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A regional approach to prehistoric landscape use in West-Central Argentina

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ABSTRACT

A regional approach to the archaeological record—one that includes not only large, stratified sites, but also small, ephemeral ones, surface finds, and isolates—provides a more representative sample of prehistoric landscape use than do stratified sites alone. In southern Mendoza Province, Argentina the stratified site record suggests both demographic decline during the middle Holocene (8000–4000 BP) and infrequent use of a vast plain east of the Andes until approximately 2000 years BP. However, results of a large-scale surface survey and obsidian geochemical and hydration analyses indicate further assessment of both trends is warranted. Specifically, our data suggest both continuous occupation of the region and use of the plains throughout the Holocene. These results have important implications for both local-scale human ecology, and broader adaptive responses to environmental changes in semi-arid southern South America.

1. Introduction

Southern Mendoza Province, Argentina (Fig. 1) presents a mosaic landscape that was occupied by hunter-gatherers from the terminal Pleistocene/early Holocene to the arrival of Europeans in the 16th century. Whether occupation was more or less continuous and whether prehistoric Mendocinos preferentially used certain resource zones are subjects of continued discussion, however. While diverse, the Mendozan environment is comparatively unproductive, broadly characterized by relatively scarce resources, patchily distributed across a vast semi-arid plain and an adjacent rugged stretch of the Andes cordillera. The distribution, ages, and contents of stratified sites suggest that challenges of landscape and climate restricted prehistoric humans' use of the region. Specifically, the radiocarbon record indicates that (1) site frequency decreased significantly between 8000 and 4000 BP, coincident with middle Holocene droughts and (2) the vast majority (88%) of sites located on the plains were first occupied after 2000 BP.

The apparent scarcity of pre-2000 BP sites on the plains and of sites in any environment between 8000 and 4000 BP has been interpreted in terms of resource availability (Gil et al., 2005; Neme and Gil, 2008a): the plains are unproductive relative to the Andean foothills and were inhabited only once regional populations were sufficiently large to require it, while drought-induced resource contractions made the already inhospitable region virtually uninhabitable during the middle Holocene. Relationships between archaeological records and environmental variables are key to interpreting human landscape use but, to understand more general adaptive capacities and evolutionary trajectories, we must first distinguish patterns reflecting behavior from ones due in whole or part to taphonomic and other biases (Garvey, 2008, 2012).

With this in mind, we designed a research program to explore the possibility that the stratified site record presents an incomplete picture of prehistoric occupation and landscape use in southern Mendoza. The region's cultural chronology is based primarily on data from stratified sites, particularly cave sites, which are rare on the landscape and therefore unlikely to reflect the full complement of prehistoric behaviors. To augment the stratified site record we used a regional approach including large-scale surface survey and spatiotemporal analyses of obsidian distributions using geochemical and hydration data. Artifact distributions—within sites and across the region—suggest both continuous occupation of southern Mendoza during the hot, dry middle Holocene and use of the plains earlier than previously documented. These results have significant implications for both local-scale human ecology and broader adaptive responses to environmental changes in west-central Argentina. In southern Mendoza and elsewhere, a regional approach can clarify broad patterns of behavior interpreted from stratified site records, relate sites to the broader regions within which they are located, and contribute to a more comprehensive understanding of human landscape use across space and through time.

Presentation and discussion of our analyses follows a brief introduction to the Mendozan landscape and its resources, and the accepted cultural chronology. We conclude with a discussion of human landscape use and adaptations in a South American semi-desert.

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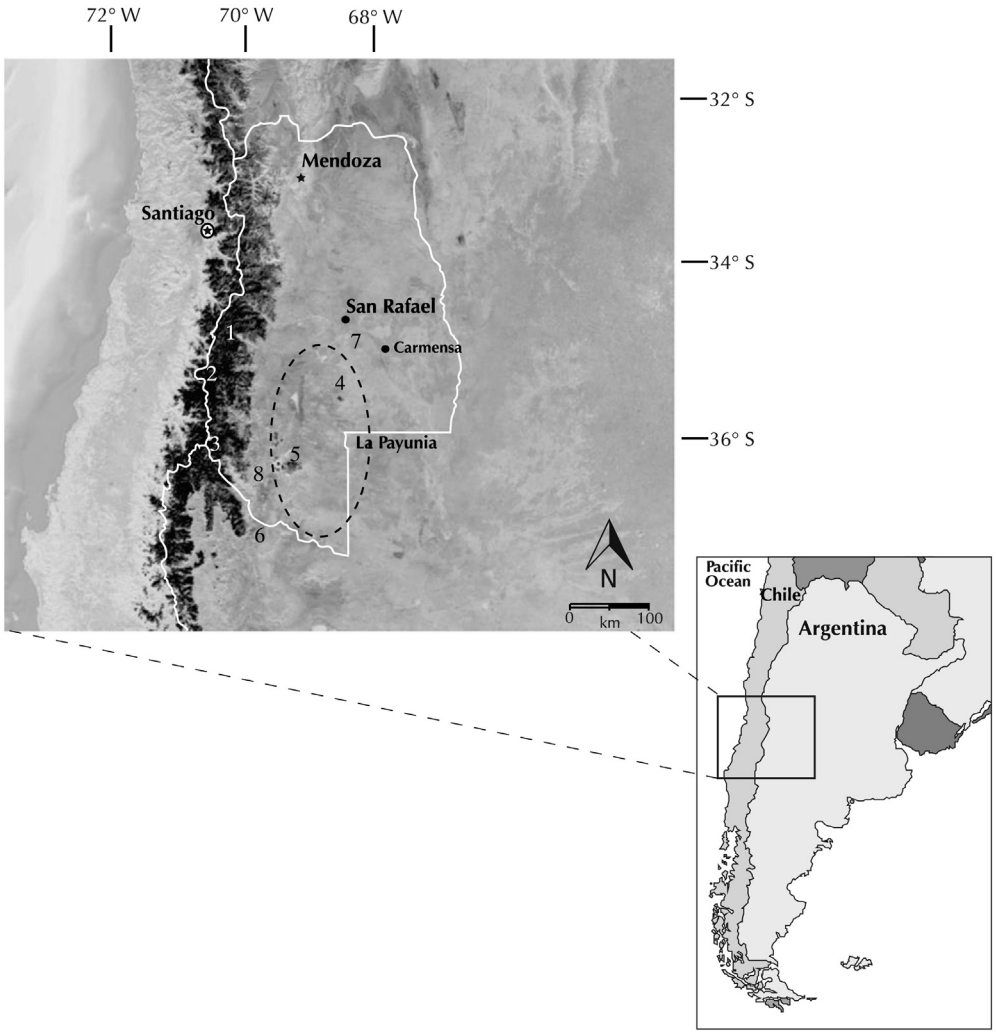

Fig. 1. Mendoza Province, Argentina. Indicated are obsidian sources (Andes: 1. Laguna del Diamante, 2. Las Cargas, 3. Laguna del Maule; plains: 4. El Peceño, 5. Payun Matrú, 6. El Huenul), sites (7. Gruta del Indio, 8. Gruta de El Manzano), La Payunia volcanic field, and the eastern extent of the "middle Atuel" (i.e., plains) at the town of Carmensa.

2. Regional background

2.1. Physical environment

Mendoza Province (32–37° S, 67–70° W) is environmentally diverse, located between the fertile, grassy Pampas to the east and the rugged Patagonian steppe to the south. The harsh and sparsely vegetated Andes cordillera in the western part of the province descends to relatively cool, moist foothills, which then give way to a low, arid plain to the east. Major rivers including the Río Atuel—the focal feature of this study—originate at elevation in the Andes and flow east across the piedmont and plains (Fig. 2).

2.1.1. High cordillera

Between 5189 m (17,024′, Cerro el Sosneado) and 2500 m (8200′), the region is characterized by glacial topography, narrow river valleys, rocky terrain, steep slopes, and thin soils. The highest elevations are perennially glaciated and the mountains receive an average of 1000 mm of precipitation annually, chiefly as winter snow. Snows begin in February and persist until December and, even during the brief summer, storms can be unpredictable and severe. Seasonal melting of the snowpack and alpine glaciers feed the major rivers but rapid, near-complete runoff keeps primary biomass low. Thus, temperature, length of growing season and severe terrain all contribute to a patchy, unreliable, and highly seasonal suite of edible resources including *guanaco* (*Lama guanicoe*), burrowing rodents (e.g., *tuco tuco*, *Ctenomys* sp.) and migratory waterfowl around glacial lakes. Modern human use of the

Mendozan Andes is limited to the summer months and, generally, elevations below approximately 3000 m (Neme, 2007).

2.1.2. Foothills

In the Río Atuel watershed, the Andes descend to foothills with elevations between 2300 m and 1500 m (approximately 7550–4900′). The foothills receive an average of 350 mm of precipitation that falls relatively uniformly throughout the year, and there are numerous arroyos and springs that provide reliable water year-round. Winds and solar radiation are less intense than at higher elevations, slopes are gentler, soils are better developed and the area supports a higher primary biomass (Neme, 2007). Prey fauna include guanaco; *pichi* (armadillo; *Zaedyus pichiy*); two species of large, flightless bird, *ñandú* and *choique* (*Rhea americana* and *Rhea pennata*, respectively); and rodents of various sizes, including *liebre* (*Dolichotis* sp.), which can weigh up to 11 kg (24 pounds). Edible plants include *algarrobo* (mesquite; *Prosopis* sp.), various cacti (e.g., *Opuntia sulphurea* and *Opuntia megacantha*), and goosefoot (e.g., *Chenopodium ambrosioides*).

2.1.3. Plains

East of the foothills, the *piedmont fringe* (1400–1200 m; approximately 4600–3900') comprises a series of broad alluvial fans of coarse gravel. The "middle course" of the Atuel runs from the piedmont east

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