Ocean Reference Time-Series Moorings: Acoustics

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Reference Time-Series Science Team Meeting
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Outline

1. My purpose here – facilitate information exchange - ref time series mooring and acoustical oceanography, network
2. Science rationale - acoustics
3. Proposed ALOHA Observatory mooring – one step in development
4. More plans in North Pacific - ATOC
5. Acoustical oceanography planning efforts
6. Concluding remarks
Scientific Rationales

- Ocean circulation and variability over wide range of spatial and temporal scales
  - Small, mesoscale, climate/basin
  - Physical properties – temperature, velocity, ...
  - Sampling – Nyquist, physical access, ...
- Surface fluxes – wind/gas/bubbles and rain
- Marine life
  - micro to mega fauna
  - basics to behavior
- T-phases
- Other …
ALOHA Mooring Sensor Network and Adaptive Sampling

- NSF proposal
  - submitted 6 March 2003 – SENSORS program
  - With Roger Lukas and Emmanuel Boss
  - Use MMP with bio-optics to adaptively sample water column
  - Attach EOM subsurface mooring to ALOHA Observatory (AO)
  - Includes EOM cable, MMP docking
  - J-boxes on subsurface float and at base – power, comms
  - Upward looking ADCP on subsurface float
  - Learn how to zero in on features of interest – real-time comms
  - Fulfill time series requirements
ALOHA Observatory Mooring

NSF Proposal March 2003
ALOHA Mooring Sensor Network: Next steps

- Add more bio-optical and other sensors
- Add winched profiler for upper 200 m
- ROV serviceable
- Another EOM mooring with fixed sensors (e.g., tomography, acoustic rain, wind, gas transfer, T-phase, marine animals)
- Other nearby sensors (e.g., IES, HEF, BBL ADCP/T-S, bottom rovers, …)
- Work towards a coherent measurement program at AO: HOT, MOSEAN, Weller NOAA, etc.
Other North Pacific Efforts

• H2O (mid-way Hawaii – California)
  – add acoustic/tomography mooring(s)
  – Is there interest in a reference time series site there or planned?

• MARS – Monterey Accelerated Research System
  – Acoustic receiving array – ATOC, Calif current
  – Eventually acoustic source

• PAPA – NOPP/ATOC demonstration

• NPAL
  – upcoming experiment, long term Navy interest
  – Continues ATOC – see last CLIVAR newsletter
Present ATOC Array
Present
Time series March 2003 0-1000 m Temp
Present Time series March 2003 travel times – measured and ECCO
Acoustic approaches - 1

Simultaneously:

- Acoustic navigation - Underwater GPS
- Acoustic communications
- Acoustical oceanography

→ Nested infrastructure of broadband transmitters + receivers + …

Other …
Acoustic approaches - 2

- Platform navigation with passive hydrophone receivers
  - Better float information (velocity, deep, …)
  - Track auvs, gliders, rovers, animals
- Acoustic tomography – fixed s/r, moving r
- Acoustic comms – when satellite comms not an option
- The acoustic spectrum

Other …
Acoustic network sites

Need to start planning

• A fair degree of flexibility in location
• Ocean signals of interest
• Bathymetry blocking
• Ocean sound speed structure, noise, logistics, etc.
• Sharing/interdisciplinary nature is essential – DEOS, RefTimeSeries, etc.
ASA AO Committee
Integrated Acoustics Systems for Ocean Observations

• Web page – AO
• Co-chairs – Bruce Howe, Jim Miller
• White paper in preparation
• Workshop
  – 19-20 Sep 2003 San Diego (tentative)
• Lead to
  – Contribute to OOI workshop 5-9 Jan 2004
  – Acceptance by CLIVAR, GOOS, etc.
Concluding remarks

- See acoustics as one link connecting point and spatial measurements
- Address siting issues – with other interdisciplinary users
- Must work towards synergies – science, technology, programs