FK180824 30-day Post Cruise Report

1. **Ship name**: Falkor
2. **Cruise Dates - Day Departed**: 8/24/2018
3. **Cruise Dates - Day Returned**: 9/20/2018
4. **Cruise Number**: FK081824
5. **Departure Port**: Astoria, OR, USA
6. **Arrival Port**: San Francisco, CA
7. **Mid-Cruise Port Call (if any)**: Newport, Oregon (small boat personnel transfer only - didn't come into port)
8. **Mid-Cruise Port Call (if any)**: None
9. **Participating Organizations, Institutions, Foundations, Government Agencies, etc.**: Woods Hole Oceanographic Institution, Texas A&M, Temple University, Harvard University
10. **Funding Sources**: NSF OCE 1443683 A robust and sensitive in situ analyzer for simultaneous methane carbon and hydrogen isotopic measurements in the deep sea

    NSF EAR 1826940 Identifying cross-talk between nitrogen and manganese cycling

    NNX17AB31G NASA Development and deployment of an Autonomous Biogeochemical Instrument for In Situ Studies

    DE-FE0028895 DOE Dynamic Behavior of Natural Seep Vents: Analysis of Field and Laboratory Observations and Modeling

11. **Describe all of the geographical area(s) where the science occurred**: Hydrate Ridge, Cascadia Margin off the coast of Oregon, USA.
12. **Name of Chief Scientist**: Anna Michel
    Organization: Woods Hole Oceanographic Institution
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13. **Cruise Objectives**:
    1) Analyze the composition of rising bubbles in situ using a suite of underwater physical and chemical analytical tools
    2) Quantify the fate of dissolved water column methane originating from seafloor bubble flares
    3) Detect, image and quantify bubble flares for improved parameterization of mass transfer rates from bubbles into the water column
    4) Characterize the distribution of methane at the sea surface above bubble flare sites originating from a range of water depths

14. **Cruise Summary**:
    During the Hunting Bubbles cruise, we worked at methane seep sites in the Cascadia Margin ranging from 10s of meters deep to 100s of meters deep. We used shipboard multibeam technologies for locating bubble sites, both previously discovered sites and several that we think are newly discovered. During the first leg, we utilized ROV Subastian to dive on the sites deeper than 100 m and used stereo cameras and in situ biogeochemical sensors to analyze the bubbles at the seafloor and looking at the bubble fate as they rose through the water column. Sediment samples and macrofauna samples were collected at sites for both chemical and biological analyses. During the second leg, we deployed the ABISS lander as a demonstration of a new deep sea biogeochemical observatory. The ABISS was deployed at an active bubble site that had a periodicity to its activity. In addition, we field tested a new in situ methane sensor for the first time. We also utilized the ChemYak for surface water analysis at two shallow bubble sites.

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**:
    1) In situ mass spectrometer for the in situ analysis of dissolved gases
    2) In situ laser spectrometer for the in situ analysis of carbon isotopes of methane
    3) QCLIMES: Field trials of a new deep sea methane sensor
    4) Bubble capture and accumulation system: for collecting deep sea methane bubbles.
    5) Stereo cameras for imaging bubbles to understand their physics.
    6) Go-pro camera for site imaging.
    7) ChemYak surface Vehicle for analyzing surface expressions of methane.
    8) ABISS Lander outfit with an optical modem for testing the capabilities for stand alone biogeochemical observatories.