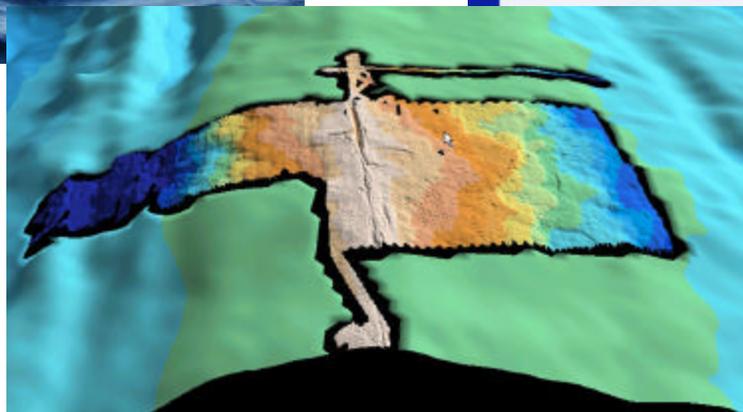


ABE and Sentry Autonomous Underwater Vehicles (AUVs)

A Justification and Approach Towards Providing Routine Access



ABE History and Technical Highlights

144 Dives 2267.8 km surveyed 1275.2 hrs. of bottom time
12 cruises in 10 operational years

- 1989:** First ABE proposal for engineering development funded
- 1994:** JDF-First science dives, magnetometer surveys with LBL nav from ship, autonomous bottom following, video stills (Tivey, Johnson)
- 1996:** JDF- Autonomous LBL navigation, closed-loop track lines, magnetometer surveys (Tivey, Johnson)
- 1999:** SEPR- Improved autonomous LBL nav, scanning sonar bathymetry, video mosaics (Cormier, Ryan, Sinton)
- 2000:** JDF- Heat flow survey (McDuff)
- 2001:** EPR- Control system upgrade, bathy/magnetics mapping (Tivey, Schouten, Fornari)
- 2002:** Galapagos- Plume detection (Shank, Fornari, Hammond),
Explorer Ridge- multibeam sonar (Embley, Baker)
- 2003:** Lost City- Multibeam mapping in steep terrain (Kelley, Karson),
NE Seamounts- digital photomosaics (Adkins, Scheirer)
- 2004:** JDF- Heat flow mapping (McDuff) plume localization Lau Basin- (Langmuir, German, Shank), color digital photographic surveys in new vent fields, adaptive plume survey,
MAR- Chirp subbottom, synergy with Jason ops (Tivey/Tucholke)



ABE-Based Research Reported in the Science Literature

7 journal articles published or in press:

(Tivey, Cormier, Carbotte, Shah, Fornari, Yoerger, Kelley)

10 engineering publications

2 EOS articles

(Tivey, Shank)

11 journal articles in preparation

22 AGU abstracts

Many less formal publications in;

Oceanus, Ridge Events, Nature online, NOAA - OE web site,

Dive & Discover



ABE/Sentry Capabilities

Endurance: 15-30 hrs (depending on payload and terrain)

Speed: 1.5 kts (3 kts Sentry)

Navigation: LBL referenced to GPS augmented with DVL,
PHINS-INS (Sentry)

Standard Sensors:

Two 3 axis flux gate magnetometers

Scanning sonar, multibeam

CTD, Optical backscatter

Digital Still camera

Optional sensors

eH (redox potential),

One 3 axis current meter

Subbottom profiler

I/O Flexibility for user-supplied sensors



Current *ABE* Data Products

Raw and processed navigation and attitude*

Science data, 1 sec updates (CTD, Maggy, OBS)*

Bathymetry (Imagenex and Multibeam)

Raw data records

Point clouds*

Gridded bathy

Digital photos

I/O Flexibility for user-supplied sensors

(* Matlab and flat ascii formats)



ABE/Sentry

Why ABE/Sentry Merits Becoming a Facility

- (1) State-of-the-Art mapping products and vehicle technology developed over a decade of at-sea operations.
- (2) Trained, experienced people with commitment to science.
- (3) Well established data pipelines, documentation and technical expertise in providing users with products.
- (4) Excellent logistics capabilities (e.g. Fiji to Bermuda in 3 weeks!).
- (5) Synergism in technology and manpower with all the other NDSF assets.
- (6) Have shown that AUV data acquisition can be applied to many different oceanographic problems with revolutionary results.



ABE/Sentry

Why a different mode of operation is needed to sustain future AUV operations for multidisciplinary oceanography

- (1) With present "project-based" mode of operation, no funds are available for general maintenance/shore-side support of *ABE/Sentry*.
- (2) With no base support, the development of new sensors and capabilities for *ABE/Sentry* may be hampered.
- (3) With present "project-based" mode of operation, the development of an *ABE/Sentry* 'operational' group is difficult since there is no continuity of support.



ABE/Sentry

Benefits of a Facility Structure for *ABE/Sentry*

- (1) Would increase deep submergence community access to AUV technology and promote synergy between complementary vehicle ops.**
- (2) Would provide general maintenance/shore-side support for *ABE/Sentry*.**
- (3) Would facilitate development of an *ABE/Sentry* operational group by providing more continuity of funding.**
- (4) Would facilitate development of new sensors and capabilities for *ABE/Sentry*.**
- (5) Would remove *ABE/Sentry* operational costs from science proposals, streamlining proposal process.**



ABE/Sentry

How to optimize their use within the oceanographic community?

Key Issues for Discussion and How to Proceed:

- Should ABE/Sentry be operated as a facility?
- If ABE/Sentry is operated as a facility, should it become part of the NDSF or operated as a facility outside of the NDSF?
- What serves multidisciplinary science best scientifically, operationally and cost-effectively?

A DESSC opinion on these issues has been requested by the Funding Agencies

What are the Funding Agencies' Views



