AEGEAN and BLACK SEA PROJECT 2006

Preliminary Cruise Plan

URI R/V ENDEAVOR

Cruise #EN-415, EN-417, EN-418, EN-419, EN-420, EN-421

GENERAL INFORMATION

Project title: Aegean and Black Sea Project 2006
Cruise Dates: 15 March – 9 July 2006
Operating Area: Sea of Crete, Thera and northern Black Sea
Total Sea Days:

Administrative Contact Information:

Robert Ballard Chief Scientist, Sea of Crete and Black Sea University of Rhode Island	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 860-572-5955 x602 Fax: 860-572-4734 Email: rballard@ife.org
Haraldur Sigurdsson Chief Scientist, Thera University of Rhode Island	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 401-874-6596 Fax: Email: haraldur@gso.uri.edu
Dwight Coleman University of Rhode Island	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 401-874-6637 Fax: 401-874-6223 Email: dcoleman@gso.uri.edu
Catalina Martinez NOAA/OE Project Manager	NOAA Office of Ocean Exploration URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 401-874-6250 Fax: Email: Catalina.martinez@noaa.gov

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1. Cruise overview

1.1. Chief scientist authorization

The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship; (2) exceed the time allotted for the cruise; (3) result in undue additional expense; or (4) change the general intent of the cruise.

1.2. Other points of contact

Prof. Steve Carey Co-PI, Thera	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: Fax: Email: scarey@gso.uri.edu
Ms. Katherine Croff	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 401-699-1161 Fax: 401-874-6223 Email: kcroff@gso.uri.edu
Mr. Todd Gregory ROV Engineer	URI Graduate School of Oceanography South Ferry Road Narragansett, RI 02882 Tel: 401-874-6132 Fax: 401-874-6223 Email: tgregory@ife.org Email at sea: tgregory@seawave.net
Mr. Jim Newman Chief Engineer	Institute for Exploration Tel: 508-548-6665 Fax: 508-540-1036 Email: jnewman@whmsi.com
Ms. Sandra Witten	Institute for Exploration/URI Tel: 781-934-5760 Fax: Email: switten@ife.org

1.3. Participating institutions

Boys and Girls Clubs

EDS Corporation

Hellenic Centre for Marine Research (HCMR)

Immersion Presents

Institute for Exploration (IFE)

Institute of Geology and Mineral Exploration (IGME)

National Academy of Sciences of Ukraine, Dept. of Underwater Heritage, Inst. of Archaeology (NASU)

National Geographic Society (NGS)

NOAA Office of Ocean Exploration (NOAA/OE)

Rhode Island Endeavor Program (RIEP)

University of Rhode Island (URI)

University of Tennessee (UT)

University of Texas, Austin (UTA)

1.4. Vessel identification and cruise number

- Call sign: WCE-5063 (Whiskey-Charlie-ECHO 5063)
- Cruise numbers: EN-415, EN-417, EN-418, EN-419, EN-420, EN-421

1.5. Permits and certification

- Sea of Crete
  - Archaeological permits are not required for work outside Greek territorial waters (6nm). All operations for the Sea of Crete survey will be outside the territorial water limit.
- Thera
  - US Department of State authorization for research in foreign waters has been requested, and approval is pending.
- Black Sea
  - US Department of State authorization for research in foreign waters has been requested, and approval is pending.

1.6. Scientific objectives

The University of Rhode Island (URI) will lead an expedition to conduct archaeological and geological surveys in the Aegean and Black Seas. The cruise will focus on three locations, the northwest Sea of Crete, in and around Thera, and in the northern Black Sea. Two research vessels will be used, the R/V AEGAEO, operated by HCMR, and the R/V ENDEAVOR, operated by URI. On ENDEAVOR, there will be a total of two cruise legs in the Sea of Crete, one at Thera and three in the Black Sea.

1.6.1. Sea of Crete

- The long-term goal of the Sea of Crete project is to document and correlate the underwater archaeological and geological records for the past 10,000 years. To do so, we intend to create a complete multibeam bathymetric map of the Sea of Crete, survey approximately 20-30% of the sea with side scan sonar, and investigate targets located by the side scan survey. We will also conduct seismic surveys and collect core samples.
- In 2006, we will focus on the northwest region of the Sea of Crete, outside Greek Territorial Seas

- The ENDEAVOR will use side scan the deeper areas in this region, from approximately 600 to 1200m. It will then use the remotely operated vehicle (ROV) HERCULES to investigate targets located by both side scan surveys.
- All work will be non-intrusive, and no samples will be collected.

1.6.2. Thera

- The purpose of the Thera cruise is to study the microstructure and surface morphology of the ocean floor within the caldera and around Thera, using multibeam, side-scan sonar, and remotely operated vehicle systems. The R/V AEGAEO, from the Hellenic Center for Marine Research, is being used in addition to the ENDEAVOR.

1.6.3. Black Sea

- The purpose of the Black Sea survey is to identify significant shipwrecks from the Bronze Age. Future cruises will perform more detailed survey, artifact recovery and excavation. The Ukrainian collaborators are also interested in locating and surveying known World War II shipwrecks near the Crimean coast, particularly the *Armenia*.
- All work will be non-intrusive, and no samples will be collected.

1.7.

Itinerary

EN-415	TRAN-1
15 March-4 April	Transit Narragansett, RI, to Nice, France
5-7 April	Port stop Nice, France
EN-417	TRAN-2
15-17 April	Port stop Nice, France
18-23 April	Transit Nice, France, to Iraklion (Crete), Greece
24-25 April	Port stop Iraklion (Crete), Greece
EN-418	SOC-1
26 April-2 May	Side scan survey in Sea of Crete
2 May	Transit to Thera, Greece, and personnel transfer
	TRAN-3
2-6 May	Transit From Thera, Greece, to Istanbul, Turkey
5 May	Port stop in Istanbul, Turkey (for fuel)
6 May	Transit from Istanbul to survey area in Black Sea, off Crimea, Ukraine
	BLS-1
7-14 May	Side scan survey off Crimea
14 May	Port stop Balaklava (Sevastopol), Ukraine
	BLS-2
15-22 May	ROV operations in Black Sea, off Crimea
23-24 May	Port stop Balaklava (Sevastopol), Ukraine
EN-419	TRAN-4
25 May	Transit Balaklava (Sevastopol), Ukraine to Istanbul, Turkey
26 May	Port stop in Istanbul, Turkey (for fuel)
27-29 May	Transit Istanbul, Turkey, to Thera Greece
30 May	Personnel transfer at Thera, Greece
	THR-2
30 May-8 June	ROV operations in and around Thera, Greece
9 June	Port stop, Thera, Greece (at anchor)
EN-420	SOC-2
10-17 June	ROV operations in Sea of Crete
18-19 June	Port stop Iraklion (Crete), Greece
EN-421	TRAN-5
20 June-9 July	Transit Iraklion, Crete, to Narragansett, RI

2. Vehicles and equipment

2.1. Equipment and capabilities provided by ship

- A-frame
- Ship's Crane

2.2. Equipment provided by scientists

- Dynacon winch with 4200m 0.68" steel-armored fiber optic cable
- ECHO side-scan sonar towsled, clump and topside processing equipment
- ARGUS optical towsled, with HD video camera
- HERCULES remotely operated vehicle, 4000 meter capability, with HD video camera
- ROV/Video Control van
- Satellite communications antenna and electronics for C-band, up to 15 Mbps
- Knuckle-boom crane, HIAB, property of NOAA/NMAO
- Ultra-short base line (USBL) acoustic navigation system (LinkQuest Tracklink 5000)

3. EN-415

3.1. TRAN-1: Narragansett, RI to Nice, France

- Mob and load equipment in Narragansett, RI.
- Depart Narragansett, RI, on 15 March 2006, and transit to Nice, France.
- There will be no members of the science party aboard.
- Deck equipment is to be offloaded in Nice upon arrival.

4. EN-417

4.1. TRAN-2: Nice, France to Iraklion, Greece

- Engineers and technicians will meet the ENDEAVOR in Nice, France, to load equipment stored in Nice and mobilize while in transit to Iraklion (Crete), Greece.
- Personnel will arrive and move onto ENDEAVOR on 15 April for mobilization.
- Depart Nice, France, on 18 April and arrive in Iraklion on 23 April.
- Point of Contact: Todd Gregory

4.1.1. Cruise plan

Date	Activity
15 April	Mob
16 April	Mob
17 April	Mob
18 April	Depart Nice, France
19 April	Transit
20 April	Transit
21 April	Transit
22 April	Transit
23 April	Arrive in Iraklion, Greece

4.1.2. Personnel

Last	First	Role	Affiliation	Gender
DeRoche	Mark	Deck Chief	IFE	M
Gregory	Todd	Engineer	URI	M
Martin	Eric	Engineer	IFE	M
Phillips	Brennan	Engineer	IFE	M

5. EN-418

5.1. SOC-1: Sea of Crete side scan survey

- Science party will arrive in Iraklion, Greece, to meet ENDEAVOR.
- Dwight Coleman will arrive 22 April; all else will arrive 24 April.
- Science party will move onto ENDEAVOR upon arrival.
- 6-7 days of side scan survey will commence on 26 April, and will terminate on 2 May at Thera, Greece.

5.1.1. Cruise plan

Date	Activity
23 April	Arrive in Iraklion, Greece
24 April	Port stop
25 April	Port stop
26 April	Transit Iraklion to Sea of Crete Side scan
27 April	Side scan
28 April	Side scan
29 April	Side scan
30 April	Side scan
1 May	Side scan
2 May	Side scan Transit Sea of Crete to Thera Shuttle personnel transfer

5.1.2. Data to be collected and processed

- ECHO will be used to collect side scan sonar and chirp sub-bottom profiler data in the northwest Sea of Crete.
- Tracklines will run E-W and will be spaced 2.75 km apart.
- Sonar data will be acquired with the Triton/Isis acquisition suite, and will be processed with Triton, CARIS, and Fledermaus software.

5.1.3. Personnel

Last	First	Role	Affiliation	Gender
Bergstrom	Roy	Web development	URI	M
Brennan	Michael	Oceanography/archaeology	URI	M
Coleman	Dwight	Oceanogrpahy/geology	URI	M
DeRoche	Mark	Deck Chief	IFE	M
Martin	Eric	Engineer	IFE	M
Orvosh	Tom	Marine Technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Podraza	Kathleen	Teacher at sea	RIEP	F
Sutherland	Michael	Oceanography/archaeology	URI	M
Whitehouse	Molly	VIP	IFE	F

DiPerna	Christopher	Geologist	URI	M
Vinahatiero	Nathan	Geologist	URI	M

5.1.4. Organizational structure

- Chief scientist and point of contact: Dwight Coleman (dcoleman@gso.uri.edu)
- Chief of operations:
- Side scan operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change):

Watch leader	**Sonar**	**Navigator**	**Data**	**Other**
Coleman	Orvosh	Coleman	Sutherland	Whitehouse
Brennan	Martin	Vinahatiero	Brennan	Bergstrom
DiPerna	DeRoche	Phillips	DiPerna	Podraza

5.2.

TRAN-3: Thera, Greece, to Ukraine waters

- Upon arrival to Thera on 2 May, there will be a shuttle for personnel transfer
  - Departing: Whitehouse, Podraza, Bergstrom, Vihateiro, DiPerna
  - Arriving: Davis, Jazwa, Stirn, Moore, Pinner, Bushnell, 4 Ukrainians
- Depart Thera on 2 May and transit to Ukrainian waters.
- There will be no marine scientific research operations conducted during transit.
- There will be an overnight port stop in Istanbul, May 4-5
- Commence side scan operations upon arrival in survey area.

5.2.1. Cruise plan

Date	Activity
2 May	Shuttle personnel transfer in Thera Transit to Ukrainian waters
3 May	Transit
4 May	Port Stop, Istanbul (overnight)
5 May	Transit
6 May	Transit

5.2.2. Personnel

Last	First	Role	Affiliation	Gender
Brennan	Michael	Oceanography/archaeology	URI	M
Bushnell	Taissa	Translator	IFE	F
Busyhina	Maria	Archaeology	Ukrainian	F
Coleman	Dwight	Oceanogrpahy/geology	URI	M
Davis	Dan	Archaeology	UTA	M
DeRoche	Mark	Deck Chief	IFE	M
Jazwa	Chris	Oceanogrpahy/archaeology	URI	M
Lutsky	Yuri	Archaeology	Ukrainian	M
Martin	Eric	Engineer	IFE	M
Moore	James	Oceanography/archaeology	URI	M
Orvosh	Tom	Marine Technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/Eng	NOAA	M
Poltavets	Serhiy	Archaeology	Ukrainian	M
Stirn	Matthew	VIP	IFE	M
Sutherland	Michael	Oceanography/archaeology	URI	M
Voronov	Serhiy	Archaeology	Ukrainian	M

5.2.3. Organizational structure

- Chief scientist and point of contact: Dwight Coleman, dcoleman@seawave.net

5.3.

BLS-1: Black Sea side scan survey

- 7 days of side scan survey will commence upon arrival in Ukrainian waters.

5.3.1. Cruise plan

Date	Activity
7 May	Side scan
8 May	Side scan
9 May	Side scan
10 May	Side scan
11 May	Side scan
12 May	Side scan
13 May	Side scan
14 May	Port Stop at Balaklava, Ukraine

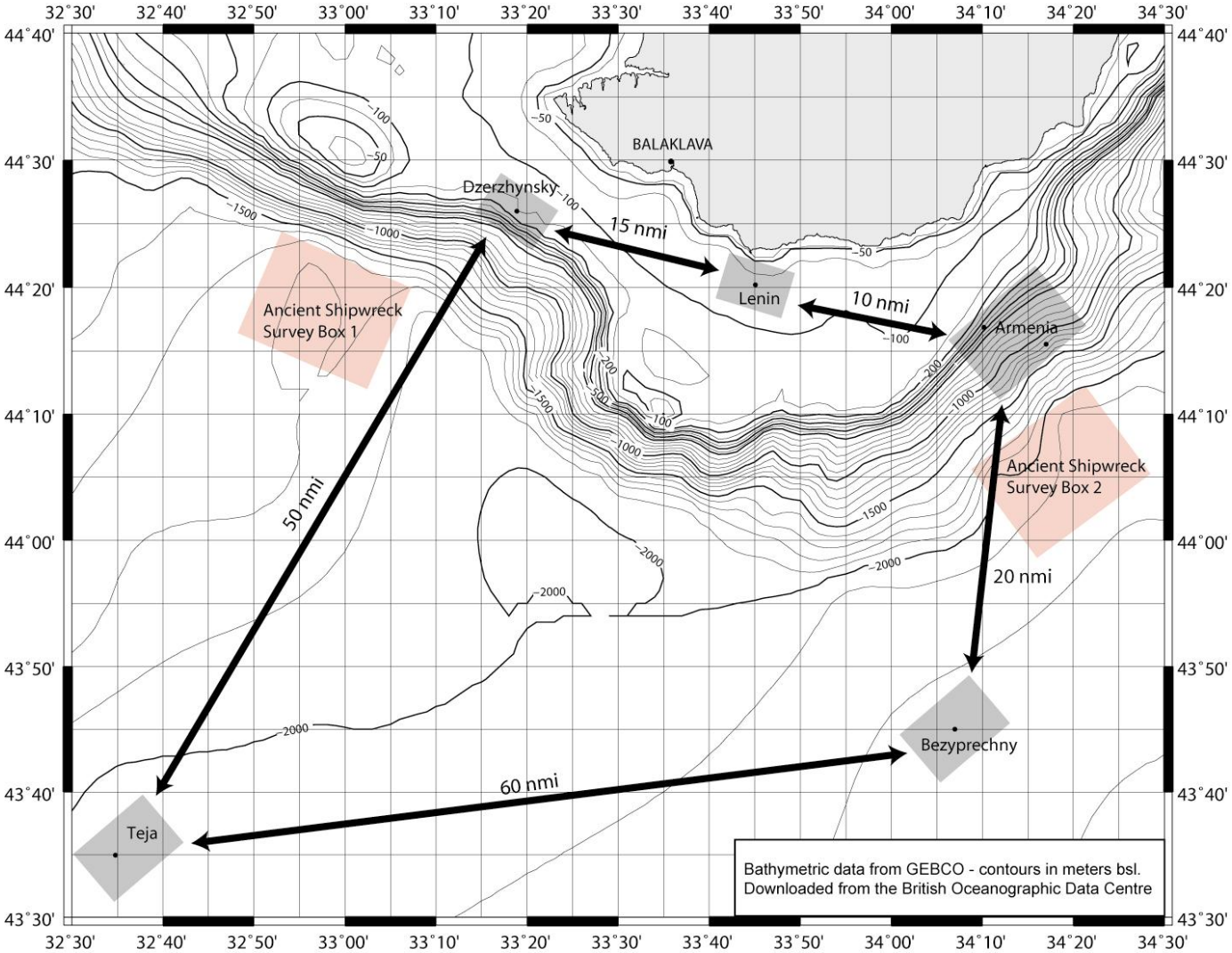

Figure 1. Planned Black Sea survey areas off Crimea

5.3.2. Data to be collected and processed

- ECHO will be used to collect side scan sonar and chirp sub-bottom profiler data in the northern Black Sea, in the Ukrainian EEZ.
- Sonar data will be acquired with the Triton/Isis acquisition suite, and will be processed with Triton, CARIS, and Fledermaus software.

5.3.3. Personnel

Last	First	Role	Affiliation	Gender
Brennan	Michael	Oceanography/archaeology	URI	M
?	?	Translator	Ukrainian	?
Busyhina	Maria	Archaeology	Ukrainian	F
Coleman	Dwight	Oceanography/geology	URI	M
Davis	Dan	Archaeology	UTA	M
DeRoche	Mark	Deck Chief	IFE	M
Jazwa	Chris	Oceanography/archaeology	URI	M
Lutsky	Yuri	Archaeology	Ukrainian	M
Martin	Eric	Engineer	IFE	M
Moore	James	Oceanography/archaeology	URI	M
Orvosh	Tom	Marine Technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/Eng	NOAA	M
Poltavets	Serhiy	Archaeology	Ukrainian	M
Stirn	Matthew	VIP	IFE	M
Sutherland	Michael	Oceanography/archaeology	URI	M
Voronov	Serhiy	Archaeology	Ukrainian	M

5.3.4. Organizational structure

- Chief scientist and point of contact: Dwight Coleman (dcoleman@gso.uri.edu)
- Chief of operations:
- Side scan operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change):

Watch leader	Sonar	Navigator	Data	Other
Coleman	Orvosh	Coleman	Sutherland	Stirn
Brennan	Martin	Pinner	Brennan	Jazwa
Davis	DeRoche	Phillips	Davis	Moore

6. Black Sea ROV operations

6.1. BLS-2 Initial ROV Operations

- Port Stop at Balaklava, Ukraine on 14-15 May
  - Departing: Jazwa, Sutherland, Lutsky, Busyhina, Poltavets
  - Arriving: Gregory, Howland, Newman, Raynes, Lovalvo, Wright
- Port stop will be followed by ROV trials, moving into ROV operations.

6.1.1. Cruise plan

Date	Activity
14 May	Port stop for personnel transfer
15 May	ROV trials/Operations

6.1.2. Data to be collected and processed

- ARGUS and HERCULES will undergo engineering trials, as necessary, and may be used to confirm targets located by side scan survey.
- Collected data will include: still imagery, HD and SD video, CTD, DO, multibeam.
- No samples will be collected.

6.1.3. Personnel

Last	First	Role	Affiliation	Gender
Brennan	Michael	Oceanography/archaeology	URI	M
Coleman	Dwight	Oceanography	URI	M
Davis	Dan	Archaeology	UTA	M
DeRoche	Mark	Deck Chief	IFE	M
Gregory	Todd	Engineer	URI	M
Howland	Jon	Engineer	IFE	M
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	IFE	M
Moore	James	Oceanography/archaeology	URI	M
Newman	Jim	Engineer	IFE	M
Orvosh	Tom	Marine technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Raynes	Brian	Engineer	IFE	M
Stirn	Matt	VIP	IFE	M
Pinner	Webb	Data/engineer	NOAA	M
Voronov	Serhiy	Archaeology	Ukrainian	M
?	?	Translator	Ukrainian	?

6.1.4. Organizational structure

- Chief scientist and point of contact: Dwight Coleman
- Chief of operations: Jim Newman

- Side scan operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- ROV operations will be conducted as necessary, at the discretion of the Chief scientist and Chief of operations.
- Science party watch positions will be as follows (subject to change and adaptation for side scan operations):

Watch leader	Herc pilot	Argus pilot	Navigator	Video	Other
Coleman	Gregory	Orvosh	Coleman	Wright	Stirn
Voronov	Lovalvo	Martin	Pinner	Raynes	Brennan
Davis	Phillips	Newman	Moore	DeRoche	Translator

6.2. BLS-3: Continuing Black Sea ROV operations

- Continue ROV operations.
- Personnel transfer 16 May
  - Depart: Moore, Stirn, Wright (to Ukrainian research vessel)
  - Arrive: Durbin, Ballard, Howell
- Transfer day visitor personnel from Ukrainian vessel twice daily

6.2.1. Cruise plan

Date	Activity
16 May	ROV
17 May	ROV
18 May	ROV
19 May	ROV

6.2.2. Data to be collected and processed

- ROV operations will be carried out to confirm targets located by side scan survey.
- Collected data will include: still imagery, HD and SD video, CTD, DO, multibeam.
- No samples will be collected.

6.2.3. Personnel

Last	First	Role	Affiliation	Gender
Ballard	Robert	Oceanography/geology	URI	M
Brennan	Michael	Oceanography/archaeology	URI	M
Coleman	Dwight	Oceanography/geology	URI	M
Davis	Dan	Archaeology	UTA	M
DeRoche	Mark	Deck Chief	IFE	M
Durbin	Mike	Satellite	IFE	M
Gregory	Todd	Engineer	URI	M
Howell		VIP	IFE	M
Howland	Jon	Engineer	IFE	M
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	URI	M

Newman	Jim	Engineer	IFE	M
Orvosh	Tom	Marine technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/eng?	NOAA	M
Raynes	Brian	Video Engineer	IFE	M
?	?	Translator	Ukrainian	?
Voronov	Serhiy	Archaeology	Ukrainian	M

6.2.4. Organizational structure

- Chief scientist and point of contact: Robert Ballard
- Chief of operations: Jim Newman
- ROV operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change):

Watch leader	Herc pilot	Argus pilot	Navigator	Video	Other
Ballard	Gregory	Martin	Coleman	Raynes	Brennan
Davis	Lovalvo	Newman	Howland	Durbin	Howell
Voronov	Phillips	Orvosh	Pinner	DeRoche	Translator

6.3. BLS-4: Final Black Sea ROV operations

- Continue ROV operations.
- Personnel transfer 20 May
  - Depart: Howland, Coleman
  - Arrive: Nichols, Wright (from Ukrainian research vessel)
- Transfer day visitor personnel from Ukrainian vessel twice daily
- Port Stop at Balaklava 22 May
  - Depart: Ballard, Howell, Newman, Wright, Davis, Voron, Translator
  - Arrive: St. Amant, Charles, Newlin, Roman

6.3.1. Cruise plan

Date	Activity
20 May	ROV (and personnel transfer)
21 May	ROV
22 May	Port Stop, Balaklava
23 May	In port
24 May	In port

6.3.2. Data to be collected and processed

- ROV operations will be carried out to confirm targets located by side scan survey.
- Collected data will include: still imagery, HD and SD video, CTD, DO, multibeam.
- No samples will be collected.

6.3.3. Personnel

Last	First	Role	Affiliation	Gender
Ballard	Robert	Oceanography/geology	URI	M
Brennan	Michael	Oceanography/archaeology	URI	M
Davis	Dan	Archaeology	UTA	M
DeRoche	Mark	Deck Chief	IFE	M
Durbin	Mike	Satellite	IFE	M
Gregory	Todd	Engineer	URI	M
Howell		VIP	IFE	M
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	URI	M
Newman	Jim	Engineer	IFE	M
Nichols	Mary	Video operator	IFE	F
Orvosh	Tom	Marine technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/eng?	NOAA	M
Raynes	Brian	Video Engineer	IFE	M
?	?	Translator	Ukrainian	?
Voronov	Serhiy	Archaeology	Ukrainian	M
Wright	Dave	Engineer	IFE	M

6.3.4. Organizational structure

- Chief scientist and point of contact: Robert Ballard
- Chief of operations: Jim Newman
- ROV operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change):

Watch leader	Herc pilot	Argus pilot	Navigator	Video	Other
Ballard	Gregory	Martin	Brennan	Raynes	Nichols
Davis	Lovalvo	Newman	Wright	Durbin	Howell
Voronov	Phillips	Orvosh	Pinner	DeRoche	Translator

6.4.

TRAN4: Sevastopol, Ukraine to Thera, Greece

- Depart Balaklava on 25 May for transit to Thera via Istanbul
- There will be no marine scientific research operations conducted during transit.
- Shuttle personnel transfer upon arrival at Thera.
- Science Party point of contact: Todd Gregory.

6.4.1. Cruise plan

Date	Activity
25 May	Depart Ukraine
26 May	Arrive Istanbul (for fuel)
27 May	Depart Istanbul
28 May	Transit
29 May	Transit
30 May	Arrive at Thera Shuttle personnel transfer

6.4.2. Personnel

Last	First	Role	Affiliation	Gender
Brennan	Michael	Oceanography/archaeology	URI	M
DeRoche	Mark	Deck Chief	IFE	M
Durbin	Mike	Satellite	IFE	M
Gregory	Todd	Engineer	URI	M
St. Amant	Kurt	Video Production	Immersion	M
Newlin	Julye	Video Production	Immersion	F
Charles	Scot	Video Production	Immersion	M
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	URI	M
Nichols	Mary	Video Operator	IFE	F
Orvosh	Tom	Marine technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/engineer	NOAA	M
Raynes	Brian	Video Engineer	IFE	M
Roman	Chris	Engineer	URI	M

6.5.

THR-2 Thera side scan and ROV operations

- Shuttle personnel transfer early morning on 30 May
  - Depart: Brennan, St. Amant, Newlin, Charles
  - Arrive: Sigurdsson, Carey, Croff, Alexandri, Newman, Vougioukalakis, Mallios
- Side scan operations around caldera for 1-2 days.
- ROV operations at Kolumbo and filming rehearsals 1 and/or 2 June.
- ROV and side scan operations will be carried out 3-8 June, simultaneously with live broadcasts.
- Broadcasts will take place 5-8pm local time (EST +7).
- Shuttle schedule for film crew and others TBD.
- Shuttle personnel transfer 9 June.

6.5.1. Cruise plan

Date	Activity
30 May	Arrive at Thera Shuttle personnel transfer (AM) Side scan around caldera
31 May	Side scan around caldera
1 June	ROV at Kolumbo
2 June	ROV at Kolumbo
3 June	ROV in caldera and passages
4 June	ROV in caldera and passages Boys & Girls Club kids
5 June	ROV in caldera and passages Boys & Girls Club kids
6 June	ROV on flank outside caldera
7 June	Side scan
8 June	Side scan
9 June	Shuttle/liberty at Thera

6.5.2. Data to be collected and processed

- Side scan sonar and sub-bottom profiling using ECHO around and inside the caldera. Side-scan will be conducted in concentric circles around the Thera island group. Ca. 12 hrs/circle @ 2 kts.
- Sonar data will be acquired with the Triton/Isis acquisition suite, and will be processed with Triton, CARIS, and Fledermaus software.
- ROV operations will be carried out to groundtruth targets located by side scan survey.
- Collected data will include: still imagery, HD and SD video, CTD, DO, multibeam, laser line scan.
- Geological samples and box cores will be collected.

6.5.3. Personnel list

Last	First	Role	Affiliation	Gender
Mallios		Engineer	HCMR	M
Alexandri	Matina	Oceanography/geology	HCMR	F

Carey	Steve	Oceanography/geology	URI	M
Croff	Katherine	Oceanography/geology	URI	F
DeRoche	Mark	Deck Chief	IFE	M
Durbin	Mike	Satellite	IFE	M
Gregory	Todd	Engineer	URI	M
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	URI	M
Newman	Jim	Engineer	IFE	M
Nichols	Mary	Video Operator	IFE	F
Orvosh	Tom	Marine technician	URI	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/eng?	NOAA	M
Raynes	Brian	Eng/tech?	IFE	M
Roman	Chris	Engineer	URI	M
Sigurdsson	Haraldur	Oceanography/geology	URI	M
Vougioukalakis	George	Oceanography/geology	HCMR	M

6.5.4. Organizational structure

- Chief scientist and point of contact: Haraldur Sigurdsson
- Chief of operations: Jim Newman.
- Side scan and ROV operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change and adaptation for side scan operations):

Watch leader	Herc pilot	Argus pilot	Navigator	Video	Other
Sigurdsson	Gregory	Martin	Croff	Raynes	Vougioukalakis
Carey	Lovalvo	Orvosh	Roman	DeRoche	Durbin
Alexandri	Phillips	Pinner	Newman	Nichols	Mallios

7. EN-420

7.1. SOC-2 Sea of Crete ROV operations

- Shuttle personnel transfer on 9 June
  - Depart: Sigurdsson, Carey, Alexandri, Vougioukalakis, Mallios
  - Arrive: Hollinshead, Patricelli, Ballard, Doros

7.1.1. Cruise plan

Date	Activity
9 June	Shuttle/liberty at Thera
10 June	Transit Thera to Sea of Crete ROV
11 June	ROV
12 June	ROV
13 June	ROV
14 June	ROV
15 June	ROV
16 June	ROV
17 June	ROV Transit Sea of Crete to Iraklion
18 June	In port
19 June	In port
20 June	Depart for transit to URI

7.1.2. Data to be collected and processed

- ROV operations will be carried out to confirm targets located by side scan survey.
- Collected data will include: still imagery, HD and SD video, CTD, DO, multibeam, laser line scan.
- No samples will be collected.

7.1.3. Personnel list

Last	First	Role	Affiliation	Gender
Ballard	Robert	Oceanography/geology	URI	M
Croff	Katherine	Oceanography/geology	URI	F
DeRoche	Mark	Bosun	IFE	M
Durbin	Mike	Satellite	IFE	M
Doros	Brian	Eng/tech?	IFE	M
Gregory	Todd	Engineer	URI	M
Hollinshead	Mary	Archaeology	URI	F
Lovalvo	Dave	Engineer	IFE	M
Martin	Eric	Engineer	URI	M
Newman	Jim	Engineer	IFE	M
Nichols	Mary	Tech?	IFE	F
Orvosh	Tom	Marine technician	URI	M

Patricelli	Robert	VIP	IFE	M
Phillips	Brennan	Engineer	IFE	M
Pinner	Webb	Data/eng?	NOAA	M
Raynes	Brian	Eng/tech?	IFE	M
Roman	Chris	Engineer	URI	M

7.1.4. Organizational structure

- Chief scientist: Robert Ballard
- Alternate point of contact: Mary Hollinshead
- Chief of operations: Jim Newman
- ROV operations will be carried out on a 24-hour watch schedule, 4 hour on/8 hours off.
- Science party watch positions will be as follows (subject to change):

Watch leader	**Herc pilot**	**Argus pilot**	**Navigator**	**Video**	**Other**
Ballard	Gregory	Martin	Roman	Nichols	Patricelli
Hollinshead	Lovalvo	Orvosh	Newman	Raynes	Durbin
	Phillips	Pinner	Croff	Doros	DeRoche

8. EN-421

8.1. TRAN-5: Iraklion, Crete, to Narragansett, RI

- Arrive in Iraklion, Greece, on 17 June.
- 2-day port stop and demobilization.
- Science party will depart 18 and 19 June.
- ENDEAVOR will depart Iraklion on 20 June; arrive in Narragansett, RI, on 15 July.
- There will be no members of the science party on board ENDEAVOR for the transit.

8.1.1. Cruise plan

Date	Activity
17 June	Transit Sea of Crete to Iraklion
18 June	Port stop
19 June	Port stop
20 June	Transit to Narragansett, RI
15 July	Arrive Narragansett, RI

9. Education and outreach

- Web sites covering the expedition at various levels include the following.
    - oceanexplorer.noaa.gov
    - immersionpresents.org
    - uri.edu/endeavor
    - uri.edu/endeavor/thera/index

All sites utilized an RSS protocol to link to each other, and the NOAA Ocean Explorer site and the Immersion Presents site showed live streaming video 24 hours a day during the time there was a satellite link

- URI ARMADA teacher-at-sea participant on the first leg.
- Using shipboard satellite telecommunications technology, portions of all surveys will be broadcast live as part of URI and IFE's public outreach programs.
- Immersion Presents: See Appendix A and B for descriptions of Immersion Presents education and outreach efforts.
- NOAA Ocean Explorer: See Appendix C for a description of the NOAA Ocean Explorer education and outreach efforts.

Underway, station and small boat operations

9.1. Underway operations

Underway operations will include the collection of sub-bottom seismic data, multibeam bathymetry, and side-scan sonar data. Multibeam data will be collected anytime other operations are not being conducted.

9.2. Station operations

Station operations will include ROV operations and geological bottom sampling. ROV diving and bottom sampling locations will be determined at sea after the processing of seismic data and video analysis, and will be confirmed with the Commanding Officer.

Initial ROV launch sites will be several hundred meters down current of targets of interest. After arriving at the seafloor, the scanning sonar systems will be used to search for acoustic targets. Once the target is located, a range and bearing will be calculated and the navigator will instruct the bridge to move the ship accordingly, and the ROV will follow. Smaller sonar targets will be viewed by the ROV as ARGUS swings into position beneath the surface ship. While ROV operations are underway and everything is in working order, there will be no reason for recovery. If however a recovery is necessary, a new launch site (station) may be selected for the next deployment.

9.3. Small boat operations

Small boat operations are weather dependent and at the Command's discretion. It is requested that at some time during the expedition, a small boat is deployed for the film crew to photograph the vessel and possibly a launch or recovery of the vehicles. Small boat operations are not normally required for towfish operations, but may be requested if difficulty arises during recovery.

9.4. Applicable restrictions

Both station and underway operations must take the effects of wind and seas into consideration. This consideration is especially critical during the launch and recovery of vehicles. The ENDEAVOR will need to display Restricted Maneuverability lights/insignia as appropriate.

ROV operations will require 'live boat' operations to maintain control of the ROV umbilical during dive operations. Consideration of the effect of wind and seas on the operation is critical to the operation. ROV operations will occur on station and will require the ENDEAVOR to display Restricted Maneuverability lights/insignia as appropriate.

10. Disposition of data

10.1. Data and samples

- The Chief Scientist is responsible for the disposition of data.
- Each PI will receive copies of all shipboard, multibeam and Hercules data acquired during the cruise.

10.2. Records and reports

The Chief Scientist is required to provide NOAA/OE with a quick look report upon completion of the cruise, and a full cruise report within 90 days of the completion of the project.

The Chief Scientist will be mailed a Post Cruise Reporting Package prior to the departure of the ship on his or her cruise. This package will include a cover letter explaining what the post cruise obligations are, when they are due, and where to send them.

- NODC Cruise Summary Report (formerly "ROSCOP") detailing the observations/samples collected by the program
- NSF/UNOLS Ship Utilization Data Report
- The on-line UNOLS Post-Cruise Assessment Report Form (formerly "Vessel Cruise Assessment"). This form will also be filled out by the ENDEAVOR's Captain and Marine Technician.
- Upon completion of all foreign cruises, a preliminary cruise report must be submitted within 30 days after cruise completion as outlined in the Clearance Approval received from the State Department. See Foreign Cruise Guidelines.

10.3. Real-time products

(highlights video, high-res image CD, etc.)

11. Communications

11.1. Radio

The call sign for ENDEAVOR is WCE-5063 (Whiskey-Charlie-ECHO 5063).

11.1.1. High Frequency Radios

Harris RF3200 - 2,000 Watt PEP, 1000 Watt AM-CW radio capable of world wide communication using single sideband modulation within the 2MHz to 30MHz band. It is programmable for simplex or half-duplex communications and is equipped for SITOR (packet radio) RF modem capability.

ICOM IC-M700 - 150 Watt, 2MHz to 30Mhz single side band radio which operates from the ship's 12 volt battery power supply for emergency voice communications.

11.1.2. VHF/FM Radios

ICOM IC-M126DSC - 25 Watt radio capable of communication on all US and international VHF marine channels. It is fitted with Digital Selective Calling (DSC) class C. VHF/FM radios are normally used for short range ship to ship and harbor communications.

ICOM IC-M100 - 25 Watt radio capable of communication on all US and international VHF marine channels.

Several hand-held - 5 Watt radios allowing convenient communication aboard ship and with small boats. Water resistant cases are available for these radios.

Simrad/Taiyo automatic VHF direction finder

11.2. Telephone

All telephone communication aboard ENDEAVOR is from the ship's chartroom. When calling from the vessel bridge personnel will advise which system is most appropriate for your needs. The deck officer will make a log entry if the outgoing call is to be billed to the chief scientist otherwise all calls must be made on a credit card, calling card, reversed charge or third number billing basis.

Service	Number	Remarks
Iridium	Since incoming calls are billed to the ship, please contact the Marine Superintendent or the captain for the number	Capable of voice and data (2400 baud) Good quality World wide coverage Service independent of vessel's heading Cost: $1.50/min - paid by ship side user
Inmarsat-B	011-874[(1)]-330-347110 voice 011-874[(1)]-330-347111 fax	- Capable of voice, facsimile and data (9600 baud) - Excellent quality - World wide coverage - Service independent of vessel's heading

		- Cost: Between $1.94/min and $2.58/min
Cellular	Since incoming calls are billed to the ship, please contact the Marine Superintendent or the captain for the number Capable of voice and facsimile	- Good quality - Coverage up to 100 miles from the US coast where cellular service is available - Service independent of vessel's heading - Cost paid by ship side user
Message relay	Brief messages for business or emergency purposes can be passed between the captain and the Marine Superintendent for relay. There is contact every day, Monday through Friday, at 0845 (RI time).	

(1) Note: For Inmarsat calls 874 designates the Western Atlantic satellite. Use 871 for the Eastern Atlantic satellite and 872 for the Pacific satellite. Contact the Marine Superintendent or captain if it is not obvious which satellite the ship will be using.

11.3. Email

E-mail is an increasingly important part of science cruises throughout the UNOLS fleet. Unlike most institutional connectivity, shipboard E-mail is neither continuous nor free. Much of the E-mail traffic on the part of the crew and scientific party is personal whereas a portion of the traffic is official, it is up to the user to pay for all traffic on his or her account and settle it with their home institution after the cruise.

Science E-mail accounts are set up by the technician upon request after arrival aboard ship. In order to obtain an account the user must agree to pay all charges for mail to and from the ship incurred by that account.

Users will be assigned an address in the format: scixx@enxxx.gso.uri.edu where scixx is the personal account number and enxxx is the cruise number.

12. Emergency information

12.1. Medical forms and emergency contacts

13. Miscellaneous

13.1. HAZMAT inventory

13.2. Port agent services

13.3. Shipping information

14. APPENDIX I: Ukrainian Science Plan

NATIONAL ACADEMY OF SCIENCES OF UKRAINE
INSTITUTE OF ARCHAEOLOGY
DEPARTMENT OF UNDERWATER HERITAGE OF UKRAINE
INSTITUTE FOR EXPLORATION IN ASSOCIATION WITH
THE INSTITUTE OF ARCHAEOLOGICAL OCEANOGRAPHY AT THE GRADUATE SCHOOL OF OCEANOGRAPHY OF THE
UNIVERSITY OF RHODE ISLAND, USA
STATE INTERDEPARTMENTAL COMMISSION AT THE CABINET OF MINISTERS OF UKRAINE FOR THE MEMORIALIZATION OF VICTIMS OF WAR AND POLITICAL REPRESSION

Developed by:

The Department of Underwater Heritage of Ukraine
Institute of Archaeology
National Academy of Sciences of Ukraine
Date:
Signed: S.O. Voronov

Approved by:

The Institute of Archaeology, National Academy of Sciences of Ukraine

Date:

Signed: P.P. Tolochko

THE BLACK SEA EXPEDITION - 2006

Program of

Ukrainian-American

Underwater Archaeological Collaboration

2006 – 2010

Kyiv
2005

The Program of Ukrainian-American underwater archaeological collaboration has been developed within the framework of the Laws of Ukraine "Regarding the protection of the archaeological heritage" and "Regarding the protection of the cultural heritage", in accordance with paragraph №18 (points 2 and 4) of the First International Convention for the Protection of the Underwater Cultural Heritage of UNESCO, and resolution №1867 of the Cabinet of Ministers of Ukraine dated December 20, 2000.

The Program foresees a five-year plan of research of sites of underwater archaeological heritage of Ukraine from 2006 to 2010 inclusive. In 2006 the Program will take the form of a pilot project. The scientific section of the Program of successive research projects will be agreed upon and approved by the Ukrainian and American sides by December 1 of every year. The American side will participate scientifically, technically, and financially in the fulfillment of the Program. Any raised objects of the underwater archaeological heritage will be prepared for museum display (and transferred to the planned Naval Museum of Ukraine), conserved,

restored, and used in accordance with a program which ensures its exhibition and long-term preservation.

BLACK SEA EXPEDITION – 2006

(pilot project of the Program of Ukrainian-American underwater archaeological collaboration for 2006)

1. GENERAL INTRODUCTION

The Ukrainian-American Black Sea expedition will be conducted in accordance with the license awarded by the Institute of Archaeology of the National Academy of Sciences of Ukraine №021/0812 dated January 31, 2006, and the permit awarded by the Ministry of Culture and Tourism №22-026/06 dated February 8, 2006. In accordance with the Laws of Ukraine the general direction of the expedition will be the responsibility of the director of the Department of Underwater Heritage of Ukraine, Institute of Archaeology, National Academy of Sciences of Ukraine, S.O. Voronov.

The 2006 expedition foresees the search and study of sites of the underwater cultural heritage of Ukraine which belong to two historical periods:

- marine vessels of the ancient period
- civilian vessels and military ships of the Second World War.

The main aim of the expedition:

The ancient period – deep sea survey of ancient trade routes on the basis of located shipwrecks and cargoes.

The Second World War – search, study, and identification of military and civilian naval vessels which bore the most significant numbers of casualties.

The research program foresees underwater work using search equipment in two quadrants (№1 and №2) marked on a naval navigation map and in coordinates of 6

separately located sites. The boundaries of both quadrants and the coordinates of the 6 separate sites are located within the territorial waters of Ukraine and in her own /marine/ economic zone off the southern coast of the Autonomous Republic of Crimea. A map showing the quadrants and coordinates is attached.

Search quadrant №1: located to the southwest of the entrance of the bay of Chersonesos, in the direction of the Bosporus Strait.

Search quadrant №2: located to the southeast of Cape Sarych, in the direction from the city of Sinop (Turkey) to Cape Chersonesos.

Search and study work will be conducted on scientific research vessels of Ukraine and the US, both within the structure of the flotilla and autonomously, within the dates approved in the Program.

The dates of the joint 2006 Ukrainian-American expedition: May 2-25.

The joint research project foresees the participation of Ukrainian and American scientific and technical staff.

The aforementioned work will be fulfilled according to the requirements of the Research Methods for the Underwater Heritage of Ukraine (by Decision №5 of the Scientific Council of the Institute of Archaeology of the National Academy of Sciences of Ukraine dated February 22, 2005) and the normative-legal acts of the Cabinet of Ministers of Ukraine regarding search and memorialization of victims of war and political repression.

Archaeological material found in the course of research must be transferred in its entirety, after raising, identification, and primary conservation, to the following state museum institutions of Ukraine, according to specialization:

- The National Preserve of Tauric Chersonesos
- The Museum of the Institute of Archaeology, National Academy of Sciences of Ukraine
- The Marine Museum of Ukraine (Balaklava)
- The Naval Military Museum Complex ‘Balaklava’ of the Central Museum of the Armed Forces of Ukraine.

2. SURVEY METHODS

The expedition flotilla will consist of:

- the scientific research vessel of the Institute of Biology of the Southern Seas of the National Academy of Sciences of Ukraine, the *Professor Vodyanytskiy*;

- the research vessel of the Institute of Archaeological Oceanography of the University of Rhode Island, the *Endeavor*.

Search equipment on the flagship will include a side-scan hydrolocator *HBO-100* with a working frequency of 100 kHz (Ukraine) and *Echo*, a dual-frequency, deep-towed CHIRP side-scan sonar instrument (100 and 400 kHz) with a sweeping 1-6 kHz CHIRP sub-bottom profiler; its maximum operating depth is 3000 meters.

Once targets have been chosen for further investigation following an extensive survey, the remotely operated vehicle *Little Hercules* (or *"Little Herc"*) (USA) will be deployed to identify the targets. *Little Herc* is attached to a camera sled, *Argus* (USA), which is also equipped with its own cameras.

3. EXPEDITION ORGANIZATION

Institutions responsible for organization:

- The Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine (S.O. Voronov)
- The Institute for Exploration in association with the Institute of Archaeological Oceanography at the Graduate School of Oceanography of the University of Rhode Island, USA (R.D. Ballard, director)
- State Interdepartmental Commission at the Cabinet of Ministers of Ukraine for the Memorialization of Victims of War and Political Repression (V.V. Kazakevych, head).

4. EXPEDITION ADMINISTRATION

Expedition director from Ukraine: S.O. Voronov (director, Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine)

Expedition director from the USA: Dr. R.D. Ballard (director, Institute for Archaeological Oceanography, University of Rhode Island)

5. EXPEDITION TEAM

SCIENTIFIC STAFF (UKRAINE)

D.N. Kozak PhD, Professor, deputy director of the Institute of Archaeology, National Academy of Sciences of Ukraine

S.D. Kryzhytsky Member of the National Academy of Sciences of Ukraine, PhD, Professor, department head at the Institute of Archaeology, National Academy of Sciences of Ukraine

V.E. Herasimov deputy director of the Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine

TECHNICAL STAFF (UKRAINE)

O.V. Zavhorodny Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine

V.M. Rosokha, head engineer, Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine

I.V. Osypchuk, Department of Underwater Heritage of Ukraine of the Institute of Archaeology, National Academy of Sciences of Ukraine

SCIENTIFIC STAFF (USA)

Dr. Joseph C. Carter	Director, Institute of Classical Archaeology, University of Texas, Austin
Dr. Dwight Coleman	Institute of Archaeological Oceanography, University of Rhode Island
Michael Brennan	Institute of Archaeological Oceanography, University of Rhode Island
Dan Davis	Institute of Classical Archaeology, University of Texas, Austin

TECHNICAL STAFF (USA)

Jim Newman
Katherine Croff
Todd Gregory

6. SCIENTIFIC BACKGROUND
RESEARCH PROGRAM 2006

I. ANCIENT PERIOD

Underwater archaeological expeditions on the Black Sea (1999-2005) have demonstrated that ancient shipwrecks have been well preserved in the anoxic layer at the bottom of the sea (research materials of the USA, Ukraine, Russian Federation, Turkey, Bulgaria). Research conducted off the coasts of Turkey (1999, 2000, 2003) and Bulgaria (2001-2002) has shown that the seabed off the southern coast of Crimea is a potential source of preserved ancient shipwrecks. Oceanographic surveys of the anoxic layer conducted at a depth of 324 m off the coast of Turkey (Sinop) in 1999-2003 located well-preserved fragments of vessels dating to the 5th cent. AD (Coleman and Ballard 2004). American scholars have developed technology for the study of artifacts, which is used to derive archaeological information of the highest quality.

Archaeological excavation has confirmed the location of numerous port cities, populated from the 6th cent BC through the medieval period, on the northern coast of the Black Sea. In historical terms the Crimean coast featured a significant number of centers active in seaborne commerce from the classical to the Byzantine period. From west to east these cities and settlements included Kalos Limen, Chersonesos, Krioumetapon, Parthenion, Charax, Phronion, Lampas, Athenaion, Theodosia (medieval Kaffa), Kitey, Cimmeric, Akra, Nimpheus, Pantikapaion, Mirmekius. Chersonesos and Theodosia were particularly prominent as *poleis* and trading centers, the former known for its wine trade, the latter for its exportation of grain to other Black Sea and Mediterranean centers. According to the 1st cent. geographer Strabo, it was Kriou Metapon that served as the arrival and departure point for ships traveling between Crimea and Sinop. Due to a lack of unambiguous evidence, the nature and scale of trade on the Black Sea in antiquity and medieval times are difficult to resolve.

Traditional sea routes radiated from ports in southern Crimea to Byzantium, numerous cities in the Kerkinitis Gulf and northwestern Pontus, as well as trading cities on the Cimmerian Bosporus and to the Colchian shore to the east (Orbeli 1930, Blavatskiy 1960, Maximova 1959, Gajdukevich 1969). In ancient navigation the mountains of Crimea acted as an effective landmark for ships transiting east to west. In medieval times, ships from Chersonesos and Kaffa participated in an active trade between Asia and Europe. Merchantmen and warships from Venice and Genoa vied for commercial primacy in these waters (King 2004). Southern Crimea served as a nodal point for both regional and international seaborne trade for nearly two millennia, and thus the area is considered to hold high potential for the discovery of historically significant shipwrecks. The seabed off southern Crimea between Sevastopol and Feodosiya is a prime location for the discovery of shipwrecks.

In oceanographic terms, the Black Sea is the only body of water on the planet whose waters become anoxic at a depth of just a few hundred meters, The research of Ukrainian and American scientists confirms that the anoxic layer begins just a few hundred meters from the shoreline. This creates an environment free of bacteria and other organisms, and is therefore ideal for the preservation of ancient shipwrecks. The anoxic layer of the Black Sea is the result of the narrow, shallow outflow from the sea through

the Bosporus Strait. The less saline, less dense surface waters, which mix with the inflowing river water of the Dnipro and Danube and other river systems, exits into the Aegean, while the dense, highly saline water beneath remains stationary. This results in a highly stratified water column and anoxic conditions beneath this layer. In the anoxic layer, organic items such as the wooden hulls of shipwrecks and any organic cargo they may have been carrying will be highly preserved.

Along the southern coast of Crimea, the submarine slope becomes anoxic relatively close to shore. When we combine this condition with the large number of trading ports and ship traffic in this region in ancient times, there is a high probability of a significant number of ancient and medieval shipwrecks whose hulls and cargoes could be well preserved and ideal sites for archaeological investigation.

Aims of the 'Ancient Period' part of the Program:

(i) The nature of commercial and social interaction between Mediterranean mother cities (predominantly Miletus and Megara) and their Black Sea colonies.

Task: the discovery of seventh-, sixth-, or fifth-century BC Greek shipwrecks in anoxic waters.

(ii) The nature, size, and scope of the ancient Black Sea grain trade.

Though it is clear that north Pontic grain helped to feed such large urban centers as Athens in the Classical and Hellenistic periods, we have only a few literary mentions of the ancient Pontic grain trade and very little physical evidence. Ships with grain cargoes have yet to be found in the Mediterranean Sea due to the oxygen-rich environment in its depths. The Black Sea's anoxic waters, on the other hand, would preserve a grain cargo well.

Task: to study issues related to grain types, transport mechanics, the sizes of ancient ships, and possible clues as to how Aegean and Mediterranean cities paid for this grain.

(iii) Ancient trade routes.

Task: to determine the main shipping routes and trade patterns by which trade was conducted between the cities of the Black, Aegean, and Mediterranean seas by studying the known locations of ancient shipwrecks.

(iv) The size, configuration, and construction of ancient and medieval galleys and cargo ships from certain chronological periods.

Task: to study the character and evolution of ship construction on the basis of ancient shipwrecks found on the bottom of the Black Sea.

II. WORLD WAR II PERIOD

In accordance with the Law of Ukraine 'Regarding the protection of the archaeological heritage', the Department of Underwater Heritage of Ukraine conducts search missions, the study and identification of sites of the underwater cultural heritage of Ukraine, and their registration with the State.

In accordance with the approved Program for the research of the underwater heritage of Ukraine, the Department plans to conduct a number of search projects and archival work to determine the locations and state of preservation of military ships and civilian vessels which were sunk during the Second World War. Another objective is to determine the presence or absence of human remains on board these ships.

The research program for 2005-2006 includes:

1. Survey and identification of site №180-p: the *Armenia*, a hospital transport vessel of the Black Sea Fleet of the USSR (1941, Black Sea). Approximate number of dead: 7000 (medical personnel and the injured from 23 hospitals in Sevastopol). To be designated an International Sea Memorial.

   archival coordinates: **latitude 44º 17 N**
   longitude 34º 10 E
   archival coordinates: **latitude 44º 15, 5' N**

longitude 34º 17 E

archival coordinates: **latitude 44º 16' 51" N**

longitude 34º 10' 12" E

2. Survey, search and identification of site №170-p: steamship *Lenin* (1941, Black Sea). Approximate number of dead: 4000 (civilian population evacuated from Odesa)

   archival coordinates: **latitude – 44^0 20. 237' N**

   longitude – 33^0 45. 278' E

   search coordinates: **latitude – 44^0 20. 209' N**

   longitude – 33^0 45. 167' E

3. Survey, search and identification of site №112-p: German transport *Teja* (1944, Black Sea). Number of dead: 4600 (Wehrmacht).

   search coordinates: latitude – 43^0 35' N

   longitude – 32^0 35' E

4. Survey, search and identification of a series of sites: №212-p, №213-p, №214-p: lead destroyers of the Black Sea Fleet, the *Kharkiv*, the *Bezposchadny*, the *Sposobny*, (1943, Black Sea). Number of dead: 716.

   search coordinates: **latitude – 44^0 13' N**

   longitude – 35^0 59' E

5. Survey, search and identification of site №171-p: destroyer of the Black Sea Fleet, the *Bezyprechny* (1942, Black Sea). Number of dead: 572 (crew members and draft reinforcements).

   search coordinates: latitude – 43^0 45' N

   longitude – 34^0 07' E

6. Survey, search and identification of site №130-p: destroyer of the Black Sea Fleet, the *Dzerzhynsky* (1942, Black Sea). Number of dead: 268 (crew members and draft reinforcements).

   search coordinates: **latitude – 44^0 26’ 05” N**

   longitude – 33^0 19’ E

S.O. Voronov, Director

APPENDIX A

Immersion Presents *Ancient Eruptions!* Production Plan Outline for 2006 Expedition

Draft 07 February, 2006

Purpose

The purpose of this document is to describe the outreach products and specific media components being developed for the Immersion Presents program related to the 2006 Expedition.

Immersion Presents Products

Live broadcasts

Production Elements

24 Live Shows: There will be four 30-minute live shows per day, for 6 days. (June 3-8)

- **Brief pre-produced introduction:** This will be a fast paced montage of film clips coordinated with music. We do not want to spend a lot of time setting the stage, but rather provide a compelling introduction segment that enables us to quickly get into the live show.
- **Live segments from the ship:** Hosted by Bob on the ship, and involving other researchers from the ship.
- **Questions and answers:** Participants at the Immersion sites and Boys & Girls Clubs will call in their questions via phone to people on the ship during the live broadcasts. A schedule of these opportunities will be made available to participating sites. We will also read off questions sent to the expedition via e-mail. A special form will be available on the Immersion Presents website for submitting questions.

Special event broadcasts: Outside the 24 live shows, we will also offer live special event broadcasts which participating Immersion Presents sites can use as fundraising events. These shows will be geared to specific sites needs. Schedule TBD.

After-School materials

Program Components

Adventure Series: Six, fun, engaging, hands-on activities designed for informal learning settings. Activity topics will cover geography, history, culture, archaeology, geology and volcanism. These will be used in after school programs starting in May, 2006.

CD-ROM: Contains Adventure Series activities in printable PDF format

DVD: Video from the expedition will be synthesized and provided on a disc designed to complement the Adventure Series. As it includes video captured during the expedition, this DVD

will be made available to in late summer or early Fall, 2006.

Camp Hercules (training event at Mystic, June 3-7): Representatives from 45 participating Boys & Girls Clubs (45 leaders and 90 Club members) will participate in a training and orientation program at Mystic Aquarium and Institute for Exploration. The program will include an overview of the 2006 expedition, demonstration of the 6 activities, and an orientation to the Immersion Presents Web site.

Web site

Audiences

1. Youth (grades 5-8) and leaders of the Boys & Girls Clubs of America who are working on Immersion Presents programs in their clubs or after-school programs.
2. Members of the public who constitute the audience for Immersion live shows at their local museum, aquarium, zoo, or other Immersion partner sites.
3. Staff at Immersion partner sites who need program or technical support information.

Depth

The Immersion Presents Web site will be structured to reflect the organization of the activities and broadcasts. Kids visiting the site will be able to find more information, geared for them at their reading level, as well as links to other trusted sites. We do not aim to make the site a comprehensive resource for the science topic presented in our programs. Rather we will rely on links to our partners for additional, relevant information, while we provide a fun, informative, engaging, and compelling first stop for kids participating in after-school programs.

Website Content

Most of the expedition content will be available in the public area of the website. Some related content will be available only to Immersion participants who login to the gated areas of the site.

Public	**Gated**

Public	Gated
• **Introduction** to the *Ancient Eruptions!* expedition • **Profiles of all expedition participants** who will be featured in the video programs • **Daily dispatches during the expedition**. These will be geared to a general audience with a goal of providing a narrative of the expedition . These will relate closely to the content presented in the broadcasts, but will provide a storyline which can be followed even if the reader has not seen a broadcast. • **Daily kids' feature**. These will focus on "day in the life" type stories featuring different people on the expedition. Where possible, these will relate to the content of activities in after-school clubs. • **Links** to sites with relevant and fun activities for kids. • **RSS feed** of daily dispatches so that we can syndicate content to the NOAA OE website	• **Message boards** for Immersion sites and club leaders • **Ask a Question** feature which kids at clubs can use to e-mail questions to the ship for inclusion in the live broadcasts.
Sample activity modules	**All activity modules** available as downloadable PDFs
Live video stream from the ship.	Archive of **all broadcasts**
Technical support information for streaming users	Technical support information for Internet2 and possibly satellite users, along with 1-800 # and **technical message board**.
Featured youth projects from clubs	**Tools** for club leaders and kids to submit and upload their media projects

Boys and Girls Club Thera trip: 5 club participants and their respective club leaders were selected to participate in a week-long trip to Thera June 3-9. They will participate in live broadcasts and will experience shore-side and ship based activities.

APPENDIX B

AOL UNVEILS THE 'MYSTERIES OF THE OCEAN"

KOL Expeditions Teams with Dr. Robert Ballard's Immersion Presents to Take Kids on a Virtual Dive into the Worlds of Ancient Volcanoes, the Titanic, and Dolphin Communication

DULLES, VA – June 5, 2006 – Going where most experienced divers can only dream to go, KOL Expeditions is taking kids on a virtual dive to explore some of the greatest mysteries of the ocean. Through an agreement between AOL and Immersion Presents, kids can explore ancient volcanoes off the coast of Greece, view the wreckage of the Titanic, and discover the "language" of dolphins through a series of live webcasts and other interactive content offered on KOL Expeditions at http://www.kolexpeditions.com.

KOL® Expeditions is a new area for AOL's kids online site designed as a free service to provide kids, parents and teachers with a platform to make learning fun through interactive missions, video content, and other special activities. The goal of the program is to encourage and excite elementary-aged kids about science, math and technology in a fun and engaging environment and to expose them to careers in science and related fields.

The "Mysteries of the Ocean" series presented by AOL and Immersion Presents is the third KOL Expedition on the site (http://www.kolexpedition.com) The summer-long series will consist of three separate programs: Ancient Eruptions, Titanic and Dolphin Communication.

Ancient Eruptions: Today - June 8
The Ancient Eruptions program will include daily live broadcasts at 10 a.m., 11 a.m., noon and 1 PM EDT from the Sea of Crete in Greece. Dr. Robert Ballard, one of the world's foremost oceanographers, and his team of scientists will be sending the ROV Hercules to the sea floor to examine ancient remains left by Thera, the second most catastrophic volcanic eruption in history. This scientific expedition will provide kids with a unique opportunity to learn about oceanography, geology, ancient civilizations and more. They can also play the game "Blast from the Past" where they weigh the evidence to see if the site of the expedition could actually be the Lost City of Atlantis.

Titanic: Mid-July
In 1985, Dr. Robert Ballard discovered the shipwreck of the RMS Titanic. Almost 20 years later he returned with a team of researchers to see how the wreckage fared in its final resting place and to study the manmade and natural damage done to the ship. Through a 30-minute video of the expedition – available on demand – kids will be able to explore the wreckage on their own in a virtual dive 12,500 feet below the sea.

Dolphin Communication: Mid-August
Dr. Kathleen Dudzinski has been studying dolphin communication since 1991 and is a recognized expert in the field. By using specifically designed equipment, she has the ability to

compare and contrast dolphin communication in different areas of the world. Through a 30-minute on demand video, kids will learn the ABC's – Acoustics, Behavior, and Communication – of dolphins and will finish this mission more excited, entertained, and knowledgeable about these marine animals than ever before. Kids can also participate in an interactive game to learn more about dolphin communication.

"Through KOL Expeditions, we're literally going to the ends of the earth to provide kids with a new and engaging way to learn and to get excited about science," said Mark Stevens, KOL Education Director & GM, AOL@SCHOOL. "We've taken kids on an exploration of Okinawa, Japan peoples and their healthy lifestyles and a virtual ride to space with NASA, and now with the 'Mysteries of the Ocean' program, we are once again excited about opening up the world of possibilities to takes kids on a deep dive under the sea with Dr. Robert Ballard and other top experts in the field."

Additionally, KOL and AOL@SCHOOL will provide career videos about different fields of study in science, interactive games, downloads, live chats with scientists, photo galleries, and additional learning material through each of the individual programs. Through the http//www.aolatschool.com destination, teachers can also engage the classrooms by tapping into the webcasts and utilizing related lesson plans and resources.

About Immersion Presents
Immersion Presents, founded by Ballard in 2002, uses "telepresence," the groundbreaking robotics and communications technology Ballard pioneered, to bring scientific research expeditions as they're happening to Immersion Presents sites (including 45 local Boys & Girls Clubs from across the country). Audiences at the sites experience the expedition "virtually;" they see everything the scientists see at the same time.

The live Immersion Presents broadcasts are an integral part of its after-school program, which takes expedition highlights and fun, hands-on activities and then produces a multimedia science and technology program for in-school and after-school audiences, including the Boys & Girls Clubs of America. Immersion Presents developed the program in collaboration with the Boys & Girls Clubs, with funding from the National Oceanographic and Atmospheric Administration (NOAA), the Institute of Museum and Library Services, the Bureau of Justice Assistance of the U.S. Department of Justice and the National Geographic Society. Learn more about Immersion Presents at www.immersionpresents.org or email info@immersionpresents.org.

About the KOL® Service
The KOL service is the first version of the AOL® service designed entirely for kids. Combining exclusive content from industry leading kids' brands and all-new original programming, the KOL service is fully integrated with AOL's award-winning Parental Controls, offering kids a safer and more secure online environment.

About AOL@SCHOOL®
AOL@SCHOOL is a no cost K12 educational portal of resources, references and tools that provides valuable age-appropriate educational content at no cost from more than 20 educational partners including Hotmath, InfoSource and Iknowthat.com. A free service from AOL for teachers and students, the site is designed to help schools make online materials a more effective part of the classroom experience, AOL@SCHOOL's powerful Search of Educator Approved materials simplifies the online experience to locate just the right education materials. AOL@SCHOOL receives 2 – 3 million unique visitors a month.
* All of the content can be accessed at http://www.aolatschool.com.

Press Contact:
Lori Dolginoff
212-652-6363

dolginoff1@aol.com

APPENDIX C

NOAA Office of Ocean Exploration
Education Plan for Aegaen/Black Sea Expedition 2006

Contacts: Paula Keener-Chavis (paula.keener-chavis@noaa.gov)
Catalina Martinez (catalina.martinez@noaa.gov)

1. Summary Web offering on NOAA's Ocean Explorer Web site (oceanexplorer.noaa.gov) to include an RSS link to other participating Web partners (Immersion and URI) and a Quicktime link to the live streaming video during the Thera leg of the expedition.

2. Ocean Explorer Expedition Education Modules (EEM)
EEM's are designed to reach out in new ways to teachers, students, and the general public, and share the excitement of daily at-sea discoveries and the science behind NOAA's major ocean exploration initiatives with the people around the world. We will develop an EEM for the Med/Black Sea Exped. To see an example of an EEM, go to the following URL http://oceanexplorer.noaa.gov/explorations/06davidson/background/edu/edu.html.

This EEM contains the following components:

Expedition Purpose
A summary of why scientists and educators are interested in exploring this area and what we might learn from our efforts in this region as we strive to further understand the 95% of our planet that is virtually unexplored.

Lesson Plans
A total of 3 inquiry and National Science Education Standards-based lesson plans for students in grades 5-12 that have been specifically designed for this expedition. These lessons have also been correlated to the Ocean Literacy Essential Principles and Fundamental Concepts. If appropriate, we will also provide links to other lesson plans residing on the Ocean Explorer Web site that have been developed for previous NOAA expeditions, and have content that relates to the expedition.

Multimedia Learning Object(s)
A link to the interactive multimedia presentation on hydrothermal vents.

OceanAGE Ocean Career Connections
Archived video and online Web chats between students and scientists highlighting a few of the careers that are represented onboard the ship during the expedition.

Other Resources and Links
A list of other resources and links related to this expedition for site visitors to explore.