Station ALOHA

28 years of HOT

Station ALOHA
(~4750m deep)

12 years of WHOI Hawaii Ocean
Time-series (WHOTS)

>5 years of ALOHA
Cabled Observatory
(ACO)

Hawaii Ocean Time-series (HOT)
- October 1988 - present (287 cruises; ~10/yr)
- 3-hourly CTD profiles to 1000 m for 36 hours
- Shipboard ADCP 5-minute profiles
- Deep casts
- many other measurements

Bruce Howe, University of Hawaii, and many, many others: D. Karl, R. Lukas, R., Weller, F. Duennebier, J. Potemra, F. Santiago-Mandujano + …

North East Pacific OOI workshop – Cabled, Endurance, and Station Papa Arrays
Portland, Oregon, 27-29 September 2016
Station ALOHA

• Sustained, consistent, collaborative, interdisciplinary science
  • Long, accurate, high-resolution climatology, carbon and atmospheric forcing variables
  • Air-sea fluxes, coupling, modeling
  • Essential information on climate change, eddy fluxes, and ecosystem dynamics
• Impacts as part of a global observational network
  • Assessing ocean changes (incl. C) and enabling climate prediction
  • Atmosphere and ocean modeling – Ocean Reference Stations
• Institutions and agencies needed to sustain infrastructure
  • Sustained multi-institutional collaboration (WHOI, UH/SOEST, PMEL)
  • Collaborative funding, NOAA, NSF and SOEST
  • OceanSITES data management (setting metadata standards)

Confidence in changes
Connections among processes
Strong tests of models
Examples from ALOHA

HOT
WHOTS
ACO
C-MORE
SCOPE

Microbial Community structure

HOE-BOE 1 Cruise, C-MORE
ALOHA Cabled Observatory
Deepest - 4728 m –
power and internet connection on the planet

Augment and support science with infrastructure at Station ALOHA
Abyssal to … surface

F. Duennebier et al., start 2002
Sept 2015 service
UH ROV Luʻukai

Plan –
Add BSP2
Add LIGHT4
Recover:
CAM2,
BSP1,
LIGHT1
Hydrophone Pressure

BSP1:
CTDO2, ADCP
Modem, Pressure,
FLNTU

BSP2:  
CTDO2, Pressure
FLNTU

Installed
6/2011

Serviced
11/2014
9/2015

ROV Jason

Camera-1
2 lights
hydrophone

Light-1
CT
ADCP
ADV
Light

Hydrophone Pressure

4728 m

Camera-2
2 lights
hydrophone
Data and results

Core measurements

- T, S, O2, v, chl a, turbidity, video, acoustics
- p, IES (depth integrating)
- Acoustic modem – acomms and nav (and IES)

ALOHA Cabled Observatory web site
aco-ssds.soest.hawaii.edu
ACO Web Page

- Data
  - MBARI SIAM and SSDS 😊
  - Plots for last hour, ... month
  - FTP for data
- Documentation
- Working with ACO
- [aco-ssds.soest.hawaii.edu](http://aco-ssds.soest.hawaii.edu)
Temperature variability

Sensors agree 1 mK
Spatial/temporal
Since 2011

30 mK pp

Need sustained sampling

Bottom water overflow

Internal Kelvin waves?
Objective: Detect particle export events from (very) episodic surface blooms (Karl and Letelier)

Turbidity and Fluorescence – chl a

speed

Turbidity

Chl a

HOT – near surface

0 m

200 m

25 year

3 days

No events yet
Abyssal biology

- June 2011 while lights working
- Lizard fish attacking Shrimp
- About 1 second
- Need for sustained continuous sampling
- Continuous high power and high bandwidth communications

Howe, Eos, 2014

- J. Drazen and A. Fleury
Acoustics – toward depth averaged sound speed

ACO Modem
~ inverted echosounder

Predicted tide
~ 2 days

\[ \delta T \approx 2 \text{ ms} \]

With Freitag and Singh

Varamo, ONR
Sounds (in addition to whales, ships, rain…)

Animal scraping frame?

Higher frequencies – Animal’s body scraping frame?

~10 Hz – frame rocking resonance?

Thunder

15 s

15 – 6000 Hz
Concluding remarks

ACO working from June 2011

Deepest power and internet on the planet, 4728 m

• Suite of bottom instruments – Most donated, thanks! 😊
  
  – Need dual sensors, acoustic modem/inverted echosounder, calibrated hydrophone, O2, …
  
  – However, challenges – cables, connectors, sensors, …, ROV, … deep test bed

• Science:
  
  – Bottom flow and mixing,
  
  – Deep biology,
  
  – Shallow-deep bio connections
  
  – Pressure (sea level, circulation, tides, tsunami, …),
  
  – Soundscapes, rain, wind, thunder, …

• Need direct access to upper ocean: profiler mooring

• Need users – data and instruments – propose!
Station ALOHA 22° 45’ N, 158° W, depth 4728 m
University of Hawaii
School of Ocean and Earth Science and Technology
http://ALOHA.manoa.hawaii.edu/ACO
Thank you for substantial support and/or in-kind donation

aco-ssds.soest.hawaii.edu
Station ALOHA web site

http://aco-ssds.soest.hawaii.edu/ALOHA/

ALOHA Cabled Observatory web site

aco-ssds.soest.hawaii.edu/dataDisplay.php