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Isotopic evidence ON human bone for declining maize consumption during the little ICE age IN central western Argentina

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ABSTRACT

This paper explores variation in maize consumption among human societies in arid environments of central-western Argentina over the last 2500 years. Increasingly positive human $\delta^{13}C$ signatures suggest a high intake of C_4 resources (maize) until *ca.* A.D. 1400. After this time, the importance of maize in the diet drops and never reaches pre-Hispanic consumption rates, despite the known importance of maize to Inka and other late-prehistoric societies in the region. This decline appears to be related to colder temperatures during the Little Ice Age from the beginning of the 15th to the mid19th centuries.

1. Introduction

The development of farming and the relationship between food producers and hunter-gatherers is a central issue in anthropological research and one that continues to receive substantial theoretical and empirical attention (e.g., Gepts et al., 2012; Kennett and Winterhalder, 2006; Piperno, 2006; Staller et al., 2006). Why domesticates were incorporated and how they became significant through time is central to understanding human dietary strategies, settlement patterns, and changes in social organization. In this regard, the relationship between human organization, resource exploitation, and environment are central (Bettinger et al., 2007; Halstead and O'Shea, 1989; Richerson et al., 2001; Smith, 2001; Winterhalder and Goland, 1997). The recent availability of fine grained paleoclimatic and dietary data from late Holocene central western Argentina make it an ideal region in which to explore these issues.

The central-western area of Argentina, between 30° and 40° S, is considered the pre-Hispanic southern limit of maize agriculture in the Americas (Fig. 1). The present paper is focused in the northern

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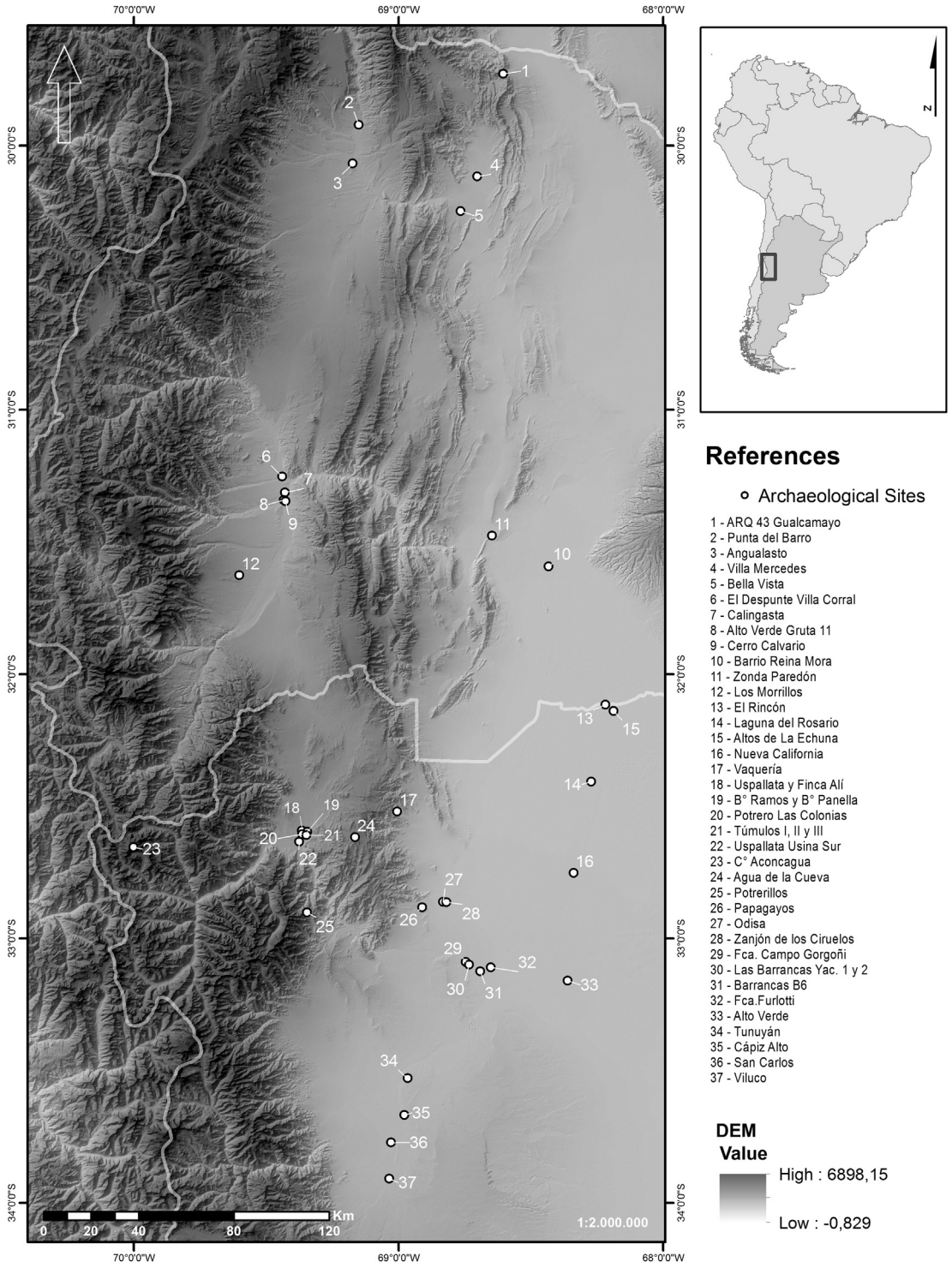

Fig. 1. Digital elevation model of the study region and sites from which human isotope samples were taken.

sector of the area, between 30° and 33° S (Fig. 1). This area has typically been considered a periphery of the northwest Argentine culture area (*noroeste argentino*, or NOA; Bárcena, 2001; Lagiglia, 1977; Schobinger, 1975), which saw the development of several complex, Andean civilizations prior to Spanish contact, most famously the Inca. The presence of cultivars such as maize, squash, bean, quinoa (Bárcena, 2001; Gambier, 1977, 2000; Gil et al., 2006a) and ceramic technology have been interpreted as evidence of farming and sedentary settlement in the region (Bárcena, 2001; Gambier, 2000; Lagiglia, 2001), and in some cases have been associated with pastoralism as well (Bárcena, 2001; Gambier, 2001; Gasco et al., 2011). Researchers have identified the presence of pit houses, domesticated camelids (llama, *Llama glama*), and corn in the intermountain valleys and interpret these as evidence of a shift