SESSION 1B

FROM RIVERS TO THE SEA

Session Moderator: Virginia Armbrust, Oceanography
MGH 082A
12:30 PM to 2:15 PM
* Note: Titles in order of presentation.

Understanding the Temporal Variation of Methane Seepage at Southern Hydrate Ridge (SHR) Using Acoustics

Bing Yu Lee, Senior, Earth and Space Sciences: Geology, Oceanography
Mary Gates Scholar, UW Honors Program
Mentor: John R. Delaney, School of Oceanography
Mentor: Susan Hautala, Oceanography
Mentor: Brendan Philip, Oceanography

Methane reservoirs are commonly found throughout the world's oceans and the release of methane from seafloor reservoirs is thought to make up 5 to 10% of the global atmospheric methane. In fact, the greatest deep-sea mass extinction in the last 97 Myr during the Paleocene-Eocene Thermal Maximum (PETM) may have been caused by methane release from seep sites along the upper continental slope margin. Recently, methane reservoirs along this margin have been gaining attention due to their potential to accelerate current global warming. Changes in seafloor pressure and temperature could destabilize these seafloor deposits and cause methane bubble plume release into the ocean. At SHR, an extensively studied active seep site located ˜90 km offshore Oregon, discontinuity in methane plume release was observed, but still not well understood. Hence, using Acoustic Doppler Current Profiler (ADCP) and pressure data archived by the Ocean Observatories Initiative (OOI) Cabled Array, we are investigating the potential correlation between tides and the presence of methane plume at SHR. Our study detects methane plume structures based on the proxies of echo contrast caused by acoustic-bubble interaction. By analyzing the derived plume structures and their correlation with 226 tidal cycles, we expect a trend of plume release triggered by low tides. Our study provides the first high-temporal-resolution analysis on the methane plume release at SHR using OOI acoustic data.

POSTER SESSION 2

Commons East, Easel 58
1:00 PM to 2:30 PM

The Effects of Salinity Shifts and Compatible Solutes on the Growth of Bacteria

Annie Shoemaker, Senior, Microbiology, Physics: Applied Physics
Mentor: Jody Deming, Oceanography
Mentor: Shelly Carpenter, Oceanography

When bacteria experience high salinity environments, such as the brines of sea ice, they take up compatible solutes to protect against osmotic stress. Examples of compatible solutes include amino acids, betaines, and other organic molecules that accumulate in the cells, balancing the osmotic difference between cytosol and external environment without impacting intracellular functions. I am exploring the mutualism of sea-ice bacteria and diatoms (an algal source of compatible solutes for bacteria), and the effects of salinity shifts on this dynamic. I have determined specific growth rates for five strains of bacteria at different combinations of temperature (–3C to 1C) and salinity (17 – 55 ppt) that mimic sea-ice conditions. Four strains derive from a collection of Antarctic bacteria found growing mutualistically in diatom cultures: 1) strain Fc1, most closely related (by16S rRNA gene sequence analysis) to *Marinobacter psychrophilus* strain i20041; 2) Fc4, closest relative *Pseudoalteromonas arctica* strain A 37-1-2; 3) Nl1, closest relative *Glaciecola pallidula* strain DSM 14239; and 4) Tr1, closest relative *Colwellia rossensis* strain S51-W. The fifth was isolated from Arctic sediments but has since been found in sea ice: *Colwelia psychrerythraea* strain 34H These strains were tested in a defined medium, composed of glucose, vitamins, and a nitrogen source (GVaN), and a complex medium, Marine Broth 2216. Those subjected to higher salinities could be tested at subzero temperatures due to the lowering of freezing point by the salts. During the incubations optical density and cell counts were determined and used for calculations. After determining permissive growth conditions from calculated growth rates, strains will be selected for experiments using specific compatible solutes and/or diatom exudates.

POSTER SESSION 2

Commons East, Easel 64

1:00 PM to 2:30 PM

Euphausiid Layer Homogeneity in Puget Sound

Zeta Lai, Senior, Oceanography
UW Honors Program
Mentor: Julie Keister, Oceanography

Euphausiids (krill) are zooplankton that play a large role in Puget Sound's marine ecosystem. They are widespread and numerous and have been suggested to play a large role in energy cycling and food web dynamics. Vertical layering of species is not uncommon, and patterns can persist between years, suggesting a significance to the layering. During the day, euphausiids form deep layers in the water column with a thickness in the tens of meters where ecosystem dynamics may differ between the top and bottom of the layer. These layers can be detected by acoustic systems, but characteristics of individuals cannot be resolved. In this study, we used net tows to sample euphausiids at different relative depths within a layer. We recorded the length, sex, and species for statistical analysis to assess the homogeneity of the layer. Comparisons against other locations in Puget Sound will allow us to see if vertical structures are consistent or if other factors such as the presence of predatory fish can explain for differences. This project will provide insight on ecosystem dynamics and carbon cycling.

SESSION 2D

BIOLOGICAL RESPONSES TO ENVIRONMENTAL FACTORS

Session Moderator: Frieda B. Taub, Aquatic & Fishery Science

MGH 234

3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Measuring Microplastic Abundance in Pacific Sand Lance (*Ammodytes personatus*) Habitat on San Juan Island

Kaitlyn Conway, Senior, Envir Sustainability: Envir Comm (Tac)
Mary Gates Scholar
Mentor: Jan Newton, Applied Physics Laboratory, Schools of Oceanography and Marine Affairs
Mentor: Julie Masura, Environmental Science, Interdisciplinary Arts & Sciences, University of Washington Tacoma

Pacific sand lance (*Ammodytes personatus*) are important to the diets of sea birds, other predatory fish, as well as mammals. Microplastics (plastics $<$ 5 mm) have been found in spawning and deep-water habitats for these organisms. This project explored if microplastics are found on beaches near Friday Harbor Labs on San Juan Island, WA., and if so, to determine their concentration and distribution. Nine sediment samples were collected from two beaches (Jackson and South) and a wave field known to be Pacific sand lance habitat in this area. Samples were processed according to NOAA's Microplastics Methods Manual. Presence, abundance, type (fiber, fragment, film, pellets) and size class ($<$ 0.5 mm, 1-5mm, 6-10mm, $>$ 10mm) of microplastics were determined from sediment samples collected. Microplastics were found in all samples. Microfibers were the most abundant microplastic type (86%), and Jackson beach had the highest concentration of microplastics (17 microplastics/m2). On average the sizes were between 1-5 mm, and the number were 13 microplastics/m2 in the study area. Larger pieces (5-10 mm) were not present at the wave field located on the seafloor, although found at both beaches. This research helps connect microplastic presence to Pacific sand lance habitat. Considering the main prey type of Pacific sand lance and microplastics found in their environment overlap in size classes, it is highly likely that Pacific sand lance are consuming microplastics.

POSTER SESSION 4

Commons East, Easel 72

4:00 PM to 6:00 PM

Testing Modeled Ocean Phytoplankton Fields Using Satellite and Ship-Based Data

Bridget M. Ovall, Senior, Oceanography
Mentor: Parker MacCready, Oceanography

LiveOcean is a computer model of the Pacific Northwest Coastal Ocean created by the UW Coastal Modeling Group. It forecasts chemical and biological properties of the ocean much the same way that atmospheric models forecast the weather. One of the many parameters that LiveOcean forecasts is phytoplankton, which form the basis of the marine food web. This study compares LiveOcean forecasts of phytoplankton populations with remote-sensed estimates of chlorophyll concentrations from satellites. The assumption is that satellite sensors, which base their chlorophyll estimates off of the color of reflected light from the ocean, represent something near the true concentration of phytoplankton. To validate this assumption, we obtained ship-based data from NOAA along a frequently sampled line near Newport, OR. Using these two sources for comparison, we were able to get an idea of how accurate the model was. Evaluating over 8-day and 32-day time periods, we started by looking at the continental shelf over the entire geographic range of the model. Then we broke it up into five zones from north to south. What we found was that the model and satellite showed the same general annual pattern of growth and decline, but they differ in many of the specifics. Most notably, the model fails to show the decrease in phytoplankton populations from north to south that satellite observations reveal and has been observed through oceanographic fieldwork. This project provides a basis for future revisions and improvements to the LiveOcean model.