

Reflection

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From my talk, I learned the basics of buoyancy frequency, which I never previously encountered. Even just with the derivations, I feel like I got an insight into how atmospheric physics is done, though I have a lot more reading to do. I didn't realize how important the barometric formula was, I used it to calculate roughly what the buoyancy frequency at ground level would be, might be a good idea to keep this formula in mind.

I was more interested in how buoyancy frequency plays a role in the ray-tracing problem. In general, it doesn't look like it directly affects the propagation or energy of acoustic waves over short distances, although the directional and attenuation affects are still present. Since my ray-tracing program is already computationally expensive as a classical model, I don't think I will include the non-linear effects of buoyancy frequency in the model, since the change in ray position and energy are negligible compared to other affects such as the uncertainty in the wind, which is also generated by gravity waves. I hope to improve the perturbation model with more knowledge of the buoyancy frequency, I have more reading to do on that which didn't make the final presentation.

Through this project, I read some materials by authors I had recognized from my own research (Sutherland, Bass, Revelle), and so it was a good method of introducing more authors to similar research for my project.

I found the presentation on atmospheric colours neat; I have never heard of Mie scattering before. Now I have a better answer to why the sky is blue, which honestly, every physics student should be able to answer with reasonable depth. The runaway greenhouse effect was interesting to learn about, I didn't realize that non-anthropogenic greenhouse gases would eventually cause the Earth to turn out like Venus, though at scales much longer than anthropogenic causes. The Bergeron theory of raindrop growth was interesting as well, it seemed like a similar problem to the mean-free path problem, but with a few other intricacies, such as how the raindrop attaches to the core.

I had more difficulty understanding the two other presentations, since they were less connected to what I already knew. But I understand more about the ionosphere, the regeneration of ozone, and the Chapman function, which may come up again in the future, so I will have a place to start if I need to look into these more rigorously.

In conclusion, I was glad to be able to take a "deep-dive" into the literature, it's given me a starting point on some works relating to ray-tracing with non-linear effects, and wind variability models.