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## Archaeological science in southern South America: An introduction

The approach that can be succinctly described as ‘archaeological science’ has grown beyond any predictions made during the last four decades. Recently published data helps to illustrate the magnitude of this evolution. In 1982 the Journal of Archaeological Science published four issues with 28 articles that occupied 409 pages, while in 2014 it published 12 issues containing 480 articles spanning 5128 pages (Torrence et al., 2015, 1–2). This is the historical context of the discipline where the Journal of Archaeological Science: Reports emerged in 2015 as a sister publication aimed at disseminating the ever-growing “... results of the application of scientific methods to archaeological problems and debates, as well as providing a forum for reviews and discussion of issues in scientific archaeology and their impact in the wider subject” (Hunt and Howard, 2015, 1).

While Europe, the USA and more recently China account for most of this recent academic development, the contribution from South American researchers has been growing steadily during the last ten years. For instance, while 19 papers with Argentinean researchers as lead authors were published in the Journal of Archaeological Science in the period 1995–2004, the period between 2005 and 2014 saw the publication of 49 articles (Torrence et al., 2015, Fig. 3). This special issue contains 19 papers, which, in the spirit of the *Journal of Archaeological Science: Reports*, develop interdisciplinary case studies by applying multiple lines of research from the domain of ‘archaeological science’. This special issue arises from the symposium entitled “*Archaeometric approaches: methodological discussions and case studies in Archaeology and Palaeoecology*”, held in 2016 in Tucumán City, as the XIX National Congress of Argentinean Archaeology. While certainly not exhaustive, this set of papers provides a flavor of the vibrancy of archaeological science in southern South America, including papers focused on stable isotopes and trace elements in human, faunal and plant remains, climate change and human paleoecology, geochemical characterization of pigments and rocks, DNA and the analysis of organic residues.

The papers included in this special issue use analytical techniques to address major questions and problem-focused research. This is most visible in the integration of datasets with different levels of theory, as well as in the strategic combination of diverse proxies that elucidate different aspects of the dynamics of past human societies and their impact on ecosystems.

The papers are organized in three main domains of archaeological enquiry: a) archaeometry, conceived as the measurement of physical and chemical properties of archaeological materials (Duarte Cavalcante et al., Killian Galvan, Lynch Ianniello et al., Samec et al., Grant et al., Dantas and Figueroa, Lantos et al., Durán et al., Maximiano Castillejo et al., Crespo et al., Kochi et al.); b) human palaeoecology, integrating

diverse proxies on climate change (Morales M. et al., Pirola et al., Burry et al., Meléndez et al., Giaché and Bianchi, Fernández et al.); and c) formation processes of the archaeological record, including in the fields of taphonomy and geoarchaeology (Morales N. et al.).

Archaeometric approaches account for a large part of the articles in the special issue, illustrating the growing maturity of ‘archaeological science’ in southern South America. Stable isotopes provide a particularly innovative field of research in South America and beyond (Makarewicz and Sealy, 2015), growing not only in the robustness of the modeling tools utilized to interpret isotope values, but also in the combination of concepts from different theoretical approaches. The issue of human and animal life histories is key in this realm (Szpak et al. 2016; Torres-Rouff and Knudson, 2017). Having begun in the late 1970s, it seems evident at this stage that stable isotopes have gradually revolutionized archaeological practice.

The interdisciplinary reconstruction of climate and landscape change framed in archaeological projects has the virtue of adjusting – within possibilities – field sampling and analytical scales to archaeological questions. The paper by N. Morales et al. is the only one assessing the formation processes of the archaeological record. Interestingly, the authors explore an innovative approach to bone bioerosion, which is not only highly informative about regional patterns of bone preservation, but also cost and time effective.

This widely encompassing, though far from exhaustive set of papers has the merit of providing an updated image of the development of ‘archaeological science’ in southern South America. We are currently facing a number of challenges that are inherent to the growth of the discipline internationally. As usual, the task in front of us in years to come will not only be empirical and methodological, but also theoretical. We need to build increasingly robust and sophisticated frames of reference for the interpretation of archaeometric and palaeoecological data, while keeping in mind that their wide archaeological impact will only be achieved by meaningfully connecting the data with significant questions about human behavior in the long-term.

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