

Rano Raraku Interior Quarry Digital Mapping Project, Phase 4, Easter Island (Rapa Nui), Chile

Introduction:

The Rano Raraku Interior Quarry Digital Mapping Project, Phase 4, is the last field season required to complete mapping of Sections C and D of Rano Raraku, the main source for 95% of all monolithic statues on Easter Island (Rapa Nui). The raw survey data we have collected to date describe, in addition to each statue's location, size, shape, and design detail, topographical contours and archaeological features including lava flows (papa), quarries, carving canals, transport canals, standing and fallen statues on the slopes, and rock art. Supporting data include a full digital image record for each statue and each quarry, a metric record, an excavation history record, and a stone surface condition report.

The direct result of this field project will be a GPS map that links our records to existing exterior quarry map records and upgrades them, establishes our mapping grid for the island and, finally, acts as the organizing strategy for the interactive presentation of all EISP island-wide survey data, statue type divisions, conservation information, and historic and ethnographic evidence. Our research purpose is to create a body of objective information that, when analyzed in a manner described more fully below, enables the recognition of patterns illustrating political divisions and shared cultural norms. The central significance of this research is that it allows the reconstruction of the Rapa Nui human population as a component of interwoven ecological, political, and esoteric systems. It combines analytical tools with social theory to contribute a unique perspective on island change models vis a vis the human dimension of global change models.

Qualifications:

I am a trained archaeologist with a specialty in iconography. From 1986 to 1996 I was an Advisor to the UCLA Rock Art Archive at the Cotsen Institute of Archaeology and, in 1997, assumed the directorship of the Archive. In that capacity, I am collaborating with the California Digital Library to place our extensive iconographic collections on the Internet, and so have a good knowledge of information dissemination in that medium. I have a long-standing commitment to archaeological site and object conservation expressed, in part, through my 2005 appointment to the US National Landmarks Commission. In 2001, the UCLA Rock Art Archive received the California Governor's Award for Historic Preservation based on an extensive rock art field recording project conducted under my direct supervision. In both my rock art and EISP work I have demonstrated that I am a forward-looking planner with long-term research and conservation goals.

I have actively expanded and improved my EISP project over time, cooperating with the UCLA Experiential Technologies Center and the Getty Conservation Institute to implement an innovative strategy to update, standardize, and increase the interactive capability of our unique database. From 1987 to 1991, I expanded my Rapa Nui research to other parts of East Polynesia and created a comparative database that includes stone sculpture in the Marquesas Islands, the Austral Islands, and the Republic of Belau, Micronesia.

Through my work with EISP I have established an inclusive professional relationship with Chilean public agencies and the Rapa Nui community. I have actively cooperated through shared resources and information with the Rapa Nui Municipalidad (municipal government); CONADI (the indigenous development agency); the Chilean National Parks service (CONAF), and the Consejo de Monumentos Rapa Nui.

I have strong ethnographic contacts on Rapa Nui, and work with a native Rapa Nui graphic artist whose family has played a recognized and honored role in historic and ethnographic research since 1914. He began work with EISP as a field assistant in 1989, and in 2000 attained the position of EISP co-director. As such, he is joint author of numerous EISP reports, monographs, and articles. He has produced over 3,000 finished drawings of monolithic sculpture and traveled to museums in the US, Chile, and the UK. His drawings illustrate all EISP publications and offer an archaeologically consistent view of the statues. In terms of logistics, EISP has a field office on the island and an ad hoc, resident participant field team. Importantly, I have an adopted Rapa Nui family, members of which have lived, worked, and attended school while living in our California home and who support our EISP teams in the field. I have a strong, supportive base at The Cotsen Institute of Archaeology at UCLA. Our EISP database is stored on three computers, two of which are at the UCLA Rock Art Archive and under the supervision of a full-time database manager. She is a graduate of UCLA and has 2 field seasons of survey experience on Rapa Nui. A copy of the database is in our Rapa Nui field office, where it serves as a look-up resource for the EISP co-director. The link between our offices is managed by our Image Catalog Editor, who is a part-time EISP employee and a UCLA undergraduate. This year he will join us on his first field season on Rapa Nui. We have received a commitment from the Cotsen Institute of Archaeology at UCLA for publication of the research findings that grow out of this proposal.

I am a previous (1989) National Geographic grantee in good standing for the EISP project. My concern for public education and my outreach efforts via public speaking, radio, commercial publication, and television are extensive. I have consulted with National Geographic Society magazine (see below), and participated in virtually all important PBS and BBC archaeological programs dealing with Rapa Nui, including Nova (twice), as well as documentaries on The History Channel, The Learning Channel, The Discovery Channel and others. Most recently, I was an on-site, invited guest with Matt Lauer on the Today Show during the world's first international broadcast from Rapa Nui. Their audience is 8.5 million. In short, as Principal Investigator of this proposal I am professionally qualified, well-established in the Rapa Nui community, well-linked to Chilean conservation and governmental agencies, well-supported by my UCLA home institution, and have an extensive public outreach on behalf of Rapa Nui history, statue and site conservation, and archaeology.

Project Description:

Statement of Purpose: The Easter Island Statue Project (EISP) is an archaeological inventory established in 1982 and designed to locate and document every monolithic stone sculpture (moai) on Rapa Nui (XXXXXXXXX 1986, 1987, 1988). Our purpose is to amass large quantities of objective data in standardized ways, and to employ data analysis strategies that enable recognition of principle motif patterns, define the design canon, and reveal cultural norms (XXXXXXXXX 2001, 2006a). It is a stand-alone project with a good published record of international cooperation (cf. XXXXXXXXXXX and Vargas C. 1998).

Status of Project: The EISP inventory has yielded over 10,000 database records on 887 moai on 210 sites (of an estimated total of 310 moai sites within 4 of 10 site types) within 35 archaeological quadrangles and in 15 museums throughout the world (XXXXXXXXX 2006b, XXXXXXXXXXX et al. 2006).

We have digitized all topographical information contained within Rano Raraku quarry and in each of

20 (of the 35, above) 3 x 2.5 km quadrangles published as part of the original University of Chile survey (Cristino F. et al. 1981). These quadrangle maps contain site numbers but lack site descriptions. We have localized all of these numbered sites on our digital versions of the quadrangle maps. We have been engaged throughout this project with the University of Chile investigators who produced the 1981 maps to enter their available non-statue site descriptions into the EISP record. Methodological Issues: Major concerns on Rapa Nui are the lack of chronological control and the (presumed) contemporaneity of extensive surface remains; the limited to non-existent middens; the accumulation of successive remains over time as reflected in multiple recycling of building components; extensive disturbance of surface remains clouding the distributional patterns of surface relationships, and a complex juxtaposed, interrelated, and superimposed surface stratigraphy. The EISP database is designed to address all of these variables.

Validated Research Assumptions: The original assumptions of EISP have been validated by the work of this project. That is, that discrete statue design attributes of form and style may be objectively described. Secondly, that clusters of these attributes will describe statue types. Thirdly, that the greatest number of statues will be located in relation to the largest and most important lineage centers, and that specific morphological and stylistic attributes will be associated with the statues on these centers. Refinement of statue type categories and review of site associations is currently in process. It is anticipated that a more fully integrated, island-wide corpus of site data with greater research potential will result from the field project and collaboration described here.

Current Research Assumptions: Firstly, we assume that statue style sequence will relate to ceremonial architecture type and chronology at 12 major lineage centers (cf Ayres 1973, Stevenson 1986, Martinsson-Wallin 1994,). Secondly, that statue types and type sequences on those 12 major centers will differ according to the ethnographic delineation of discrete, island-wide east and west political divisions. Finally, that statue types within these divisions will correlate with statue types within a geographic east/west division we have discovered and are mapping in the interior of Rano Raraku quarry.

Mapping Problems: Maps and images created by Chilean governmental agencies over three decades were reviewed to create the most recently published map of Rano Raraku (Cristino F. and Vargas C. 1980; Cristino F. et al 1981). A key base document was the plan by Lt. D.R. Ritchie of the Mana Expedition to Easter Island (Routledge 1919, fig. 44; XXXXXXXXXX 2003:166-69). Five archaeological zones were created in Rano Raraku in 1981: interior and exterior slopes, interior and exterior quarries, and upper quarries (Cristino F. and Vargas C. 1981). The 396 statues recorded were numbered, measurements were taken, an attribute list was created, and a preliminary typological strategy was devised. Two interior quarry zones, designated C and D, were outlined but not mapped (ibid).

Clear (agreed-upon) definitions for "site" and "feature" identification in the survey maps published to 1981 has always been a problem, as is the lack of consistency in the derivation and use of such definitions in general. We have made methodological decisions and constructed definitions, elements, and parameters for "sites," "features," and "objects." We have standardized data entry methods and the digitization of analog sources into a uniform format. We have digitized EISP metric database files, image catalog files, and 1,000 non-EISP archival images of historic excavations and ethnographic activities related to the statues. Working with the Experiential Technologies Center, UCLA, we have devised a method for data exchange and presentation through a multiuser interface that is flexible, cohesive, intuitive, and dynamic. We have the ability to execute certain types of scientific queries dealing with statistical, spatial, and visual analyses, and to support publication and data distribution in several types of media.

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EISP Mapping Work, 2002-2005: Surveying was accomplished in 2002 and 2003 by J. XXXXXXXXXX, C. Arevalo Pakarati and Dr. P. Boniface (Boniface and XXXXXXXXXX 2002). We were supported by our team of UCLA Rock Art Archive staff, volunteers and Rapa Nui resident participants. We placed our survey on geodetic station "Easter Island Laser Station - JPL 4008-S"(GPS datum WGS 84 and UTM projection zone 12), approximately 10 km west of Rano Raraku and established in 1992. This is the same projection used for the island-wide survey maps published to date (Cristino F. et al. 1981). We established four base stations in Rano Raraku on the south side of the volcano. The positions of statues in Areas C and D were surveyed to centimeter level accuracy using a borrowed Thales Promark 2 GPS mapping system with two Ashtec single frequency satellite receivers to gain latitude, longitude, and elevation above sea level. The attitude of the statues was also recorded: the direction in which the statues faced; the forward slope, and the sideways/lateral slope. The exact position, total length, total height above ground, compass orientation, tilt, and circumference of every statue standing or lying on the slopes of both the interior and the exterior of the volcano were also recorded. Statue stone surface condition reports were completed on every one of the statues in the interior and on all of those implanted or lying on the exterior slopes. Digital and standard video and photography, sketches, and measurements were accomplished. In 2004, Matthew Bates (California Polytechnic University, Pomona) joined us as project surveyor. We used borrowed Trimble 5700 equipment. Our major emphasis was the collection of additional mapping points that would allow the further exposition of design details on selected statues and quarries. GPS points were downloaded and imported to a Microstation design file. The pace of work was approximately 300 survey points collected per day for a total of 2200 points collected in Sections C and D. In 2005 XXXXXXXXXX and Arevalo Pakarati conducted two map check field seasons to amplify and clarify the first drafted version of the map accomplished by Alice Hom. A sixth zone of Rano Raraku was defined. Preliminary copies of our map were provided at that time to all relevant Chilean public agencies. Methods, Tools and Techniques: In 2006, new, state-of-the-art GPS survey equipment was donated by Trimble to EISP. Using this equipment, we anticipate that completion of the collection, processing, and evaluation of survey points in Rano Raraku will take two weeks. We will then move on to selected statue sites in the unsurveyed areas outside of Rano Raraku, including but not limited to those directly relevant to our hypotheses above. We will collect sufficient points to localize these sites and to place the entire, island-wide survey on our own Rano Raraku grid. Newly mapped features will be identified by a numeric trinomial encoding the quadrangle number, the site number, and the feature number (assigned sequentially), and the attributes of each feature will be described by means of differential characteristic codes. These identifications usefully coordinate with those previously established and widely used by other investigators. We will construct topological tables for survey points, arc and polygons in each mapped quadrangle and zone, interface all of our new survey data with our established databases, and employ GIS mapping and data management strategies using ESRI ARC/INFO and ArcView as analytical tools. Included in these data tables are observations on statue stone surface condition. Standardized with the help of Leslie Rainer of the Getty Conservation Institute (GCI), these observations will be made directly available to Chilean conservation agencies through our collaboration with the Chilean National Parks (CONAF et al. 2001) the Centro Nacional de Conservacion (Bahamondez P. 1990; Bahamondez P. and Vanelzuela 2005).

Anticipated Outcome of Field Work: The results of the EISP Rano Raraku survey for which this proposal seeks partial funding, including all data describing the statues, will be published by The Cotsen Institute of Archaeology at UCLA, 2007-8.

The Historical Anthropology Model on Rapa Nui: We intend to pursue semiotic, spatial, and other analyses to address research questions dealing with the statues and statue types in the context of ecological, geographic, economic, and social queries. What is the use of ethnography and how valid is the historical anthropology model on Rapa Nui? What is the significance of the statue typology

and how can it be applied to survey data interpretation? We will test our concept of statues and statue types vis a vis ceremonial sites and east/west political divisions and, as well, recently stated hypotheses that "intermediate" statues were geographically related to ethnographically suggested lineage divisions (Shepardson 2005; Lipo and Hunt 2005). Concurrent studies into iconography and the geochemical analysis of statue material are also underway (XXXXXXXXXX 2006a; Meighan et al. 2003). The small corpus of statues (5% of the total) that were carved of non-Rano Raraku material contain several statues for which a wide range of ethnographic data are known but have not been validated. The validity of these data for understanding statue function in proto-historic and historic time is substantial.

If the EISP database can be expanded and implemented to control or exclude sample bias and include a significant number of site types other than, and addition to, statues and ceremonial sites, the resultant ability of the database to deal with broader research queries would be greatly enhanced. The available data suggest that the majority of the prehistoric population of this 166 sq km island was living on less than 100 sq km of land. We know too little, still, of the basic family unit, site habitation distribution and the hierarchy of site use, and social organization. The EISP database, if it can become a tool of larger purpose and wider use to researchers, conservators, and others, has the potential to provide insight into, and visualization of, these and other important issues. Valuable linkage between and among researchers and research findings is currently limited but imperative on Rapa Nui. Without such linkage, and at the inexorable pace of increased land use, sites and the data they encode will inevitably be lost. The urgency of statue preservation is one of the forces that drives this EISP project. The attention paid to it by Chilean national site management and conservation agencies is a measure of its worth.