



Climate change, paleoenvironments and cultural variability during the Late Pleistocene in Pampa del Tamarugal, Atacama Desert, Chile.

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The Pampa del Tamarugal (PdT; $\sim 19^{\circ}30'S$ - $21^{\circ}30'S$) is an endorheic basin located today at the core of the Atacama Desert (northern Chile), the most arid desert on earth. Water, a fundamental resource for survival of humans, animals and plants, is a scarce resource in the PdT landscape given that precipitation fall upslope over the Andes and the Altiplano and perennial springs infiltrate in the foothills before reaching this basin. However, discontinuous human occupations in the since 13ka and the presence of extinct fauna dated 18-14ka southernmost part of the PdT, revealed the presence of water in the past under a highly environmental variability. It is widely known that two pluvial phases occurred in the Atacama Desert (CAPE I-II) and the Altiplano (Tauca and Coipasa phases) during the Late Pleistocene characterized by significant increases of rainfall amount and the consequent environmental changes. However, palaeoecological evidence that allowed to understand the environmental scenarios that supported human populations and extinct fauna in the PdT since and/or during the Late Pleistocene is scarce and fragmentary. Thus, this paper presents new palaeoecological evidences from the PdT in order to shed light to the environmental dynamics and landscape characteristics.

Between the Guatacondo and Tambillos ravines, growing evidence shows different features of past landscapes and human activities. Thus, plant macro-remains as leaf litter packs, trunks in horizontal position, in situ bases of trunks, plant stem imprints as well as different sedimentary deposits revealed the presence of paleosprings, paleowetlands and small shallow lacustrine basins during the Late Pleistocene. In Quebrada Maní, for example, large paleowetlands developed until 11ka. Instead, the preserved vegetal macro-remains showed a peculiar spatial pattern of vegetation during that period where *Prosopis* trunks are more frequent in lowlands (~ 850 m asl) of PdT while the macro-remains, mainly of *Escallonia*, are abundant near to the foothill (~ 1150 masl).

Later on, during the early and mid-Holocene, an abrupt decrease in rainfall in the Central Andes generated hyperarid conditions in PdT and consequently, no evidence of human populations was found. Sedimentological observations and OSL dates suggest the development of arid landscapes in the Guatacondo ravine ($21^{\circ}S$) by this time, dating the incision of the ravine sometime between 6.6-1.3ka.

After that, a new humid pulse during the Late Holocene (2.5-1ka), associated with new human occupations in PdT characterized by the development of villages and wide field-crops occurred. This period of intensive cultural development and "re-use" of the PdT ended around 1-0.7ka, following a trend to aridization recorded in the rodent middens pollen record. After that the villages of PdT were abandoned and population moved to villages located at higher altitude or associated with water oases active until the present. Around 100-150 yr BP, a brief humid pulse in the PdT occurred synchronously with the reoccupation of the field-crops but probably just seasonally.

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