

Sea Secrets Review – An Evening with Dr. Ved Chiryath

On Tuesday April 5th I attended a virtual discussion hosted by Dr. Ved Chiryath at the University of Miami School of Marine and Atmospheric Sciences. Dr. Chiryath presented an overview of his biography and his past and current research.

Dr. Chiryath has developed a unique confluence of skills in his education. He developed an intense interest in telescopes as a child. That interest in telescopes led to exploring an interest in photography as a teenager. These interests led to a passionate exploration of the stars at an early age; Dr. Chiryath discovered a planet while still in high school.

Dr. Chiryath explored these interests at the University of Moscow for his undergraduate degree and continued on to his PhD at Stanford. In that time and beyond he has developed a number of key technologies that have greatly expanded our ability to accurately map the ocean floor.

One of the challenges of mapping the ocean floor is the confluence of minimal light and the distortion created by waves. The water absorbs approximately 50% of the light that hits the surface. However, these particular traits also offer an opportunity. When light hits the ocean surface it concentrates the light in these magnified bands. Dr. Chiryath developed several technologies; one of which sends bursts of non-visible light via an LED placed upon a drone. That non visible light penetrates the surface of the water and some proportion of that light is reflected back to a satellite. This information is coded and transformed into an image. This technology is allowing NASA to develop a more accurate map of the ocean floor that is hundreds of feet deeper than has previously been possible.

While this information is incredibly valuable it is still only solving one of several problems. The sheer size of the data that an accurate map of the ocean floor requires is an enormous expense. The fact that the computers are still in the process of learning to differentiate coral from rocks is another challenge. The amount of time and energy it would take for the relevant programs to learn how to differentiate is a steep challenge.

For that challenge NASA has developed a game/program called Nemo-Net. (<http://nemonet.info/>)

Nemo-Net is a game that anyone can download. The goal of the game is to identify coral. Similar to the “Captcha” questions that websites use to verify that you are a human, the dual purpose of verification and assisting with machine learning is captured within this game. People who play the game are engaged in an educational and fun activity while they are assisting NASA with the task of teaching their machines how to successfully differentiate between coral and rocks.

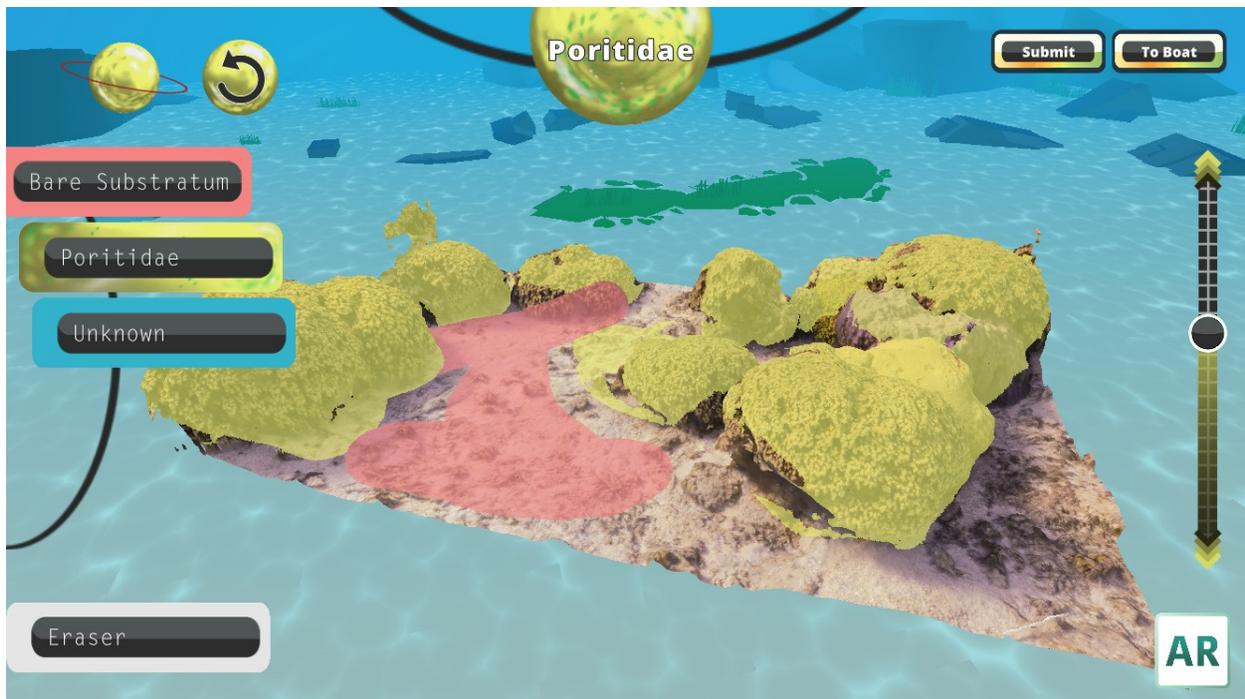
This was an exciting lecture to watch. I am always eager for the opportunity to have students participate in citizen science. This also happens to coincide with material I am teaching my math applications class. We recently began learning about the basics of machine learning – the idea that if a computer has enough information that is verified to be true that it is possible for a computer to begin to accurately identify things. Given that we are learning about this I have engaged my students in the process of becoming coral identifiers.

As an extra credit assignment they are engaged in one hour a week of coral identification. The coral identification occurs by “painting” images of coral in one color and then painting the images of the

substratum in a different color. By differentiating between what is coral and what is not they are assisting the NASA program to identify as well. This will vastly speed up the time and reduce the intensity of resources needed to identify coral on the subsurface.

To get credit students to share their stats at the end of each week to demonstrate the amount of time they have spent working on the detection.

Every student has been given a codename and a checklist to see that they have done the work; the badges they collected along with a screenshot of their work.



The students begin the detection as of this week. They will reflect on the challenge and show their work. They were excited at the prospect of doing something fun that would offer them an externally validated grade in compensation. It was a fair trade since this wouldn't be something that they would normally do on their own and the chance to get involved in playing a small but vital role in improving our understanding of the ocean floor is a valuable educational experience.