

Six Field Seasons at Arlington Springs: An Investigation of Paleoenvironmental Change on Santa Rosa Island, California

John R. Johnson¹, Thomas W. Stafford, Jr.², G. James West³, Thomas K. Rockwell⁴, and Don P. Morris⁵

¹Santa Barbara Museum of Natural History, ²University of Aarhus, Denmark, ³University of California, Davis, ⁴San Diego State University, ⁵Channel Islands National Park

ABSTRACT

Between 1994 and 2008, an interdisciplinary team conducted six field investigations at the Arlington Springs Site (CA-SRI-173). This research has clarified the chronostratigraphy at Arlington Springs in order to understand the geological and paleoenvironmental context for the earliest evidence of humans on the large Late Pleistocene island of Santarosae off the California coast. Excavations in 1994, 2000, and 2001 at the west side wall of Arlington Canyon exposed a section of sediments from the current ground surface to a depth of about twelve meters adjacent to the location where deeply buried human bones (“Arlington Springs Man”) had been discovered by Phil C. Orr in 1959. Following an experiment with ground penetrating radar in 2005, a Giddings rig was transported to the site in 2006 in order to recover ten deep sediment cores. The last period of fieldwork took place in 2008 in order to investigate the stratum where the Late Pleistocene human bones and tiny chert flakes had been discovered. At present, forty radiocarbon dates have been obtained to date the stratigraphy at Arlington Springs, documenting 16,000 years of sediment accumulation. Sediment layers have been traced through three dimensional space using the data gathered from the cores obtained in 2006.

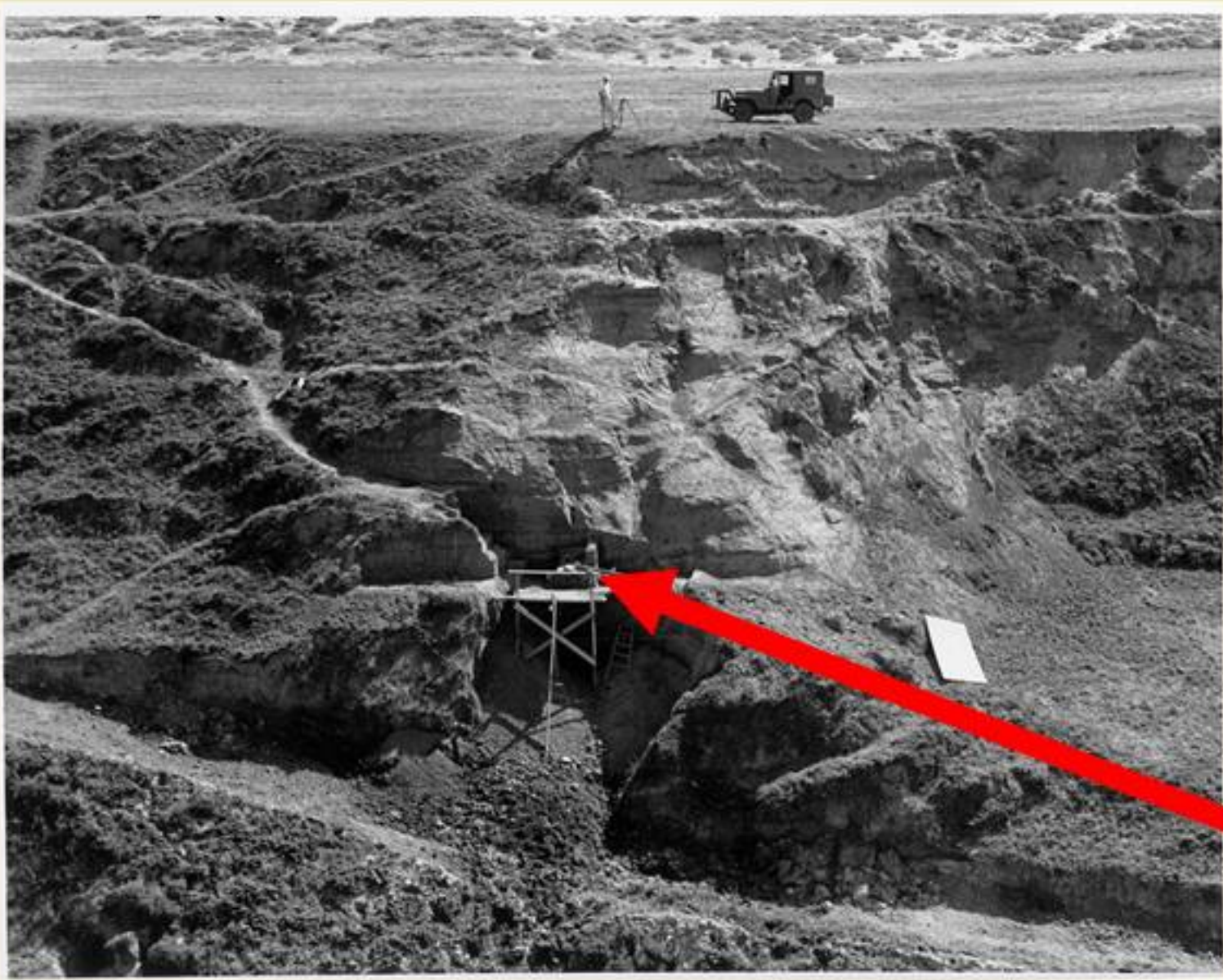


Figure 1. Location of Arlington Springs Man's skeletal remains *in situ*, buried 11.4 m (37.5 ft) below the surface.

1ST FIELD SEASON, 1994



Figure 2. Study of stratigraphic section and collection of sediment samples for analysis.

QUESTIONS PRIOR TO 2ND FIELD SEASON

- What was the exact stratigraphic position where Phil Orr discovered the human bones?
- Would ¹⁴C samples collected in the field corroborate the 13,000 B.P. age suggested by bone collagen dating (10,960 ± 80 RCYBP CAMS-16810)?
- What has been the sedimentary history of the Arlington Springs locality?
- What was the environment like on Santa Rosa Island at the end of the Pleistocene?

2ND AND 3RD FIELD SEASONS, 2000-2001



Figure 3. Test excavations to re-expose strata and initiate ¹⁴C studies.



Figure 4. Location of Arlington Springs excavation in 2001.



Figure 5. Fully exposed stratigraphic section, 2001. Sediments on Santa Rosa Island are undisturbed by bioturbation, permitting fine-scale chronostratigraphic analysis. Periods of incision and sediment aggradation appear to be correlated with sea level fluctuations..



Figure 6. Sediment layer determined to be that where the skeletal remains of Arlington Springs man were discovered in 1959, located stratigraphically beneath the bottom of the Younger Dryas Black Layer.

4TH AND 5TH FIELD SEASONS, 2005-2006

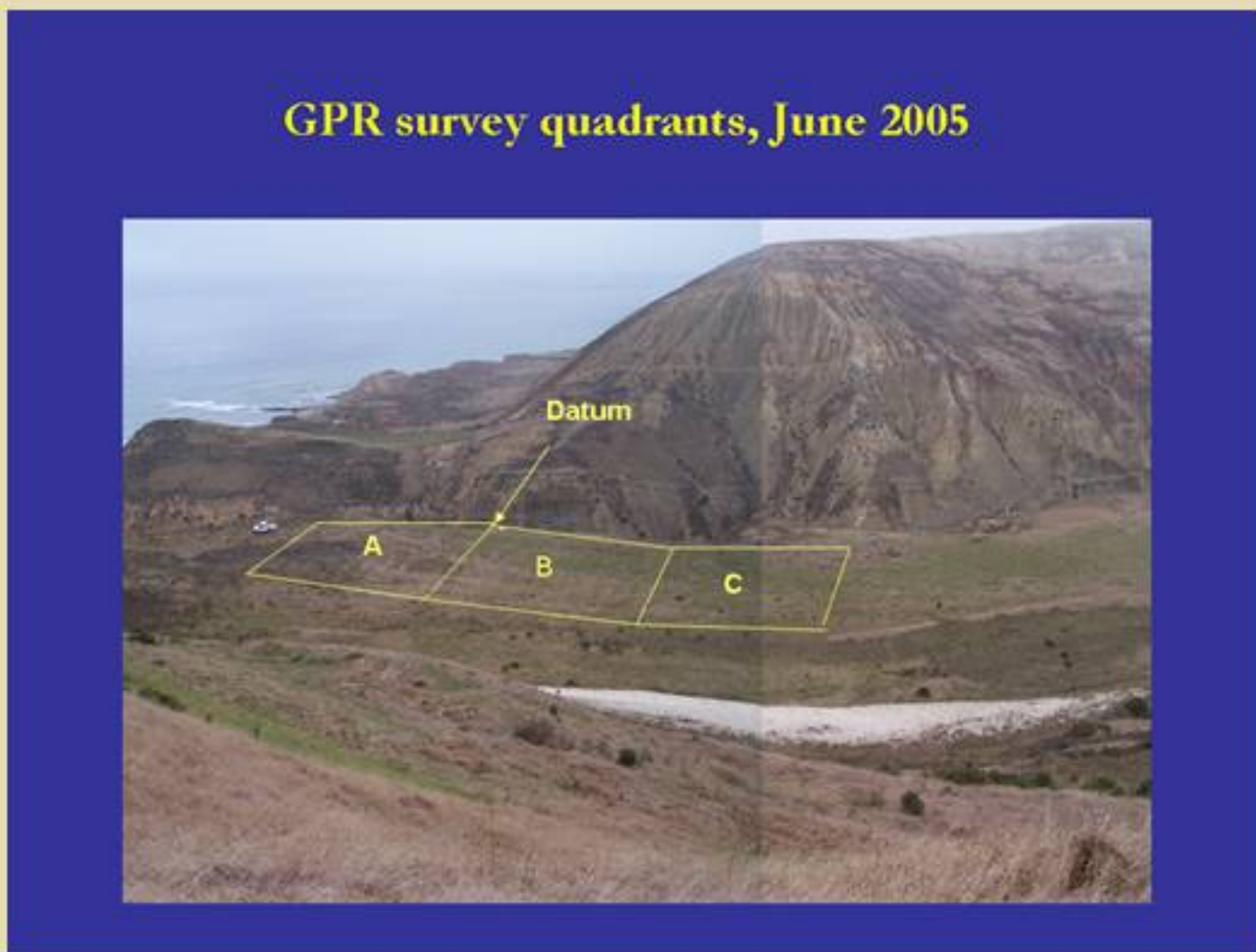


Figure 7. Ground Penetrating Radar Survey, 2005.



Figure 8. Drill rig and crew during excavation of eight deep sediment cores, 2006.

6TH FIELD SEASON, 2008



Figure 9. Volumetrically controlled sample of layer that contained remains of Arlington Springs Man.

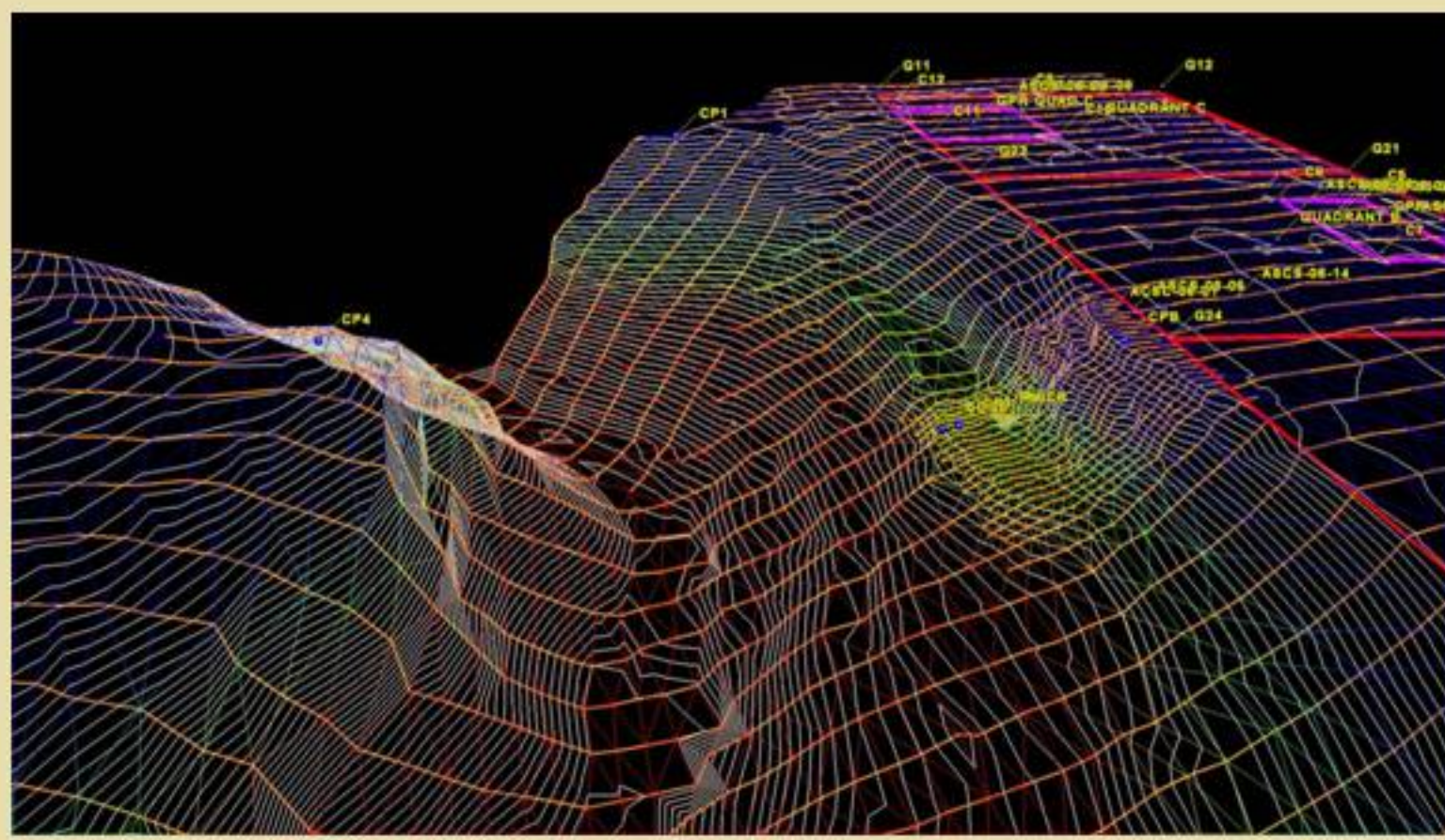


Figure 10. Half-meter contour model showing locations of six seasons of fieldwork at Arlington Springs based on LIDAR.

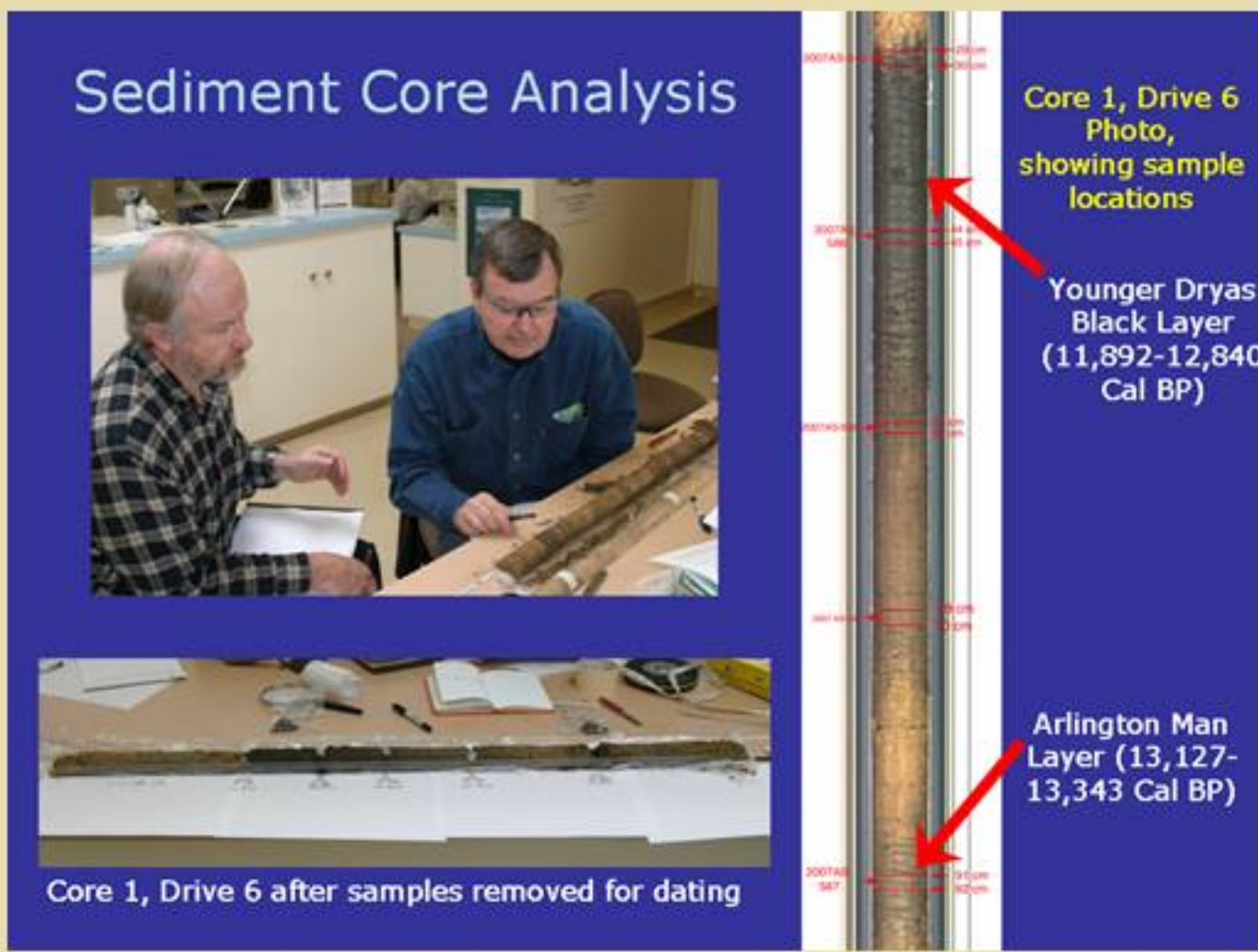
ANALYSES OF SAMPLES RECOVERED FROM SIX FIELD SEASONS



Figure 11. Microfaunal remains from Arlington Man layer, mostly extinct deer mouse, *Peromyscus mesodryites*.



Figure 12. Lithic debitage from Arlington Man stratum.



Figures 13-14. Ongoing analyses of sediment cores, include more than sixty radiocarbon determinations.

RESULTS

- Identification of the stratum of the human bone
- LIDAR laser scanning of Arlington Springs locality
- Dating and initial studies of the Younger Dryas Black Layer, 12,800 to 12,000 cal BP.
- Pollen studies that document the presence of a pine-cypress forest at the onset of the Younger Dryas.
- Dating of Arlington Man stratum to about 13,200 years ago.
- Quantitative analysis of vertebrate faunal remains in Arlington Man stratum: mostly *Peromyscus mesodryites*, but also extinct shrew (*Sorex*), salamander, and the earliest records for several land bird species.
- Discovery of chert microflakes demonstrating prehistoric cultural activity in the same stratum that contained Arlington Man's bones.
- Reconstruction of the depositional history of the Arlington Springs vicinity through radiocarbon dating combined with lithological descriptions of deep sediment cores.

SELECTED PUBLICATIONS

- Agenbroad, L. D., J. R. Johnson, D. Morris, & T. W. Stafford, Jr. 2005. Mammoths and Humans as Late Pleistocene Contemporaries on Santa Rosa Island. In: *Proceedings of the Sixth California Islands Symposium*, D. A. Garcelon and C. A. Schwenn, eds., pp. 3-7. Institute for Wildlife Studies, Arcata, CA.
- Johnson, J. R., T. W. Stafford, Jr., H. O. Ajie, & D. P. Morris. 2002. Arlington Springs Revisited. In: *Proceedings of the Fifth California Islands Symposium*, D. R. Brown, K. L. Mitchell and H. W. Chaney, eds., pp. 541-545. Santa Barbara Museum of Natural History, Santa Barbara, CA.
- Johnson, J. R., T. W. Stafford, Jr., G. J. West, & T. K. Rockwell. 2007. Before and After the Younger Dryas: Chronostratigraphic and Paleoenvironmental Research at Arlington Springs, Santa Rosa Island, California. American Geophysical Union Joint Assembly, Acapulco, 22-25 May, 2007. *Eos* 88(23), Joint Assembly Supplement Abstr. PP 42A-03. http://www.agu.org/meetings/sm07/sm07-sessions/sm07_PP42A.html.
- Kennett, D. J., J. P. Kennett, G. J. West, J. M. Eriandson, J. R. Johnson, I. L. Hendy, A. West, B. J. Culleton, T. L. Jones, & T. W. Stafford, Jr. 2008. Wildfire and Abrupt Ecosystem Disruption on California's Northern Channel Islands at the Allerød-Younger Dryas Boundary (13.0-12.9 ka). *Quaternary Science Reviews* 27:2530-2545.
- Oakley, K. P. 1963. Relative Dating of Arlington Springs Man. *Science* 141(3586):1172.
- Orr, P. C. 1962a. Arlington Springs Man. *Science* 135(3499):219.
- Orr, P. C. 1962b. The Arlington Springs Site, Santa Rosa Island, California. *American Antiquity* 27(3):417-419.
- Orr, P. C. 1968. *Prehistory of Santa Rosa Island*. Santa Barbara Museum of Natural History, Santa Barbara, CA.
- Waters, M. R. & T. W. Stafford, Jr. 2007. Redefining the Age of Clovis: Implications for the Peopling of the Americas. *Science* 315:1122-1126.

ACKNOWLEDGEMENTS

- Dagny Aslin
Katherine Bradford
Guy Cochran
Paul Collins
Ray Corbett
Danisha Figueroa
Robert Gardner
Ken Garrett
Michael Glassow
Amy Gusick
Colleen Haraden
Doug Hechter
Brian Holguin
Jeff Homburg
Jack Hunter
Karl Hutterer
Norman Johnson
Esther Kenner
Douglas Kennett
James Kennett
- Patricia Lambert
Brent Leftwich
Edward Marx
Beth McWaters-Bjorkman
Ryan Perroy
William Reitze
Michael Rondeau
Lori Santoro
Fred Schaeffer
Skye Sellers
John Southon
Sam Spaulding
Elizabeth Sutton
Ra Thea
Gilbert Unzueta
William Urschel
Phillip Walker
and
Field Crews, 1994-2008

FINANCIAL AND INSTITUTIONAL SUPPORT

- Scott Newhall
Anne G. Cotton, in memory of John Cushing
John W. Cotton
Robert Daniell, Jr., in memory of Robert Daniell, Sr.
Preston B. Hotchkis
Alexander M. Power
- Centre for GeoGenetics, Copenhagen
Channel Islands National Park
(Russ Galipeau, Ann Huston, Kelly Minas, Don Morris, Earl Whetsel, Mark Senning, among others)
Santa Barbara Museum of Natural History staff and trustees
Santa Cruz Island Foundation
National Geographic Society
Oregon State University College of Oceanic and Atmospheric Sciences

