CLUSTER 3: LIVING OCEANS AND GLOBAL CLIMATE CHANGE

In the first week of COSMOS, Cluster 3 has hit the water swimming. Our faculty are Dr. Pomeroy, Climate Change and Dr. Lai, Oceanography. Teacher Fellow, Mr. Tim Towler of San Diego High School of International Studies, is new to COSMOS this year. Below are student observations:

“We kick started our first full day at the beautiful campus of Scripps Institution of Oceanography with Dr. Lai. We got firsthand experience with sea creatures in their habitats. We learned about the marine ecosystem and were able to dissect a lizard fish! In the morning, students explored the tide pools north of Scripps Pier. There were amazing sea creatures to discover and observe. By the end of the day we got exclusive access to the Scripps pier and were able to get an amazing view of the tide and waves, even able to spot stingrays.”

- Jennifer C.

“Tuesday we had the amazing opportunity to have Dean Albert Pisano lecture us. We discovered how engineering can help improve society inspiring many of the COSMOS students to believe in their own engineering capability. After the lecture, we focused on the information presented and how the information was presented. Focusing on the delivery of the presentation will help us for our future presentations. We broke off into project groups for our final science project with three groups remaining on the UCSD campus with Dr. Pomeroy, two groups traveling to SIO with Dr. Lai.” Each group was introduced to their mentor and began to brainstorm ideas for the topic of their project. “

- Ash L.

“Wednesday, we had our first lecture in global climate change. The instructor, Betsy Stone, introduced us to albedo, the ratio of the amount of radiation reflected from one surface to the amount of radiation striking the surface. We used equipment such as a temperature probe and light sensor with a LabQuest unit in order to determine the percent reflectivity of different surfaces by using colored paper to model them. Next, we received a quick review on molecular chemistry and learned the criteria for gases to be greenhouse gases. The lecture continued on infrared spectroscopy and we did a virtual lab on Hooke’s law and the spring constant. We went to the Pomeroy Lab nearby to watch an infrared spectroscopy on a balloon made of rubber and filled with helium.”

- Bryan P.

We are still at the beginning of our four weeks with COSMOS and have just begun to delve into our group projects, which will be challenging yet rewarding. We look forward to the experiences yet to come and our project presentations at the end of our investigations.
Our focus concluding week 1 and through week 2 is experimental design, ethics and data gathering. The group projects are coming together, with groups collecting pre-lab data to set boundaries for their experimental work in Week 1. Variable identification, hypothesis formation and protocol design are in process, with data gathering through Week 2.

Thursday, we learned about the myriad research sources available at UCSD through the library tour. By utilizing the library’s online databases, we will be able to improve our projects, ethics essay, and academic debates with scientific information. In our Science Communications class, we discussed our Ethics Essays, final projects and began formulating hypotheses under Mr. Towler’s guidance. These hypotheses were further developed in our group meetings after lunch with the input of UCSD professors.

- Orianna X.

Friday, we split our day in half to learn about both aspects of our cluster: climate change and living oceans. The morning lecture was given by a guest professor from the University of Iowa, who taught us how to analyze spectrometry data in Excel with various formulas and filters. In the afternoon, we headed down to SIO back to the Scripps Institute of Oceanography and spent a day learning more about the Rocky Intertidal ecosystem. We also went to La Jolla beach and searched the shore for sand crabs! Later, we would test the different salinity and temperatures of multiple sites on the beach including a rocky cliff and on the shore.

- Tony D.

Wednesday, our day began with lectures from Doug Collins about Aerosols, Clouds and Climate, Greg Matters on the Uncertainty in Global Climate, and Michael Shaloski on Pressure and Temperature supersaturation. After each topic we were able to investigate the topics by looking at formation of bubbles in Root Beer based on the size of condensation nuclei introduced. We used compressed CO2 to explore the effects of gas expansion on temperature, and relate that to what happens as materials rise in the atmosphere. We finished the morning with a lab using pressure, water and condensation nuclei to create clouds in a bottle that could be visualized using a green laser. Today, we’ll be visiting the 30m wave flume experiment at SIO and be able to see big science in action.

- Yu-Jane C.

- Joanne C.

- Mr. T and our amazing RA’s, Bryan and Tamika, for helping us out so much! Shark bait, ooh haha!

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Week 3 for Cluster 3 has focused on data collection for final projects. Our Science Communications classes have been used to address presentation styles and techniques and to discuss the lectures from the previous sessions.

On Thursday, Cluster 3 visited the Hubbs-SeaWorld Research Institute in Carlsbad and the Birch Aquarium at Scripps. At the Hubbs-SeaWorld, we saw how white sea bass were raised from larvae to enormous yard-long fish, and then released into the wild for game fishing. We saw how they tagged the fish in the cheeks to keep track of them (if you ever go white sea bass fishing, give them your fish heads!). At Birch Aquarium, we were able to learn more about the environment and ocean biosphere while gazing at the beautiful tanks full of fish, corals, sea stars, anemones, and seahorses - just to name a few. Overall, it was a very interesting and educational day. But one disappointment: there wasn’t enough time to fully enjoy the aquarium!

- Sara Y.

On Friday, we went down to SIO and heard a lecture about aerosols and the work that’s done at the wave flume experiment. Afterwards, we went to tour the wave flume and learned about the work they do, what a typical day was like, and saw all the machinery. It was definitely a unique experience! In the afternoon, we were able to see one of the largest collections of fish and saw some incredible preserved deep sea fish. We also saw a collection of invertebrates, which included two of the largest squid we’ve ever seen! We ended the day with an interesting lecture about classification, taxonomy, and cladistics.

- Maggie W.

On Monday, our cluster got to go down to Scripps Institution of Oceanography to receive another lecture from Dr. Lai. This lecture was the most extraordinary out of all the previous lecture that he has given. The lecture was given on the pier down at the beach. Cluster 3 students were expecting a normal lecture but couldn’t believe their eyes when they saw what Dr. Lai had stored for us. His lecture consisted of us dissecting a 2 day dead 4 foot long mako shark. In the dissecting process we got to see all of the body parts of the animal and obtain information about the life of the shark. Following the dissection we got another lecture in a classroom about evolution. I learned the many evolution theories such as Darwin and Wallace’s theory: they both had the same theory “descent with modification”.

- Lucerito L.

This Tuesday we got to go to a fantastic Discovery lecture by the National Geographic Explorer Albert Lin, and everyone loved his presentation about his travels and research on Genghis Khan in Mongolia. We also worked on our final projects as well. At Scripps Institution of Oceanography we executed the main part of our final project, measuring thermal effects on arthropod’s aerobic capacity. For the project, we heated up the temperature while measuring the respiration rate of one crab as a control group and then ran the other crabs on a treadmill while timing them. At the end we collected our data and headed back to ERC for the Cosmos 10th anniversary dinner.

- Allison M.

The morning of our third Wednesday at COSMOS, Cluster 3 trekked to the Natural Science Building for our lab and lecture with Dr. Pomeroy. Early on the COSMOS board members stopped by to see us in action, then moved on to Clusters 1 and 9. This week in the lab we're focusing on ocean acidification from carbon dioxide and how it's affected by climate change. We constructed and calibrated our own pH probes, measured the pH of ocean model systems and collected data on sea water acidity. The data taken will then be put into Excel as we learn how to compute and organize within the program.

- Ava S.

With just over a week to go this summer, we are preparing for GeoEngineering debates on Wednesday, and practicing presentations on Friday. Our Cluster is looking forward to presenting our projects to parents on our final day of our summer adventure into The Living Ocean & Global Climate Change.
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Our final week at COSMOS concludes four weeks of adventures of science. From SIO to the Main Campus at UCSD. From the Birch Aquarium to the Hubbs Marine Hatchery. From the Chemistry Lab to the Pier and Tidepools, we have had many fantastic experiences.

Thursday after the Cluster Information Lecture, we went to our morning Science Discovery session, and Mr. T taught us about expressing error in our projects, to help us finish them and prepare for the presentations next week. In the afternoon, our cluster split up and went to SIO or to the NSB to work on data collection for our projects.

- Alex W.

Friday at NSB, we met Sherry Seethaler, acclaimed author of Lies, Damned Lies, and Science. After studying Dr. Seethaler’s book for our impending geoengineering debates, her lecture served as a benevolent validation of our hard work. After walking back to ERC for lunch, we went down to SIO, Ritter Hall, where Dr. Lai passed out dissection papers - we knew that the room would start smelling promptly. Five minutes later, we each had a squid, shrimp, huge fish, and a mouse and were given the simple directions “DISSECT” via the blackboard. My partner Kalvin and I were lucky enough to have been given an especially large squid, so we started with that. An hour later, we had dissected all but the mouse, as it “hit close to home” for some of us. Kalvin and I quickly got over the mammal aspect of the mouse and tore into the project - literally. After our dissections, Dr. Lai helped us use our observations of structure to create a cladogram. We finished the day fishing from the end of Scripps Pier, a new experience for most of our cluster. Good day. A little ripe, but good.

- Kate M.

Monday, we went back to SIO, where Dr. Lai lectured on Polar Ecology and osmoregulation. We also went to the Scripps Pier to do water sampling from depths, dissolved oxygen testing, turbidity measurements and examine the part of the flume that we had cleared. After that, we had lunch at Scripps and enjoyed the beachside view. Finishing lunch, we headed to Ritter Hall to examine various types of living primitive fish and amphibians. After the hands-on experience, Dr. Lai began the second part of his lecture about “Dead Zones and Ocean Acidification.” After the second part of his lecture, we headed out for a last visit to the beach to enjoy the rest of the day and splash in the water.

- Kalvin L.

The last couple of days, everyone is rushing to finish any data collecting so that they can finish their final project. On Tuesday, everyone started off their day with the discovery lecture from Prof. Olivia Graeve on material science. After, it was just a busy day for everyone. Our groups of different project topics met at NSB and SIO to make any finishing touches for our final project research. Graphs, data tables, charts, and procedures were all challenging areas that we encountered to put together our final projects. PowerPoints are coming together, and we are all excited to present what we have been researching for the past 3 weeks!

- Ben L.

On Wednesday, we were fortunate enough to see the beautiful ocean view from SIO one last time. There, Dr. Francesca Malfatti introduced us to the massive world of marine microbial biogeochemistry. She explained how anthropogenic impacts on the environment even effect the smallest of organisms. Afterwards, we were able to visit her laboratory and see the kind of work she and her colleagues do...and the incredibly expensive technology they use! In the afternoon, we had our GeoEngineering debates.

- Tania M.

One the last day, all five of our groups worked diligently in the morning during our Science Communications class and all throughout the afternoon at NSB. I saw all the groups practicing their speeches and finalizing their presentations as Saturday’s final presentation is fast approaching. There are only two more days of COSMOS and we are all in the final stretch to the end!

- Brendon N.

All the students in Cluster 3 have done a fantastic job researching their topics, conducting their data collection and analyzing their data. Their project presentations look great and I’m very proud of the accomplishments of all our cluster’s participants. We appreciate all the hard work of the Cluster Faculty and Cluster Assistants in helping our student’s flourish.

- Mr. Towler