

## FK161229 Smith Post Cruise Report

Timestamp: 2/14/2017 19:57:08

1. Ship name: Falkor
2. Cruise Dates - Day Departed: 12/29/2017
3. Cruise Dates - Day Returned: 1/16/2017
4. Cruise Number (Example: FK160115): FK161229
5. Departure Port:: Apra Harbor, Guam
6. Arrival Port:: Honolulu Harbor, Hawaii
7. Mid-Cruise Port Call (if any) : None
8. Mid-Cruise Port Call (if any) : None
9. Participating Organizations, Institutions, Foundations, Government Agencies, etc.: University of Hawaii at Manoa, University of Guam, 'Iolani School, Martha's Vineyard Regional High School & Sail MV, 11th Hour Racing.
10. Funding Sources. List all a) funding agencies, b) award numbers, and c) project titles.: Science support funding from NOAA's Pacific Islands Regional Office via JIMAR.
  - a) NOAA/Joint Institute for Marine and Atmospheric Research
  - b) NOAA Award # NA16NMF4320058
  - c) Pacific Islands Deep Sea Coral and Sponge Initiative
11. Describe all of the geographical area(s) where the science occurred: A single swath of multibeam data was collected during the entire transit from Guam to Hawaii. The location of the targeted surveying for science purposes occurred within the Johnston Atoll Unit (JAU) of the U.S. Pacific Remote Islands Marine National Monument (PRIMNM).
12. A. Name of Chief Scientist: Dr. John R. Smith, Jr.
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13. Cruise Objectives: Multibeam mapping within the Johnston Atoll Unit (JAU) of the Pacific Remote Islands Marine National Monument (PRIMNM), was the focus of this project. The objectives were to carry out

multibeam mapping, sub-bottom, and magnetics surveys, provide the fully processed data to the research community and public, synthesize it with pre-existing data in the region, and produce derived products including interpretative geologic maps and substrate analyses necessary for habitat characterization and mineral resource evaluation. The plan was to map as many seamounts in the southwestern portion of the JAU, known as the Johnston Seamount Group, as the available time on site would allow.

Interpretative geologic maps have been completed in the month since the cruise ended, along with preliminary interpretation of the magnetics data. We just recently submitted an abstract detailing our results to The Geological Society of America, Cordilleran Section meeting which will take place in Honolulu, Hawaii in May 2017. We will continue our efforts in merging the Falkor data with the pre-existing data and also plan to prepare a manuscript for publication within the next few months. Derived products have already been made available to the various interested NOAA groups including the PRIMNM office, the Coral Reef Ecosystem Program, and the office of Ocean Exploration and Research for an upcoming Okeanos Explorer cruise. This cruise will most likely target some of the seamounts we mapped with ROV dives, along with additional mapping of neighboring seamounts.

14. Cruise Summary: In addition to the EM302 and EM710 multibeam systems, we had asked for use of the CHIRP sub-bottom profiler (SBP), towed magnetometer, and XBT probes/system. We did not have any operational activities planned for the first half of the transit, other than opportunistically collecting multibeam data with the EM302. During the long transit, we learned the QPS Qimera multibeam processing software and trained watch personnel on its use. We also prepared data products and processing scripts to assist us with data reduction and merging of the new data with the pre-existing data in the region.

We carried out 24/7 survey operations for the ~5.5 consecutive days once we arrived within the monument during the latter portion of the transit (ten days following departure from Guam). We split the watch teams into three watches, each one being eight hours in length. In addition to multibeam and magnetics surveying, daily activities included dropping an XBT once per day at approximately the same time. Once we concluded survey operations, we returned to a normal workday schedule and post-processing the geophysical data and preparing derived products occupied the remaining three days of transit to Hawaii. In summary, we mapped seven individual seamounts, covering 11,241 square kilometers in the prime survey area, not including the two weeks of transit data.

We did not lose any days to weather or mechanical breakdown. Carrying the ROV did limit the speed we could achieve on the transit because of the amount of fuel being burned as we motored into the trade seas, winds, and currents. Thus, the decision was made not to divert as far south, which was the original plan to avoid the strongest trades. It sounds like no additional hard ballast can be added to Falkor to counter the high height of the ROV system, which requires an additional reserve of fuel be maintained for stability reasons only. This is a serious imitation to long haul missions to remote areas that require extensive transit, as science days on site become too few and thus Falkor becomes a less favorable platform.

A problem with the K-sync did not allow us to run the SBP because it conflicted with the EM302. There was a source of noise affecting the EM302, and we could not determine its origin. The magnetometer logging software was also a serious issue which led to corrupted time-stamping, extensive science team time lost to recovering it, and lack of confidence with the results. All three of these items were discussed in the post-cruise assessments.

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? No

17. Equipment Used: We used the Kongsberg EM302 multibeam sonar system, the magnetometer, and the XBT system.

18. Other: Noise source on the EM302 should be investigated at the earliest opportunity. The magnetometer interface software should be replaced, period. K-sync issue needs to be resolved. Any alternative solutions to the extra fuel reserve for ship stability with the ROV system should avidly be explored.

19. Will you be submitting Station Plots? Yes

20. Does Schmidt Ocean Institute have your permission to make this Preliminary Cruise Report publicly available on its website or its data partners' websites? Yes