FEATURED RESEARCH: Geoarchaeological investigations at Rano Raraku, Easter Island by Richard Dunn p.9

Photo taken viewing the inner slope of Rano Raraku, and showing the back of moai 156, which was excavated by the EISP team. Moai are set into rock cuttings and deeply buried by colluvium. Image from EISP/Jo Anne Van Tilburg.
UPCOMING MEETING

THE GEOLOGICAL SOCIETY OF AMERICA
September 22–25, 2019
Phoenix, Arizona
https://community.geosociety.org/gsa2019/home

GSA Geoarchaeology Business Meeting & Awards Ceremony
Monday, September 23
5:45 pm–7:30 pm
Phoenix Convention Center, Room 125AB, North Building

Sponsored Short Courses:

502 - Everything You Wanted to Know about Luminescence Geochronology—Mysteries of the “Illuminati” Revealed.

509 - Introduction to Drones (sUAS) in the Geosciences.

Scientific Field Trip:

416 - Geoarchaeology of Prehistoric Agriculture, Soils, and Floodplain Dynamics on the Lower Salt and Middle Gila Rivers, Arizona
Saturday, September 21

Sign up at https://community.geosociety.org/gsa2019/attend/registration

GEOARCHAEOLOGY SESSIONS:

Session 14 Sunday, September 22 (8:00am–12:00pm)
Room 226ABC, North Building (Phoenix Convention Center)
T100. Phylogenetic Paleobiology: Good Things Come in Trees

Session 102 Monday, September 23 (9:00am–6:30pm)
Hall AB, North Building (Phoenix Convention Center)
T126. Geoarchaeological Insights into Paleoenvironmental Reconstruction and Cultural Dynamics (Posters)

Session 105 Monday, September 23 (9:00am–6:30pm)
Hall AB, North Building (Phoenix Convention Center)
D9 Recent Advances in Geomorphology (Posters)

Session 148 Monday, September 23 (1:30pm–5:30pm)
Room 125AB, North Building (Phoenix Convention Center)
T126. Geoarchaeological Insights into Paleoenvironmental Reconstruction and Cultural Dynamics

Session 188 Tuesday, September 24 (9:00am–6:30pm)
Hall AB, North Building (Phoenix Convention Center)
T4. Eolian Processes and Landscape Evolution (Posters)

Session 202 Tuesday, September 24
Hall AB, North Building (Phoenix Convention Center)
D31 Recent Advances in Stratigraphy (Posters)

Session 224 Tuesday, September 24 (1:30pm–5:30pm)
Room 125AB, North Building (Phoenix Convention Center)
T125. The Geologic Substrate on Which Maya Civilization Developed

Session 260 Wednesday, September 25 (9:00am–6:30pm)
Hall AB, North Building (Phoenix Convention Center)
D3. Recent Advances in Geoarchaeology (Posters)

CONFERENCES AND WORKSHOPS

2019 Soil Science Society of America (Joint Meeting with the American Society of Agronomy and the Crop Science Society of America)
San Antonio, Texas
November 10–13, 2019
https://www.acsmeetings.org/

2019 Society for American Archaeology 85th Annual Meeting
Austin, Texas
April 22–26, 2020
https://www.saa.org/annual-meeting
The Association of American Geographers Annual Meeting
Denver, Colorado
April 6–10, 2020
https://annualmeeting.aag.org/

Developing International Geoarchaeology
Simon Fraser University, BC Canada
June 17–21, 2019
https://www.developinginternationalgeoarchaeology.org/

European Geosciences Union General Assembly 2020
Vienna Austria
May 3–8, 2019
https://www.egu2020.eu/

Archaeological Institute of America Meeting (Joint meeting with the Society for Classical Studies)
Washington D.C.
January 2–5, 2020
https://www.archaeological.org/meeting/about

XXI INQUA Congress 2023
Rome, Italy
http://www.inquaroma2023.it/

GEOLOGICAL SOCIETY OF AMERICA REGIONAL SECTION MEETINGS
https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/Home.aspx

2020 GSA South-Central Section (54th Annual Meeting)
March 9–10, 2020 • Forth Worth, Texas
Abstracts Due: December 3, 2020
https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/sc/2020mtg/home.aspx

2020 GSA Northeastern Section (55th Annual Meeting)
March 20–22, 2020 • Reston, Virginia
Abstracts Due: December 10, 2019
https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/ne/2020mtg/home.aspx

2020 GSA Southeastern Section (69th Annual Meeting)
March 20–22, 2020 • Reston, Virginia
Abstracts Due: December 10, 2019
https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/se/2020mtg/home.aspx

2020 GSA Rocky Mountain Section (72nd Annual Meeting)
May 4–5, 2020 • Provo, Utah
Abstracts Due: February 4, 2020
https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/rm/2020mtg/home.aspx

2020 GSA Cordilleran Section (116th Annual Meeting)
May 12–14, 2020 • Pasadena, California
Abstracts Due: February 11, 2020

2020 GSA North-Central Section (54th Annual Meeting)
May 18–19, 2020 • Duluth Minnesota
Abstracts Due: February 18, 2020
https://www.geosociety.org/gsa/about/sections/gsa/Sections/nc/home.aspx

AWARDS

THE DOUGLAS C. KELLOGG AWARD FOR GEOARCHEOLOGICAL RESEARCH

The Douglas C. Kellogg Award provides support for dissertation research, with emphasis on the field and/or laboratory aspects of this research, for graduate students in the earth sciences and archaeology. Under the auspices of the SAA’s Geoarchaeology Interest Group, family, friends, and close associates of Douglas C. Kellogg formed a memorial in his honor.

Eligibility: Recipients of the Kellogg Award will be students who are (1) actively pursuing the Ph.D. degree in earth sciences or archaeology; (2) applying earth science methods to archaeological research and (3) seeking to engage in a career in geoarchaeology.

Materials Required: The application should consist of a research proposal no more than three pages long that describes the research and its potential contributions to American archaeology, a curriculum vita, and two letters of support, including one from the chair that certifies that the student is conducting the proposed research along with the expected date of completion of the degree. Electronic submissions as pdfs sent to the committee chair are preferred. File names must include the applicants surname or last name and the award (Douglas C. Kellogg Fund for Geoarchaeological Research) must be clearly indicated in the proposal.

For more information contact:
Cynthia Fadem (Earlham: fademcy@earlham.edu)

Application guidelines:
https://www.saa.org/career-practice/awards/awards-detail/douglas-c.-kellogg-fellowship-for-geoarchaeological-research
Submission Deadline: December 20, 2019

Congratulations to our 2019 awardee:
Jacob P. Warner (Louisiana State University)!

GEOARCHAEOLOGY INTEREST GROUP
PAUL GOLDBERG RESEARCH AWARD
(formerly the M.A./M.S. RESEARCH AWARD)

The Geoarchaeology Interest Group Paul Goldberg Research Award provides support for thesis research, with emphasis on the field and/or laboratory aspects, for graduate students in the earth sciences and archaeology.

Eligibility: Recipients of the Geoarchaeology Interest Group Paul Goldberg Research Award will be students who are (1) actively pursuing the M.A. or M.S. degree in earth sciences or archaeology (please indicate which on application); and (2) applying earth science methods to archaeological research.

Materials Required: The application should consist of a research proposal no more than three pages long that describes the research and its potential contributions to American archaeology, a curriculum vita, and two letters of support, including one from the committee chair that certifies that the student is conducting the proposed research along with the expected date of completion of the degree. Electronic submissions as pdfs sent to the committee chair are preferred. File names must include the applicants surname or last name and the award you are applying for must be clearly indicated in the proposal.

For more information contact:
Cynthia Fadem (Earlham: fademcy@earlham.edu)

Application guidelines:
https://www.saa.org/career-practice/awards/awards-detail/paul-goldberg-award

Submission Deadline: December 20, 2019

Congratulations to our 2019 awardee:
Cayla Kennedy (Utah State University)!

SOCIETY FOR ARCHAEOLOGICAL SCIENCES
STUDENT RESEARCH INTERNATIONAL TRAVEL AWARD

The Society for Archaeological Sciences is pleased to announce the creation of the SAS Student Research International Travel Award. Up to $1000 is now available to help with costs of international travel for laboratory or field research to students who have been SAS members for more than one consecutive year.

Eligibility: Applications will be accepted from undergraduates in their final year of study who are planning to attend graduate school as well as Masters degree and PhD students. Research must be undertaken in a different country than that of their home institution. Funds may not be used to attend at conferences, field schools, classes and/or training courses.

Application guidelines:
http://www.socarchsci.org/awards1.html

Submission deadline: February 1 & September 1, annually

FRYXELL AWARD FOR INTERDISCIPLINARY RESEARCH

The Fryxell Award is presented in recognition for interdisciplinary excellence of a scientist who need not be an archaeologist, but whose research has contributed significantly to American archaeology. The award is made possible through the generosity of the family of the late Roald Fryxell, a geologist whose career exemplified the crucial role of multidisciplinary cooperation in archaeology. The award cycles through zoological sciences, botanical sciences, earth sciences, physical sciences, and general interdisciplinary studies. The Fryxell Award for 2021 will be presented in the ‘zoology’ category.

Eligibility: Any professional archaeologist may submit nominations for this award. Nominees must be SAA members by the time of their nomination.

Materials Required: Nominators must submit a letter describing the nature, scope, and significance of the nominee’s contributions to American archaeology, as well as the nominee’s curriculum vita. Support letters from other scholars are helpful. 4-6 are suggested. Please send submissions to the committee chair.

For more information contact:
Elizabeth J. Reitz (ereitz@uga.edu)

Application guidelines:
https://www.saa.org/career-practice/awards/awards-detail/fryxell-award-for-interdisciplinary-research-for-2020

Nomination/Submission Deadline: March 2, 2020

Congratulations to our 2019 awardee: M. Steven Shackley (University of California, Berkeley)!
**RIP RAPP AWARD**

George "Rip" Rapp, Jr. was one of the primary individuals responsible for establishment of the division and generously established a division award fund with the GSA Foundation. The award is given for outstanding contributions to the interdisciplinary field of geoarchaeology.

**Materials Required:** Nominations should be sent to gsa.agd@gmail.com and should include a biographical sketch, a statement of outstanding achievements, and a selected bibliography and/or CV for the nominee.

**Application guidelines:**
https://community.geosociety.org/geoarchdivision/awards/riprapp

**For more information contact:**
Rolfe D. Mandel (mandel@ku.edu)

**Nomination deadline:** February 15, annually

**Congratulations to our 2019 awardee, Kathleen Nicoll (University of Utah)!**

**CLAUDE ALBRITTON, JR. AWARD**

Under the auspices of the Geoarchaeology Division, family, friends and close associates of Claude C. Albritton, Jr., have formed a memorial fund in his honor at the GSA Foundation.

**Eligibility:** Recipients of the award are students who have (1) an interest in achieving a Master's or Ph.D. degree in earth sciences or archaeology; (2) an interest in applying earth science methods to archaeological research; and (3) an interest in a career in teaching and academic research.

**For more information contact:**
Rolfe D. Mandel (mandel@ku.edu)

**Application guidelines:**
https://community.geosociety.org/geoarchdivision/awards/student/albritton

**Submission deadline:** March 15, annually.

**Funding & Contributions:** Initially, the fund was set up with a gift of several thousand dollars. Members of the division, other GSA members, and those who know Claude are being asked to consider contributing to this fund. To contribute to the Albritton Fund, send your gift to the GSA Foundation, indicating that the gift should go toward this award.

**Congratulations to our 2019 awardees, Miriam Rothenberg (Brown University) and Adam J. White (University of California, Berkeley)!**

**R.E. TAYLOR STUDENT POSTER AWARD**

This prestigious award acknowledges innovative student contributions to archaeological research through the use of scientific methods, and has enhanced the careers of prominent young scholars and professionals for more than a decade. The award is named in honor of Professor Emeritus R. Ervin Taylor of the University of California at Riverside for his outstanding contributions in the development and application of radiocarbon dating in archaeological research and his dedication to the founding of the Society for Archaeological Sciences; his leading role as President (1980) and General Secretary (1981-2002) of the Society; and his committed service as editor of the SAS Bulletin. Professor Taylor's many valuable contributions were recognized by the SAA in 2004 with the Fryxell Award for Interdisciplinary Research. The award consists of $100 US, a one-year SAS membership and subscription to the SAS Bulletin.

**Eligibility:** Entries will be judged on the significance of the archaeological problem, appropriate use of methods, soundness of conclusions, quality of the poster display, and oral presentation of the poster by the student, who should be the first author in order to be considered. Students should submit an email application to Tatsuya Murakami (tmurakam@tulane.edu) by Friday March 29, 2019. Applications must include the title and abstract of the poster, evidence that you have registered for the Society for American Archaeology (SAA) meetings (email from the SAA), and proof of your status as an undergraduate or graduate student (usually appears on your SAA registration).

**For more information contact:**
Tatsuya Murakami (tmurakam@tulane.edu)

**Application guidelines:**
http://www.socarchsci.org/awards.html

**Submission deadline:** March 27, 2020

**RICHARD HAY STUDENT PAPER/POSTER AWARD**

Richard Hay was a long-standing member of the Geoarchaeology Division and had a long and distinguished career in sedimentary geology, mineralogy, and geoarchaeology. He is particularly well known for his work on the Olduvai Gorge and Laetoli hominid-bearing sites and was awarded the Division's Rip Rapp award in 2000. The grant is competitive and will be awarded based on the evaluation of the scientific merit of the research
topic and the clarity of an expanded abstract for the paper or poster prepared by a student for presentation in the Division's technical session at the meeting.

Eligibility: The Richard Hay Student Paper/Poster Award is a travel grant awarded to a student presenting a paper or poster at the GSA's annual meeting.

For more information contact:
Rolfe D. Mandel (mandel@ku.edu)

Application guidelines:
https://community.geosociety.org/geoarchdivision/awards/student/hay

Submission deadline: August 30, annually.

Funding & Contributions: To contribute to the Hay Award, send your gift to the GSA Foundation, designating the gift for the Geoarchaeology Division Fund.

GEOARCHAEOLOGY: AN INTERNATIONAL JOURNAL

Geoarchaeology has news! Our impact factor is again on the rise. The number of submissions continues to increase and the impact factor has substantially increased over the past 10 years reflecting growth in the discipline and enhanced prestige of the journal. The current IP is at 1.882 and climbing thanks to the quality manuscripts received and the prompt and generous time and efforts of our peer reviewers. The interdisciplinary journal continues to be published six times per year without any page charges to the authors. The journal presents the results of original research at the methodological and theoretical interface between archaeology and the geosciences. The most recent 2019 issue is a special issue based on the DIG (Developing International Geoarchaeology) conference guest edited by Lisa-Marie Shillito, John Blong, Alicia Sawyer, and Helen Mackay.

The journal is now over 40 years old, established in 1986 and published by Wiley, it remains the premier peer-reviewed publication emphasizing our discipline. We invite you to submit your research to Geoarchaeology. There are three submission categories: research articles, short contributions, and review papers. Manuscripts should examine the interrelationship between archaeology and the various disciplines within Quaternary science and the Earth Sciences more generally, including, for example: geology, geography, geomorphology, pedology, climatology, oceanography, geochemistry, geochronology, and geophysics. Because the journal is international, authors should present their research within a large scholarly context such that results are of global significance. Manuscripts reporting on research conducted in the Americas, Africa, Asia, Australia and Polynesia are especially encouraged. Manuscript submission and review is fully electronic and processed through Manuscript Central, a web-based program for managing documents in the peer-review process. Manuscripts accepted for publication are processed rapidly and appear on-line in Early View on the Journal’s website.

The journal is co-edited by Sarah C. Sherwood and Kevin Walsh who are assisted by a board of expert Associate Editors. At the start of 2019, after 12 years of exemplary service, Co-editor Jamie Woodward stepped down and was replaced by Kevin Walsh. Dr. Walsh directs the MA in Landscape Archaeology at the University of York. His research is situated within the northern Mediterranean and the Alps focuses on early to middle Holocene (Mesolithic to the Bronze Age) considering the human interaction with, and impacts on the environment, and responses to environmental change. This is a nice contrast to Sherwood who’s research focuses on anthropogenic sediments in the context of cave and rockshelter sites, tells, and earthen monument construction. Her research is primarily situated in southeastern North America but also includes Eastern Europe and most recently Oceania. The journal wishes to recognize Dr. Woodward who, along with past editor Gary Huckleberry, grew the journal through their dedication to excellence which has enhanced its profile and quality. We are grateful for their hard work and continued commitment to our discipline.

For more information, contact: Sarah C. Sherwood (sherwood@sewanee.edu) or Kevin York (kevin.walsh@york.ac.uk).

Journal Website & Submission Guidelines:
https://onlinelibrary.wiley.com/journal/15206548
DIVISION OFFICERS

Past Chair
Cynthia Fadem
Associate Professor of Geology
Earlham College
fademcy@earlham.edu

Cynthia is a college professor and consultant with experience in the US West, Tanzania, Armenia, and Croatia. She is Chair of the Earlham College Archaeology and 3-2 Engineering Programs, and faculty member in the Geology, Museum Studies, Environmental Science, Environmental Sustainability, & Sustainable Agriculture Programs. She is current Chair of the SAA Geoarchaeology Awards Committee and Past Chair and Webmaster of the GSA Geoarchaeology Division. Cynthia studies primarily soils, stable isotopes, geomorphology, and geochemistry of archaeological materials toward reconstructing past environments and understanding site taphonomy. She also studies lithic and ceramic artifacts and their provenance.

Chair
Richard K. Dunn
Professor of Geology
Norwich University
rdunn@norwich.edu

Richard Dunn received his BS in Geology and BA in Anthropology from the University of Minnesota, Duluth (’87), MS in Geology from Wichita State University (’90), and PhD in Geology from the University of Delaware (’98). He was the 1996-97 and 97-98 Geoarchaeology Fellow at the Wiener Laboratory of the American School of Classical Studies in Athens. Currently, he is Professor and Chair of Earth and Environmental Sciences at Norwich University, Vermont. His research follows three paths: 1) field mapping of surficial geology for the Vermont Geological Survey; 2) sedimentology and stratigraphy of glacial deposits; and 3) geoarchaeology, mostly involving landscape reconstruction at coastal and fluvial sites, with work in Greece, Israel, Cyprus, Portugal, Belize, and Easter Island. He has been a member of GSA since 1988 and has served the Geoarchaeology Division twice in the role of JTCP member, as the Vice-Chair, and currently as Division Chair.

Vice-Chair
Laura Murphy
Assistant Professor of Anthropology
Washburn University
laura.murphy@washburn.edu

Laura received her PhD in 2015 from the University of Kansas where she studied geoarchaeology; her particular interest is in the Quaternary paleoenvironments of the Great Plains. Her involvement in the Geoarchaeology Division began in 2005 as an undergraduate student at Ohio State. Since then, she has worked to promote the division through the website and social media pages. As Vice Chair, she has been working on developing strategies to increase division membership, retention, and diversity, especially at the student level, and to foster affordable opportunities for geoarchaeology field trips at annual and regional meetings. Contact her if you wish to get involved at any level of the division!

Incoming Vice-Chair
Sam Krause
Lecturer
Texas State University
sam.m.krause@gmail.com
Dr. Sam Krause is a soil geomorphologist/geoarchaeologist and a lecturer at Texas State University. Her research focuses on anthropogenic impacts on soils and wetlands over time, how these impacts can be quantified, and how the environmental history of these systems could inform society’s ongoing use of soils and wetlands today. Sam spent many years working as a CRM archaeologist in the private sector in New Mexico, Arizona, and Texas. Her current research focus is in central and northwestern Belize and she is hoping to begin some new projects in New Mexico and in the hill country of Texas, so stay tuned! She is one of the editors for the Geoarchaeology Division newsletter, so please send her any updates you may have, and is delighted to serve the Division as vice chair, beginning September 10th. Aside from researching soil and water, some of her interests are hiking, rock climbing, and comics. You can follow her on twitter @Samanthosaurus.

Judson Finley is associate professor of anthropology and director of the anthropology program at Utah State University. He earned his PhD in anthropology from Washington State University in 2008. Judson’s recent research uses geoarchaeological methods to explore the Fremont foraging-farming transition in eastern Utah’s Uinta Basin. He has served as Geoarchaeology Division Secretary-Treasurer since 2015 and was editor of the division newsletter from 2012-2015. Judson is committed to continuity in division leadership.

Justin Holcomb is a current PhD Candidate of Anthropological Archaeology at Boston University. He studies the geoarchaeology of the Pleistocene peopling of the Americas and the Aegean Basin. He just finished a two-year Predoctoral Research Fellowship at the Malcolm H. Wiener Laboratory for Archaeological Science in Athens, Greece, where he conducted research on the Palaeolithic site of Stelida on the island of Naxos – the earliest hominin occupation in the Greek Islands. He is also the Project Geoarchaeologist at the University of Oregon’s Museum of Natural and Cultural History’s Archaeological Field School at the Connley Caves – a stratified late Pleistocene/early Holocene Western Stemmed Tradition occupation. In his free time, Justin enjoys brewing beer, reading fantasy books, and rock climbing.

2019 Division Election

As of September 10th the new elected officers are:

- **Past Chair**: Richard Dunn
- **Chair**: Laura Murphy
- **Vice-Chair**: Samantha Krause
- **Secretary-Treasurer**: Judson Finley
- **Student Representative Ex-Officio**: Rebecca Taorimina
NOTES FROM THE FIELD

STUDENT AND FACULTY NEWS

This summer, Justin Holcomb (Boston University) engaged in two research projects targeting human dispersal in the Pleistocene. On the island of Naxos, Greece, he worked as a Project Geoarchaeologist and Assistant Director of the Stelida Naxos Archaeological Project (SNAP), directed by Dr. Tristan Carter (McMaster University). Here, he is constructing a multiscalar geoarchaeological framework of Quaternary deposits spanning 200,000 kya and is pinpointing the initial entrance of hominins into the Aegean Basin. He also served as a Project Geoarchaeologist for the University of Oregon Museum of Natural and Cultural History's Archaeological Field School at the Connelly Caves directed by Dr. Dennis Jenkins. Here, he helped teach undergraduate students geoarchaeological field method and theory as the team excavated a late Pleistocene to early Holocene occupation associated with the Western Stemmed Tradition. At this site, Justin is studying the local Pluvial lake-level fluctuations and their role in constraining and/or facilitating both human occupation and archaeological site formation at the regional and site-specific scales. These studies will serve as key contributions to his dissertation research within the Department of Anthropology at Boston University.

Dr. Cynthia Fadem (Earlham College) and the UNCG Olduvai Gorge Paleoanthropology Field School (running every summer since 2014 as part of The Olduvai Paleoanthropology & Paleoecology Project (TOPPP) https://studyabroad.uncg.edu/index.cfm?FuseAction=Programs.ViewProgramAngular&id=10647), had another successful summer! Dr. Fadem and students are part of ongoing work at a very rich archaeological site with two bone taphonomy analogues and multiple potential toolstone sources. At Bell’s Korongo East (BKE), a middle Bed II site on the south side of the Side Gorge, Dr. Fadem and her students moved active excavation due to the highly erodible site sediment. The fossil-rich fluvial sands presented fruitful digging for field school students and exciting sed/strat work for her student research assistant. At Olduvai Transect 1 (OT1, an open Serengeti Plain environment) and Olduvai Transect 2 (OT2, a similar area with standing water in the wet season and abundant tree canopy shelter), they collected bones and mapped elevation and landscape features. By comparing bone distribution, weathering, and landscape variation in environments similar to those of Olduvai’s archaeological sites, they are hoping to elucidate the fundamental principles of Olduvai taphonomy. They are also sampling and analyzing potential quartz toolstone sources throughout the Olduvai Gorge region. By cataloguing the geochemical diversity of the outcrops, they aim to build a database for sourcing archaeological quartz assemblages. Needless to say, all of the exciting research, cataloguing, and analysis is keeping the team very busy, so Dr. Fadem heartily encourages applications to the field school! Graduate and continuing education students are welcome in addition to undergraduates.

Jedidiah Dale (University of Texas at Austin) spent the summer working in Northwestern Belize investigating both the ancient and modern environment as part of his Master’s research. Along with Dr. Timothy Beach and Dr. Sheryl Luzzadder-Beach, collaborators from the Maya Research Program (UT Tyler), and local communities, his team collected new lake cores to assess ancient Maya environmental impacts. He also successfully deployed two new pieces of equipment, an Acoustic Doppler Current Profiler (ADCP) and side scan sonar, to study the modern geomorphology of the Rio Bravo and help understand its potential influence on past inhabitants. This included interesting insights into the role of woody debris in tropical rivers. Jed is now looking forward to a year of data analysis and lab work!

FEATURED RESEARCH

Geoarchaeological Investigations at Rano Raraku, Easter Island

Richard Dunn
Department of Earth and Environmental Sciences
Norwich University
rdunn@norwich.edu

Ecocide, the concept that the magnitude and rate of human activity proceeds at a pace that outstrips the natural resources of the environment and leads to social degradation, is a term that has been applied to the eastern Pacific island of Rapa Nui, or Easter Island. The island was settled by Polynesians ca. 900 to 1000 AD who found a palm-dominated forested environment that supported their tree harvesting and various gardening efforts. At a unique volcanic complex, Rano Raraku, stone that was relatively easy to work enabled the production of more than ~1000 megalithic moai statues. However, by the time of European arrival in the early 18th century, the island was deforested, the population significantly reduced,
and social structure in flux. Presumably the social transformation is linked to the environmental degradation, but debate continues over the timing, causation, and full natural and social effects of island-wide deforestation. For example, various workers have suggested that deforestation was primarily driven by humans and their various needs for trees, or by the proliferation of rats that ate palm nuts, or by the reduction in freshwater due to changing climate. Our own studies have focused on the geological, geomorphological, and ecological conditions and their change at the site of Rano Raraku, the location of the ancient moai quarries, and the human-landscape interaction here.

Over the past three decades the Easter Island Statue Project (EISP), directed by Dr. Jo Anne Van Tilburg of UCLA and Cristian Arévalo Pakarati of Rapa Nui, has conducted surveys, excavation, and geological work across the basin of the eroded volcanic landform known as Rano Raraku. We have collected sedimentological, stratigraphic, geochemical, macro and microbotanical, micromorphological, and chronological data that enable us to reconstruct environmental conditions in the basin throughout its active use. Easter Island is a 164 km² triangular-shaped late Pleistocene eruptive center located in the eastern Pacific at 27°9' S lat., 109°, and 26’ W long., east of the East Pacific Rise and on the Easter Seamount Chain. It is composed of three amalgamated basaltic shield volcanoes, Rano Kau (west corner), Poike (east corner) and Ma’unga terevaka (north corner) that are in various stages of erosional reduction.

Rano Raraku is found near Poike and stands 50 to 115 meters above the surrounding basaltic plain and is semi-circular in shape and approximately 800 x 1000 m across. The interior consists of steep slopes that define a central basin containing a freshwater lake that is one of only two permanent freshwater sources on the island. The landform has been incorrectly identified as a volcanic cone, but mapping reveals that it is a collapse basin formed on what remains of the flank of a deeply eroded volcanic complex built of phreatomagmatic lapilli tuff. What has been described as an ash mantling the feature’s rim is in fact a complex modern soil and paleosol developed in the tuff.

The exposed, consolidated tuff is nearly completely modified by quarry activity (Figure 1). Our cores near the base and downslope of the quarry area reveal the three-dimensional topography of the erosion surface produced during quarrying and deforestation of the steep interior slopes. This topography consists of relatively deep gullies separated by broad interfluvies. The paleo-surface is buried by colluvium that was produced during deforestation and subsequent downslope re-working of the thick soil, and from the large volume of fine-grained sediment produced during moai production. Artifacts, including stone tools, are found on the paleo-surface (Figure 1), indicating quarry work was associated with the erosion period. The extent of erosion and subsequent burial is astonishing, with nearly six meters of sediment in local depocenters (Cover photo and Figure 2) and only a very small watershed from which to derive material. Moai, which our excavations show were inset into bedrock cuttings, were deeply buried, producing the iconic image of “heads on the slope”.

From our excavation profiles we have collected data that enable us to reconstruct the nature and history of land use in Rano Raraku. This included extensive mixed-crop gardening that was coeval with and distributed among moai production areas. Quarry activity persisted into the 16th century while use of the quarry area under study appears to have ended before the late 18th century. Rano Raraku’s soil and immediate water supply provided islanders with a uniquely rich and highly local production center of foodstuffs. Details of our results and their social implications are discussed in Sherwood et al., forthcoming in the Journal of Archaeological Science. Data from Rano Raraku reveal that land use and the resulting environmental degradation on the island, and its impact on social structure, was complex spatially and temporally and more nuanced than the ecocide model might suggest, with moai production and sustainable gardening continuing late into pre-European history.
Figure 1. This photo of the inner slope of Rano Raraku shows the south end of the lake and the lapilli tuff bedrock of upper slopes. Natural fractures in the bedrock have been exploited in quarrying of moai. A thick colluvial apron mantles the lower slope. Excavation site of moai 156 and 157 lies at the transition from exposed bedrock to colluvium. Inset image shows ~420 cm of deposits recovered from the colluvial apron by hand-auger. From this and several other cores we have established that the stratigraphy below the quarry area consists of a thick paleosol on tuff that is truncated by an extensive erosion surface which is traceable through all cores and that is overlain by colluvium containing quarry tools.

Figure 2. This excavation profile at moai 156, shown to the depth of 4.2 m below surface but eventually extending nearly 6 meters, was sampled for macro and microfossils, soil micromorphology, geochemistry and geochronology. The presence of sweet potato, banana, and mulberry indicates a mixed-crop production located among the moai. Image from EISP/Jo Anne Van Tilburg.