ALOHA Cabled Observatory Installation

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Outline

ACO – ALOHA Cabled Observatory

- Background and History
- Deployment
- "First light" 6 June 2011
- Initial data
- Concluding remarks



ACO Field Work

- February 2007
 - Relocate submarine telecom cable
 - Attach Proof module
 - 20 months acoustic data
- October 2008
 - General purpose "node"
 - Failed because of connectors
- May-June 2011
 - Successful



Proof module hydrophone

Cable Termination

USNS ZEUS

February 2007



As deployed

Proof module above Cable termination

Jbox+hydropone function

Seawater return

Acoustic data 20 months

May-June 2011 Deployment

- From R/V Kilo Moana
- Using ROV Jason and Medea
- Challenging time
 - Fiber connections
 - Re-generators in cable had become scambled
 - After 17 day, finally connected with 5 hours left

Bottom configuration – June 2011

Cable Termination

TAAM mooring (thermistor array + acoustic modem)



JBOX, OBS



Jason – sine qua non



Matt Heintz and team – thanks!

On the seafloor



CTD data – Seabird microCat

- Shows 24 hours
- 18 September 2011
- Warm (20 m°C) and salty (20 mPSU) events
- Events usually together, some tidal correlation



Pressure data - Digiquartz

- 24 hours, 18
 September 2011
- Top absolute signal
- Bottom anomaly δP relative to TPXO 7.2
- Magnitudes about the same





Acoustic Doppler Profiler (ADP) data Sontek 250 kHz

 18 September 2011



ADCP U,V,W + T + S + $\delta P + \sigma_{\theta}$

- 18 hours
- 18 August 2011
- δP anomaly re TPXO 7.2



Proof module acoustic data + WHOT wind speed



Two opposing wave trains of the same frequency

 p_{12}

INTERACT to generate

Wind, Waves, and Acoustics Background Levels a Station ALOHA

Duennebier, Lukas, Nosal, Aucan, and Weller, submitted

An ACOUSTIC signal at twice the frequency and with amplitude proportional to the product of the amplitudes of the opposing waves

 $\frac{1}{2}\rho_0 a_1 a_2 \omega^2 \cos 2\omega t$

 $\xi_{12} = a_1 a_2 \cos kx \cos \omega t$

New LF hydrophone data



ACO-3 Low-Frequency, 0.01-20Hz, Acoustic Spectrogram Levels are dB re mean levels observed over 20 months from Feb, 2007 to October, 2008. Annotations point to the recordings of earthquakes.

Glass balls – mooring work

Aleutian Earthquake 2 September 2011 MW = 6.8

10,000

1.000

Frequency, Hz 100



Engineering Data



Web pages and real time data plots

- Station ALOHA
 - http://www.soest.hawaii.edu/ALOHA/
- ALOHA Cabled Observatory
 - http://www.soest.hawaii.edu/ALOHA/ACO.html
 - <u>http://www.soest.hawaii.edu/acowiki/index.php/M</u>
 <u>ain_Page</u>
- MBARI providing SIAM and SSDS

Future

- Expand science
- Fill the water column
- Extend the footprint
 Fixed
 - Moorings
 - Bottom nodes
 - Acoustics
 - Mobile
 - AUVs + docking stations
 - Gliders
 - Crawlers



Concluding remarks

- ACO:
 - Installed successfully 6 June 2011
 - Present sensors CTD, pressure, ADPs, video, hydrophones; thermistor array (autonomous)
 - Will provide a wealth of diverse data, will be available
 - Some sensors/connections failed (ac-modem, AMM/CTDs, lights)
 - New ideas and projects will be enabled, addressing further diverse topics – submit proposals!
- Cable re-use
 - On table as cost-effective ocean observing technology

KM1116 Cruise Participants



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- AdRem
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SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY



ACO - First video from camera

