Verifying Radiance Distribution Data Using Hydrolight Software

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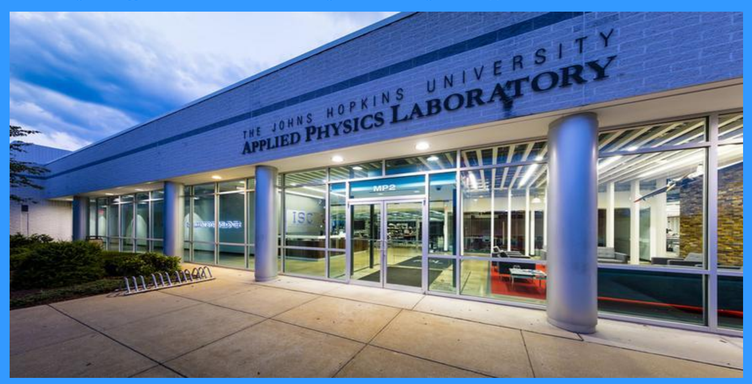
College Park Scholars Academic Showcase, May 1, 2020

Introduction

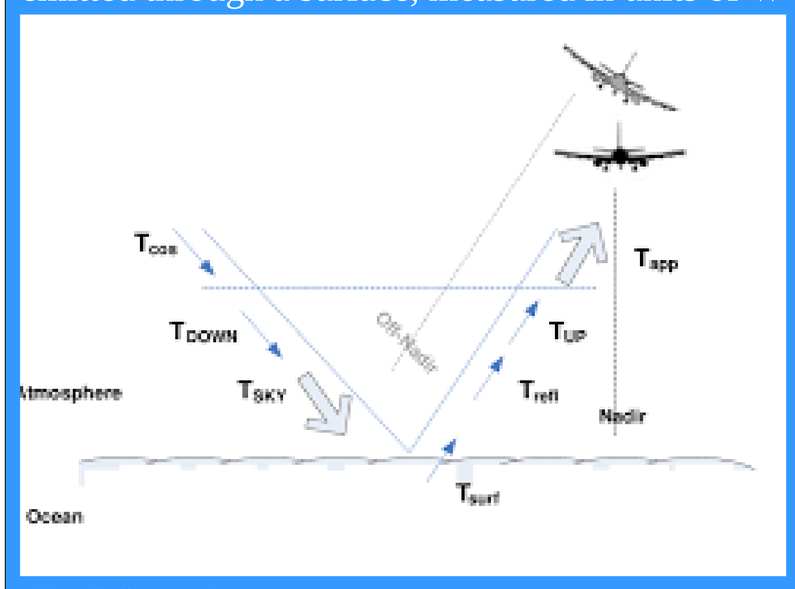
Over the summer I returned to my summer internship at Johns Hopkins Applied Physics Lab in Laurel, MD. I was tasked with verifying the accuracy of my department's ocean surface data.



Note: Due to the nature of APL being a government contractor I am not allowed to disclose any specific APL data or models I may have used during my internship.

What is a Radiative Transfer Model?

This model describes the amount of radiance that is absorbed and reflected from the oceans surface. Radiance is the amount of light emitted through a surface, measured in units of W·sr−1·m−2·nm−1.



Site Information:

Johns Hopkins Applied Physics Lab

11100 Johns Hopkins Rd, Laurel, MD 20723

Mimi Szeto

Johns Hopkins University Applied Physics Lab solves complex research, engineering, and analytical problems that present critical challenges to our nation.

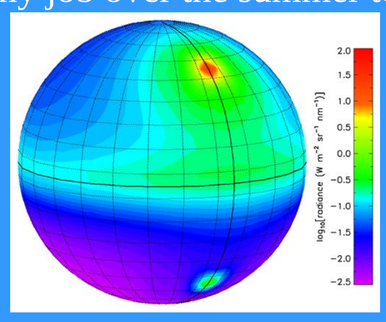
My goal was to verify ocean data obtained by my department using Hydrolight software.

Project Goals:

The goal of the project I worked on was to verify the accuracy of data already created by APL with a trusted public software, in this case Hydrolight. My supervisors wanted Hydrolight to be run various times, each time with a new set of ocean conditions to conform to.

Activities:

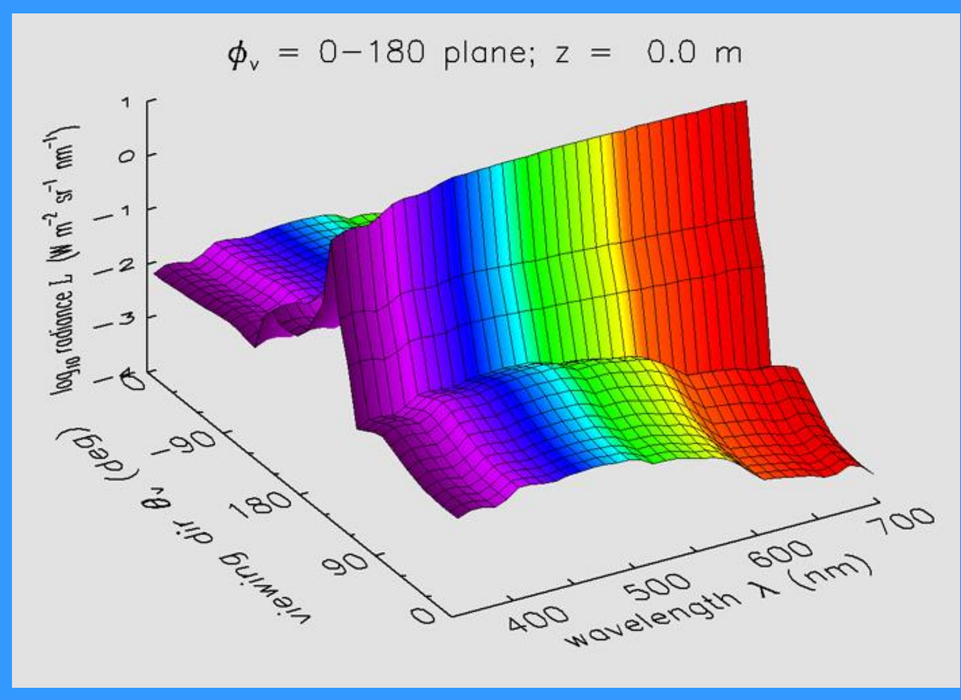
While on site my job was to learn how to run the Hydrolight software, which runs a radiative transfer model, and compare it with APL's current ocean data. Nobody in my department had used the software before so it was my job over the summer to learn how to run it.



This image of a globe plots radiance in each region based on its intensity (W·sr−1·m−2·nm−1) with purple being low levels of intensity and red being higher levels of intensity.

Impact:

This project gave me great experience in working with and developing software which I had little experience in before. It also taught me how to be self sufficient in my work and research.



This is an example of a graph that could be made using Hydrolight. It displays the wavelength of the light measured, where the light was received after hitting the water, and radiance value of that light. From this graph you are able to pull out how much radiance was measured at each sun angle and wavelength so that you can compare the highest and lowest data points.

Discussion: Running the Software

The Hydrolight software is an extremely complex model that takes into account more variables than just simple things such as the angle of the sun, it also creates its own model of how ocean waves move. This sea surface rendering can be used to model all kinds of ocean conditions.

Future Work:

Despite the amazing experience that working with my section provided I don't think that I will continue working with ocean data in the future. I gained a lot of great experience in developing software, but the subject of oceanography isn't where I would like to focus my career. I hope to one day use a mechanical engineering degree to go into design or consulting where I use my knowledge of software from this experience to my benefit.

Acknowledgments:

Thank you to Mimi Szeto for overseeing my work and teaching me new technical skills. I would also like to thank Dr. Holtz and Dr. Merck for advising this project.