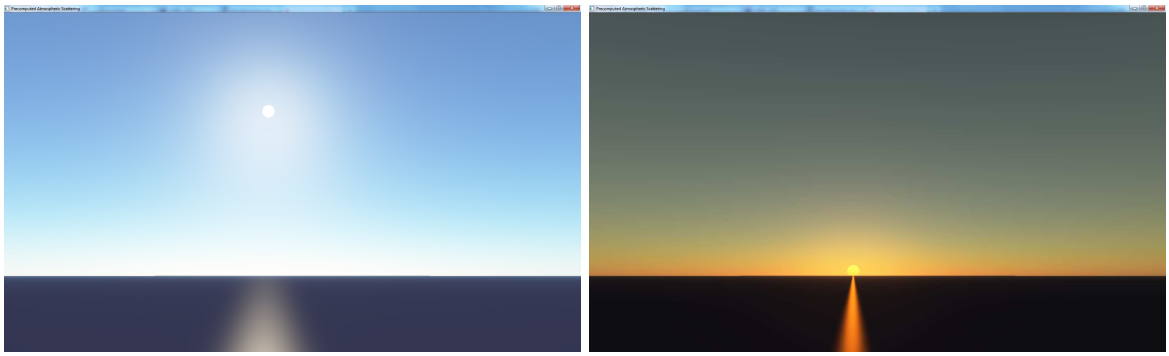

Figure 3: View of the daylight from the ground and view of the sunset the aerial perspective from the ground.

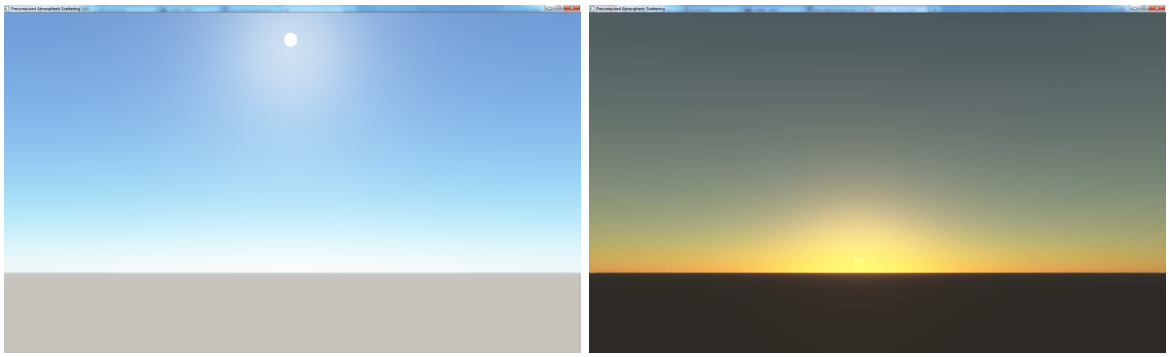

Figure 4: View of the daylight from inside the atmosphere and view of the sunset and the aerial perspective from inside the atmosphere.