

FK190211 30-day Post Cruise Report

1. **Ship name:** Falkor
2. **Cruise Dates - Day Departed:** 2/11/2019
3. **Cruise Dates - Day Returned:** 3/14/2019
4. **Cruise Number:** FK190211
5. **Departure Port:** Manzanillo, Mexico
6. **Arrival Port:** Manzanillo, Mexico
7. **Mid-Cruise Port Call (if any):** N/A
8. **Mid-Cruise Port Call (if any):** N/A
9. **Participating Organizations, Institutions, Foundations, Government Agencies, etc.:**
University of Georgia, Harvard University, University of Vienna, Max Planck Institute for Marine Microbiology, Coastal Carolina University, University of Wisconsin, National Autonomous University of Mexico (UNAM)
10. **Funding Sources:** National Science Foundation, OCE 1357360, "Collaborative Research: Microbial carbon cycling and its interactions with sulfur and nitrogen transformations in Guaymas Basin hydrothermal sediments"
11. **Describe all of the geographical area(s) where the science occurred:** Gulf of California
12. **Name of Chief Scientist:** Samantha Joye
Organization: University of Georgia
Mailing Address: Room 220 Marine Science Bldg
City/Town: ATHENS
State and Zip/Postal Code: GA
Country: USA
Phone 1: +1 706-542-5893
Email 1: mjoye@uga.edu
13. **Cruise Objectives:**
The program objective is to identify and quantify the specific microbial populations of the habitat and to evaluate how these microorganisms impact and interact with geological structures (for example, vents, filtrations, hydrates) and megafauna (for example, mussels, benthic infauna) that inhabit these highly productive seabed ecosystems. We compared systems characterized by different fluid flow regimes and

chemical composition to explore four main objectives: (1) characterize microbial populations in situ using coupled metagenomics and metatranscriptomics; (2) quantify the activity of microorganisms that mediate major elementary transformations, p. carbon, nitrogen, iron and sulfur, in extreme habitats; (3) quantify the relationship between microbial diversity and environmental activity and gradients (physical and geochemical); and (4) discover and document unique interactions between microorganisms and macro and megafauna.

14. Cruise Summary:

We conducted a systematic study of the biogeochemistry and microbiology of the coupled sediment-water column dynamics in two regions in the Gulf of California. We lost ~two weeks of operations (roughly 10 dives) because of a delay in receiving the UGA shipping container which held all of the instruments and disposable supplies for 8 of the 11 members of the science party. Despite that setback, we had a very successful expedition. Our work began in the Guaymas Basin, where we studied the sediments and mineral towers impacted by hydrothermal discharge. From there, we navigated to the northeast to study cold seep ecosystems along the Sonora Margin; the Sonora Margin sites replaced our planned study sites at the Northern end of the Gulf of California [we were unable to sample there because of a delay in port]. We collected samples from three study areas: Guaymas Basin Microbial Mat field, Guaymas Basin Pagoda towers, and Sonora Margin cold seeps. On ROV SuBastian dives, we collected animal samples, fluid samples from areas of diffuse venting, rock samples and sediment cores. The CTD on the vehicle provided temperature, salinity, oxygen and depth data along each dive track. We conducted CTD sampling at night to describe the hydrography of the water column and to collect samples for chemical and microbiological analysis in the home labs; some radium isotope analyses were conducted on the ship. At each site, we conducted multi-beam mapping sonar transects to map the study sites and identify targets of interest. This work defined new ecological and geochemical final members for the EPR / Gulf of California hydrothermal ecosystem. The data will reveal the specific variability of the habitat and will help to elucidate the factors that drive the dynamics and activity of the microbial population.

- 15. Did you collect Measurements or Samples, including biological specimens? Yes**
- 16. Did you deploy and/or recover any Moorings, Bottom Mounted Gear, or Drifting Systems? Yes**
- 17. Equipment Used:** ROV, CTD, Lander, OsmoSamplers, McClane Pumps, MBES
- 18. Total number of CTD casts completed during the cruise:** 25
- 19. Total number of AUV dives completed during the cruise:** 0
- 20. Total number of ROV dives completed during the cruise:** 12
- 21. Total number of ROV samples collected during the cruise:** 100

22. Total number of Unmanned Aerial Vehicle (UAV) or other vehicle deployments during the cruise: 0

23. Total amount (TBs) of data collected during the cruise: 11 TB

24. Other interesting facts: The discovery of the large mineral towers in S Guaymas Basin is a worthy discovery to note.