Maidu folklore and his ongoing rapport with surviving Maidu elders places him in an ideal position to make further contributions towards a better understanding of the process of Concow Maidu culture change.

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Visions of the Sky: Archaeological and Ethnological Studies of California Indian Astronomy. Robert A. Schiffman, ed. Salinas: *Coyote Press Archives of California Prehistory* No. 16, 1988, xiv + 171 pp., 84 figs., 13 tables, $9.95 (paper).

Review by:
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Recent studies of the ethnographic record have demonstrated that native Californians had sophisticated knowledge of the celestial world and that certain of their rituals were related to astronomical beliefs and observations. *Visions of the Sky* compiles nine papers linked by an interest in this theme, with particular attention paid to the putative relationship between astronomical beliefs and practices and parietal art. The volume begins with a foreword by E. C. Krupp, who discusses some of the implications of hunter-gatherer calendrical systems in worldwide terms. He also makes an important cautionary point in stating that the significance of purported astronomical events *vis-à-vis* archaeological sites, such as direct observational alignments or indirect illuminations of rock art panels during solstices, can only be established by contrasting such "special" phenomena with what happens at these sites at other times and seasons.

The nine papers consider California archaeoastronomy at three levels of analysis: syntheses, site reports, and special studies. Following a brief introduction by Schiffman, the first contribution is a paper by the late Travis Hudson, "The Nature of Native California Astronomy," which provides a general overview of native California knowledge about astronomy. This is complemented by a second synthetic work, also by Hudson, "The 'Classical Assumption' in Light of Chumash Astronomy." Here he shows that the traditional belief that the origins of astronomy and calendrics occurred only among food producers is no longer tenable, and uses the Chumash as an example of a foraging group that developed a sophisticated calendrical system and high level of astronomical knowledge.

A paper by Tom Hoskinson and R. M. Cooper concerns a rock art site in Chumash territory interpreted as Sapaksi (CA-SBa-502 and -526), the "House of the Sun," and introduces the second level of analysis presented in the volume, the "archaeoastronomical site report." These authors attempt to test the hypothesis that this site was the "House of the Sun" by establishing whether "features at the site might interact with the sun at the time of the December solstice" (p. 31). During the summer solstice they found that an "indirect event" occurs, with sunlight entering two apertures in the cave wall, forming beams that intersect at a man-made hole in the floor. During the winter solstice, by contrast, the hypothesized use of the site as a direct solstitial observatory could only be supported if observations of the sunrise were

taken on the bluff above the site.

John Romani, Dan Larson, Gwen Romani and Arlene Benson provide a second archaeoastronomical site report in "Astronomy, Myth and Ritual in the West San Fernando Valley." Considering the well-known sites of Burro Flats (CA-Ven-151 to -161) and Stoney Point (CA-LAn-357), they look for evidence of features indicative of the observation of solstitial events at these rock art sites. At Stoney Point their hypothesized summer solstice sunrise event failed to occur. Their hypothesized event also failed to occur at Burro Flats, although they discovered that a beam of light plays across a painted set of concentric circles. By walking around the site, as well, they discovered that a direct observational alignment could be established between a bedrock mortar, a notch on the horizon and the summer solstice sunrise.

Additional archaeoastronomical site reports are provided by V. J. Harper-Slaboszewicz and R. M. Cooper, on CA-Ker-17; Robert A. Schiffman, for CA-Ker-317; and Beverley S. Trupe, John M. Rafter and Wilson G. Turner, concerning CA-SBr-291. These contributions range from barely plausible evidence to support the thesis that the sites served as observatories, to demonstrations (as in the Trupe et al. case) that if one is to walk around a circle of stones on a solstice, eventually the solstice sunrise will be observable from somewhere along the circle.

Special studies are introduced by Dorothy Mayer's "Sky Games in California Petroglyphs." This constitutes a state-wide review of published rock art illustrations to determine if drawings or engravings of the pole-and-hoop game can be identified, with the intention of establishing a connection between aboriginal gambling practices, astronomical beliefs, and rock art. Katherine Bracher contributes "Solar Eclipse Dating of Chumash Rock Art." Operating under the assumption that paintings of a black circle with a white border or flames probably represent an eclipse, she attempts to date the pictographs at Painted Cave, above Santa Barbara, by comparing the distribution of motifs at the site with the sky as it would have appeared during one of the eclipses that would have been visible from this site. Although no plausible fit can be found, she nonetheless concludes that the site probably dates from the sixteenth or seventeenth centuries, because this was the only period during which good eclipses could have been seen from this locale.

Though some of the observations from the site reports are intriguing and will interest those concerned with rock art and archaeoastronomy, there are a number of shortcomings in this volume that warrant mention. At an editorial level, the paper by Hoskinson and Cooper is so poorly written and badly organized that it is almost unintelligible. The absence of illustrations, including a site map referenced in the text, further contributes to the amateurism of the presentation.

But what most plagues this and other papers in this volume is an almost complete inattention to scientific method. Hypotheses are framed, found to be unsupported at sites and, based on new empirical observations, the original hypotheses are then revised with ad hoc additions to account for the new "evidence" (e.g., Hoskinson and Cooper; Bracher; Romani et al.; Harper-Slaboszewicz and Cooper; Trupe et al.). Similarly, designs (such as circles or rays) are inferred to be "celestial motifs," then interpreted as such and, subsequently and tautologically, suggested to provide supporting evidence that the sites were related to astronomical beliefs (e.g., Hudson; Mayer). But perhaps the worst abuse of scientific method is Mayer's article on "Sky Games." Touting a purely formalist approach that pays no attention to context,

archaeology, or ethnology—and is therefore somehow the more objective and scientific because of this independence—she provides a comparison between motif forms to support the proposition that celestial gambling is depicted in rock art. Like other such Nineteenth Century approaches, it leads nowhere. Instead, anthropomorphic motifs are interpreted as "hut-shaped figures associated with Ophiuchus" (p. 42); the similarity of a southern Sierra "pelt figure" to a glyph from the Codex Nuttal is said to suggest "Mesoamerican influence" (p. 66), while another "pelt figure" is likened to a Mesoamerican ballcourt (p. 68); and, in the most unbelievable example among a number of incredible formalist claims, the resemblance of an eroded geometric painting from CA-Tul-80 to the "boat of Sokaris, from the Egyptian Book of the Dead" (p. 67) is contended to reflect "European influence." If anything, this paper is a textbook example of a nonscientific approach. It deserves no place in a modern, professional monograph.

Unfortunately, the absence of any semblance of scientific method is matched by another deficiency that is evident throughout the papers: an unfamiliarity with, or confusion concerning, basic anthropological theory. Thus, Krupp leads off with an "explanation" of the function of prehistoric calendars (p. v) that is nothing if not old-fashioned and long-discarded functionalism revived. As the saying goes, "all roads lead to social solidarity" in functionalist interpretations, but even more damning is the confusion of consequence with cause that results from it, which is evident in both Krupp's and Hudson's arguments. Similarly, Hudson tells us that the California tribelet constituted a ranked social system (p. 5). One would hope that this was an oversight that might have been corrected had he been afforded an opportunity to edit the paper prior to publication, but given the contradictory claims that fill his two papers, one cannot be too sure. After all, is it really believable that early ethnographers were "universally biased" against studying the astronomical beliefs and practices of native Californians, as he contends (p. 98), when it is exactly their data on astronomy that he uses to discuss this topic? And while we all decry the effect of Euro-American expansion on the native Californian population and cultures, to narrow-mindly dismiss the Catholic Church as a "medieval church, emerging from the inquisition" (p. 99) not only smacks of the same ethnocentricism he accuses the missionaries of having harbored toward native Californians, but will offend some readers. Finally, while it is encouraging that Romani et al. (pp. 129-130) have seen fit to draw their work into a wider theoretical perspective by citing the historical-materialist writings of Maurice Godelier, they have misunderstood the main point of Godelier's thesis in misinterpreting the concept of the social relations of production. Consequently, while the superstructure (which includes ideology, ritual, and politics) maintains a dominant role in a forager mode of production, infrastructure (including economy) still comprises the determinant role; economics and infrastructure, therefore, cannot simply be ignored, at least if one is to engage in a materialist as opposed to an idealist form of analysis.

Readers, in other words, will find this volume of mixed value. It is apparent that those enamored with the rock art and archaeoastronomy hypothesis will find that it contains additional support for their claims. For, as is made clear in these papers, the hypothesis currently can be modified to suit any empirical conditions, with ad hoc adjustments allowing it to withstand any potentially falsifying evidence—as long as one is a true believer. But potential falsification is the criterion that separates scientific hypotheses

from nonscientific propositions. What this volume reveals most strongly to me, as an admitted skeptic and a believer in scientific method, is that those archaeologists most interested in studying the "origins of science" in California prehistory and ethnohistory via rock art and archaeoastronomy are clearly the least interested in practicing science.

Prehistoric Sites in the Prado Basin, California: Regional Context and Significance Evaluation. Susan K. Goldberg and Jeanne E. Arnold. Los Angeles: U.S. Army Corps of Engineers, 1988, xi + 132 pp., 4 figs., 8 tables, gratis (paper).

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This volume reports the assessments of prehistoric sites near the junction of Orange, Riverside, and San Bernardino counties, with regard to their eligibility for inclusion into the National Register of Historic Places (NRHP). Research domains necessary to this task are generated from a review and synthesis of archaeological data drawn from a larger regional context, territory sandwiched between and including parts of the Peninsular and Transverse ranges. Here, Cajon Wash and the inland Santa Ana River drainage, which bisects Prado Basin, together formed a natural corridor for prehistoric diffusion, trade, and migration between the Mojave Desert and southern Los Angeles Plain. Goldberg and Arnold's work points to the kinds of research efforts that lie ahead if issues of either external relations or internal chronology and past lifeways are to be effectively addressed.

The study is divided into two parts: Part I, "Regional Context," and Part II, "Significance Evaluation." Following a project goal statement, report prospectus, and a geographic delineation of the study area, Part I reviews regional prehistory and ethnography (Gabrielino and Serrano) and subsequently discusses research issues. The review includes a summary of previous archaeological work by subregion.

The section covering research issues proposes that two concepts, "Milling Stone Horizon" and "Shoshonean Incursion," have been uncritically adopted in previous research and that these "confining frameworks" should be rejected in favor of rigorous analyses of components of general research domains (i.e., technology, subsistence, settlement, exchange/external relations). Objectives are identified for each research domain, and questions specific to each objective are formulated, followed by data requirements. This research discussion provides a quick overview of scientific observations and analyses critical to a synthesis of regional culture history.

In Part II, Goldberg and Arnold first discuss the meaning of "significance evaluation" of archaeological resources and the constructs that guide their particular evaluations. Following a definition of the Prado Basin Archaeological District, each Prado Basin site is summarily described and evaluated for NRHP eligibility.

Judged as a CRM document, the report is better than most of its genre; nonetheless some critique might be helpful to the purpose of the study.

The justification for abandonment of the "Milling Stone Horizon" concept for adoption of "rigorous componential analyses" rests on several complaints. For instance, the authors write that the concept was developed for coastal chronology, and thus its application to interior regions implies an interregional homogeneity that has not been demonstrated. Manos and metates are not particularly time-