1. **SCIENTIFIC OBJECTIVES**

The science objectives of this cruise were to collect hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) station. Station ALOHA, is defined as a circle with a 6 nautical mile radius centered at 22° 45'N, 158°W. In addition, a bottom moored sediment trap was deployed just outside the NE corner of Station ALOHA which consisted of two 4000m McLane sediment Traps. Cruise activities consisted of CTD operations, 48 hr CTD diel sampling, deployment and recovery of a free floating sediment trap array, primary production array and HYPERPRO Optics. Various experiments were also conducted using the onboard incubators. In detail our objectives included:

1. **CTD operations:**
   - Conducted at Station ALOHA (referred to as, Station 2), defined as a circle with a 6 nautical mile radius centered at 22° 45'N, 158°W. This is the main HOT station and was occupied for the majority of the cruise.
   - 48 hr diel sampling was conducted at Station ALOHA.
2. Deployment and recovery of a free floating PIT Sediment Trap array: for an inter-cross comparison at two depths: 150m & 300m.
3. Deployment and recovery of the primary production array.
4. Deployment of the deep moored sediment traps, consisting of 2 McLane sediment traps:
   - Trap 716 @ 3980m: Formaldehyde Solution
   - Trap 715 @ 4000m: RNA Later Solution
   Traps are scheduled to open on 4/10/2015 at noon and close on 11/10/2015 at noon.
   The 21 cups rotation will occur at an interval of 10 days, 4 hrs, 34 mins and 17 secs.
5. Daily Hyperpro Optics casts.
6. Incubation experiments to look at the effect of light and the absence of light on gene expression patterns from photoautotrophs and photoheterotrophs.
2. SCIENCE PERSONNEL

<table>
<thead>
<tr>
<th>Participant</th>
<th>Title</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Frank Aylward (M)</td>
<td>Post-Doc</td>
<td>UH/CMORE</td>
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<td>Bob Bidigare (M)</td>
<td>Scientist</td>
<td>UH/CMORE</td>
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<tr>
<td>Tara Clemente (F)</td>
<td>Chief Scientist</td>
<td>UH/SCOPE/CMORE</td>
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<tr>
<td>Maria del Carmin Muñoz Marin (F)</td>
<td>Post-Doc</td>
<td>UCSC/CMORE/SCOPE</td>
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<tr>
<td>Ken Doggett (M)</td>
<td>Research Associate</td>
<td>UH/CMORE</td>
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<td>Sara Ferron-Smith (F)</td>
<td>Post-Doc</td>
<td>UH/CMORE</td>
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<tr>
<td>Eric Grabowski (M)</td>
<td>Research Associate</td>
<td>UH/CMORE</td>
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<tr>
<td>Christien Laber (M)</td>
<td>Student</td>
<td>Rutgers University</td>
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<tr>
<td>Morgan Linney (F)</td>
<td>Research Associate</td>
<td>UH/CMORE</td>
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<tr>
<td>Jozef Nissimov (M)</td>
<td>Post-Doc</td>
<td>Rutgers University</td>
</tr>
<tr>
<td>Sarah Searson (F)</td>
<td>Research Associate</td>
<td>UH/CMORE</td>
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<tr>
<td>Eric Shimabukuro (M)</td>
<td>Research Associate</td>
<td>UH/SCOPE</td>
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<tr>
<td>Oscar Sosa (M)</td>
<td>Co-Chief Scientist</td>
<td>UH/CMORE</td>
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<tr>
<td>William Truong (M)</td>
<td>Intern</td>
<td>UH/CMORE</td>
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<tr>
<td>Ger van den Engh (M)</td>
<td>Scientist</td>
<td>MARCY</td>
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<tr>
<td>Alice Vislova (F)</td>
<td>Student</td>
<td>UH/CMORE</td>
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<tr>
<td>Blake Watkins (M)</td>
<td>Marine Engineer</td>
<td>UH/CMORE</td>
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<tr>
<td>Steve Tottori (M)</td>
<td>Marine Technician</td>
<td>OTG</td>
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<tr>
<td>Trevor Young (M)</td>
<td>Marine Technician</td>
<td>OTG</td>
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(19 science personnel: 13 male and 6 female)

3. GENERAL SUMMARY

Operations were conducted as planned.

Station ALOHA
Station ALOHA (referred to as Station 2), was occupied for the majority of the cruise. We conducted a total of 20-CTD casts. A 48-hr diel was started on the second day of the cruise (4/7/2015) at noon and consisted of 17-CTD casts. During the diel the CTD was deployed, recovered and sampled on a 3 hr interval. The diel depths sampled included: 5, 25, 45, 75, 100, 125, 150, 175m and the deep chlorophyll maximum (DCM).

DeLong Lab, University of Hawaii
Cruise Participants- Oscar Sosa, Frank Aylward and Alice Vislova

1) **Light perturbation experiment using surface water microcosms in an onboard deck incubator.** Water request: A full rosette from 25 m-depth water on the first CTD cast at Station ALOHA. The goal of this experiment was to resolve RNA diel variability in the surface water microbial community in response to the alteration of the available light field. Seawater was collected from 25 m on the first cast in Station ALOHA waters (S2C1)
at midnight on April 7, 2015 to prepare microcosms. Light treatments included 30% light, >1% light, dark treatment, and continuous low light. We successfully sampled our microcosm experiment over the course of three days (April 7-9) every 4 hours to obtain RNA and/or DNA samples.

2) **500 meters depth large volume filtration of prokaryotic biomass.** Water request: ca. 100 liters (10 rosette bottles). We sampled three casts over the course of the cruise. The goal of this sampling experiment was to obtain total community DNA for PacBio sequencing, Single Cell Genomes, and nucleic acids of the viral fraction. All samples were obtained successfully with the water available.

3) **Deployment of bottom-moored sediment traps (4000 meters) loaded with RNA preservative.** The goal of this experiment is to study the metatranscriptomes and RNA identities of microbial community involved in the degradation of sinking particulate matter in the open ocean. Sediment traps collection cups were filled with RNA preservation solution. Deployment was on schedule in the morning of April 7, 2015.

**Zehr Lab, UCSC**
Cruise Participants- Maria del Carmin Muñoz Marin
The Zehr lab objectives were to develop a whole genome array approach for UNYN-A1 in order to determine the whole genome transcription patterns related to PSI, energy metabolism and nitrogenase gene expression over light-dark cycles. A qPCR profile on conducted on the first day to determine the depth in which UCYN-A1 were most abundant. The 48-hr diel was sampled at 45m for RNA, DNA, FCM and Card-FISH.

**Bidle Lab, Rutgers University**
Cruise Participants- Christien Laber and Jozef Nissimov
The Bidle lab objectives were to determine the presence, diversity and abundance of diatom and coccolithophore associated viruses. Water was collected from the 55%, 22% and 1% PAR (14, 35, and 107m, respectively) twice a day to measure cellular biomass for RNA/DNA/Protein/Lipid work, free viruses, virus concentrations, TEP analysis, virus counting and polony analysis of virus communities.

**Lindell Lab, Technicon-Israel**
Cruise Participants- Tara Clemente and Eric Shimabukuro
Sampled the 48-hr diel at each of the 9 depths (5, 24, 45, 75, 100, 125, 150, 175 & DCM) to assesses infected cyanobacterial cells, free cyanophages and to look at total virus-like- particle counts (VPL).

**Bidigare Lab, University of Hawaii**
Cruise Participants- Bob Bidigare
Sampled the 48-hr diel at each of the 9 depths (5, 24, 45, 75, 100, 125, 150, 175 & DCM) for HPLC to look at phytoplankton accessory pigments.
Karl Lab, University of Hawaii
Cruise Participants- Ken Doggett, Sara Ferron-Smith, Eric Grabowski, Sarah Searson, William Truong, Blake Watkins, Ger van den Engh

1) Flow cytometry - live analysis and SYBR staining of 17 profiles collected during the diel sampling.
2) pH x 3 and nutrient x 1 samples were collected at 25m from the 17-CTDs conducted during the diel sampling.
3) Chlorophyll and Oxygen profiles were collected for CTD calibration
4) Samples for DOP were collected from 200-1000m to test measurement sensitivities by using less NaOH in the MAGIC protocol.
5) Comparison of methods (old & new) measuring total RNA & DNA concentrations.
6) Deployment of an in situ PP array to measure primary production using two different incubation techniques: $^{14}$C assimilation and $O_2$ production from $^{18}$O-labeled water.
7) On-deck incubation experiments to validate the use of the MIMS to measure gross primary production using the $^{18}$O incubation method.
8) Diel sampling of O2/Ar measurements at 5, 25 and 45m, to determine net community production in situ.
9) Deployment of PIT sediment trap array to test old vs new cross design at 150m and 300m measuring PC/PN replicates.
10) Niskin bottle sampling error was looked at on two CTD casts targeting 350 & 500m. Measurements of POC, Microscopy Slides and FCM were taken. Niskin bottles were sampled over a time course of 0.5 hr intervals for 2 hrs from three sections from within the Niskin bottle (top/middle/bottom).

4. R/V KILO MOANA OFFICERS AND CREW, TECHNICAL SUPPORT

The officers and crew of the R/V Kilo Moana were helpful and accommodating throughout the cruise. The crew showed enthusiasm, concern and dedication to our scientific mission. Ship’s officers and crew did a great job with communication and were instrumental in the deployment of the deep moored sediment trap and free floating arrays.

Technical support during this cruise was good. OTG personnel were available at any time to assist in our work and helped keep operations timely. All CTD operations were conducted on the ships 0.681 wire due to non-operational Caley CTD crane. The ships e-mail communication system was in poor working order during our cruise, however OTG and the ship’s crew were helpful in positioning the ship so that important messages and positions were able to be sent and received. All of our research objectives were accomplished.
5. DAILY REPORT OF ACTIVITIES (all times are local time unless otherwise stated)

April 2<sup>nd</sup>, 2015 – Loading Day
0900 – Equipment and science supplies were loaded on this day.

April 6<sup>th</sup>, 2015
0855: Depart Snug Harbor, underway for Station ALOHA
0935-1015: Safety briefing.
1015-10:30: Science meeting.
1030-1050: Deep-moored sediment trap deployment safety meeting (attendees: Captain-Gray Drewry, 1<sup>st</sup> Mate- Eric Schoenberg, OTG- Trevor Young, Scientists – Tara Clemente & Blake Watkins)
1230-1300: Fire and abandon ship drill.
1855: Arrive at Station ALOHA.
1950-2035: PIT sediment traps deployed @ 22º 44.948' N; 158º 3.078' W

April 7<sup>th</sup>, 2015
0011-0042: S2C1 in H2O- target depth 200m
0158-0244: S2C2 in H2O- target depth 500m
0403-0439: S2C3 in H2O- target depth 200m
0611-0630: Primary production array deployed @ 22º 46.966' N; 158º 02.280' W
0852-1037: Bottom moored Sediment trap deployed @ 22º 50.865' N; 157º 54.426' W
1100-1230: Triangulation of the bottom moored sediment trap at three locations 0.5 miles to the North, East and West of deployment location (22º 50.865' N; 157º 54.426' W).
1230-1322: S2C4 in H2O- target depth 500m - **Start 48hr Diel**
1342-1417: Hyperpro -1
1505-1552: S2C5 in H2O- target depth 500m
1811-1854: S2C6 in H2O- target depth 500m
1900-1940: Primary production array recovered @ 22º 43.7' N; 158º 03.9' W
2107-2152: S2C7 in H2O- target depth 500m
2354-0045: S2C8 in H2O- target depth 500m

April 8<sup>th</sup>, 2015
0255-0242: S2C9 in H2O- target depth 500m
0557-0640: S2C10 in H2O- target depth 500m
0903-0941: S2C11 in H2O- target depth 500m
1156-1239: S2C12 in H2O- target depth 500m
1332-1410: Hyperpro -2
1503-1545: S2C13 in H2O- target depth 500m
1801-1847: S2C14 in H2O- target depth 500m
2104-2209: S2C15 in H2O- target depth 1000m
2359-0042: S2C16 in H2O- target depth 500m
April 9th, 2015
0258-0344: S2C17 in H20- target depth 500m
0558-0635: S2C18 in H20- target depth 500m
0857-0935: S2C19 in H20- target depth 500m
1156-1240: S2C20 in H20- target depth 500m
1446-1509: PIT sediment traps recovered @ 22º 27.729' N; 158º 17.347' W
1510: Depart for Honolulu Harbor

April 10th, 2015
0630 - Arrive at Honolulu Harbor sea buoy
0745 - Tied up at Snug Harbor
0800 - Departed vessel, full off-load