

ARCHAEOLOGY SOUTHWEST *magazine*

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Although Preservation Archaeology begins with the active protection of archaeological sites, it doesn't end there. We utilize holistic, low-impact investigation methods in order to pursue big-picture questions about what life was like long ago. As a part of our mission to help foster advocacy and appreciation for the special places of our past, we share our discoveries with the public. This free back issue of *Archaeology Southwest Magazine* is one of many ways we connect people with the Southwest's rich past. **Enjoy!**

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Imaging the Past: Places of Meaning, Moments of Wonder

Adriel Heisey

I GREW UP IN A LAND cloaked in verdure, where time and the elements have long since softened every bold edge, so the desert's nakedness will always turn my head. Even now, after living here a quarter century, when I fly through this land laid bare by climate and natural processes, my low aerial immersion in its relentless exposure can soon overwhelm my senses. But it also can activate deep impulses.

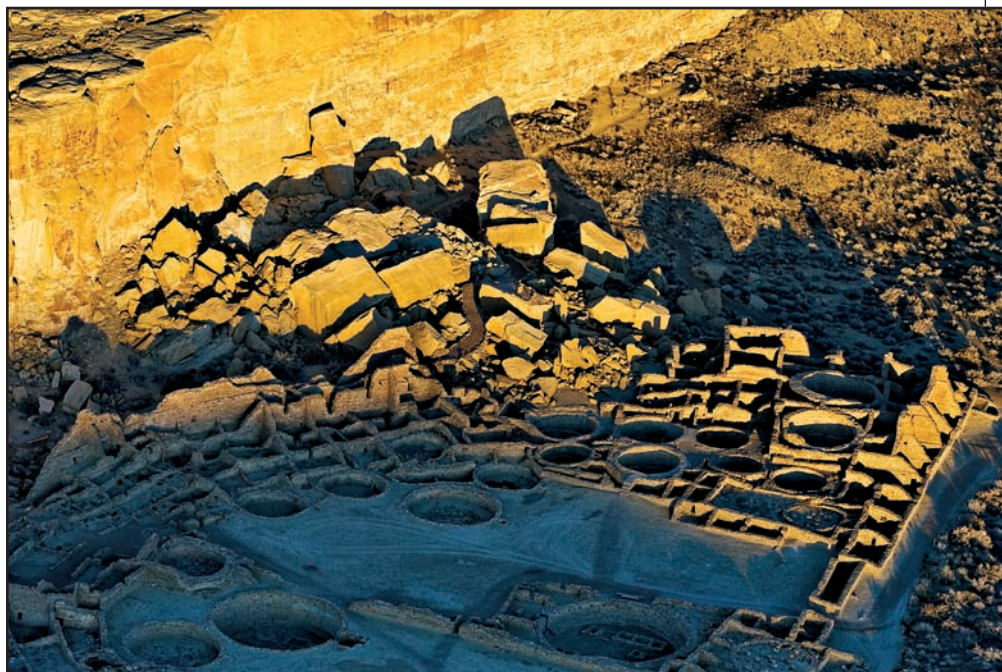
When I moved from the Cumberland Valley of Pennsylvania to the high desert of the Colorado Plateau, I was ripe for a new relationship with the land. In truth, that is why I came here. I had two tools at hand for meeting the challenge: flying and photography. The flying was occupational; I had chosen the life of a professional pilot because I wanted to be in the sky more than anything else, and routinely. The photography was for love—love of seeing and love of images. I learned it on my own, by doing it, and that makes its rewards all the sweeter.

Together, these skills brought me into an encounter with a land unlike anything my early life had prepared me for: the closest exam-

ination through a magnifying glass all the way up to the omniscient earthward gaze of satellites reveal countless stories encrypted in the surface of the desert. My low aerial explorations energized my latent passion for deciphering and interpreting these stories, and proved to be a perfect middle ground between the magnifying glass and the satellite.

Going on a flight, whether as pilot or as passenger, is a time for temporarily leaving behind pedestrian concerns and contemplating context. Even in a purely physical sense, flying is transcendence. And if one is inclined to go beyond the utilitarian, then to go aloft is truly to enter a world of wonder. I will admit this without apology: I am drawn to wonder. It is the engine of my enterprise.

To the extent that we seek transcendence—by lifestyle choices for personal longevity, by having children, by considering seventh-generation sustainability—we also confront the brevity and triviality of our own individual existence. This is not necessarily an undesirable encounter. When we feel rejuvenated after time spent, say, hiking a canyon, surely one element of our renewal is the full contact with natural systems that contain, support, and ultimately minimize the importance of our lives.



Pueblo Bonito and Threatening Rock, Chaco Canyon, New Mexico. The builders of the great house shored up the rock at its base to prevent its collapse. The pillar did not topple onto the pueblo until 1941.

©Adriel Heisey

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Top: Pottery Mound (right-center), twelve miles west of the fertile Rio Grande Valley, New Mexico. Home to a large village in the fourteenth and fifteenth centuries, the place has become so barren that the site is threatened by severe downcutting and lateral erosion of the Rio Puerco, a watercourse that was once the lifeblood of a thriving community. Bottom: Geoglyph south of Casa Grande, Arizona. Surface artifacts confirm the prehistoric age of this feature, which rests in a Sonoran Desert playa that, in turn, dates to the Pleistocene Epoch, 1.8 million to 11,000 years ago. Its purpose, creators, and exact age are unknown, but it is still watching the sky unblinkingly in the twenty-first century.

I have two reliable triggers of this at once humbling and validating experience: geology and archaeology. Geology has this effect because it is an encounter with deep time and planetary scale. There is nothing quite like the bracing gusts of sobriety that hit when we begin to glimpse our place in the scheme of things.

Archaeology does this, too, but on a much more human scale. If we were able to do a quantitative analysis of the pensive silence that descends on most non-native lay

people who visit a Chacoan great house, for example, the most common train of thought might be:

So many people must have lived here in its heyday, and yet they're gone. How old is this building? A thousand years? Will anyone a thousand years from now even know that I existed, let alone know anything about who I was?

I photograph archaeological sites from the air because both the experience and the resulting images bring torrents of thoughts like these, and more.

Coming from the sky to a place of ancient human endeavor, finding it situated in the larger landscape, bearing relationship to a broad array of landforms, landmarks, and resources—this experience touches me profoundly, as though I am meeting not only the individual, but also the extended family, clan, and tribe. As a pilot who flies every day from one contemporary community to another, crossing over countless others in between, I am only too familiar with the face of our civilization on the landscape. To know where the old places are, what they look like, and a measure of what scientific and ethnographic investigation has revealed about them, reins in the primacy of our own presence and adds precious depth to our understanding of place.

This issue's authors seek to understand and convey past, place, human life, and the complex relationships among these through images from above, beneath, and beyond. Some of these images have been created through the authors' own work, and some were created in the early days of aerial photography. Some are virtual, some are actual; some are resonant, some are static; all are, in some way, being preserved against the disintegrations we can predict.

Obviously, the landscape as we know it won't last forever, nor will archaeological ruins, nor will these images we create, nor will we. Our time scales are vastly different, but our ultimate fate is the same. Yet, if we continue to pry open the seals of our inherent ignorance with the tools native to our evolving brains, we find ever-growing webs of connection. To fly, to photograph, and to share is my way of animating the webs with wonder and coming to terms with a naked land, laden with stories.

Imaging with Ground-penetrating Radar

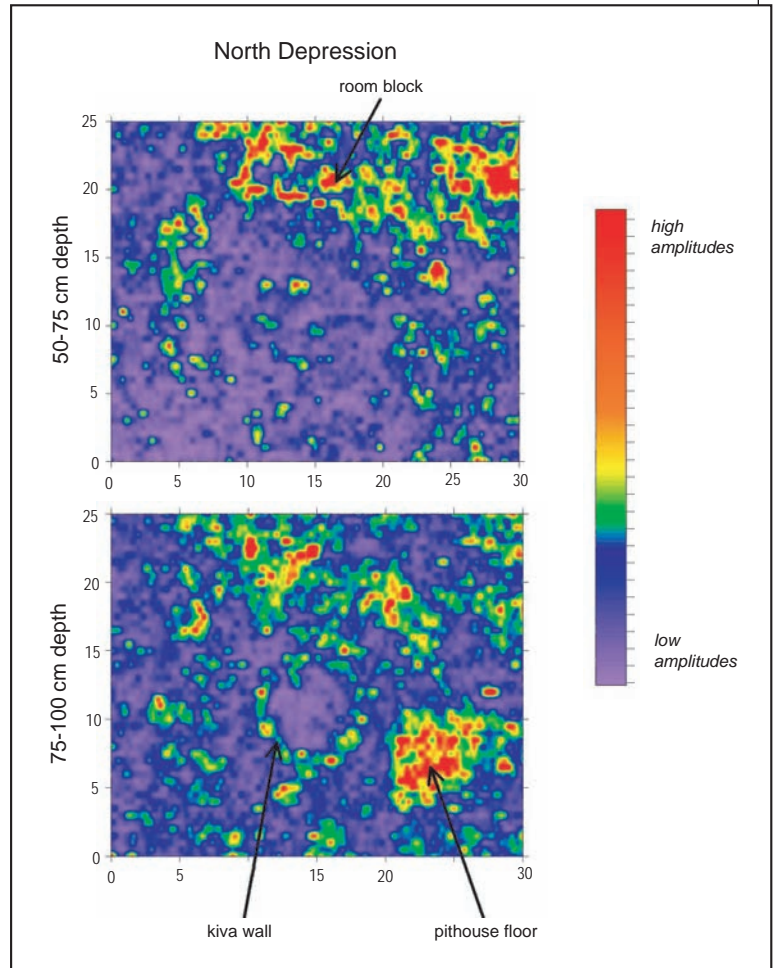
Lawrence B. Conyers, University of Denver

ARCHAEOLOGISTS WORKING in the American Southwest have long appreciated the potential of geophysics for locating, mapping, and understanding the buried cultural materials that historically have been found through surface surveys, random shovel tests, and backhoe trenching. A method called ground-penetrating radar (GPR) enables us to readily detect stone walls, stone or compacted earth foundations, and clay or compact earth floors. As such, GPR may transform the way sites are discovered, mapped, and interpreted.

GPR works by reflecting radar pulses off of buried materials and then placing them in three-dimensional space. Data are usually collected in parallel transects spaced fifty centimeters apart in grids of up to 100 by 100 meters. Reflections are processed into two-dimensional vertical profiles and plan-view maps, which produce images of the location and strength of the reflections.

Some buried features made of stone or compacted clay, such as those commonly found on the Colorado Plateau, are very reflective to radar waves. These produce high-amplitude reflections that are identifiable in two-dimensional GPR reflection profiles and in amplitude slice-maps, which are analogous to excavation levels. In the Hohokam area of southern Arizona, however, buried architecture is usually made of the same earth as its surrounding matrix, so it does not produce distinctive interfaces that can reflect radar waves. In these cases, buried architecture may be delineated as areas of no reflection or as regions where more highly reflective adobe melt layers are found adjacent to intact walls of more homogeneous adobe. Other archaeological features readily visible through GPR include baking ovens, storage cisterns, pit structures of various shapes and sizes, and irrigation canals filled with coarse sediment.

An example of GPR's interpretive power comes from my student Tiffany Osburn's study of Pueblo II (A.D. 900–1150) and Pueblo III (1150–1300) period sites at Comb Wash in southeastern Utah. Archaeologists had identified at least five circular surface depressions with associated pottery. Interpreted as great kivas, the depressions were seen as evidence of strong ties between this area and Chaco Canyon during the Pueblo II period. To test this hypothesis, we collected grids of closely spaced GPR profiles over each of the depressions, producing horizontal amplitude slice-maps. In three locations, Osburn



A horizontal amplitude slice-map from a large, circular depression at a site in Comb Wash, Utah. GPR detected the remains of a room block at 50-75 cm depth. Remains of an associated kiva and an earlier pit structure also became apparent at 75-100 cm depth.

mapped small domestic kivas with associated room blocks and earlier pit structures. These remains are consistent with individual farming households, not great kivas. The other two depressions contained no buried architecture whatsoever, and are of unknown origin. GPR mapping not only produced images of buried architecture, but also provided a noninvasive means of testing ideas about human behavior and cultural connections.

An example of GPR mapping from University Indian Ruin in east Tucson also supports its utility. The walls of this Hohokam Classic period mound were visible as areas of low reflection or no reflection. In this case, low amplitudes denoted walls that had no surface expression other than a low, broad rise.

To see an example of how GPR detected a canal, visit www.cdarc.org/asw25-3.

Oblique Views: Time and Change in Southwestern Landscapes

Linda J. Pierce, Center for Desert Archaeology

IN 2004, while collaborating with the Albuquerque Museum and Adriel Heisey on the *From Above* exhibit (see <http://www.cdarc.org/from-above>), the Center for Desert Archaeology learned that Charles and Anne Lindbergh had taken numerous aerial photographs of the northern Southwest in July 1929.

Independent historian Erik Berg explained that the newlyweds had captured the oblique aerial images of archaeological sites, contemporary settlements, and landscapes at the request of archaeologist Alfred V. Kidder, following on Charles's offer of assistance. Now known to be among the earliest aerial images of the region (see page 6), the original prints are curated at the Museum of Indian Arts and Culture (MIAC) in Santa Fe, and the original negatives are archived at the Palace of the Governors.

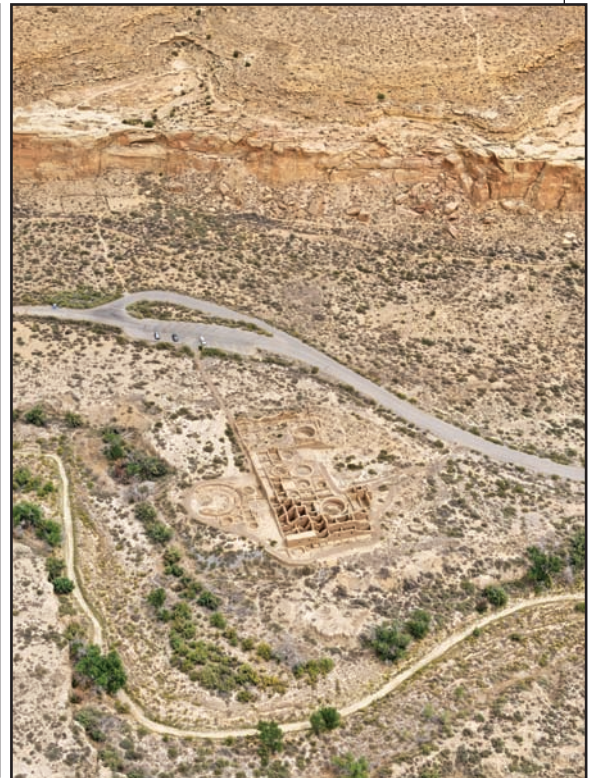
We considered including a selection of Lindbergh images in *From Above*, but soon realized that the collection had its own story to tell. We know well

enough from our own ground view that portions of this seemingly timeless landscape have changed considerably over the past near-century, but this historical bird's-eye view provides a singular opportunity to examine those changes from a fresh perspective. Moreover, the content of the images—places such as Canyon de Chelly, Chaco Canyon, and the Rio Grande and Chama valleys near Santa Fe—invites commentary from diverse and complementary perspectives. MIAC Director Shelby Tisdale and I began to explore ways to share the Lindbergh collection with the public.

We felt that rephotography, or the production and presentation of near-exact then-and-now pairs, would enable viewers to more readily perceive the changes that have occurred since the Lindberghs' flights. Adriel Heisey agreed to create the rephotographs, and he has completed fourteen pairs to date. Seven pairs are views of Canyon de Chelly and Canyon del Muerto, and seven pairs depict places in Chaco Canyon.

Meaningful rephotography projects go beyond simple comparison and contrast, however; they engage

Palace of the Governors



Adriel Heisey

Two of three images of Pueblo del Arroyo, Chaco Canyon, New Mexico (see page 5 for third image). Left, taken by the Lindberghs, July 1929 (courtesy Palace of the Governors, Museum of New Mexico, #199); right, Adriel Heisey, 2008.

viewers in a more profound consideration of change and how it is measured, and they elicit a rich range of perceptions, depending upon the knowledge each viewer brings to the image pair. By seeking and sharing commentary from Native Americans, landowners, archaeologists, and historians, among others, the Oblique Views project will convey that landscapes are cultural as well as geological, imbued with history and memory (see page 5). Complex changes in practices and relationships are manifest.

Oblique Views is still in development. It may take the form of an online exhibit, publication, physical exhibi-

tion, or all three. We look forward to its realization, and we are proud of the preservation work the project has accomplished to date (see page 6).

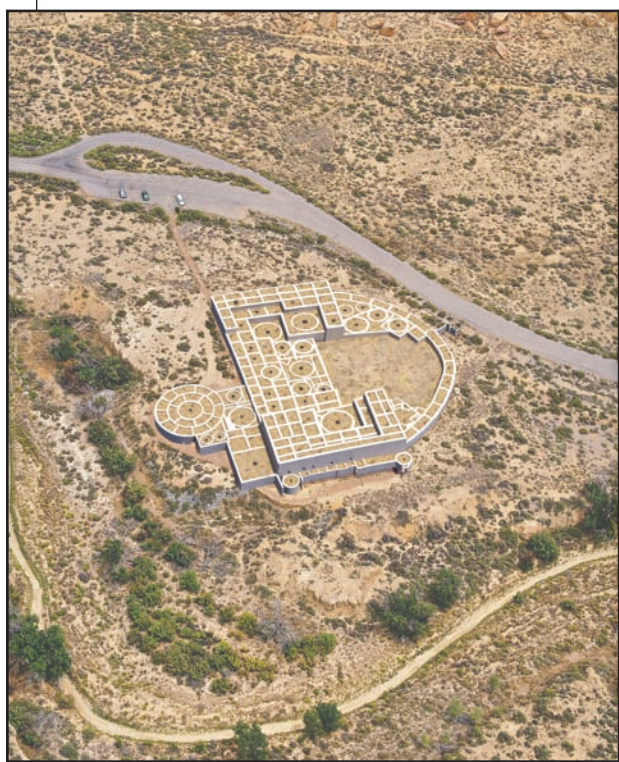
Funding for the project has been provided by William

J. Robinson, The Southwestern Foundation for Education and Historical Preservation, the Schaffner Family Foundation, and the Museum of Indian Arts and Culture.

Three Views of Chaco Canyon's Pueblo del Arroyo

R. Gwinn Vivian, Arizona State Museum (Retired)

WE ARE FORTUNATE that the Lindberghs photographed the Chacoan great house known as Pueblo del Arroyo. This image not only allows us to appreciate the uniqueness of this great house, but also provides an opportunity to reflect on changes in environmental and historic features in this small portion of Chaco Canyon just west of Pueblo Bonito.



One of three images of Pueblo del Arroyo, Chaco Canyon, New Mexico (see page 4 for other two images): Doug Gann's digital model of Pueblo del Arroyo, superimposed on Heisey's image.

For some unknown reason, Chacoan builders located Pueblo del Arroyo near the center of the canyon floor; other great houses, such as Pueblo Bonito and Chetro Kettle, were situated close to the north cliff face. And, strangely, Pueblo del Arroyo was oriented generally east–west, whereas other canyon great houses were oriented north–south. Moreover, Pueblo del Arroyo was unique in having an associated tri-walled structure. This circular building with associated rooms was a late western extension on the original structure, as Douglas Gann's digital reconstruction shows. Neil Judd (see pages 6–7) excavated a major portion of Pueblo del Arroyo, including the tri-walled structure, in the late 1920s, in conjunction with his work at Pueblo Bonito.

Remarkably, Chacoans chose this great house location despite ancestral awareness of the shifting course of Chaco Wash. The wash's potential destructiveness is apparent in the Lindbergh photograph: ongoing downcutting and bank erosion is evident, particularly to the left of the remains of the tri-walled structure. The contrast with Adriel Heisey's 2008 photograph is striking. Although there was little vegetation in the wash in 1929, dense stands of willow, cottonwood, and small groundcover now blanket most of the wash bottom; runoff is largely restricted to a narrow inner channel. Pueblo del Arroyo was built primarily following a channel-filling period in canyon prehistory.

In 1899, canyon homesteader and amateur archaeologist Richard Wetherill erected the buildings that can be seen on the southeast edge of the great house ruin mound in the Lindbergh photograph. They served as a boarding house for the Hyde Exploring Expedition's staff, guests, and occasional visitors. A wagon and early automobile road

for hauling supplies from Gallup, New Mexico, crossed Chaco Wash near the buildings.

In the early 1930s, the Hyde buildings were remodeled as the Chaco Canyon Trading Post, which served local Navajo and the small Chaco Canyon National Monument staff and their families. The "store" was on the south side of the building, and living quarters were on the north. When the trading post closed in the late 1940s, Gordon Vivian—my father—moved the National Park Service's (NPS) Ruins Stabilization Program into the store. The residential quarters became our fourth "home" in Chaco. The NPS removed the Hyde buildings in the late 1950s, along with all other "non-aboriginal" buildings in the lower canyon.

The only remaining historic feature—Chaco Canyon cemetery, burial place of Richard and Marietta Wetherill—is not distinguishable in the Lindbergh photograph. In Heisey's image, however, it is clearly defined as a fenced rectangular area at the end of a foot trail north of the parking lot.

Saving the Lindbergh Negatives

AS THE OBLIQUE VIEWS TEAM began exploring the Lindbergh collection in 2004, archivists at the Palace of the Governors shared their grave concern: the original nitrate negatives had deteriorated to the point that they might be lost completely within a decade. Flammable and highly volatile, cellulose nitrate negatives deteriorate at unpredictable rates and pose serious health and safety risks. Preservation intervention became a top priority.

The Palace welcomed the Center for Desert Archaeology's interest in helping to preserve this incomparable collection. In May 2007, Jannelle Weakly (Photographic Collections Curator, Arizona State Museum) and Linda Pierce traveled to Santa Fe to create high-resolution scans of the 198 remaining negatives. The 1600 dpi scans were done at 100 percent of size for the complete collection.

The nitrate negatives were subsequently placed in long-term frozen storage, arresting the deterioration process. Digital files were saved on two external hard drives, one of which remained at the Palace in permanent storage. The other is maintained by the Oblique Views project team. The Palace of the Governors has granted the team permission to use any of the images in the Oblique Views project.



Jannelle Weakly examines a Lindbergh negative at the Palace of the Governors.

The 1930 Aerial Survey of Prehistoric and Historic Canals in the Salt-Gila River Region

Todd W. Bostwick, Verde Valley Archaeology Center and PaleoWest Archaeology

IN THE SUMMER OF 1925, archaeologist Neil Judd of the Smithsonian Institution guided C. S. Scofield of the U.S. Department of Agriculture on a tour of archaeological sites in Chaco Canyon. Inspired, Scofield proposed a survey of the middle Gila River's ancient canals, which would soon be obliterated by modern irrigation systems being built in anticipation of the San Carlos Dam. In addition to his proposal to Judd, Scofield communicated this urgent need to Arizona Senator Carl Hayden, who had sponsored the San Carlos Dam (renamed Coolidge Dam). Scofield also approached the U.S. Geological Survey.

No action was taken, however, until the summer of 1929, when Judd and Odd Halseth, City Archaeologist at Phoenix's Pueblo Grande Museum, discussed the idea at the Pecos Conference. Judd was undoubtedly aware of Olaf Emblem and Carlos Vierra's aerial survey of Chaco Canyon the previ-

ous summer, as well as the Lindberghs' flights the previous month (see page 4).

Dissatisfied with a series of canal maps that had recently been created by former City of Phoenix engineer Omar Turney, Halseth convinced Judd that he could facilitate an aerial survey of prehistoric and historic canals in the Phoenix region. Judd received authorization from Matthew Stirling, Chief of the Bureau of American Ethnology, to visit Phoenix in September 1929 and inspect some Hohokam canals with Halseth. In his report to Stirling, Judd noted that the remains he saw were very impressive—a prehistoric canal in Mesa was reported to be sixty-six feet wide and eight feet deep—and

he recommended mapping the canals through an Army Air Service survey, followed by ground work.

After Senator Hayden exerted his influence on the War Department, two flyboys stationed at San Francis-



Left to right: Sgt. R. A. Stockwell, Lt. Edwin Bobzien, Neil Judd, and Odd Halseth pose in front of the Douglas airplane used in their 1930 aerial survey. (Courtesy of the National Anthropological Archives, Smithsonian Institution, Photo Lot 3, and Pueblo Grande Museum, City of Phoenix.)

co's Crissy Field were assigned the task in January 1930. With great fanfare in the Arizona newspapers, Judd came from Washington, D.C., to provide instructions. Pilot Lt. Edwin B. Bobzien flew systematic transects along both sides of the Salt and Gila rivers over a one-week period, and Sgt. R. A. Stockwell shot about 600 panchromatic images with an electronically driven large format Fairchild K-3 camera mounted in a hole in the floor of their Douglas O-2H observation airplane. Special filters were used to cut through the ground haze. Flying at an altitude of 10,000 feet, both men wore furlined garments and sheepskin moccasins to keep warm. They returned briefly in March to reshoot some underdeveloped photographs, bringing the total number to more than 700.

The collection of photographs included a set of oblique shots captured at 1,500-foot altitude by Stockwell, who held the heavy camera over the edge of the open cockpit. These obliques were taken for the purpose of seeing the shadows of canal banks and identifying specific localities, including close-up views of the Hohokam sites of Pueblo Grande, Mesa Grande, and Casa Grande.

The aerial survey covered a total of about 140 miles in length and fifteen miles in width, with a few gaps between certain transects and sections. Each of the high-altitude photographs covered a little more than a section of land, or one square mile. These were printed and hand-pasted into larger photo mosaics that showed the full length of the canals, some of which traversed the landscape for more than ten miles. The mosaics typically covered about seven miles in width.

In October 1930, Judd employed Halseth to conduct field inspections. Halseth was to determine the names of the modern and abandoned canals and interview local farmers. He earned \$500 for annotating the aerial mosaics, taking ground-level photographs, and measuring existing canals. Although Halseth claimed to have interviewed more than 100 people, he kept few notes on those interviews.

Halseth completed his ground surveys by January 1931, finding some of the canals by following linear deposits of artifacts. He wrote two brief reports and returned the annotated photographs to Judd. He also sent some photographs taken with his own Graflex camera and a pocket Kodak camera.

Judd authored a full-page spread on the aerial survey in the Sunday edition of the *New York Times* on March 2, 1930, entitled "A Lost Civilization Traced by an Air Survey." He also published two short papers in the 1930 and



Top: Mosaic photograph of Tempe and Mesa, showing canals with Halseth's annotations, January 1930. Historic canals were identified with red ink; prehistoric canals were marked in green. Bottom: Oblique aerial photograph of prehistoric canals at Pueblo Grande, Park of Four Waters, looking northwest, January 1930. (Both photographs courtesy of the National Anthropological Archives, Smithsonian Institution, Photo Lot 3, and Pueblo Grande Museum, City of Phoenix.)

1931 Smithsonian annual reports, but never prepared a comprehensive report.

In 1935, the War Department released the photographs to the U.S. National Museum. They were stored until 1959, when Richard Woodbury obtained some of the oblique photographs for research related to his excavations in the Park of Four Waters at Pueblo Grande. The Smithsonian catalogued a portion of the set in the 1990s. In 2005, archaeologist Richard Boston and I proposed a digitization project, to be funded by Pueblo Grande Museum. As a result, the museum acquired a complete set of the entire collection in 2005, and its staff catalogued the collection in 2008. Another set is maintained at the Smithsonian's National Anthropological Archives. This invaluable bird's-eye record of the 1930 landscape along the Salt and Gila rivers is thus preserved and available to researchers, just as Scofield, Judd, and Halseth intended.

Modeling the San Agustín Mission

Douglas W. Gann, Center for Desert Archaeology

OVER THE PAST DECADE, archaeological research has revealed unexpected details about 4,000 years of human habitation in the Tucson Basin. At the Center for Desert Archaeology, we use new media tech-

model of the Tucson Basin as it would have looked before European colonization. Familiar natural landmarks—in this case, the three surrounding mountain ranges and Sentinel Peak itself—provide subtle but important vi-

sual cues that situate the viewer in a known space, even in an unfamiliar period of time.

In the 1820s, the area surrounding the San Agustín Mission was an agricultural oasis. The mission had been built among a network of canals that in turn had been maintained for thousands of years. Major David Fergusson of the Union Army mapped this Tucson acequia network in 1862. Because archaeological research had demonstrated the antiquity of the canal system,

we decided that it was reasonable to use the 1862 map as a proximate version of the 1820s system. Terrain within one kilometer of the mission was modeled directly from a digitized plan of the acequia network.

The last traces of the mission were lost in the 1950s, as the City of Tucson's landfill overwhelmed the mission site. Our digital model of the chapel and the convento is based upon archaeological data recovered by William Wasley of the Arizona State Museum in 1956; additional data recovered by Desert Archaeology, Inc., in 2000 and 2003; an account by Tucson pioneer Atanacia Santa Cruz de Hughes (1850–1934) published in 1930; hand-drawn plans from 1926; an antique postcard in the personal collection of archaeologist J. Homer Thiel; an 1856 watercolor by John Russell Bartlett; an oil painting that was exhibited in a private gallery in Tucson in 2008–2009; and more than fifty historic photographs. Although most of these photographs are in the collections of the Arizona History Museum and the University of Arizona Library, some were loaned by Tucson families of long standing who responded to our public appeals for images of the mission.



Digital model of Tucson's San Agustín Mission in the 1820s; view from Sentinel Peak, looking northeast.

nologies to interpret these rich data and explore such themes as cultural continuity, technological change, and persistent places. Our ultimate goal is *Virtual Southwest*, a digital time machine that will engage viewers and help them understand their place in the long continuum of life in Tucson and the Southwest.

One of the most important elements of this project is a visualization that takes participants back in time from a familiar view at a popular Tucson landmark—Sentinel Peak, or “A-Mountain”—to historic and ancient views from the same vantage point. At a specific moment in the experience, viewers may enter the 1820s landscape of the Tohono O’odham village of Chuk Son, including the nearby Tucson Presidio and the San Agustín Mission.

Our digital modeling of the mission’s setting and its chapel and convento, or living quarters, has been a fascinating and recursive process. It is best described according to three of its components: the surrounding landscape, the immediate vicinity, and the mission complex itself.

We rendered the background landscape in a two-stage process that integrated Geographic Information Systems (GIS) data and color satellite imagery to create a realistic

The most conjectural element of the model is the chapel, which is completely depicted only in the Bartlett painting (and, even then, obscured by a tree). In general, though, sources depicting or describing the chapel or its remains seem to agree. Two known floor plans of the two-story convento, on the other hand, contained information that was not reflected in the historic images. Dubious of the existing plans' accuracy, and given the paucity of direct archaeological evidence, we developed a new strategy for analyzing photographs of the mission structures.

Photogrammetry uses images of a single object taken from multiple angles to create a three-dimensional model of the object. Our photometric modeling went a step further by generating geometry in three dimensions and assigning texture maps—images that portray texture and

small details—based upon the image data studied. We used a program called Canoma to analyze and link visible features across historic photographs.

Each iteration of the model has been a virtual hypothesis open to critical evaluation. Whenever we add new information to the model, our working hypothesis is tested. Continual advances in 3-D modeling technology have also allowed us to upgrade the appearance of the model and provide a richer visual experience. The most recent version of the complete model may be viewed at <http://www.cdarc.org/asw25-3>.

At present, we are putting the finishing touches on a fully interactive model of the San Agustín Mission that will enable *Virtual Southwest* visitors to experience its sights and sounds as never before.

The American Southwest Virtual Museum

Christian E. Downum, Meghann M. Vance, and April D. Peters
Northern Arizona University

THE AMERICAN SOUTHWEST VIRTUAL MUSEUM (<http://swvirtu-museum.nau.edu/>) is a collaborative project among Northern Arizona University, the U.S. National Park Service (NPS), and the Museum of Northern Arizona. Built around the concept of “Parks as Classrooms,” the project offers Internet-based explorations of artifacts exhibited at individual parks. The Virtual Museum is affiliated with the NPS’s Learning Center of the American Southwest.

The Virtual Museum offers detailed, high-resolution photographs of artifacts exhibited at the parks’ visitor centers, as well as in-depth information about these artifacts. Individual artifacts are linked to text and videos that explain the circumstances of an artifact’s discovery, its scientific importance, and its cultural meaning to contemporary Native Americans. Through the Virtual Museum, visitors can view artifacts in greater detail and from different vantage points than are possible in person, and they can access information not featured in the parks’ exhibits. They can also view and learn about selected objects from park collections that are not on display.

In addition, the Virtual Museum presents virtual tours of exhibits, visitor trails, and other features through high-resolution panoramic photographs. Users can move



Wupatki National Monument's Box Canyon Pueblo in a late summer thunderstorm, A.D. 1190.

digitally through physical exhibits, clicking on various “hot spots” embedded in the photos. The hot spots open individual exhibit cases, where users can view detailed



Autumn sunrise enters a pithouse at Winona Village, A.D. 1130.

color photos of artifacts. Hot spots also open links to high-resolution PDF versions of exhibit panels and photographs displayed at NPS visitor centers. Video presentations keyed to points along the trail or to particular mu-

seum exhibits feature commentary by archaeologists and Native Americans.

The main goals of the project are to assist visitors with pre-visit exploration and planning, to supplement their on-site experiences, and to foster greater understanding of past human activities and relationships with physical and cultural environments.

The Virtual Museum allows visitors to linger and learn in ways that are not possible during an on-site visit. For visitors who are not physically able to walk the trails, the site provides an opportunity to see things that would not be accessible otherwise. People with

Web-enabled mobile devices can also bring up the Virtual Museum during their visit, supplementing real-life experiences with digitally presented information and perspectives.

Digital Re-Creations of Ancient Life

Christian E. Downum, Northern Arizona University
Victor O. Leshyk, <http://www.victorleshyk.com>

ONE COMPONENT of the American Southwest Virtual Museum is digital re-creations of scenes of daily life in the past, a collaborative effort by Downum, an archaeologist, and Leshyk, a professional scientific illustrator. These multimedia creations depict known sites or locations at specific points in time and during particular seasons of the year. Our guiding principles dictate that the scenes must be detailed, realistic, factually accurate, and dynamic.

Each re-creation is based on a known archaeological site. They are composed of multiple layers of images, derived from varying combinations of LIDAR (Light Detection and Ranging) scanning, outdoor photography of landscapes and architecture, studio photography of artifacts, detailed scale modeling, and artistic rendering using Adobe Photoshop and Painter software. So far, we have created a Clovis-age faunal scene on a spring afternoon 13,100 years ago, near the place of a Clovis point discovery; the exterior of Box Canyon Pueblo in late summer of A.D. 1190, at Wupatki National Monument; and the interior of a pithouse during an autumn sunrise in A.D. 1130, at Winona Village. All of the artifacts depicted in the scenes were recovered from the site itself or from nearby archaeological sites of the same time period.

These images should help people visualize ancient life from an eyewitness vantage point, making full use of the archaeologist's knowledge of architecture, environments, prehistoric events, and artifacts, and the illustrator's aesthetic sense of light, shadow, perspective, color, and motion.



Mammoth and bison on a spring afternoon 13,100 years ago.



Photo-documenting the stabilization of a fragile archaeological site is essential to its long-term protection. This image is one in a dramatic series taken by Larry Baker, Executive Director of Salmon Ruins, during stabilization of Three Corn, a Navajo pueblo east of Farmington, New Mexico. An impressive network of scaffolding enabled the crew to reach Three Corn, which is perched atop a sheer boulder forty feet above the nearest ground.

Archaeologists have identified some 250 pueblitos in the portion of the Dinéyah, or Navajo homeland, that lies east of Farmington. Primarily dating between 1710 and 1760, pueblitos were built in response to Ute raiding. Wooden roof beams from these structures have been extensively dated through tree-ring samples collected by Dr. Ron Towner of the University of Arizona's Laboratory of Tree-Ring Research. Unfortunately, these remarkably picturesque sites are terribly threatened by vandalism and erosion. Salmon's stabilization team has implemented preservation measures at seven pueblitos, completed an assessment of another, and established an active site monitoring program.

Larry Baker shared these images in a slideshow at the recent annual meeting of the New Mexico Association of Museums. Slides, too, need careful preservation treatment as they age. Following Larry's presentation, the full sequence of images related to the stabilization was scanned, and the originals have been retired from use. We invite you to view the entire sequence at <http://www.cdarc.org/asw25-3>.

See the Center for Desert Archaeology website for more information: <<http://www.cdarc.org>>

AT THE CENTER FOR DESERT ARCHAEOLOGY, we envision a society in which the places of the past are valued as the foundations for a vibrant future. As such, it is our mission to preserve the places of our shared past. A private 501(c)(3) organization, the Center is supported through donations, memberships, and grants from individuals, foundations, and corporations. Center members receive an annual subscription to *Archaeology Southwest* and a host of other benefits. For more information or to join, contact Membership Assistant Kathleen Bader at 520.882.6946, ext. 26, or kbader@cdarc.org.

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Back Sight

EARLIER THIS YEAR, Larry Baker, Executive Director of Salmon Ruins, invited me to give the keynote address at the 2011 annual meeting of the New Mexico Association of Museums (NMAM). Collaboration was to be the theme. Given the importance of the Center's decade-long partnership with Salmon Ruins, it was a natural fit, and I was pleased to accept. As I prepared my talk, I could clearly see the role that this partnership has played in the development of Preservation Archaeology. As I searched for images to illustrate my talk, I also confirmed the important role that images have played in our success.

The Salmon partnership began with a research focus: Preservation Archaeologist Paul Reed's first task was publishing the results of significant excavations directed by Cynthia Irwin-Williams in the 1970s. Historical photographs helped us share the story of community-based preservation at Salmon with the public, and Adriel Heisey's aerial images helped us place Salmon Pueblo in a holistic context (see *Archaeology Southwest* Vol. 16, No. 2). Images of dismal storage conditions helped us tell a compelling story that led to a Save America's Treasures grant. This award and assistance from volunteers helped to conserve more than 1.5 million artifacts in the Salmon collections.

Updating and publishing the original research raised many new questions. A successful National Science Foundation (NSF) grant followed, resulting in an expanded partnership with nearby Aztec Ruins National Monument. Doug Gann created digital reconstructions of Salmon Pueblo, and Adriel Heisey's aerial images of Salmon, Aztec, and Chaco provided wider regional context. Most recently, our Salmon-based partnership received an NSF grant to bring our research results to an even broader audience, primarily through interactive digital imagery.

Although *Archaeology Southwest* has been the Center's primary vehicle for sharing information with the public, we have been aware of the need to expand our Internet presence. That inspired *Virtual Southwest*, which I previewed to the attendees of the NMAM conference in November. Now online in preliminary form (<http://www.cdarc.org/asw25-3>), *Virtual Southwest* is developing through our current NSF grant. The pace of change in the digital world is dramatic and constantly accelerating. Plan to make regular visits to *Virtual Southwest* as it evolves over the coming year.

Throughout our partnership with Salmon Ruins, we have recognized the power of images to convey the places of the past, as well as their meaning and their value. Partnering with the creators of images and searching for new ways to share powerful visual tools are creative processes that constantly inspire us in our work at the Center.



Through the Center's Virtual Southwest, digital time travelers can enter the Great Kiva at Aztec Pueblo in A.D. 1150.

back sight (bāk sīt) n. 1. a reading used by surveyors to check the accuracy of their work. 2. an opportunity to reflect on and evaluate the Center for Desert Archaeology's mission.

Handwritten signature of William H. Doelle in black ink.

*William H. Doelle, President & CEO
Center for Desert Archaeology*