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CENTER FOR CYBER-ARCHAEOLOGY & SUSTAINABILITY AT UC SAN DIEGO

UC San Diego

At-Risk World Heritage and Cyber-Archaeology

An Up-date on the UCOP Catalyst Grant

Thomas E. Levy

Distinguished Professor, Norma Kershaw Chair

Department of Anthropology
Center for Cyber-Archaeology and Sustainability, Qualcomm Institute
University of California, San Diego, USA

Calit2

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"Inventing a persistent, collaborative research and education environment as a model for the major research university in the 21st Century" –
Mission Statement, Calit2

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Undergraduate Student Research Program:

UC San Diego | NATIONAL GEOGRAPHIC | Engineers for Exploration

CISA3

A First of its Kind Institutional Partnership Between National Geographic and UC San Diego to define the future of Exploration through Cross Disciplinary Engineering!

Directors:
Dr. Albert Yu-Min Lin - Calit2 Research Scientist
Prof. Ryan Kastner - CSE Associate Professor
Dr. Curt Schurgers – Calit2 Research Scientist

Staff:
Daniel Johnson – Calit2 Staff Engineer

3 Years
50+ students
5 projects (two adopted for Nat Geo Magazine Assignments)
10 summer scholarships
Global Deployment (Mongolia, Jordan, Bermuda, Cameroon, and more)
National Awards (Intel Cornel Cup Finalists)
1 student driven spinout startup (spark aerial)

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UC San Diego

Undergraduate VR Club

Build. Learn. Explore.

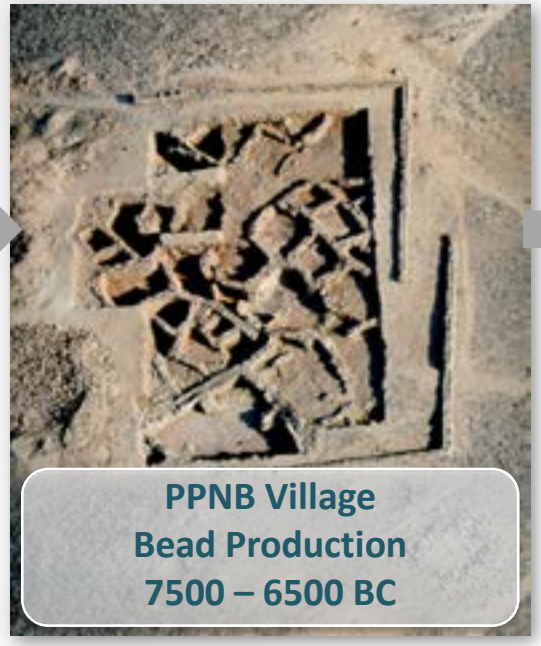
Provides access to HTC Vives, Oculus Rifts, Google Cardboards, and all sorts of headsets and controllers for your next project. As a community of makers, we're happy to help you succeed.

With graduate students in the field, Jordan

UC San Diego Deep-time Metallurgy Research in Faynan, Jordan

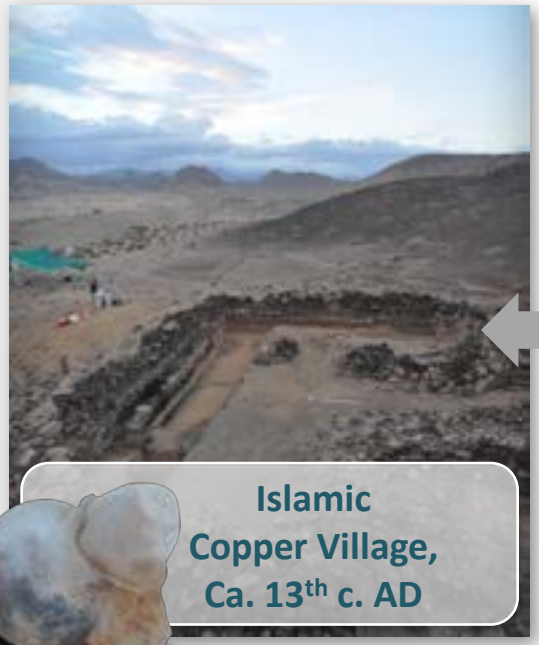
Archaeological and Historical Questions Drive Research

Thomas E. Levy
Mohammad Najjar



PPNB Village
Bead Production
7500 – 6500 BC

Early Bronze I
Metalworker's Village,
Ca. 3600 BC



Early Bronze III-IV
Metal Manufactory,
Ca. 2700 – 2000 BC

Iron Age
Copper Factory,
Ca. 1200 – 900 BC

Islamic
Copper Village,
Ca. 13th c. AD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The SAArchaeological record
SOCIETY FOR AMERICAN ARCHAEOLOGY
1999 Paperless
A
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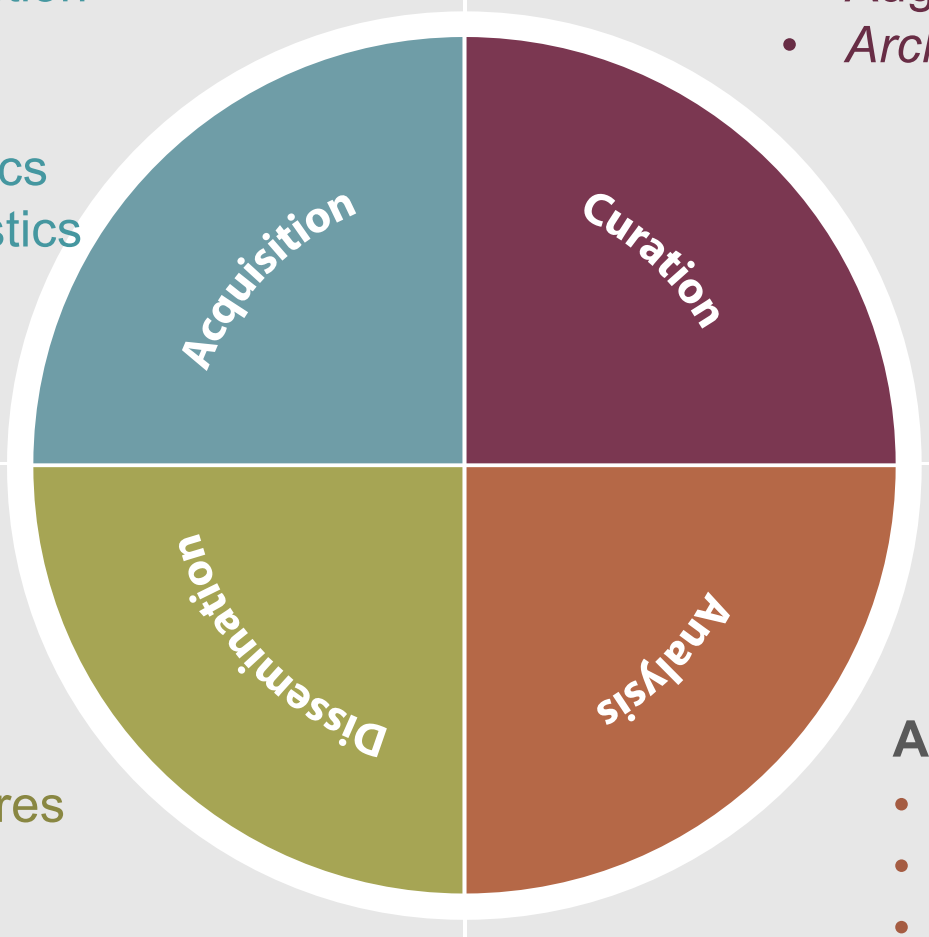
L

ACQUISITION

- Archaeology Research Design
- Digital Data Collection Tools
- Diagnostic Imaging/Geophysics
- Analytical Diagnostics
- *ArchField*
- *OpenDig*

CURATION

- Data Storage
- Geo-Spatial Mapping
- Augmentation
- *ArchaeoSTOR*



DISSEMINATION

- Cyber-Infrastructures
- Open Access
- Citizen Science
- Print Publishing
- CAVES
- Archaeo-Diplomacy

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ANALYSIS

- Modeling & Simulation
- Visual Analytics
- Crowd Sourcing
- 3d Visualization
- Cultural Analytics

New Explorations in Iron Age Edom
– Anthropological & Historical Approaches

Organization of Craft Production (after Costin)

- Context – Degree of Elite Sponsorship
- Concentration – Distribution over landscape
- Scale – size of labor force,
  - principles of labor recruitment
- Intensity – full time/part-time

Trade

Ethnogenesis – Edom and Israel

Social Evolution

Khirbat en-Nahas, Jordan, ca. 10 ha
Helicopter shot courtesy Queen Noor


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Gallery: 30 Awesome College Labs

Posted 8.24.10 at 12:00 pm 7 Comments

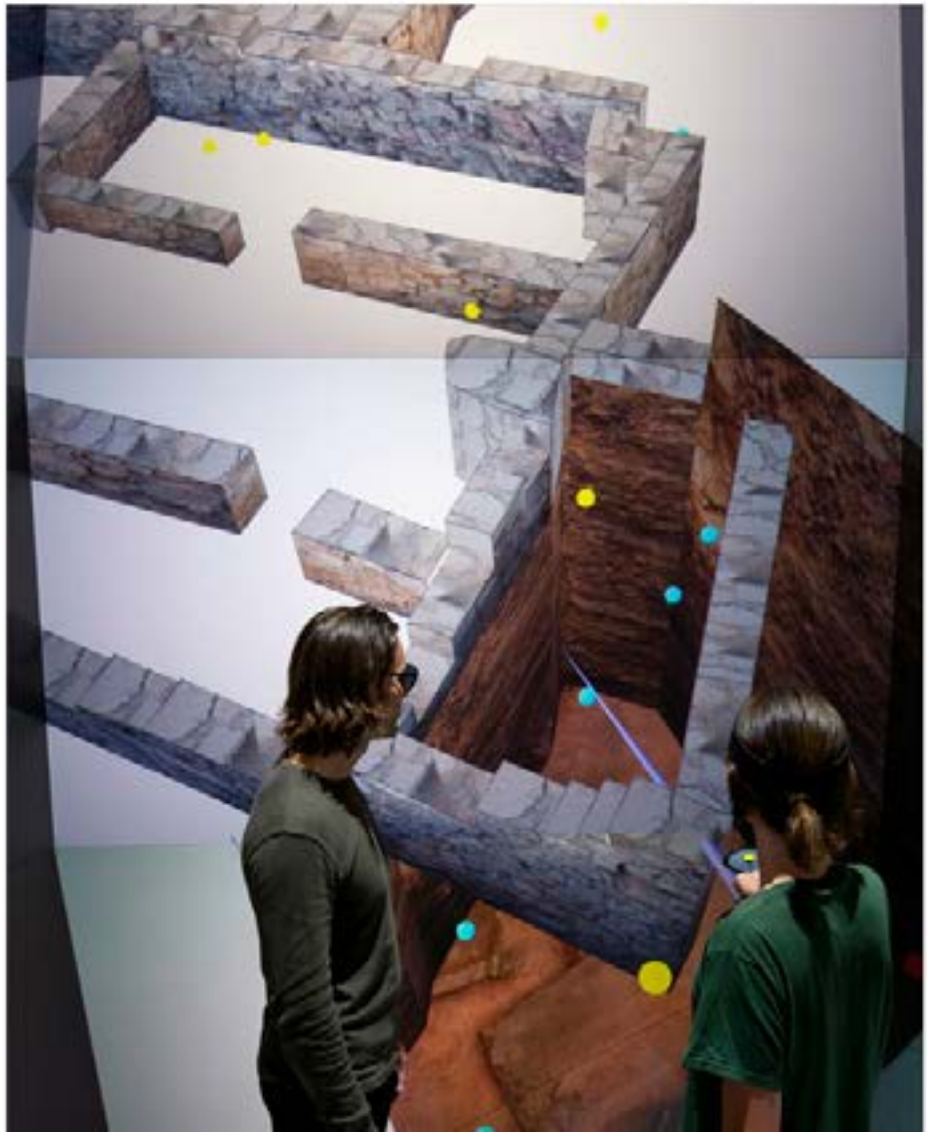


IMAGE 23 OF 30

University of California at San Diego: California Institute of Telecommunications and Information Technology

Courtesy Erik Jepsen/Calit2

Career: Virtual archaeologist
Learn to: Excavate a fortress in Jordan using virtual reality

It's something you'd expect to find in Lara Croft's mansion: a pentagon-shaped room projecting a 3-D virtual-reality model of an excavated 57,000-square-foot fortress from the 10th century B.C. The StarCAVE is the world's most advanced virtual-reality room, with 34 high-definition projectors that display images around and beneath the user, totally immersing students in their data. With a handheld controller, they can walk through buildings, rotate artifacts, or rise above the model for a bird's-eye fly-through.

Students spend months at a time investigating and recording in three dimensions the real site in Jordan. In San Diego, they use the data to build the virtual model of the entire fortress. "What exactly the huge fortress was used for, that's the big question," explains grad student Kyle Knabb. "The answer, we hope we'll find in the CAVE."

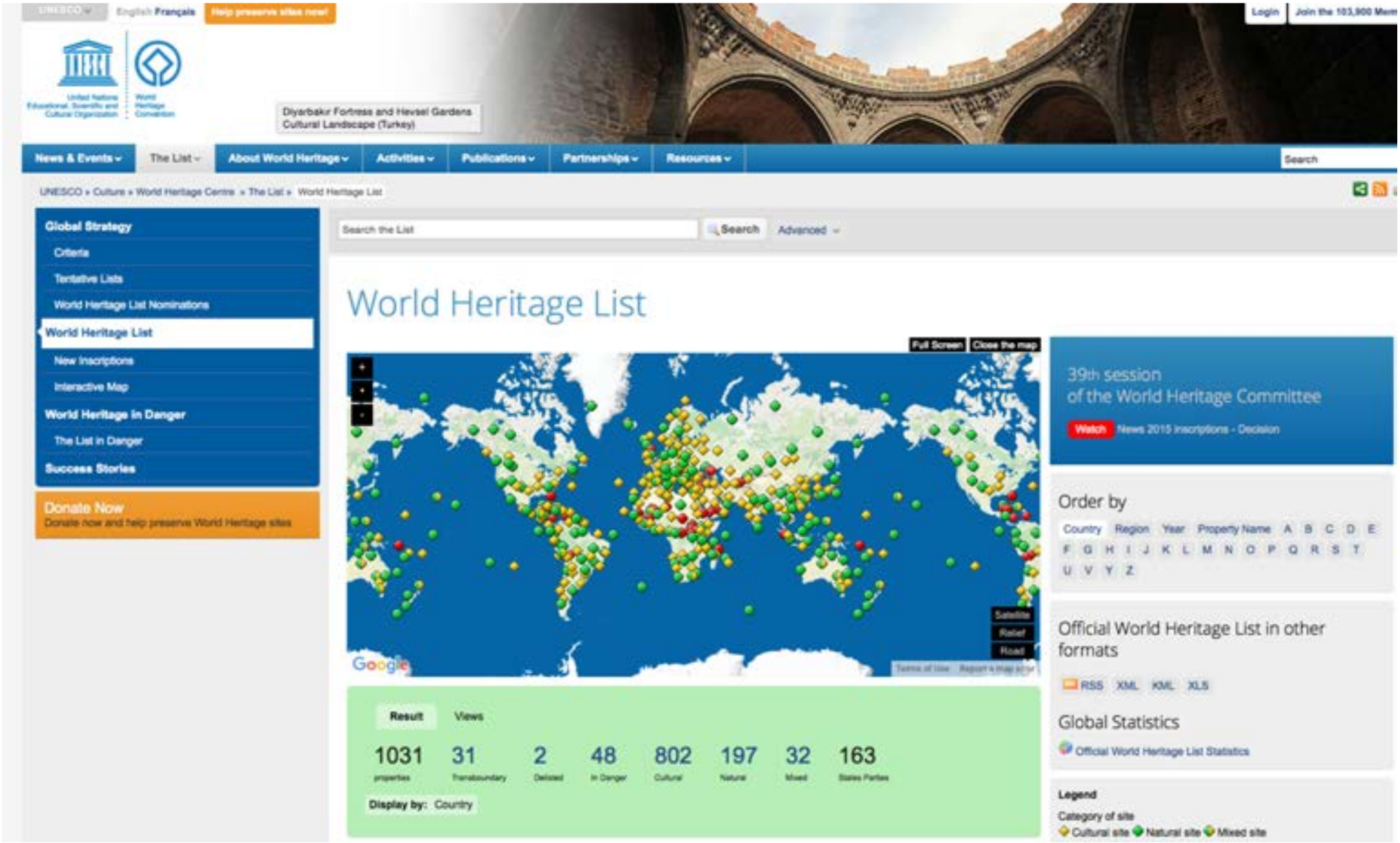
Phone: 858-822-4998
Web site: calit2.net

TAGS
Science

Popular Science

9/2/2010

With
Tom Levy
Jurgen Schultz
Kyle Knabb
Tom DeFanti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World Heritage Convention
Diyarbakır Fortress and Hevsel Gardens Cultural Landscape (Turkey)
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World Heritage in Danger
The List in Danger
Success Stories
Donate Now
Donate now and help preserve World Heritage sites
Search the List
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Advanced
World Heritage List
Full Screen
Close the map
Satellite
Relief
Road
Google
Result
Views
1031 properties
31 Transboundary
2 Delisted
48 In Danger
802 Cultural
197 Natural
32 Mixed
163 States Parties
Display by: Country
39th session of the World Heritage Committee
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Official World Heritage List in other formats
RSS XML KML XLS
Global Statistics
Official World Heritage List Statistics
Legend
Category of site
Cultural site
Natural site
Mixed site

Wednesday January 20, 2016

theguardian

Iraq

Isis has destroyed Iraq's oldest Christian monastery, satellite images confirm

But… Natural Processes *(Erosion, Earthquakes, Floods, etc)* can also destroy sites

Press Room

CATEGORIES

All News
Research
Health
Arts & Humanities
Students & Alumni
Faculty & Staff
Administration

Video
UC in the News
Press Room

UC president announces 2016 Research Catalyst Award recipients

UC Office of the President
Monday, December 7, 2015

University of California President Janet Napolitano today (Dec. 7) announced the 2016 recipients of the President's Research Catalyst Awards, chosen from a pool of more than 180 proposed projects.

The four awards, totaling more than $4.8 million, will involve faculty and students from nearly every UC campus. The selected research projects focus on protecting biodiversity; enhancing agricultural resilience in times of drought; preserving cultural heritage sites in the Middle East, and the detection of dark matter.

Share

Contact
University of California Office of the President
(510) 987-9200

Related Links

University of California Research Initiatives

3-D Digital Preservation of At-Risk Global Cultural Heritage

Led by Thomas Levy, UC San Diego, $1.07 million. Cyber-archeology and digital humanities use virtual methods to safeguard some of the most at-risk cultural heritage objects and places. A four-campus collaboration will conduct path-breaking archeological research – covering more than 10,000 years of culture and architecture – in Egypt, Turkey, Jordan, Greece, Israel, Morocco and Cyprus. Researchers will use the 3-D archeological data to study, forecast, and model the effects of human conflict, climate change, natural disasters and technological and cultural changes on these sites and landscapes.

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UC President's Catalyst Grant: *At-Risk World Heritage and the Digital Humanities*

Thomas E. Levy, PI
UC San Diego

Willeke Wendrich, Co-PI
UCLA

Benjamin Porter, Co-PI
UC Berkeley

Nicola Lercari, Co-PI
UC Merced

Jürgen Schulze, Co-PI
UC San Diego

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Brady Liss
UC San Diego

Rachel Moy
UCLA

Craig Smitherman
UC San Diego

Researchers

Graduate Students

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UC San Diego

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UC San Diego

Taylor Harman
UC San Diego

Arkin Gupta
UC San Diego

Andrew C. Johnson
UC San Diego

Connor Smith
UC San Diego

Rose Elliot Smith
UC San Diego

Michael Tolentino
UC San Diego

Undergraduate Students

Professor Gideon Avni
Israel Antiquities Authority

Eretz Ben Yosef
Tel Aviv University

Youssef Bokbot
INSAP - National Institute of Sciences for Archaeology and Cultural

Rabia El Mehdaoui
Ministry of Culture - Rabat, Morocco

Dr. Sorin Hermon
The Cyprus Institute

Professor Vasiliki (Lina) Kassianidou
University of Cyprus

Professor Ioannis Liritzis
University of the Aegean, Greece

Mohammad Najjar
Jordan's Landscapes, Jordan

Dr. George Pavlides
Athena Research and Innovation Center in Information,

International Partners

PI – Levy, UC San Diego; Co-Pis – Wendrich, UCLA; Lercari, Merced; Porter, Berkeley

PI – Levy, UC San Diego; Co-Pis – Wendrich, UCLA; Lercari, Merced; Porter, Berkeley

UCOP Catalyst Grant Goals

ACQUISTION

- **Record At-Risk World Cultural Heritage Sites in Middle East** (Integration and application of UC San Diego tools ArchField and ArchaeoSTOR) – Late Mycenaean Kastrouli Site, Greece
- **Crowdsourcing - Monitor At-Risk World Cultural Heritage with TerraWatchers**

DISSEMINATION

- **Deliver in 3D Immersive Visualization Theatres (CAVEkiosks)** at *4 UC campuses*
- **Deliver 3D Cultural Heritage Products in personal immersive VR devices** (Google Cardboard, Oculus Rift, etc.)

CURATION

- **Cyberinfrastructures** - *Deliver 2D and 3D cultural heritage content over Internet through on-line digital archaeology atlases - MedArchNet*
- **ArchaeoSTOR - Web-based Database**
- **CAVEBase**
- **UC San Diego Library Digital Collections**

COMPUTER SCEINCE CHALLENGE

- **Move Big Cultural Heritage Data over Pacific Research Platform (PRP) Network**
- **Use California PRP network as model for a country**

PI – Levy, UC San Diego; Co-Pis – Wendrich, UCLA; Lercari, Merced; Porter, Berkeley

Catalyst Project Dissemination:
Calit2/Qualcomm researchers build CAVES for 4 UC campuses

UC San Diego - Library

UC Merced - Library

UC Berkeley - Museum

Jordan archaeology data displayed in NextWAVE
Grand opening, KAUST Saudi Arabia, PI- Tom DeFanti

UCLA - Museum

UC San Diego –- Kidron River Valley, Israel - Palestine

Cyber-Archaeology, Economic Sustainability and
Cultural Heritage in the Eastern Mediterranean

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What is a Heritage Asset District

Jerusalem Institute for Israel Studies
Milken Innovation Center

Features

- Heritage Asset District defined by natural watershed
- Create High value attractions capable of bringing visitors to the district.
- Sharing of costs and revenues throughout district
- Financing based on incremental value created from strengthening attractions

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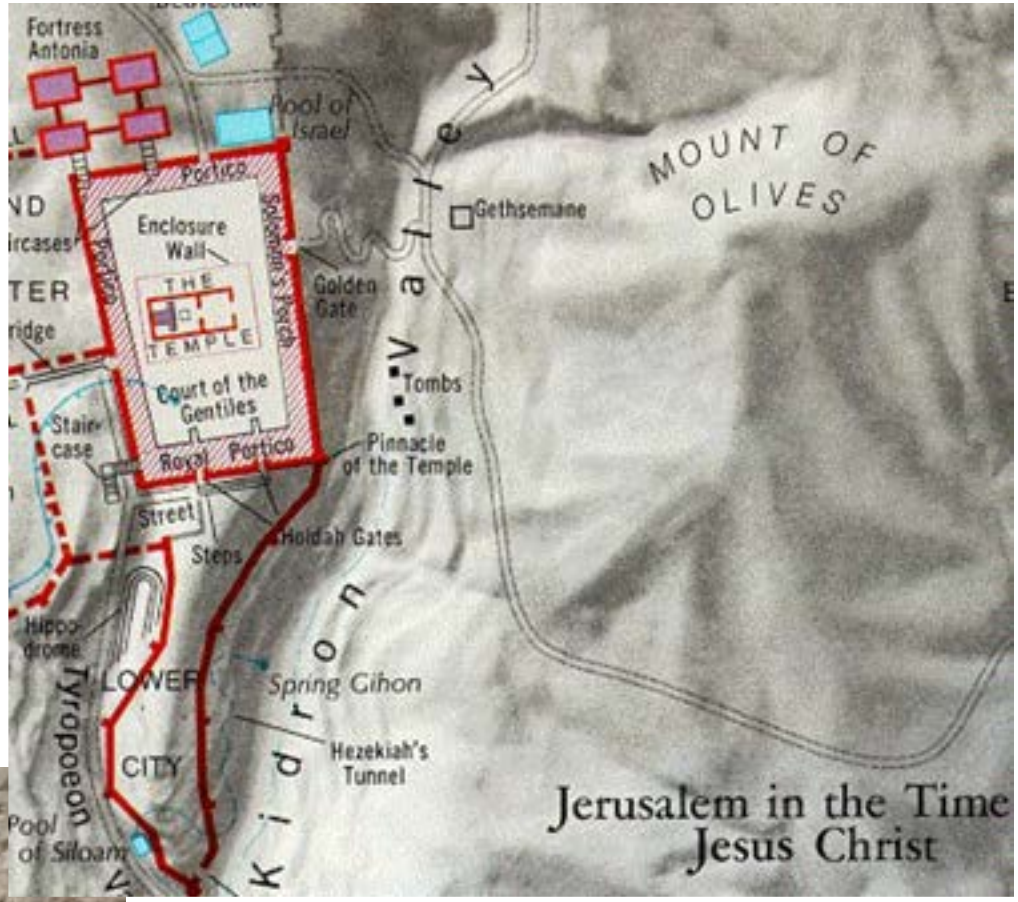
June 2015 –

UC San Diego –- Kidron River Valley Cultural Heritage Project–
"Sewage Flows Where Pilgrims Once Trod"
Israel – Palestine

Peace through Sewage!



About 350,000 people live in the Kidron Valley

About 3.5 billion people care about the Holy Basin…

Jews, Christians, Moslems

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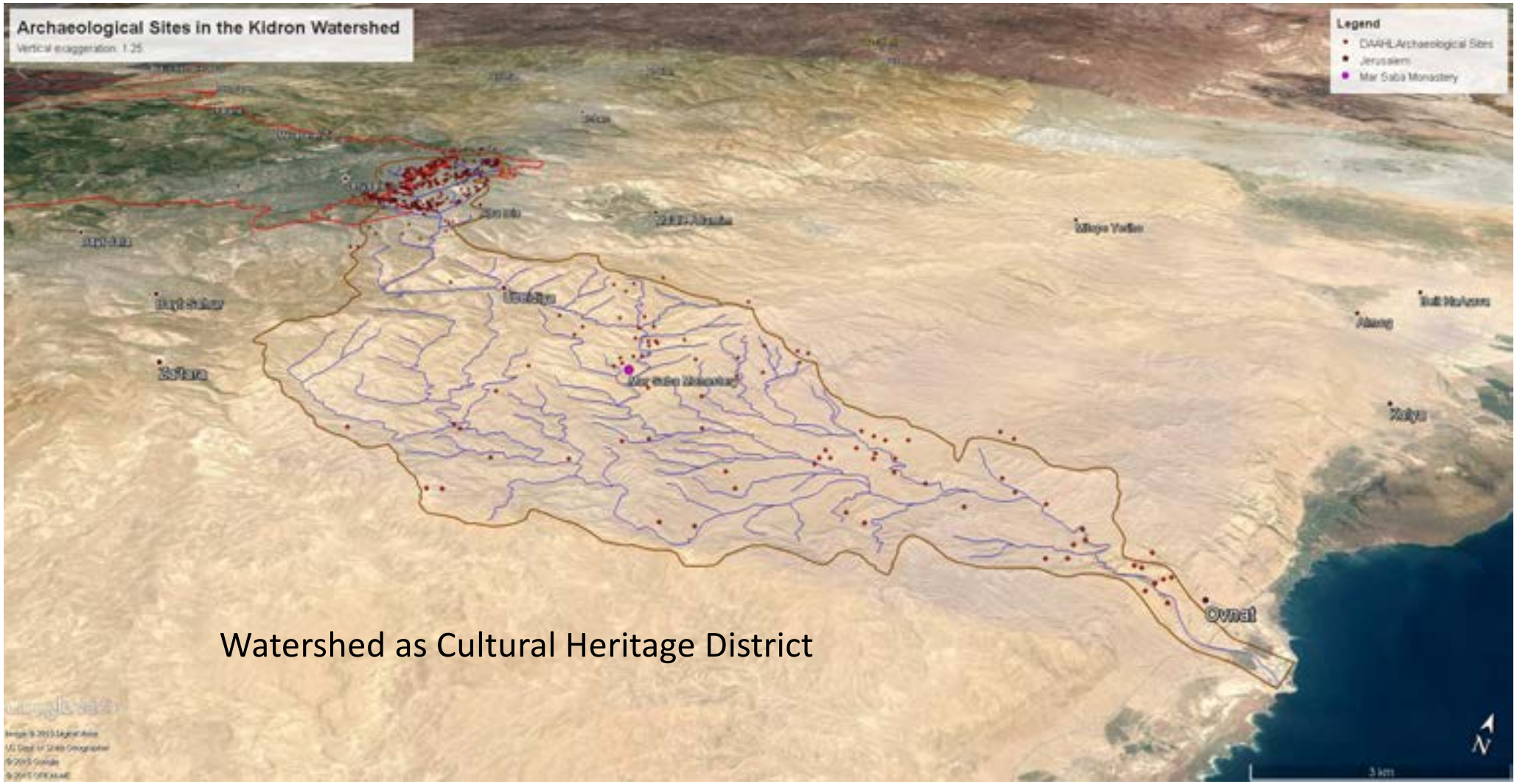

Watershed as Cultural Heritage District

UC San Diego –- Kidron River Valley Cultural Heritage Project

In the field - Tom Levy, Glenn Yago, Avener Goren, Matt Howland, Craig Smitheram, Father Ioannis

SfM – Structure from Motion - Processed with PhotoScan Agisoft

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UC San Diego


Welcome to the CAVEkiosk!
Use the Xbox controller to interact with this exhibit, and hold the Right Trigger for a list of detailed controls.
Location Bookmark

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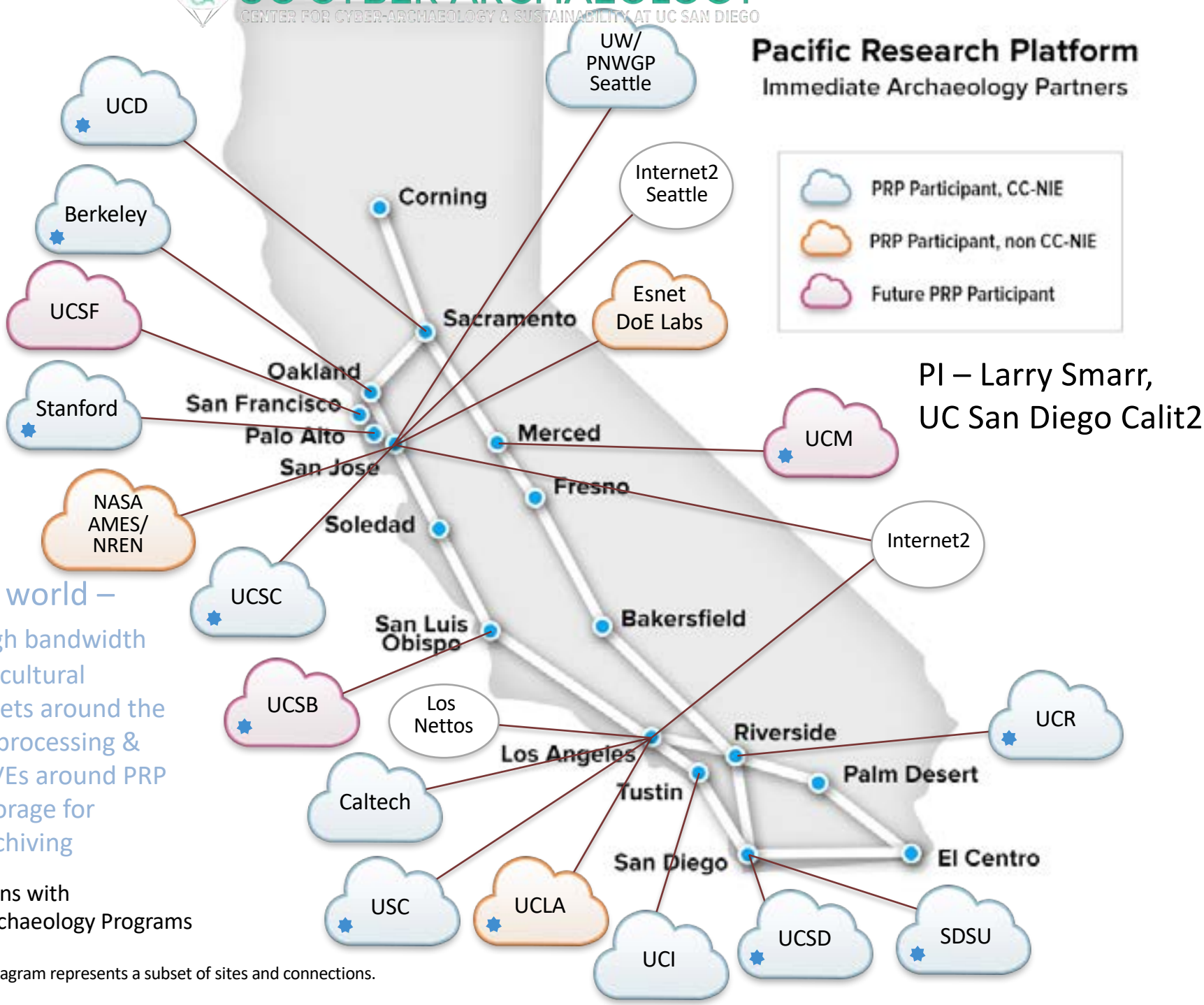


PI – Larry Smarr,
UC San Diego Calit2

In an ideal world –

-Extremely high bandwidth to move large cultural heritage datasets around the PRP cloud for processing & viewing in CAVEs around PRP
- Unlimited Storage for permanent archiving

Institutions with active Archaeology Programs

Note: This diagram represents a subset of sites and connections.

MERCED WIDE-AREA VISUALIZATION ENVIRONMENT (WAVE) LAB

Courtesy Nicola Lercari & Jeff Weekley

WHAT IS THE MERCED WAVE?

- INTERDISCIPLINARY RESEARCH LAB (HUMANITIES, ENGINEERING AND NATURAL SCIENCES)
- LATEST IN DESIGN EVOLUTION OF IMMERSIVE, LARGE-SCALE VIRTUAL ENVIRONMENT RENDERING AND DISPLAY ENVIRONMENTS
- BUILT ON COMMODITY PCS AND CONSUMER ELECTRONICS RUNNING MOSTLY OPEN SOURCE
- MODULAR AND UPGRADEABLE
- NETWORK-CONNECTED AT VERY HIGH SPEEDS (10/40G, 100G SOON) THROUGH THE PACIFIC RESEARCH PLATFORM
- PART OF A LARGER CONTENT DEVELOPMENT ECOSYSTEM THAT INCLUDES OTHER UC CAMPUSES (UCSD+UCLA+UC BERKELEY) AND GLOBAL PARTNERS
- RECIPIENT OF THE CENIC (CORPORATION FOR EDUCATION NETWORK INITIATIVES IN CALIFORNIA) "INNOVATIONS IN NETWORKING AWARD" 2017

Courtesy Nicola Lercari &
Jeff Weekley


THE MERCED WAVE is
the UC San Diego
WAVE's
"LITTLE SISTER"
UC San Diego shown
here
Courtesy Nicola Lercari & Jeff Weekley

WHAT IT IS NOT

- VIDEO WALL
- PROPRIETARY
- SINGLE-USE
- VENDOR-SPECIFIC
- EXPENSIVE

Courtesy Nicola Lercari & Jeff Weekley

WHAT A WAVE DOES

- PROVIDES A PROFOUND SENSE OF IMMERSION
- SENSE OF PRESENCE
- SHARED EXPLORATION OF THE VIRTUAL SPACE AND DATA SETS
- COLLABORATIVE INTERPRETATION
- INTERACTION CREATES NEW PERSPECTIVE ON HERITAGE DATA
- ENHANCED PERCEPTION PRODUCES NEW KNOWLEDGE
- PARTICIPATORY ACCESS TO CULTURAL RESOURCES
- PRESENTS INFORMATION IN NOVEL AND ACCESSIBLE WAYS

Courtesy Nicola Lercari & Jeff Weekley

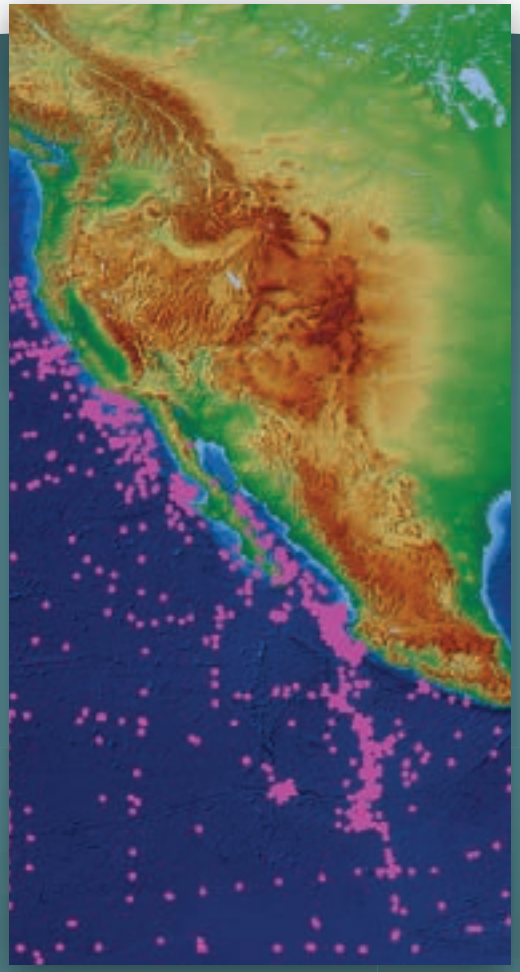
UC Merced's VR CAVE: Merced WAVE

- Transferring 5 CAVECam images over 10 Gbit/sec fiber connection from UCSD to UC Merced:
  - Total data size: 1.96 GBytes
  - Transfer took 2.17 seconds
  - Transfer rate: 924.49 MBytes/sec (~1GBytes/sec)
- This transfer would have taken:
  - 21 seconds over 1Gbit/sec connection (regular Ethernet)
  - 5.35 minutes over 50Mbit/sec connection (residential internet)

Thanks to George Papatheodorou, Ioannis Liritzis, Matt Howland, Brady Liss

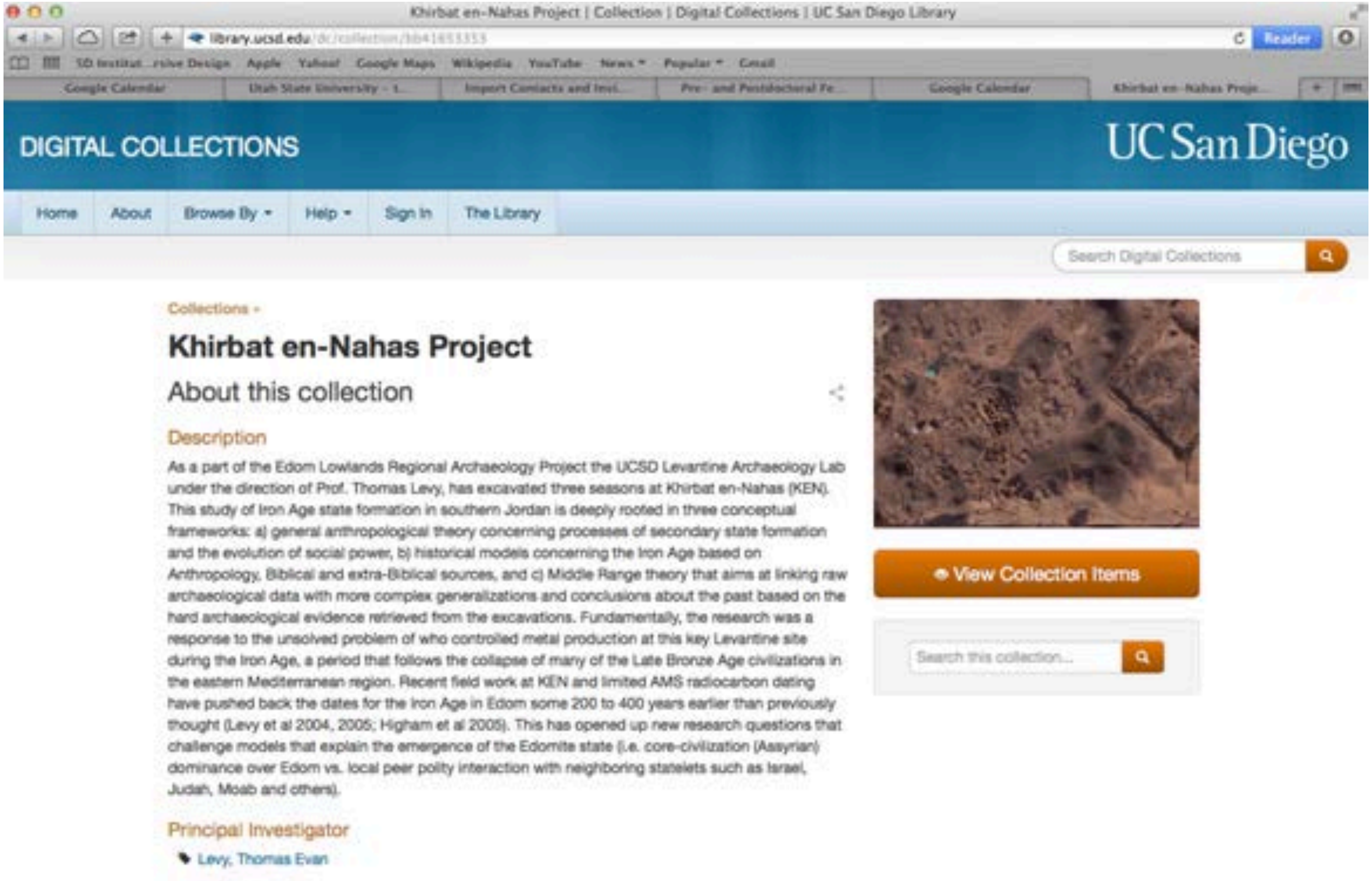
UCSD RESEARCH CYBER-INFRASTRUCTURE

UCSD
Cyber-Archaeology



UCSD
Oceanography

SDSC
NSF Geology


DIGITAL COLLECTIONS

UC San Diego

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Collections

Khirbat en-Nahas Project

About this collection

Description

As a part of the Edom Lowlands Regional Archaeology Project the UCSD Levantine Archaeology Lab under the direction of Prof. Thomas Levy, has excavated three seasons at Khirbat en-Nahas (KEN). This study of Iron Age state formation in southern Jordan is deeply rooted in three conceptual frameworks: a) general anthropological theory concerning processes of secondary state formation and the evolution of social power, b) historical models concerning the Iron Age based on Anthropology, Biblical and extra-Biblical sources, and c) Middle Range theory that aims at linking raw archaeological data with more complex generalizations and conclusions about the past based on the hard archaeological evidence retrieved from the excavations. Fundamentally, the research was a response to the unsolved problem of who controlled metal production at this key Levantine site during the Iron Age, a period that follows the collapse of many of the Late Bronze Age civilizations in the eastern Mediterranean region. Recent field work at KEN and limited AMS radiocarbon dating have pushed back the dates for the Iron Age in Edom some 200 to 400 years earlier than previously thought (Levy et al 2004, 2005; Higham et al 2005). This has opened up new research questions that challenge models that explain the emergence of the Edomite state (i.e. core-civilization (Assyrian) dominance over Edom vs. local peer polity interaction with neighboring statelets such as Israel, Judah, Moab and others).

Principal Investigator

- Levy, Thomas Evan

Field Directors

- Levy, Thomas Evan
- Najjar, Mohammad

Illustrator

- Hebron, Caroline

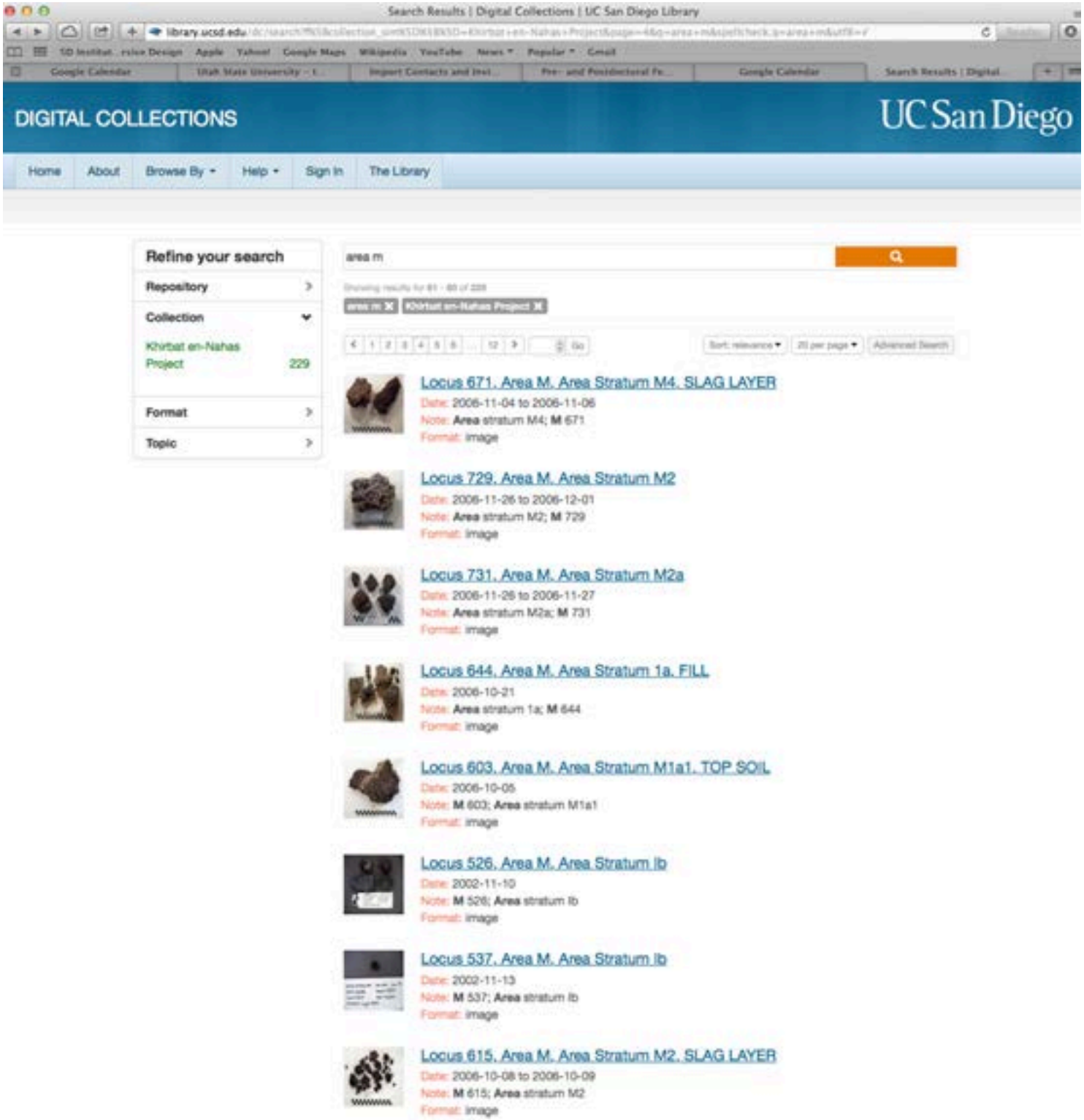
Research Team Members

- Arbel, Yoav
- Beherec, Marc
- Ben-Yosef, Erez
- Gidding, Aaron
- Knabb, Kyle
- Monroe, Elizabeth
- Muniz, Adolfo
- Smith, Neil G.
- Soderbaum, Lisa

Extent

1365 digital objects.

View Collection Items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library.ucsd.edu
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Sign In
The Library
Refine your search
Repository
Collection
Khirbat en-Nahas Project 229
Format
Topic
area m
Locus 671. Area M. Area Stratum M4. SLAG LAYER
Date: 2006-11-04 to 2006-11-06
Note: Area stratum M4; M 671
Format: image
Locus 729. Area M. Area Stratum M2
Date: 2006-11-26 to 2006-12-01
Note: Area stratum M2; M 729
Format: image
Locus 731. Area M. Area Stratum M2a
Date: 2006-11-26 to 2006-11-27
Note: Area stratum M2a; M 731
Format: image
Locus 644. Area M. Area Stratum 1a. FILL
Date: 2006-10-21
Note: Area stratum 1a; M 644
Format: image
Locus 603. Area M. Area Stratum M1a1. TOP SOIL
Date: 2006-10-05
Note: M 603; Area stratum M1a1
Format: image
Locus 526. Area M. Area Stratum Ib
Date: 2002-11-10
Note: M 526; Area stratum Ib
Format: image
Locus 537. Area M. Area Stratum Ib
Date: 2002-11-13
Note: M 537; Area stratum Ib
Format: image
Locus 615. Area M. Area Stratum M2. SLAG LAYER
Date: 2006-10-08 to 2006-10-09
Note: M 615; Area stratum M2
Format: image

Locus 671, Area M, Area Stratum M4, SLAG LAYER

Photo 3

Date collected Date

2006-11-04 to 2006-11-06

Note

Area stratum M4

Intrusive hearth 673 in southeast of locus.

Description

SK (metallurgical level) -- Fl (Fill) -- Very hard sediment derived from mud, clay, and furnace fragments, much like layer above (670). Began with much crushed finely slag, especially in the east of the locus. Spots of sandy bricks or sandstone in the fill.

Finds

Slag, tuyere pipes. Collected samples from sandstone or bricks and from crushed slag.

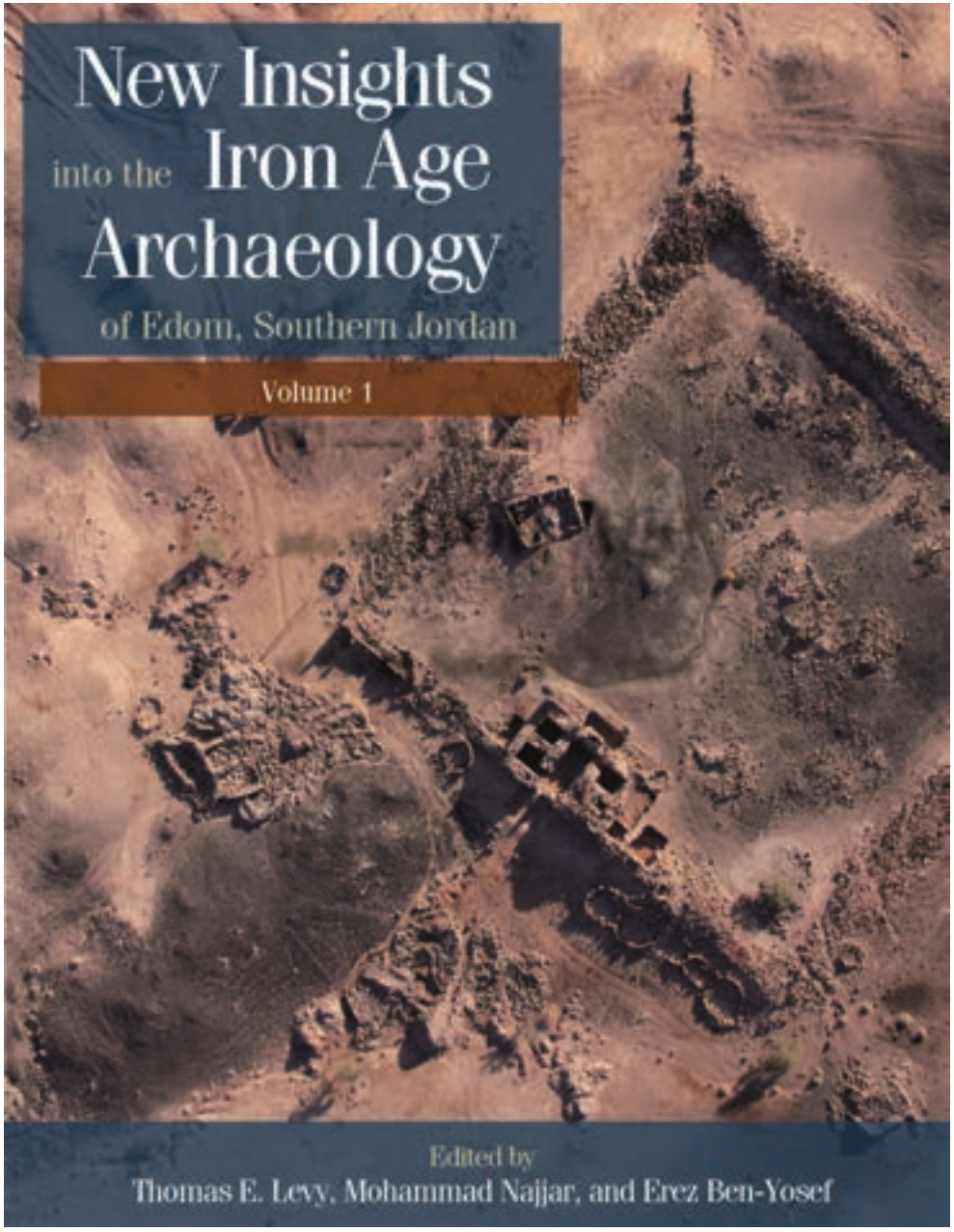
Format

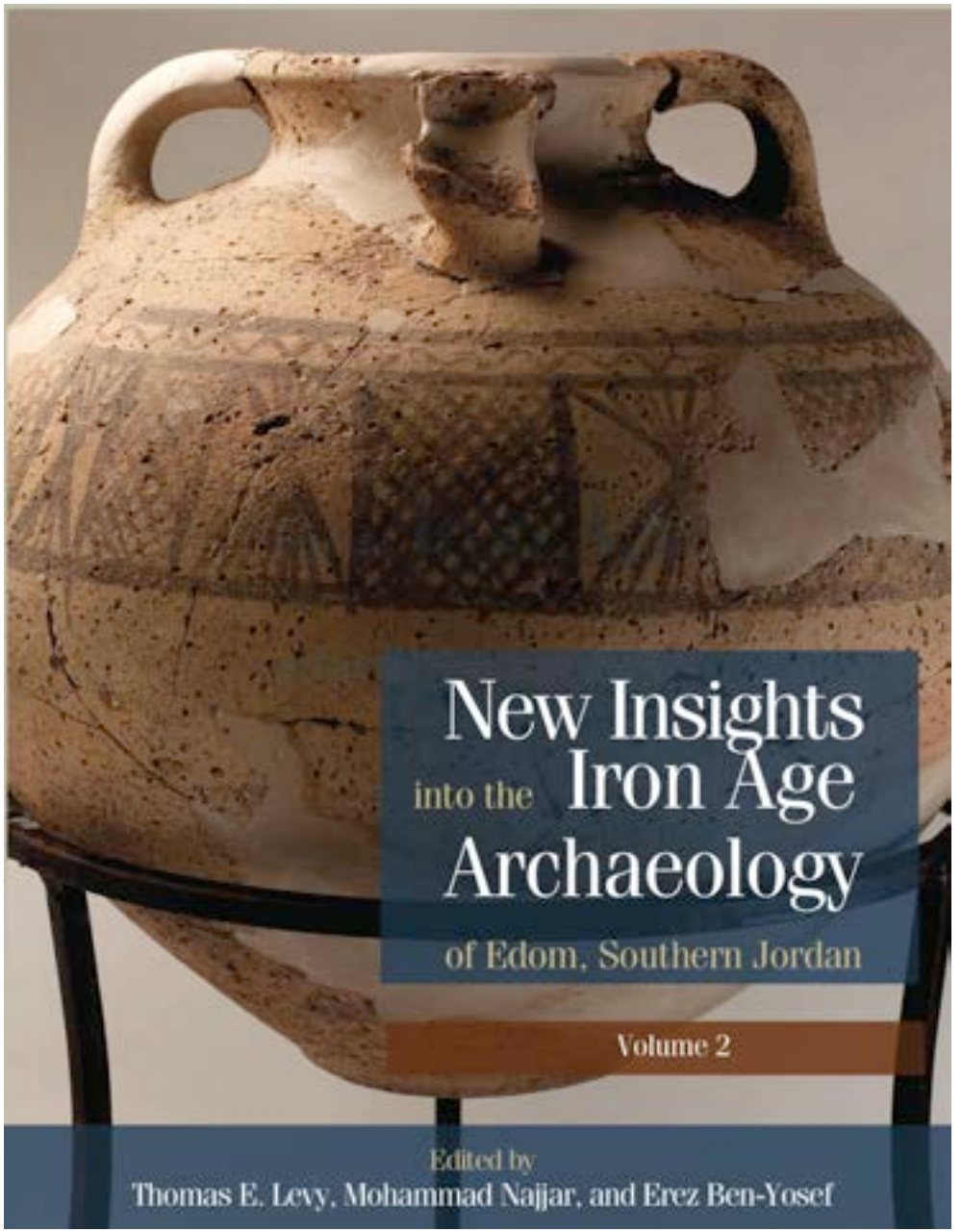
View formats within this collection

image

Components of "Locus 671, Area M, Area Stratum M4, SLAG LAYER"

- Slag, Locus 671, Area M
  - Photo 1
  - Photo 2
  - Photo 3
  - Photo 4
- Basket number 9908





Published by - UCLA Cotsen Institute of Archaeology Press, November, 2014

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Current Data Nodes

DAAHL - Holy Land

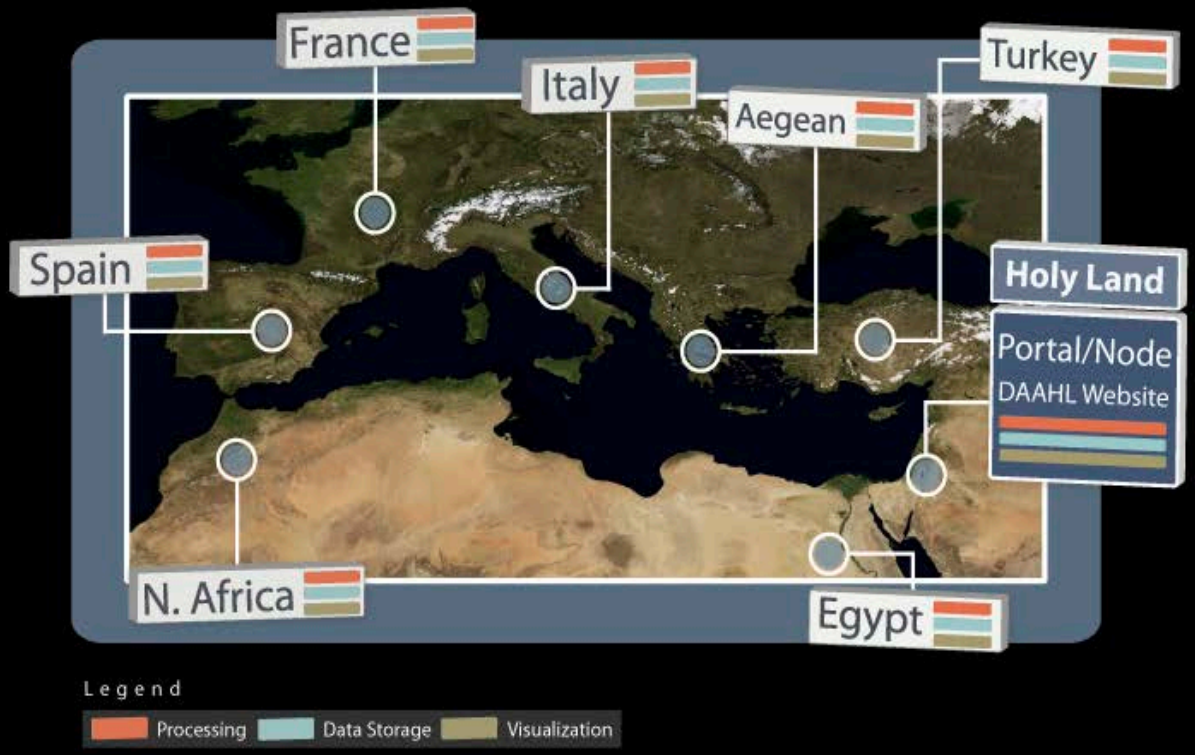
Other Links

MedArchNet Prototype
Calit2
Cisa3
MedArchNet Conf.
GAIA Lab

ASOR

Mediterranean Archaeological Network (MedArchNet)

Online Atlas, Cyberinfrastructure and Portal-Based Science Environments



The Mediterranean Archaeological Network (MedArchNet) is a series of linked archaeological information nodes, each of which contains a regional database of archaeological sites that share a common database structure in order to facilitate rapid query and information retrieval and display within and across nodes in the network. To visit the current nodes, click your mouse over the Holy Land or Aegean region indicated on the map shown here, or press the node links on the left side of the page.

http://daahl.ucsd.edu/DAAHL *with Stephen Savage, ASU*

http://daahl.ucsd.edu/DAAHL/

The Digital Archaeological Atlas of the Holy Land

The Online Virtual Museum

QUALCOMM INSTITUTE

UC CYBER-ARCHAEOLOGY
CENTER FOR CYBER-ARCHAEOLOGY & SUSTAINABILITY AT UC SAN DIEGO

UC San Diego

Virtual Reality Club at UCSD

Virtual Reality for Cyber-Archaeology Hackathon

Presented by

UC CYBER-ARCHAEOLOGY

Virtual Reality Club at UCSD

This Spring, VR Club at UCSD is partnering with the Center for Cyber-Archaeology & Sustainability at UCSD to host a VR Cyber-Archaeology hackathon. Participants will have 36 hours to create a Virtual Reality experience with applications for at-risk archaeological sites from the eastern Mediterranean region. All attendees will be provided with a wealth of archaeological data and VR equipment for their hacks.

When: Friday, April 7 - Sunday, April 9
Where: B210 (VR Lab) in EBU3 Basement & CSE1202 in EBU3 First Floor

What is a Hackathon?

A Hackathon is a coding marathon that lasts anywhere from 12 to 36 hours. During a Hackathon, students work with a team to create an innovative project completely from scratch, with no prior work allowed. Participants are provided with food, space, mentorship, and the equipment needed to complete their projects. At the end, all attendees will present their work, and judges will award prizes to the top projects.

Who can attend?

All UCSD students can apply for this Hackathon! We especially encourage students interested in archaeology or VR technology to attend. Teams will consist of 1-2 anthropology students, and 3-4 engineers, with a maximum team size of 5 students. Roughly 10 anthropology/archaeology students and 40 engineers will be selected from the applicant pool, for a total of 10 teams and 50 participants.

DEVPOST Jobs NYC The Commit Hackathons Log in Sign up

CYBER-ARCHAEOLOGY VR HACKATHON

Home Participants Rules Submissions Updates Discussions

★ **Connect with the participants – support your favorite projects by liking, sharing, and commenting on them.**

Search... Search SORT Select one

Little Connor and the Ore of t

Copper: From ore to the prized treasure

+1 ♥3 ●0

Excavation at Khirbat Nuqayb

Khirbat Nuqayb al-Asaymir!

+1 ♥6 ●0

VR Story of an Archaeologica

Explore a unique juxtaposition of current and past at the ancient copp

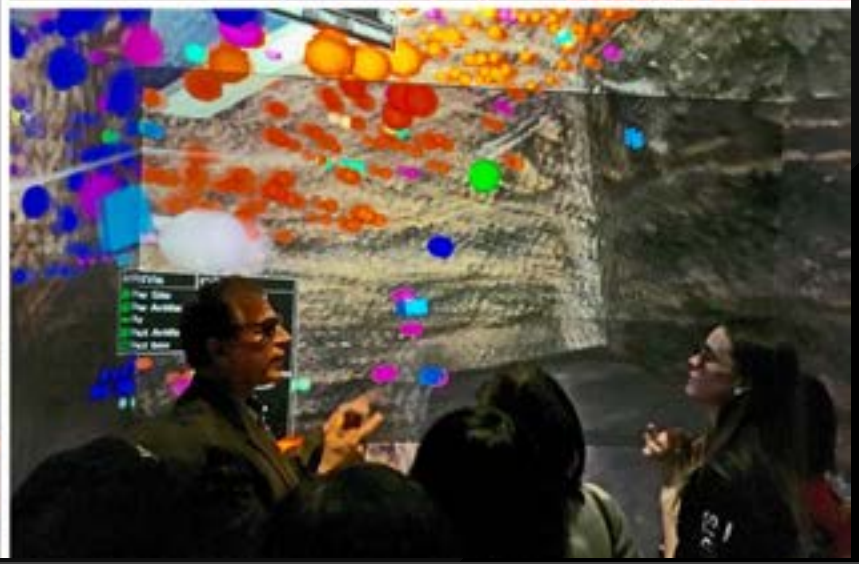
+1 ♥2 ●1

Scavenging en-Nahas

a scavenger hunt to explore the organization of copper production in

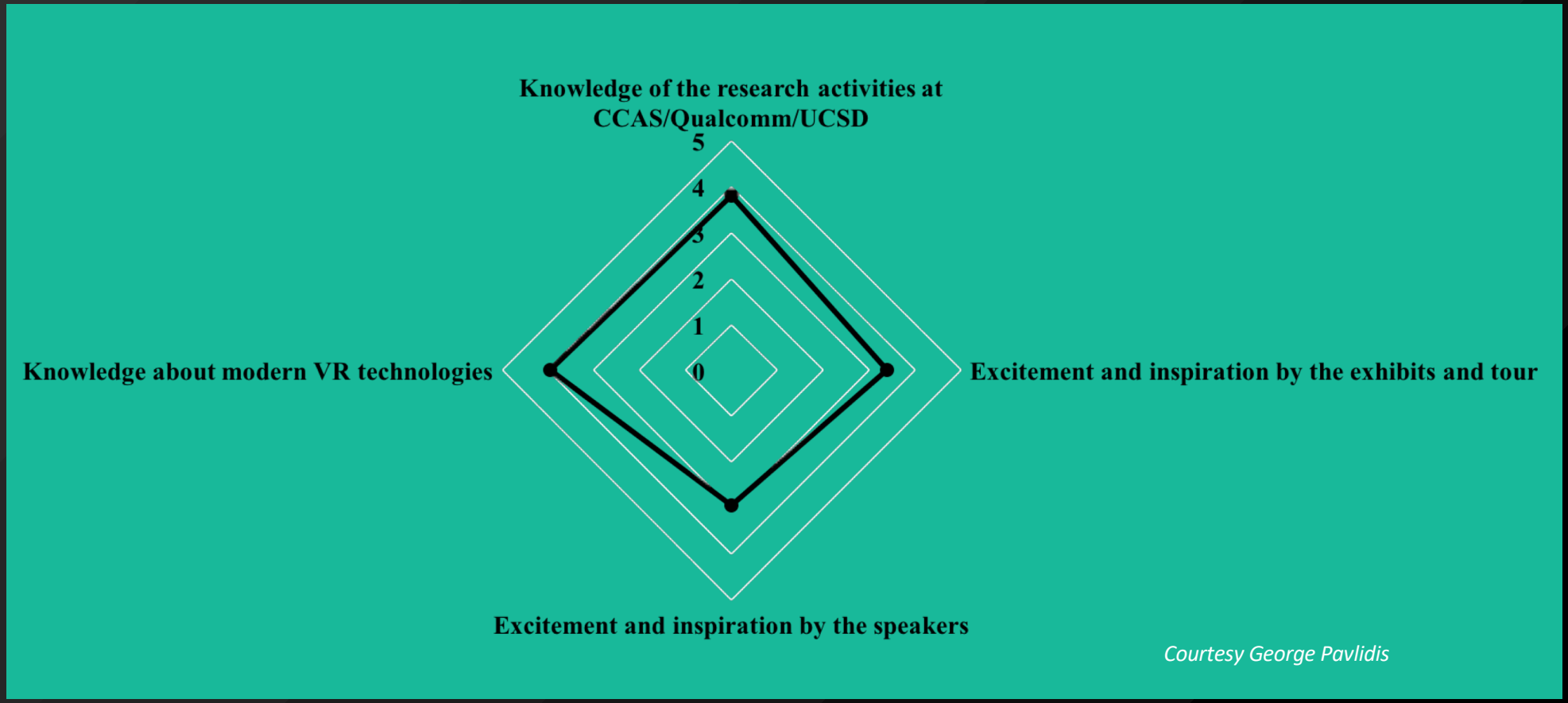
♥2 ●1

La Jolla Country Day School, UCSD



La Jolla Country Day School, UCSD

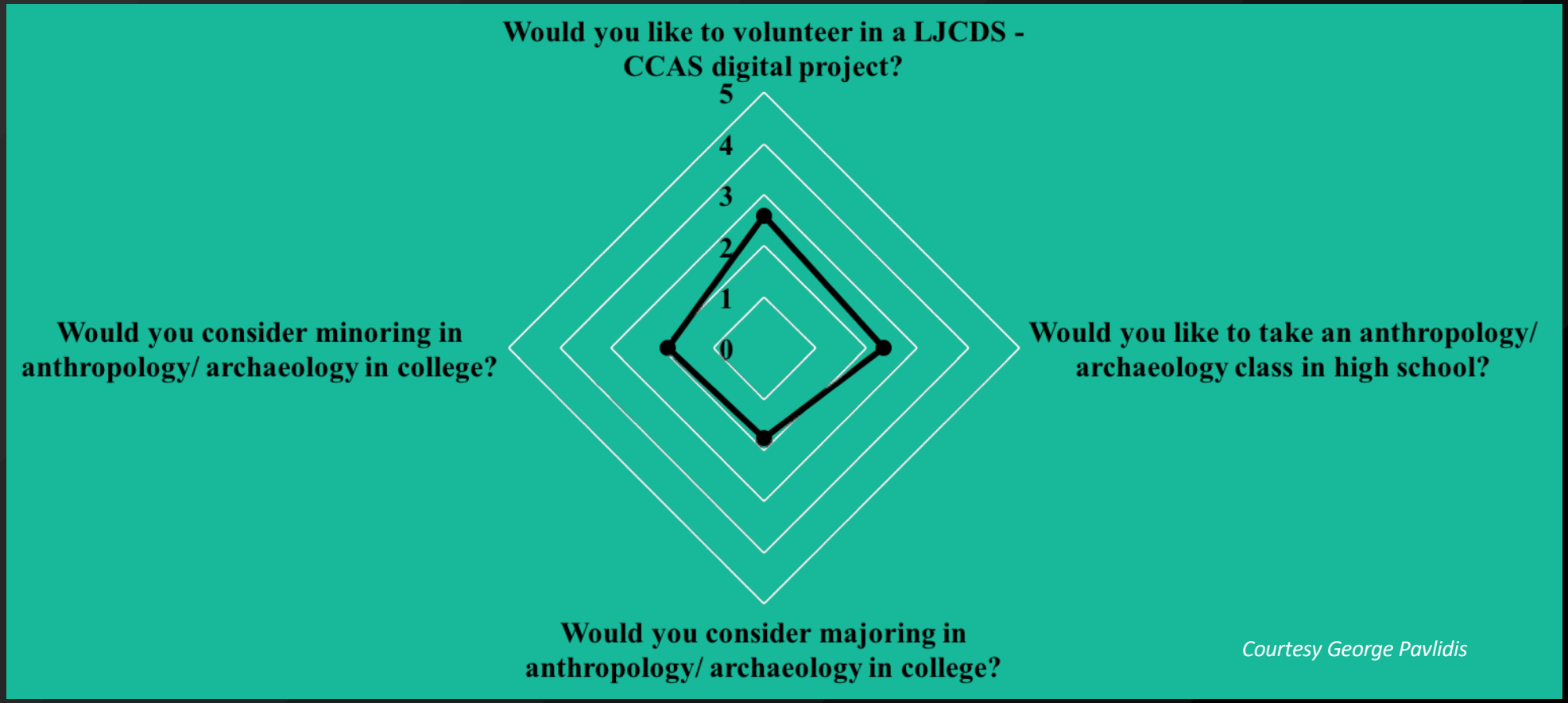
- Participants mainly amazed by the technologies and high-tech venue rather than the actual content (n = 92)



Courtesy George Pavlidis

La Jolla Country Day School, UCSD

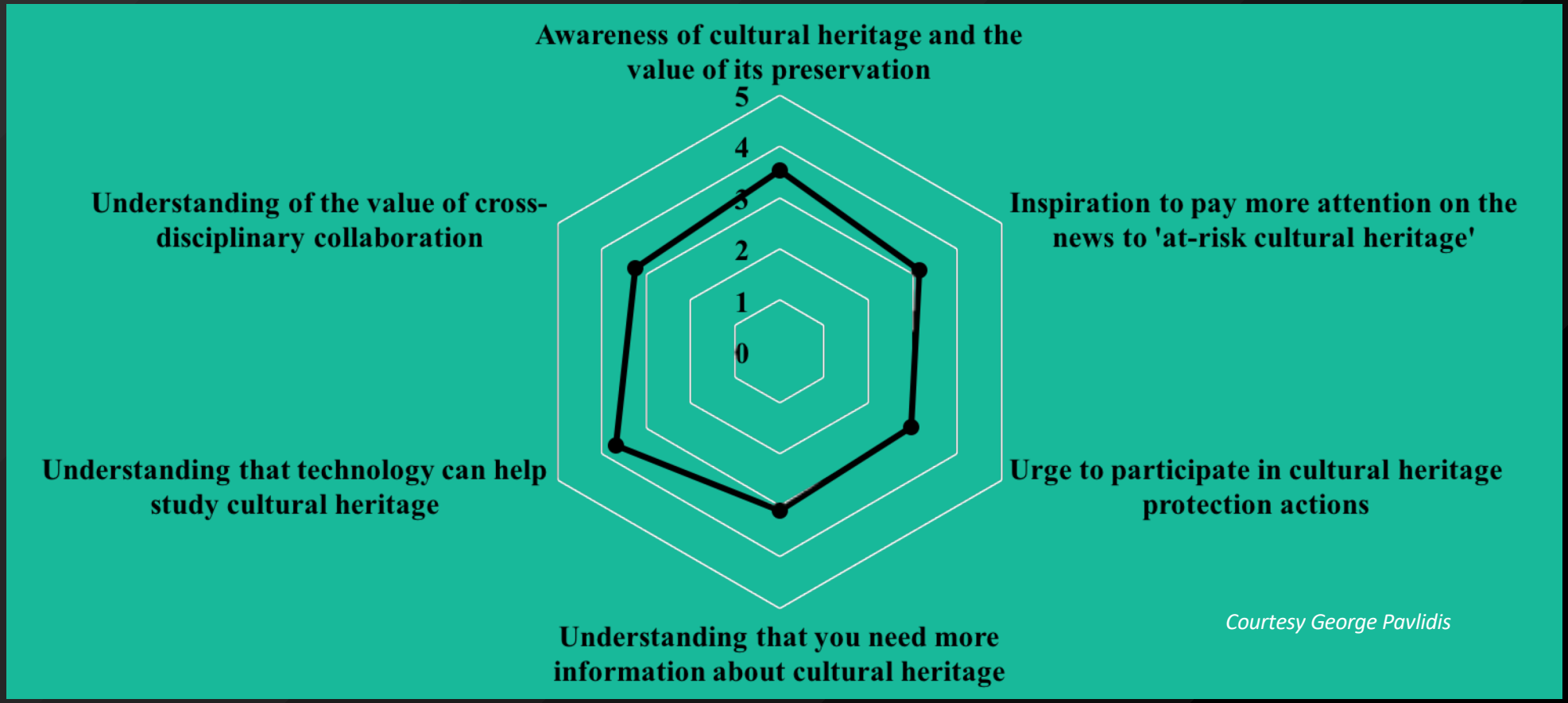
- The lack of cultural education and awareness becomes even more apparent by the students' responses to career-related questions (n = 92)



Courtesy George Pavlidis

La Jolla Country Day School, UCSD

- The gain in awareness regarding the cultural aspect was still high (even though gained within two hours) and gives a positive incentive for the organization of more such events (n = 92)



Courtesy George Pavlidis

Seminars for the general public

UC CYBER-ARCHAEOLOGY

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Public Outreach – La Jolla Country Day School visit, February, 2017


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SCRIPPS CENTER FOR MARINE ARCHAEOLOGY
UC San Diego Scripps Institution of Oceanography and Department of Anthropology
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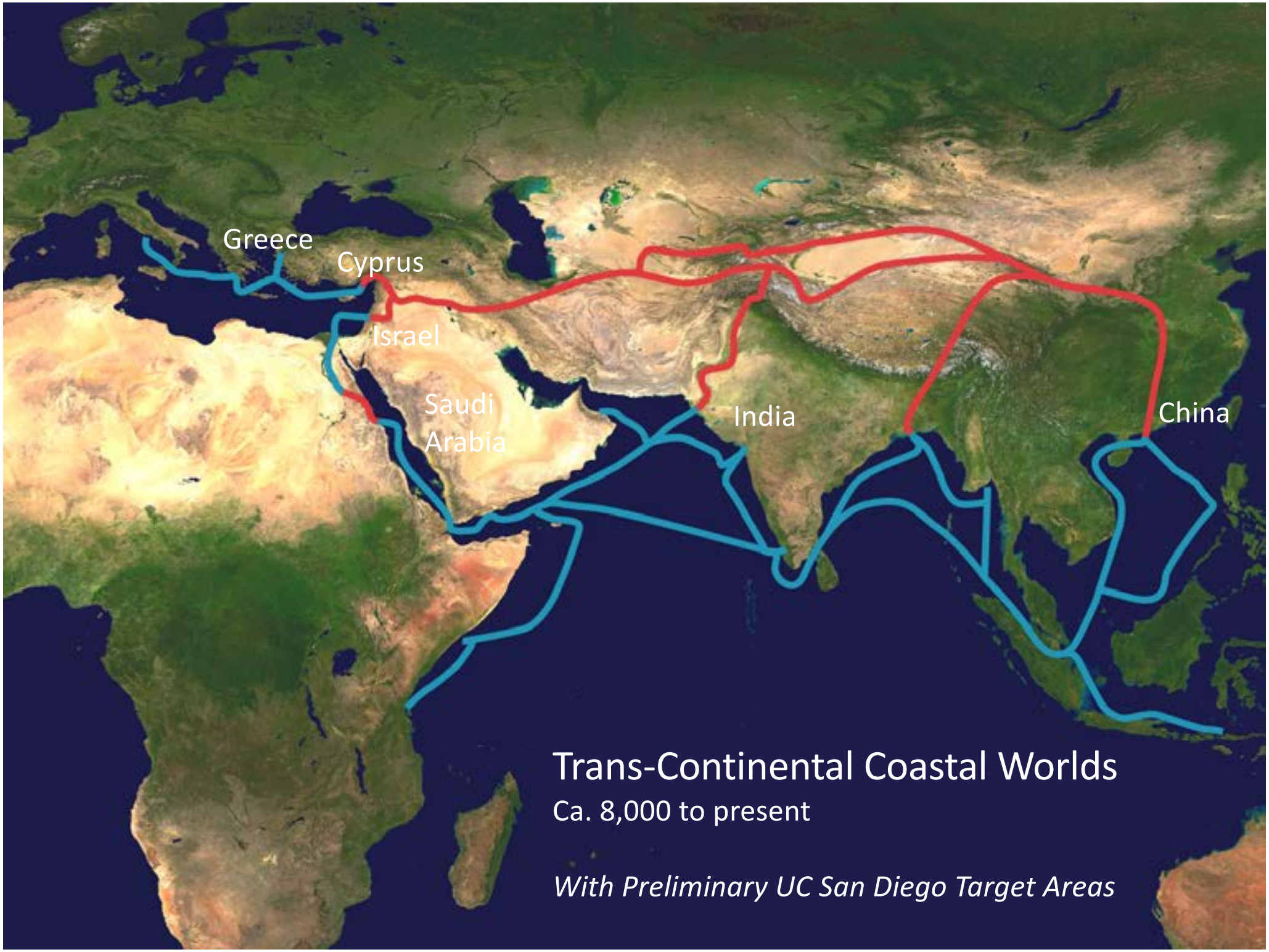

Greece
Cyprus
Israel
Saudi Arabia
India
China
Trans-Continental Coastal Worlds
Ca. 8,000 to present
With Preliminary UC San Diego Target Areas

Kastrouli Late Bronze Age Land and Sea Project –

Toward the Creation of a Heritage Asset District

Mycenaean tomb excavation, ca. 1200 BC
July 19 – August 3, 2016 (16 days)

Marine Sediment Coring & Geophysics Survey
Antikyra Bay, Gulf of Corinth
August 4 – 8, 2016 (5 days)

21 days, ca. 2 TB data = Big Cultural Heritage Data

Thomas E. Levy (PI), Ioannis Liritzis (Co-PI)

What Is Scientific Diving?

- In 1975, in response to numerous accidents in the commercial diving sector, the United Brotherhood of Carpenters and Joiners of America, supported by the AFL-CIO, petitioned the Federal Government urging a development of commercial diving standards applicable to all professional diving operations. Given the employee-employer nature of the relationship between scientists and students and their universities, these standards would have impacted most scientific diving activities associated with academic and research institutions.
- The American Academy of Underwater Sciences (AAUS) was formed by a handful of institutions long conducting scientific diving activities to voice community concerns that the impact OSHA's Commercial Diving Standards presented to institutional scientific diving activities.

Before you go…. Become a Science Diver!

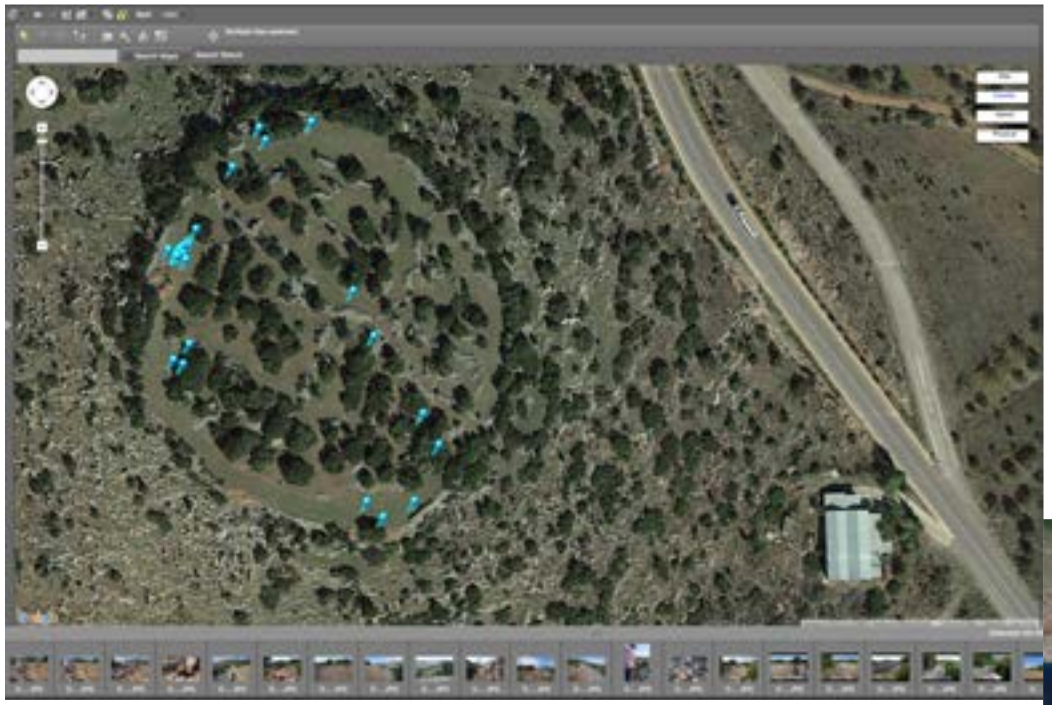
The Scripps Scientific Diving Course is a 100-hour course required of anyone wishing to use SCUBA for their scientific research or employment under the auspices of Scripps and UC San Diego.

The course curriculum includes:

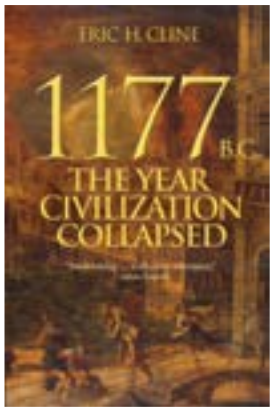
- Physics and Physiology of Diving
- Decompression Theory and Dive Planning,
- Equipment and Environmental Considerations,
- Hazardous Marine Life, and
- Scripps Scientific Diving Program and Policy;
- Diving Emergency First Aid
  (CPR, first aid, oxygen administration, and field neurological examination) training)
- Dive Rescue;
- Written Scripps Scientific Diver examination; and
- 12+ supervised open water dives.

Toward a ‘Mycenaean Coastal World’

The 2016 UC San Diego – University of the Aegean Expedition to Greece

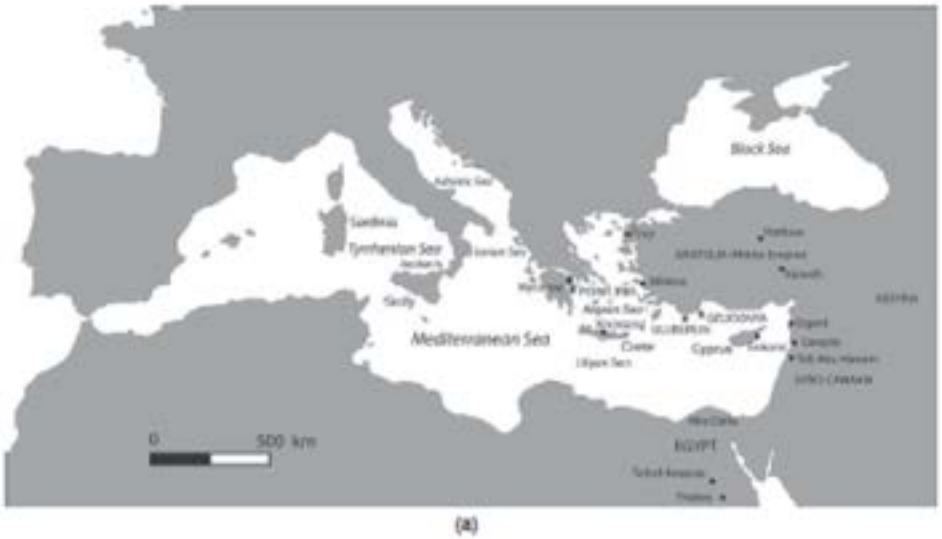


1) Kastrouli Mycenaean excavation

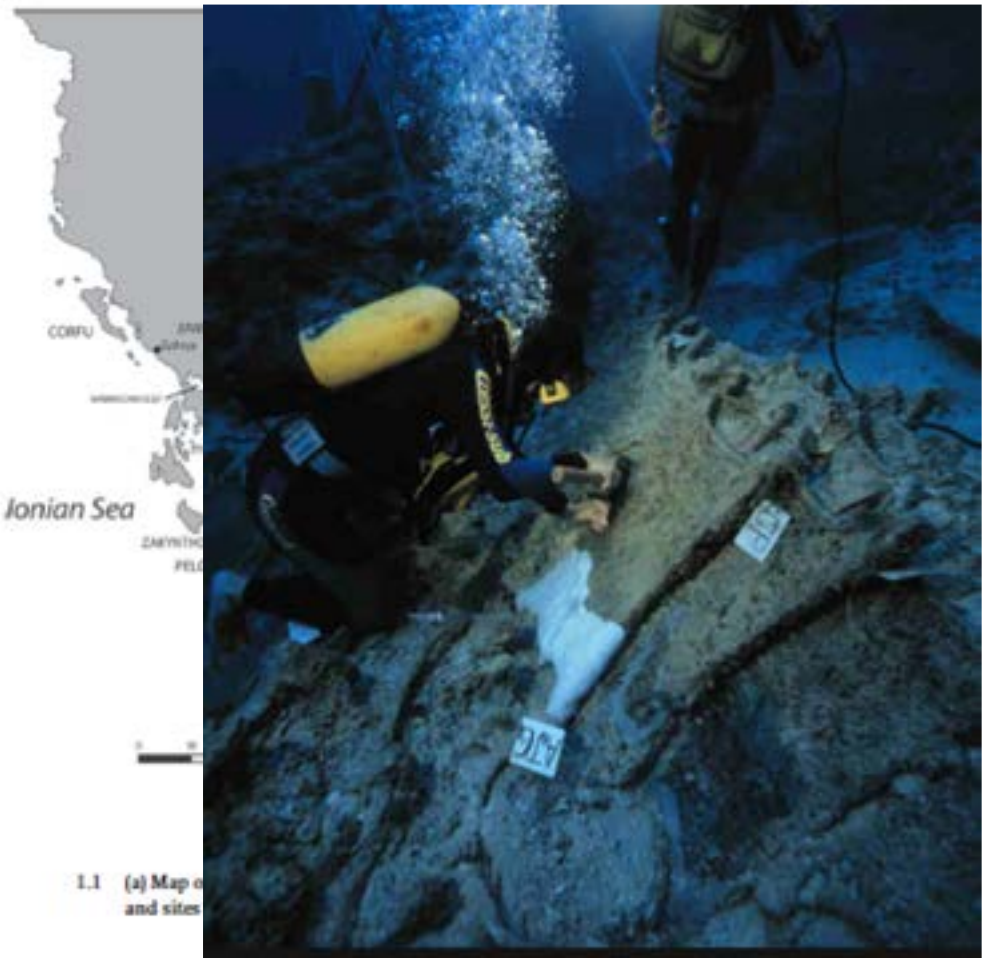


2) Marine Coring Project, Gulf of Corinth

The Problem of Mycenaean Coastal Worlds –
Thank you Thomas Tataron –
Maritime Networks in the Mycenaean World
(Cambridge University Press, 2013)



(a)

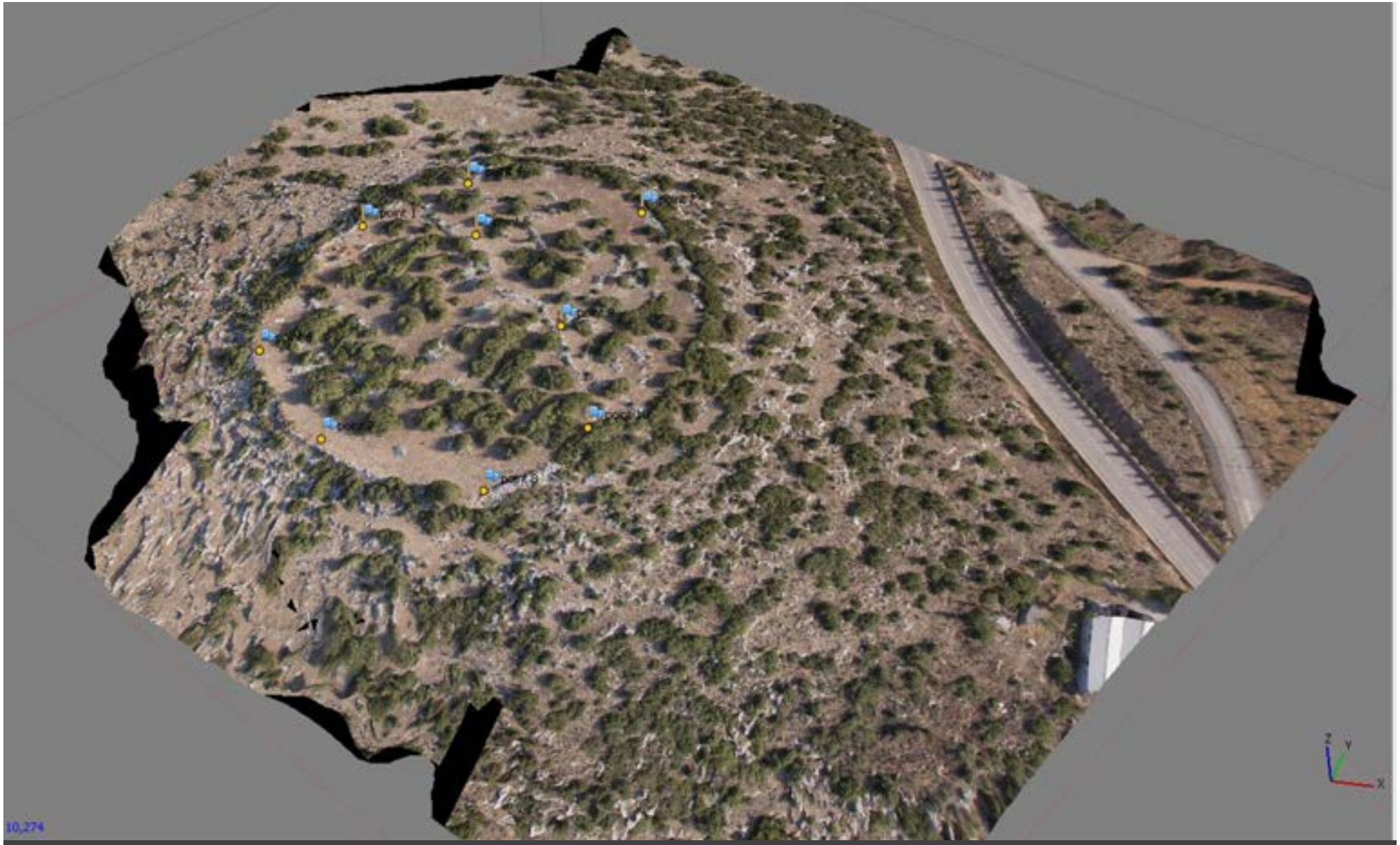


1.1 (a) Map o
and sites

- We know little about Mycenaean anchorages and harbors
- We know a lot about LB international long distance connections with states
- Lack systematic body of method & theory to identify and reconstruct coastal nodes & maritime routes of small and medium-scale networks

Our Kastrouli team – July 30, 2016
Ioannis Liritzis, University of Aegean Co-PI; Thomas E. Levy, UC San Diego, PI;
Thanos Sideris , Field Director

Sensing from the Air: Kastrouli 2016 – Georeferenced Orthophoto from helium balloon



Layout 2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Layout 1
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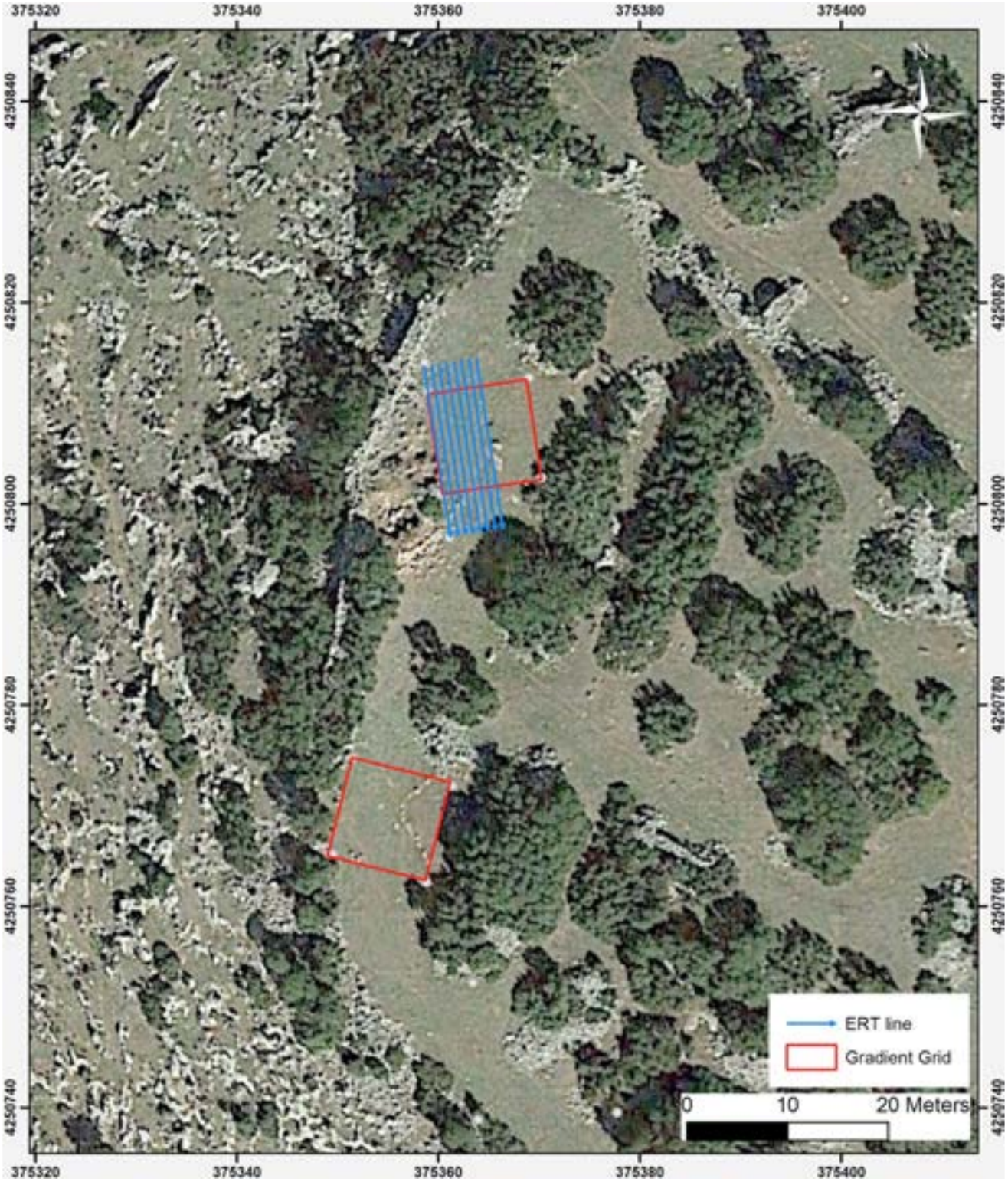
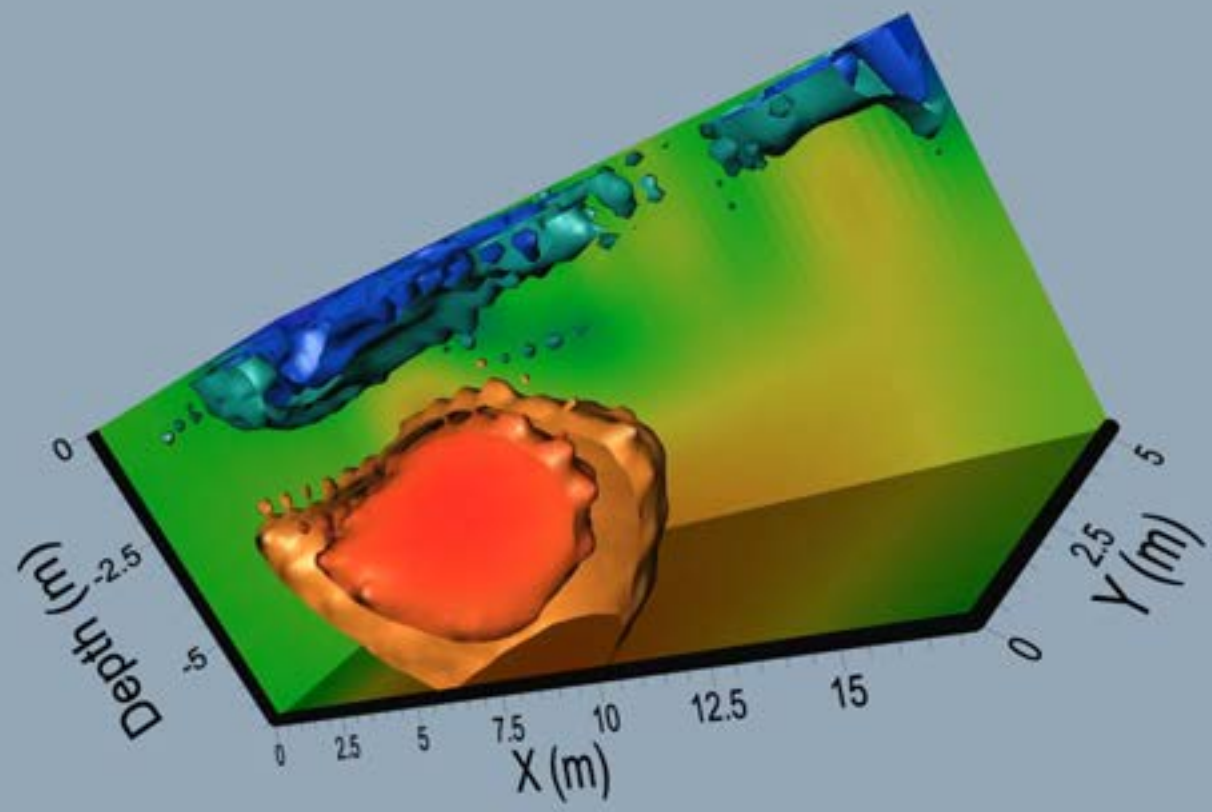


Ground Penetrating Radar

1st year student
The'ano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-5
Depth (m)
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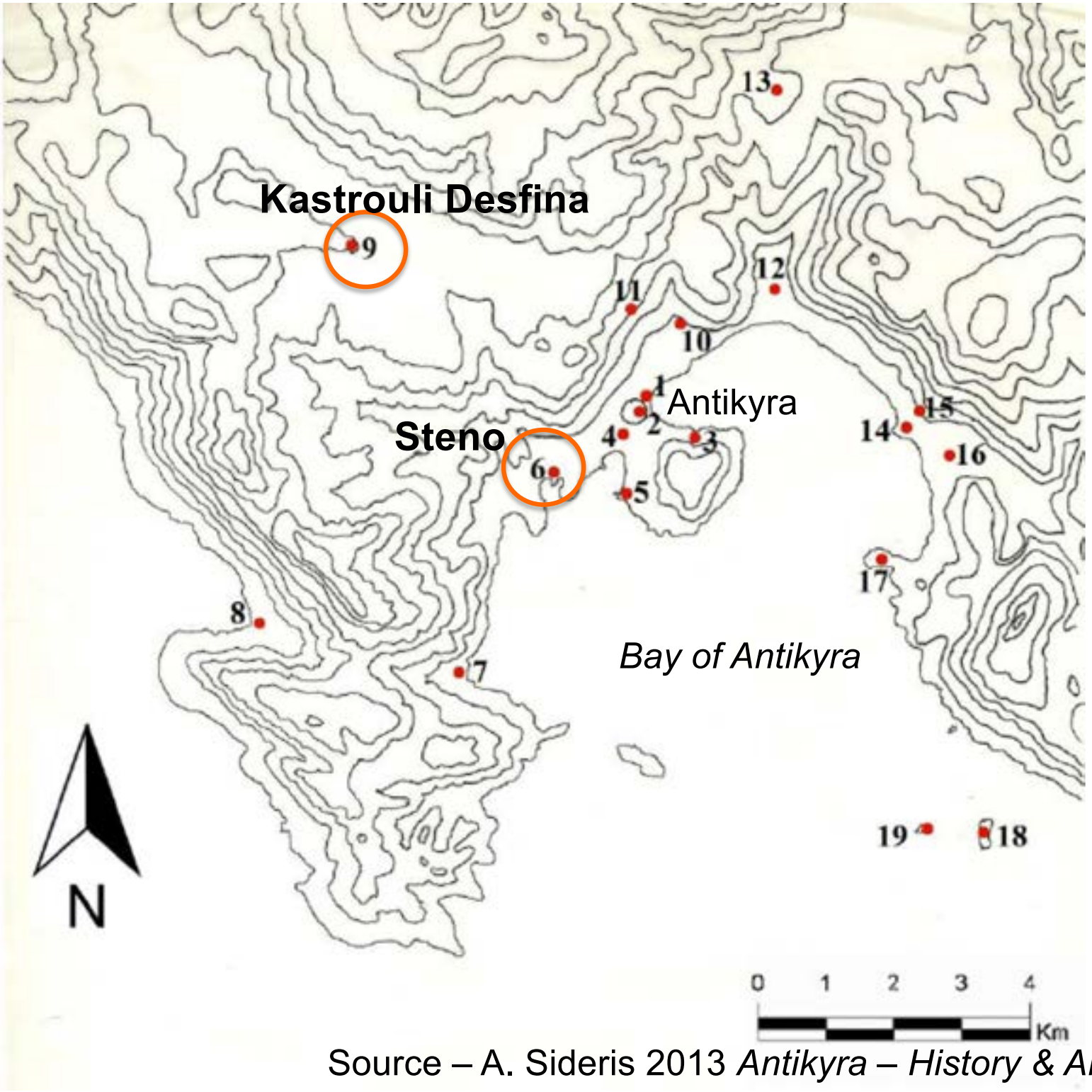
5
7.5
10
12.5
15
X (m)
0
2.5
5
Y (m)

Structure from Motion and Agisoft Photoscan


10
20
30
40
CM

Late Helladic IIIC, Early (ca. 1190 – 1070 BC)

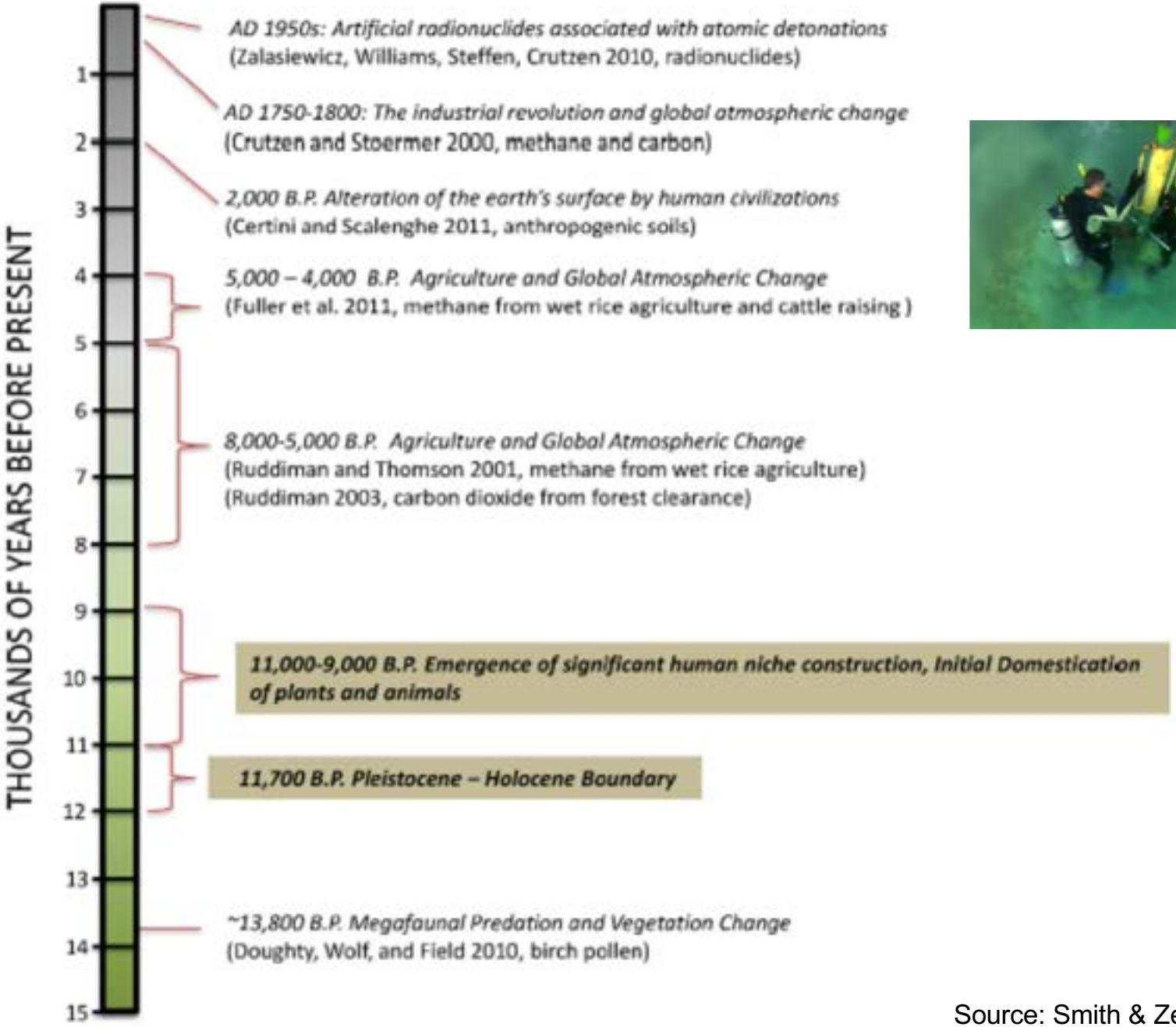
With Prof. George Papatheodorou, Marine Geology, University of Patras, Greece
Prof. Richard Norris, Scripps Institution of Oceanography, UC San Diego
Prof. Tom Levy, Center for Cyber-Archaeology and Sustainability, UC San Diego



Source – A. Sideris 2013 *Antikyra – History & Archaeol*

Steno Bay

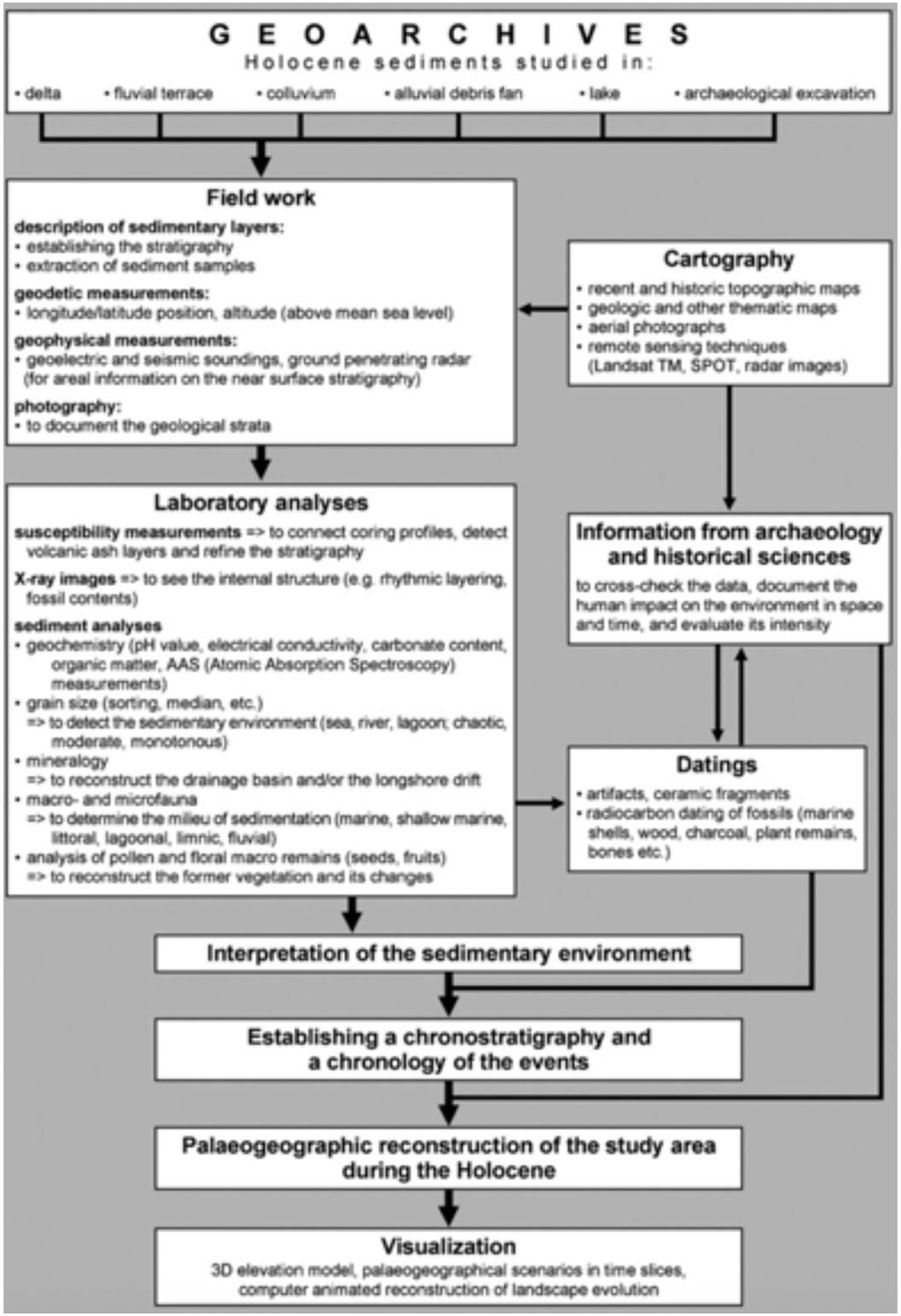
Alternative temporal boundaries for the Holocene-Anthropocene – We will search in the Mediterranean to China Cultural Interaction Sphere



Source: Smith & Zeder 2013:9)

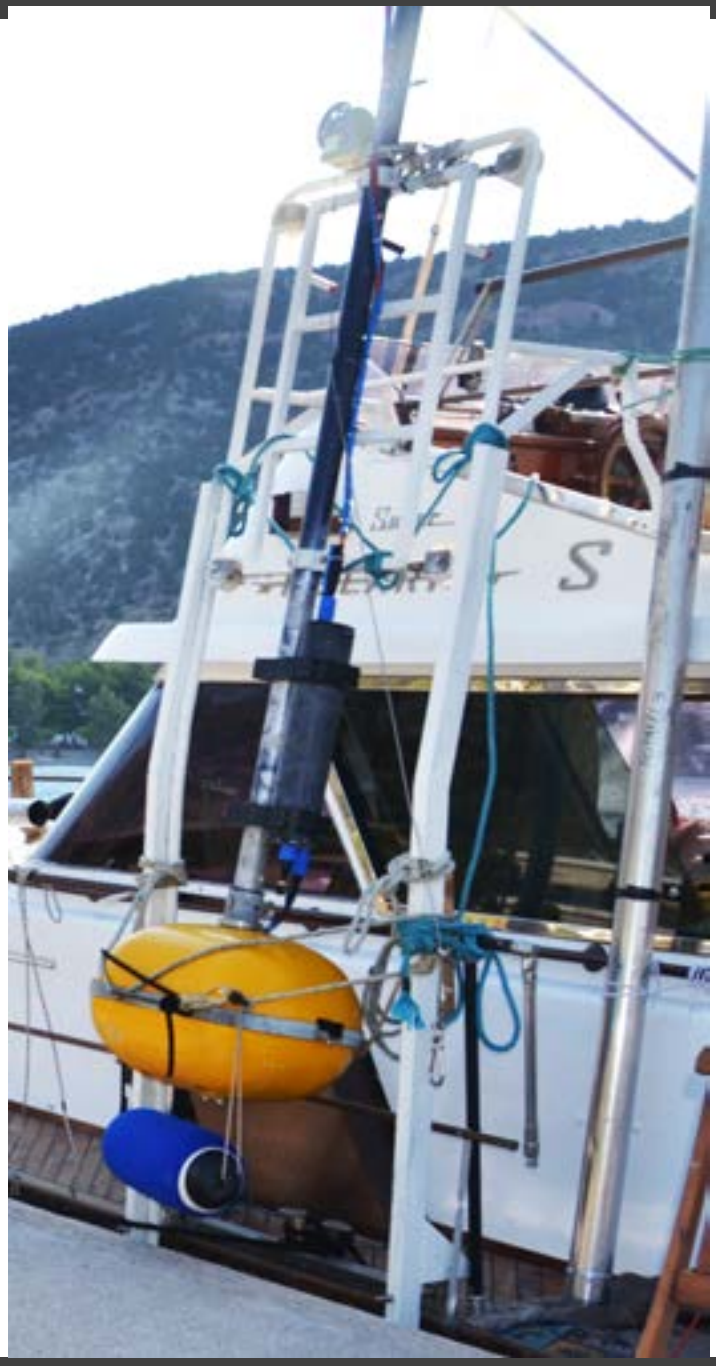
Coring: Sources of Proxy Data for Paleoclimate and Environmental Reconstruction

Research Domain	Data	Information available from study
Glacial (Ice Cores)	Oxygen and hydrogen isotopes, Gas content in air bubbles, trace elements and micro-particle concentrations	Global scale climate change through time
Geological	Microfossils, Oxygen isotopes, sediment mineralogy, geochemistry, eolian dust, submerged land surfaces, shorelines	Detailed regional description of how deposits formed and under what environmental conditions, pollution through time
Biological (plants)	Charcoal (tree-rings), pollen, phytoliths, plant micro and macro fossils (unchared/charred), diatoms	Dendrochronology, climate, vegetation, land use, salinity, water pollution, diet, plant use (for processing, crafts, technology fuel)
Biological (fish)	Fish bone, scales, otoliths	Diet, fishing technology, seasonal activities
Biological (mollusks)	Shell middens, species variation, oxygen isotopes	Ancient shorelines, nature of coastal micro-environments, economy
Biological (mammals)	Large & small mammal bones	Natural fauna, diet, husbandry, disease, social status, crafting
Biological (Insect remains)	Charred and unchared	Climate, vegetation, living conditions, trade, human diet



Flow-chart of Methods in Geoarchaeology and Paleography

(Bruckner et al 2005:96)



Side-Scan Sonar


Nikon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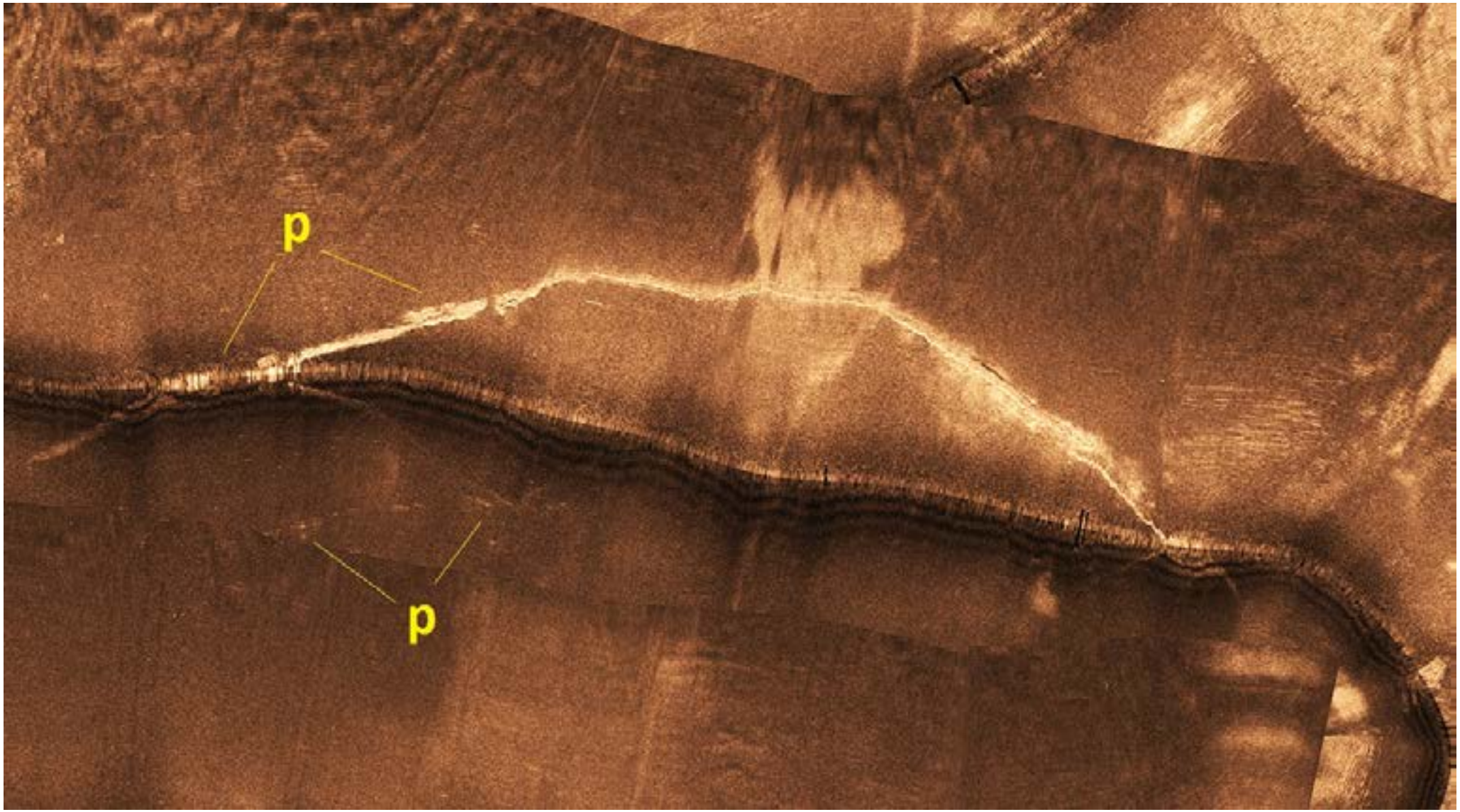
Sensing the Seas – Marine Geophysi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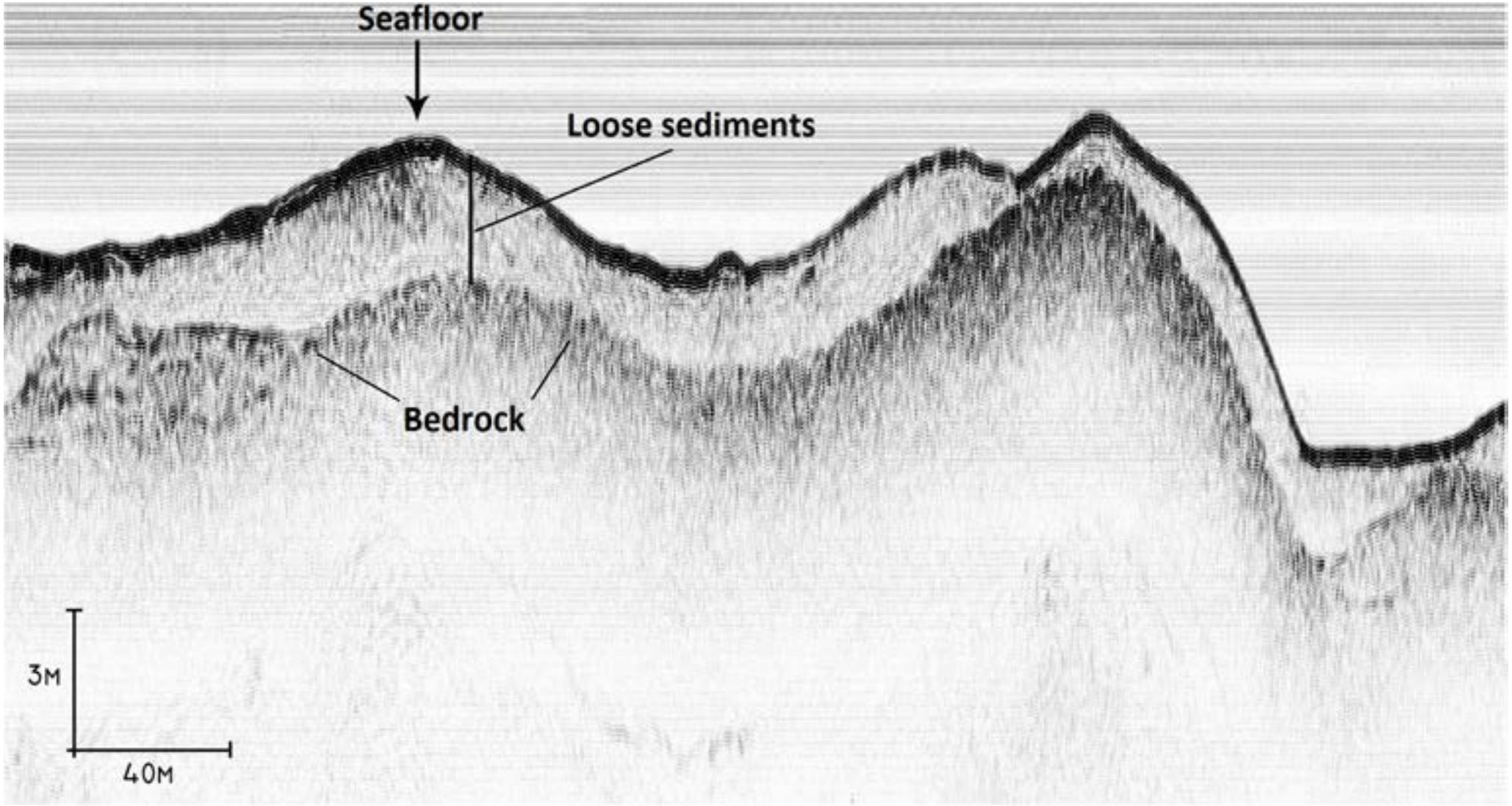
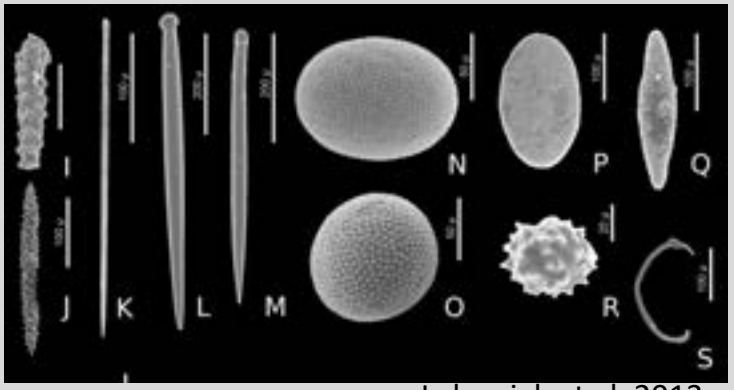

Seafloor
Loose sediments
Bedrock
3M
40M

Dick Norris, Tom Levy and team coring near Antikyra

Proxy Data: Reconstructing reef ecosystems of the past

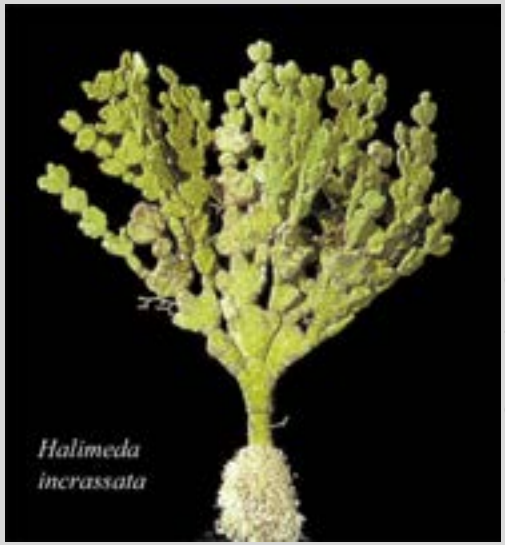
Fish

Sponges



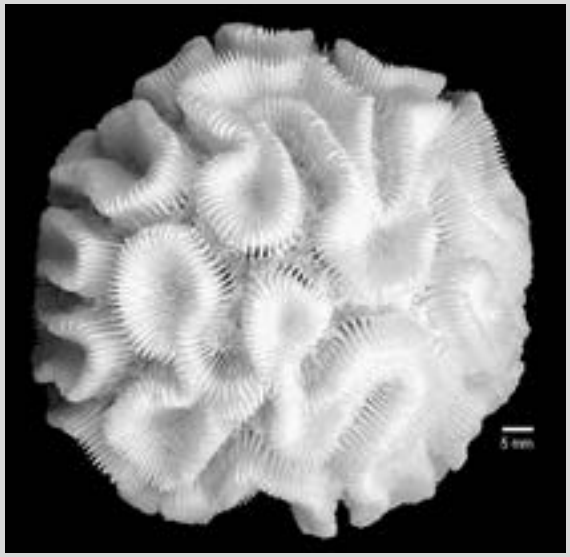
Lukowiak et al. 2013

Algae



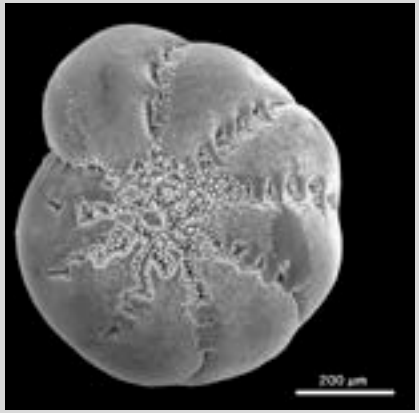
gettysburg.edu

Corals



NMITA

Foraminifera



USGS.gov

Bivalves

NMITA

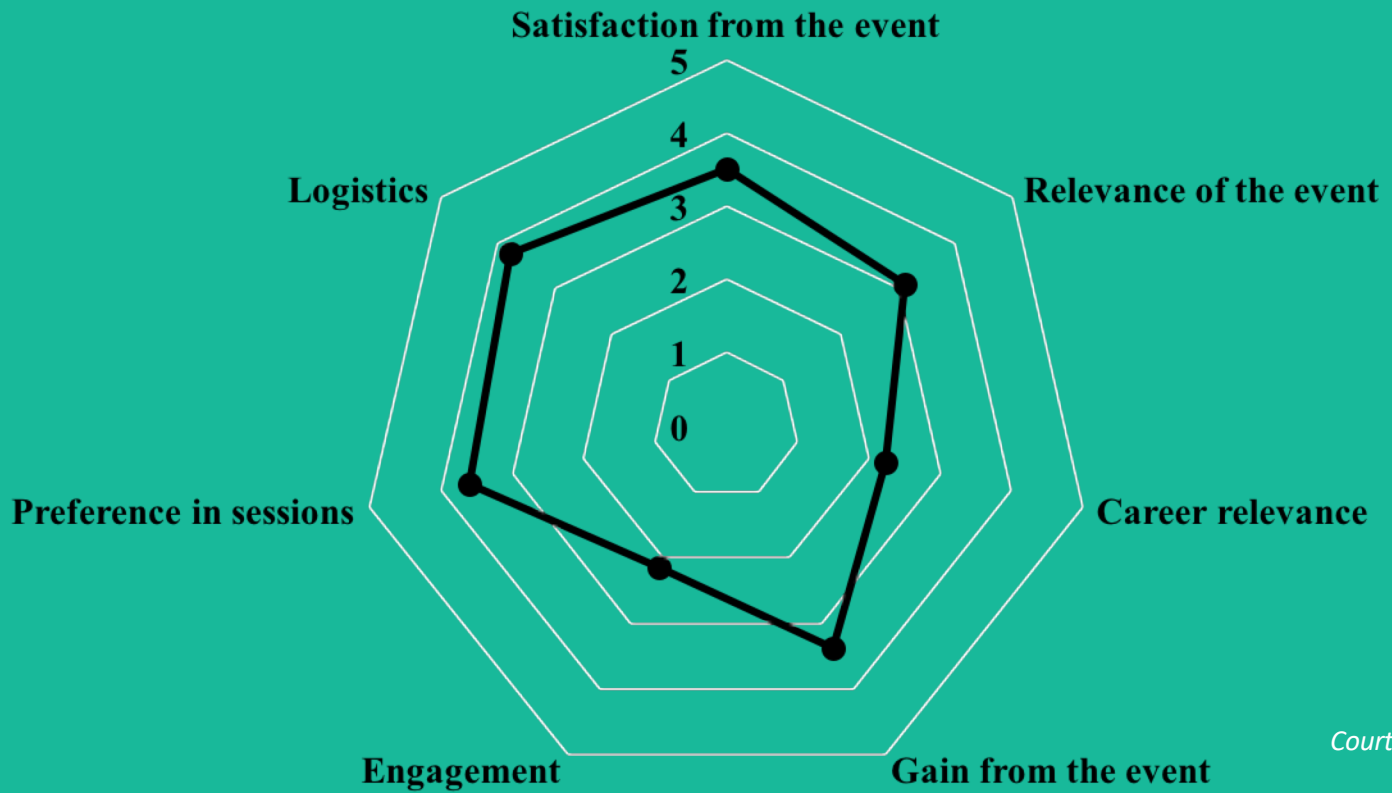
Urchins

Acknowledgements

- Mohammad Najjar, Andreas Hauptmann
- Matt Vincent, Matt Howland, Kathleen Bennallack, Aaron Gidding, Vid Petrovic, Tom Wypch, David Vanoni, Kyle Knabb, Ian Jones, Matt Howland, Andrew Huynh, David Stour, John Mangan, David Hernandez, Alan Turchik, Brady Liss, Craig Smitheram, Steve Savage
- Tom DeFanti, Falko Kuester, Todd Margolis, Jürgen Schultz, Albert Lin, Alex Hubenko, Trish Stone, Ramesh Rao, Larry Smarr, Sarah
- Doug Ramsey, Scott Blair, Alex Matthews, Tiffany Fox
- National Geographic Society
- PBS/NOVA Television
- Ken Garrett Photography
- Department of Antiquities of Jordan
- Steve Savage, Neil Smith, Erez Ben-Yosef
- Alina Levy, Margie Burton, Sarit Hadad, Connor A. Smith, Kristin Agcaolii, Anish Kannan, Glenn Yago, Avner Goren, Janet Napolitano, Nancy Lee

La Jolla Country Day School, UCSD

- Radar chart of the overall average ratings for all sections of feedback asked (n = 92)



Courtesy George Pavlidis