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Advances in Arid Zone Archaeology: The 4th Southern Deserts Conference

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1 - Advances in arid zone archaeology: The 4th Southern Deserts Conference

Alan N. Williams, Kane Ditchfield, Valeria Cortegoso, Karen Borrazzo

Pages 1-4

2 - The memory of the landscape: Surface archaeological distributions in the Genoa Valley (Argentinean Patagonia).

Sabrina Leonardt, Vivian Scheinsohn, Florencia Rizzo, Pablo Tchilinguirían

Pages 5-18

3 - Lithic taphonomy in desert environments: Contributions from Fuego-Patagonia (Southern South America).

Karen Borrazzo

Pages 19-28

4- The influence of raw material size on stone artefact assemblage formation: An example from Bone Cave, south-western Tasmania.

Kane Ditchfield

Pages 29-43

5- Environment, space, and morphological variation of projectile points in Patagonia (Southern South America).

Marcelo Cardillo, Karen Borrazzo, Judith Charlin

Pages 44-56

6- Changes in lithic technology and environment in southern continental Patagonia: The Chico and Santa Cruz River basins

Nora Viviana Franco, George A. Brook, María Virginia Mancini, Lucas Vetrivano

Pages 57-65

7- Hunter-gatherer mobility decisions and synchronous climate change in the Southern Andes: The early and middle Holocene occupations of ARQ-18, San Juan, Argentina (29.5°S)

Erik Marsh, Valeria Cortegoso, Silvina Castro

Pages 66-80

8- Geographic vectors of human mobility in the Andes (34–36° S): Comparative analysis of ‘minor’ obsidian sources
Original Research Article

Valeria Cortegoso, Ramiro Barberena, Víctor Durán, Gustavo Lucero

Pages 81-92

9- Obsidian use and mobility during the Early and Middle Holocene in the Salt Puna, NW Argentina.

Elizabeth Pintar, Jorge G. Martínez, Carlos A. Aschero, Michael D. Glascock

Pages 93-108

10- Moving obsidian: The case of Antofagasta de la Sierra basin (Southern Argentinean Puna) during the late Middle and Late Holocene.

Patricia S. Escola, Salomón Hocsman, María P. Babot

Pages 109-122

11- The disappearing desert and the emergence of agropastoralism: An adaptive cycle of rapid change in the mid-Holocene Lake Titicaca Basin (Peru–Bolivia).

Erik J. Marsh

Pages 123-134

12- Logistical mobility in plateaus in Central-Western Santa Cruz, Argentina. An approach from technological, archaeofaunal and anthracological evidence.

Sebastián Pasqualini, Gisela Cassiodoro, Juan Matías Dellepiane

Pages 135-151

13- Potters and herders at the southern edge of the Andean world: Risk management and mobility in Northwestern Mendoza, Argentina.

Cecilia Frigolé, Alejandra Gasco

Pages 152-162

14- Dunes, hills, waterholes, and saltpeter beds: Attractors for human populations in western Pampa, Argentina.

Mónica Alejandra Berón

Pages 163-173



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Advances in arid zone archaeology: The 4th Southern Deserts Conference



Whatever else it may be, a desert landscape is a historical document preserving a complex record of the interaction of past climates, geomorphic processes and cultural systems.

(Smith, 2013).

1. Introduction: the Southern Deserts Conference and the present volume

The *Southern Deserts Conference* series is now over a decade old. Established in 2001 in Canberra, Australia, the series focusses on archaeological and palaeoclimatic inter-disciplinary research within the deserts of the southern hemisphere. Originally, conceptualised as a unique event by Prof. Mike Smith (National Museum of Australia), the original gathering proved so successful that subsequent collaboration with Prof. David Thomas (University of Oxford, UK) and Prof. Calogero Santoro (University of Tarapacá, Chile) resulted in the development of a series of meetings to celebrate the arid zone, and facilitate greater interaction between researchers working in these types of environments.

In the last 14 years, the conference series has gone from strength-to-strength, with two further well-attended conferences at Arica (Chile) in 2005 and Uppington (South Africa) in 2008, and a number of research outputs, including the well-cited book *23°S – Archaeology and Environmental History of the Southern Deserts* (Smith and Hesse, 2005) and a special issue of *Chungara Revista de Antropología Chilena* (Santoro and Standen, 2008). In addition, post-conference field trips have exposed researchers across the world to a range of different arid zones, often with similar questions about formative history and human occupation in the past, and resulting in pan-continental collaboration (e.g. Williams et al., 2008).

Despite a long absence of seven years, a fourth conference was successfully organised in Mendoza, Argentina – on the edge of the Patagonian desert - in 2014 by Dr. Ramiro Barberena and his colleagues at the National University of Cuyo. The conference can be considered one of the best of the series to date, with representation by well over a hundred researchers from around the globe, including Australia, the United Kingdom, France, Germany, Norway, USA, Latvia, South Africa, Chile, and Argentina (Fig. 1). The conference had a range of themes exploring the environmental history and demographic change of societies within deserts, with a specific focus on discontinuous records, whether through human behaviour or taphonomy. Sessions included the evolution, formation and colonisation of the deserts, exploration of human behaviour in

key temporal periods (e.g. Last Glacial Maximum), new methods and their applications to desert environments, as well as interactions between Indigenous peoples and European explorers/colonisers.

In this Quaternary International special issue, we include a series of research articles that were originally presented in two sessions of the conference: 'Advances in Archaeological Methods: Developments and Applications to the Southern Deserts' and 'Desert Archaeology'. The former specifically called for papers focused on the application of new techniques or methods of analysis with implications for research in the southern deserts, while the latter included a much wider range of papers on artefact analysis, taphonomy, and archaeological records across desert regions. As would be expected given the location of the conference, the papers are primarily from research and/or researchers in Argentina, including such regions as the Northwest, Cuyo, Pampa and Patagonia. Below, we provide a brief overview for the volume, highlighting its major themes, and findings for future consideration.

2. The papers

In order to adequately understand the complex interaction between past climates, geomorphic processes and cultural systems (Smith, 2013), archaeology requires specific methodologies which are capable of reconstructing both behavioural and non-behavioural processes that condition what is observable in archaeological contexts today. Several papers in this volume aim to provide a perspective on this topic.

Both Borrazzo and Leonardt et al. explore the influence of taphonomic processes on archaeological site formation, and the effect this can have on archaeological interpretation. At a broad scale, Leonardt et al. used a landscape taphonomy approach to investigate the archaeological record from the Genoa Valley - an area not previously investigated in the Chubut province, Argentina. Exploring three different types of landform (slope, wetland and salt lake), they found that much of the archaeological distribution could be explained by taphonomic processes operating in these specific environments, and highlighted the potential pitfalls of behavioural interpretations without good taphonomic understanding. Focussing on one area at the southern extremes of South America, Borrazzo investigates taphonomic mechanisms which affect the archaeological lithic assemblage and explores archaeological strategies for dealing with regional background noise (i.e. geofacts). She found that frequent winds of 90km/h in Patagonia can move surface artefacts of up to 5 cm in size, which in turn represents ~66% of the surface lithic record. This is an important finding, with deserts across



Fig. 1. The attendees of the 4th Southern Desert Conference.

the world frequently exposed to high velocity winds, and often containing an archaeological record dominated by surface finds (e.g. the Namib Desert on the west coast Africa).

A range of lithic studies are also included in this volume, which outline new techniques and approaches to the analysis of an assemblage, and providing useful insights and limitations to their application of past behavioural interpretation. **Ditchfield** in a detailed study of a Pleistocene assemblage from Bone Cave in southwest Tasmania (Australia) illustrated that the size of the raw materials available to Aboriginal people strongly influenced the archaeological formation of stone artefact assemblages; and understanding the raw material available to past societies is therefore essential in providing an accurate interpretation of their behaviour. **Ditchfield** also demonstrated that the smaller raw materials resulted in an increasing need for innovation within the assemblage, as hunter-gatherers sought to prolong and curate such a limited resource – along with demographic pressure and climate change, this may provide a further explanation for increasing societal complexity observed over the last 10,000 years. **Cardillo et al.**'s paper crosses the gap between methodological considerations and past behaviour in their review of Patagonian projectiles. In reviewing and undertaking statistical analysis of a large number ($n = 1445$) of these types of artefacts found in late Holocene contexts across Patagonia, they surprisingly found little broad-scale correlation, despite previous studies to the contrary. While, there was some evidence of overall latitudinal trends, with wide expanded blades to the north grading to more elongated ones to the south, there was extensive variation due to local conditions. These findings can now contribute to an improved understanding of the locales or territories of prehistoric societies across Patagonia, and caution against the common broad-scale typological assignment of material culture frequently adopted by researchers globally.

Franco et al.'s research includes the comparison of lithic technologies and climate change over the last 12,000 years in along the Santa Cruz and Chico River corridors in Patagonia. They show a complex story of colonisation, occupation and abandonment of regions analogously with large-scale climatic shifts over this time. Importantly, they demonstrate that along with mobility and foraging changes, lithic technologies are also modified during increasingly arid periods. This finding conforms with examples across the southern deserts of increasing investment and innovation in technology to maximize hunting and gathering returns

during periods of climatic deterioration, including microlithisation at ~5000 years ago in Australia, and pottery and the exploitation of wild seeds and !nara melons in the Namib (**Kinahan, 2016; Kinahan and Kinahan, 2006; Smith, 2013**). **Marsh et al.**'s research also presents a narrative of human-environment interactions at ARQ 18, a high elevation rockshelter in the Andes at San Juan, southern Argentina. Multi-disciplinary analysis of the archaeological record demonstrates occupation of the site early in the Holocene (~10.1ka) shortly after the region was de-glaciated, and likely forms some of the earliest evidence of people at these latitudes. Throughout the Holocene, occupation and mobility strategies are then dictated by a large-scale climate shift, with intensification as humidity increases, and abandonment during peak aridity.

The volume also has a particular focus on reconstructions of hunter-gatherer mobility and large-scale interconnectivity (e.g. trade and exchange) as key strategies to cope with desert landscapes and their inherent environmental fragility. In this volume, contributions by **Pintar et al.**, **Escola et al.** and **Cortegoso et al.** demonstrate how the geochemical analysis of obsidian can help reconstruct some of these patterns. At a regional scale, **Cortegoso et al.** present a comparative spatial analysis of the human use of two 'minor' obsidian sources (i.e. exhibiting low intensity of use at macroregional scale). They used the occurrence of asymmetric distributions to assess the existence of dominant geographic vectors of human access and use of the Andean highlands using an innovative application of GIS least pathway analysis. They found that the Andes, perhaps unsurprisingly, formed a significant barrier for past populations, but that hunter-gatherers on both sides of the mountain range exploited the obsidian sources in similar ways while developing on different societal and behavioural trajectories.

Undertaking the investigation of a small area of known obsidian sources in the high elevation inter-montane desert of Salt Puna, northwest Argentina, and applying X-Ray Fluorescence (XRF) analysis for geochemical sourcing, **Pintar et al.** produces an important record of local hunter-gatherer behavioural and territorial change. Their data demonstrates the progress of societal colonisation and territorial expansion of the region during the early and mid-Holocene through the activation and exploitation of obsidian sources. Importantly the study highlights that changing mobility strategies appear concurrent with rapid climate change, and likely represent the initiation and foundations of more formalised trade and exchange networks later in the Holocene. **Escola et al.**

continues the story begun in Pintar et al. through exploration of obsidian transport and trading networks in the Salt Puna region in the mid- and late Holocene. They use a range of geochemical analyses to show the changing importance of obsidian sources as populations become established and transform into consolidated agropastoral societies. **Marsh** also explores the emergence of agropastoralism during the late Holocene. In an important and innovative application of Bayesian modelling and adaptive cycles, Marsh shows that the adoption and spread of agro-pastoralism along the banks of Lake Titicaca may have occurred in as little as 400 years. This is incredibly fast, perhaps 10 generations, and highlights the importance of high-resolution studies in future archaeological research both in Peru and further afield.

While applying different analytical techniques, **Pasqualini et al.**'s research also undertakes the high-resolution investigation of a small area of the semi-arid Santa Cruz province (Patagonia, Argentina) to understand and characterise hunter-gatherer foraging and mobility strategies. They explore and document the archaeological record of a number of different site types from the last 2500 years, including hunting blinds, extraction and occupation sites. Despite climate fluctuations, they demonstrate that a complex strategy of logistical behaviour during this time, allowed a range of relatively resource-poor heterogeneous environments to be successfully adapted by populations for survival and growth. Mobility is also a central theme presented in **Frigolé and Gasco's** paper, focused around the role mobility plays in managing economic risk in the late Holocene in north-western Mendoza. They combine both osteometric analyses on camelid bones and petrographic analyses on pottery sherds to help elucidate an inter-environmental seasonal mobility pattern supplemented by hunting, herding and storage strategies, including some llama castration. They suggest that llama caravans may have played a role in this mobility strategy, especially given the presence of non-local Chilean pottery – a finding requiring further investigation in the future.

We conclude the volume with **Berón's** contribution, since in her study of the arid west Pampa, she provides a wonderful review and summary of the general prehistory of hunter-gatherers and their interaction with desert environments in Argentina over the last 9000 years. She highlights the importance of watering holes and reservoirs within the desert as foci for the archaeological record for all peoples, and of such importance to the researcher. Her paper also provides one of the only studies that discuss the most recent impact to the desert societies - the arrival and conquest of the Spanish in the 16th Century.

3. Conclusions and future directions

The Southern Desert Conference series is intended to foster collaborative and interdisciplinary pan-continental comparisons of deserts and their myriad of dimensions, especially within the realms of archaeology and palaeo-climatic research. The series represents an important gathering of researchers interested in arid environments across the world, and provides an indication of current focus and themes. Significant progress appears to have been made since the last conference seven years ago, where the focus was necessarily on trying to achieve just a broad understanding of archaeological and climate systems in these regions – Pleistocene sites in South America were but a whisper, while much of the Australian deserts had yet to be physically investigated, and there was a desperate need for greater inter-continental collaboration. This volume showcases how far research has come, with the larger picture of desert climate, colonisation and occupation now understood (at least conceptually), and focus shifting to more detailed spatial and temporal resolution studies. The current narrative is

seeking to flesh-out the story, and provide a greater understanding of the behaviours and lives of hunter-gatherers in semi-arid and arid environments. While inter-continental collaboration is also greatly improved with several international networks formed; and an increasing opportunities for meetings and gatherings of researchers, such as the *Spanning the Atlantic: Human Palaeodemography in Southern Hemisphere Drylands* series (a Leverhulme Trust: International Network Grant led by Prof. Peter Mitchell).

In this volume, we include a number of papers that demonstrate this shift in focus, and include exploration of taphonomic processes, lithic analysis, Bayesian modelling, sourcing studies, and multi-disciplinary approaches. The papers all indicate the importance of major climatic events in the behaviour and demographic change of hunter-gatherers. In South America, this is especially evident during the early Holocene climatic optimum (8–6ka), and increasing aridity in the mid-Holocene (6–4ka) – similar conditions are evident in both Australia and parts of South Africa at broadly similar times. However, moving beyond the classic environmental deterministic philosophy of the 20th Century, the results here suggest that past societies responses were non-linear, and included technological innovation, demographic correction and local changes to mobility and land-use activities. The studies also highlight key intersections in the landscape, such as raw material sources and water-holes, as important to both past societies and today's researcher of the past.

This volume and the wider conference series provide several future directions for arid zone research. In the first instance, it demonstrates how much is still left to do. Despite seven years since the last conference, the level of on-ground data is still sparse especially in Australia and Africa. As demonstrated in this volume, once significant data becomes available in a region, a range of methods can be applied and stories told about past societies. Further data is desirable in Africa, where data is largely constrained to a handful of researchers, including Dr. John Kinahan, Prof. Peter Mitchell, Dr. Brian Stewart, Dr. Jason Orton, Prof. Mike Chazan, Dr. David Morris, and Dr. Ralf Vogelsang in Namibia and various parts of South Africa; and the palaeoclimatic works of teams lead by Prof. David Thomas in Botswana and Dr. Brian Chase in Namibia and South Africa. While in Australia, a number of the deserts remain largely un-investigated (certainly beyond the margins), including the Simpson Desert, Great Sandy Desert, Gibson Desert, Great Victorian Desert, and Tanami Desert. Similarly, palaeoclimatic data is fairly sparse, and heavily biased towards the temperate and tropical regions of the continent.

This volume also demonstrates a range of new methods and approaches that can, and should be, adopted more widely across arid zone research. Of note, is the use of non-destructive elemental analysis (e.g. XRF) to define common sources of raw material, and map routes of hunter-gatherer migration, movement and trade. Obsidian is unfortunately sparse in Australia, but some attempts have been made on volcanic axes ([Grave et al., 2012](#)), and the application to other raw material types may prove fruitful. In East Africa, obsidian and other volcanic material is prevalent, and the technique has been explored (e.g. [Coleman et al., 2008](#)), but increasing high-resolution studies has potential to significantly advance our understanding. With increasing application of radiocarbon data as a proxy for human activity in the archaeological literature, the application of Bayesian modelling as presented in Marsh (this volume) is also worth pursuing elsewhere. This study found massive change in societal behaviour in a very small period of time, and highlights the speed of change in these systems – something that should be explored in other societies across the southern deserts. Finally, the papers in this volume frequently apply multi-disciplinary approaches to understand human and environment change, often with great success. We would certainly recommend

that future investigations in the desert maximize their returns through a multi-disciplinary approach.

Given the success of the conference series, and previous research outputs, we would, of course, also recommend the continued intra- and inter-continental co-operation and engagement to promote inter-disciplinary agendas (e.g. Veth et al., 2014; Williams et al., 2008), and explore both the similarities and differences in societal development across the arid regions of the world. Given the results of this volume, future development around its major themes will undoubtedly provide exciting new research.

Finally, we like to acknowledge the effort and work of staff and the editorial board and Quaternary International for their help in making this volume. We also highlight to readers the 5th Southern Desert Conference that is proposed in Western Australia in the next few years.

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