Chapter 19

Social Interaction and Communities of Practice in Formative Period NW Argentina: A Multi-Analytical Study of Ceramics

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Abstract

The study of long-distance exchange of goods and resources has long been central to the understanding of socio-political and cultural complexity in the south-central Andes. Traditional studies have emphasized typological similarities to reconstruct regional networks, proposing the dominance of different centres through time. While these approaches were informative on the general direction of contacts, the nature and scale of interaction has remained speculative. This chapter summarises the latest results of our ongoing research project on long-distance circulation of archaeological materials in northwestern Argentina during part of the Formative Period (ca. 1500 BC-AD 1000). The study applied a multianalytical methodological strategy integrating archaeological analysis with archaeometric techniques, including thin section petrography, instrumental neutron activation analysis (INAA) and laser ablation inductively coupled mass-spectometry (LA-ICP-MS) in order to contribute an evidence-based holistic view of pre-Hispanic exchange networks. The study examined materials traditionally studied separately, including 542 ceramic samples and 113 obsidian and volcanic rock artifacts, from seven sectors in the semi-arid valleys area. We summarize here the results of the ceramic analysis, showing the following trends: (1) inter-valley *heterogeneity* of clay and fabrics for *ordinary wares*; (2) inter-valley *homogeneity* of clay and fabrics for a wide range of *decorated wares*; (3) selective circulation of *two distinct* polychrome wares. These trends reflect the complex inter-community relationships experienced in small-scale societies. The study offers a new platform to model ancient exchange, and circulation and interaction more broadly, based on actual material transfers. The results call for the re-examination of the centralized models of exchange and interaction that are often drawn upon to account for emergent cultural complexity in the past, both in the Andes and beyond.

Introduction and background

The study of long-distance exchange of goods and resources has long been central to the understanding of socio-political and cultural complexity in the south-central Andes (Browman 1984; Nielsen 2013; Núñez and Dillehay 1978; Smith and Janusek 2014; Stanish et al. 2010). Compositional analysis of archaeological materials can offer an empirical approach to the multiplicity of ancient socio-spatial relationships that result from the long-term mutual obligations established across communities, what following Gosden (1989) can be called 'social landscapes'. In the south-central Andes, traditional studies have approached such social landscapes through the typological similarities identified in artefacts found in distant areas, hypothesizing the regional predominance of different centers through time (e.g., González 1998; Pérez Gollán 2000). In recent years, geochemical and mineralogical studies have been implemented throughout the region (e.g., Burger et al. 2000; Escola 2004; Laguens et al. 2007; Ratto et al. 2007; Scattolin and Lazzari 1997; Yacobaccio et al. 2004) to complement typological approaches, yet their selective focus on individual classes of archaeological evidence (i.e., either pottery or obsidian) has concealed the substantial complexity of the region's ancient circulation networks. Here we propose that the intricate structure of relationships supporting these ancient networks can only be detected through a multi-analytical strategy that considers different classes of artifacts simultaneously.

[INSERT Figure 19.1 near here]

In the south-central Andes, llama-assisted long-distance circulation of goods supported integrative reciprocal ties across the region, also providing a wealth of resources that enabled the development of socio-political hierarchies (Aschero 2007; Berenguer and Dauelsberg 1989; González 1998; Llagostera 1996; Núñez and Dillehay 1978; Tarragó 1996). In this context, the Alamito culture within Campo del Pucará (ca. AD 100-500, Campo from now on), and the Aguada complex in the Ambato Valley (ca. AD 600-900, Ambato from now on) (Figure 19.1), have been proposed by early researchers (e.g., Núñez Regueiro 1998; Núñez Regueiro and Tartusi 1990, 2002; Pérez Gollán 2000) as nodes that controlled the regional dissemination of materials and ideas across northwestern Argentina (NWA) at subsequent periods in the region's prehistory. However, archaeological data indicate that these areas were actually anomalies within the social landscape of NWA's Formative Period, which was largely characterized by settlements consisting of scattered residential units surrounded by agricultural enclosures and animal pens, with a generalized access to a variety of artifacts and materials (Korstanje 2007; Lazzari 2006; Lazzari et al. 2009; Scattolin 2006a, 2006b). We propose here that the standard model of long-distance interaction, which argues for the successive pre-eminence of centres controlling regional networks, must be evaluated in the light of newly acquired archaeological, technological and compositional data.

This chapter presents the latest results of our ongoing research project on long-distance circulation of archaeological materials in NWA during part of the Formative Period (ca. 1500 BC-AD 1000)[1]. Our approach is based on a multi-analytical methodological strategy including archaeological, archaeometric, petrographic, and spatial analysis of artifacts previously studied separately, in order to contribute an evidence-based holistic view of pre-Hispanic exchange networks. The study examined 542 ceramic samples and 113 obsidian and volcanic rock artifacts, from seven sectors in the semi-arid valleys sub-area of NWA (Figure 19.1). We summarize here the results of the ceramic analysis.

Materials and Methods

The study focused on materials from the areas where we have been conducting systematic archaeological work for more than 30 years, namely the western hillside of the Aconquija Sierra (Aconquija), the CajónValley (Cajón), the Santa María Valley (Santa María) and the El Bolsón Valley (Bolsón) (Figure 19.1). Ceramic samples from neighbouring valleys and basins, such as Campo del Pucará (Campo), Hualfín Valley (Hualfín), Quebrada del Toro (Toro), the Lerma Valley (Lerma), the Calchaquí Valley (Calchaquí), and the site Soria 2 were provided by museum collections and other research projects. The methodology included thin section petrography and instrumental neutron activation analysis (INAA) for ordinary and decorated wares, and targeted laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS) for two distinct polychrome wares (Condorhuasi and Vaquerías), in order to assess earlier hypotheses concerning their non-local origin (González and Baldini 1989; Núñez Regueiro 1998).

Thin section petrography was conducted on 299 sherds (55 percent of the chemical sample), through point-counts as well as qualitative analysis, identifying a total of 16 groups in three large classes: coarse, intermediate and fine. Chemical analysis was conducted following MURR standard procedure, as discussed in Chapter 1 of this volume. The first stage of analysis once the chemical data was obtained was to create core reference groups, based on hierarchical cluster analysis (HCA), principal components analysis (PCA), and inspection of elemental plots. The core reference groups were then validated by jack-knifed Mahalanobis Distance-based probabilities, which led to minor adjustments. In total, only 236 specimens were assigned to core groups, forty-three percent of all ancient pottery submitted for analysis. Second, a canonical discriminant analysis (CDA) was conducted on the core reference groups, and the discriminant functions were used to assign the remaining specimens to the best group[2]. The study also obtained chemical data for clay samples from 10 known sources, submitted as 19 experimental bricks with varying degrees of aplastics. Batches were fired at 650°C and 900°C, and one sample at 500ºC. The study also included two samples of archaeological raw clays and two modern pottery samples manufactured from other local clays. All elemental data and sample descriptions can be accessed from the MURR Archaeometry Laboratory website: http://archaeometry.missouri.edu/datasets/datasets.html.

Summary of results

The results of chemical analysis show twelve core groups and eight macrogroups relevant to the sample under study (Figure 19.2). Some of the clay samples approximate the chemical groups discussed below, but these trends are not sufficiently strong to assert membership of the clay samples into the chemical groups. Based on the petrographic and geochemical results, we identified the following main trends in the data: (1) inter-valley *heterogeneity* of clays and fabrics in *ordinary* wares within the core study area; (2) inter-valley *homogeneity* of clays and fabrics for *decorated* wares within the core study area; (3) selective circulation of two *distinct* polychrome wares, one of which is clearly non-local to the core study area.

[INSERT Figure 19.2 near here]

1) Inter-valley *heterogeneity* of clays and fabrics in ordinary wares within the core study area

Thin section petrography identified five coarse fabric groups (thirty-three to forty-six percent of intentionally added sand with fairly wide granulometric range), with spatial distributions limited to particular valleys/areas (Aconquija, Cajón, Santa María, Campo, and Toro). Petrography also identified nine groups of intermediate fabrics (sixteen to thirty-three percent of intentionally added sands of diverse granulometric range), with a slightly less restricted spatial distribution compared to the coarse fabrics (e.g., intermediate fabrics D and E appear both at Aconquija and Santa María).

Chemical results obtained for ordinary wares have assigned the samples to five macrogroups (MG3, MG5, MG6, MG8, MG11), agreeing fairly well with the results of petrography analysis and with the chemical group structure identified through previous analyses

(Lazzari et al 2009). As discussed in Chapter 1, the criterion of abundance is typically used to establish source areas in geochemical studies of ceramics. However, our sample reflects the uneven access to collections related to the research history of the region, which prevents us from simply inferring the location of a source area from the relative abundance of a chemical group in a particular valley. Taking in consideration both archaeological and archaeometric criteria, we propose the following association between chemical group and source area: MG3 to southern Santa Maria/southern Aconquija; MG5 to Aconquija-Campo; MG6 to mid-Santa Maria; MG8 Aconquija-Campo; MG11 to Toro. These assignments should be treated as a working hypothesis for future clay sampling and analysis.

2) Inter-valley *homogeneity* of clays and fabrics for *decorated wares* within the core study area

Petrographic analysis showed that decorated wares could have intermediate pastes, however, the majority of the decorated wares had either a fine fabric with very low percentage of intentionally added very fine aplastics (fabric L, ten to thirty percent) or a fine fabric with absence of intentionally added aplastics (fabric M). Petrography was unable to establish a clear correlation between different styles of decoration and fabrics L and M, nor was it able to identify distinct spatial distributions for these fabrics. The two fine fabrics are also fairly continuous across time in the core study area. These results, however, agree well with the results of INAA, which was able to distinguish two distinct chemical groups for decorated wares, MG2 and MG7, both with predominately fine fabrics, which also occur in most valleys and throughout the period considered here. At present, there is not a clear difference in the frequency of fabrics M and L in

MG2 and MG7. However, it appears that MG2 was mostly used for decorated wares, whereas MG7 was used for some decorated wares as well as for ordinary wares. Among the decorated wares done with MG7, some have Fabric M (without any aplastics). This points at the existence of common style of manufacture that was employed to make decorated wares at different locations and with different clays. It should be noted that the vast majority of assigned decorated wares (seventy-six percent) fall within MG2, while many of the unassigned specimens are also chemically similar to MG2. Considering chemical and archaeological data, and experimental clay data, we propose northern Santa María as the potential source area for MG2, and Hualfin-BV for MG7.

3) Selective circulation of two *distinct* polychrome wares: The cases of Condorhuasi and Vaquerías

LA-ICP-MS was applied to a total of 96 samples including Condorhuasi, Vaquerías, and contextually associated ordinary wares, which were also analyzed through thin section petrography and INAA. The results of the three techniques agree in identifying Vaquerías wares, with distinct metamorphic components, as originally manufactured in the Toro and/or Lerma areas. Fifty-six percent of the Vaquerías samples analyzed through petrography fall within INAA Group MG9, which showed their unique temper to be high in Sb. The clay fraction is also fairly homogenous, as ninety percent of Vaquerías samples fall within LA-ICP-MS Group A. The study also showed that the potters who made Vaquerías style used different clay than the one they used for ordinary wares in Toro, which were made with LA-ICP-MS Group D clay. The results strongly indicate the existence of a consistent technical mode and clay choice for this ware across the samples obtained at various locations.

The combined petrography and INAA results for Condorhuasi suggested that Aconquija-Campo were the likely source areas, but could not distinguish between the two. The LA-ICP-MS analysis of clay fractions of both Condorhuasi and associated ordinary wares showed that ninety-three percent of the Condorhuasi samples recovered at sites in Aconquija and Campo were all made with ICP-Group B clay, while seventy-seven percent of Campo ordinary wares also fall in this group. These samples are chemically distinct from ordinary wares found at Aconquija sites, which all fall in LA-ICP-MS Group C. At the same time, five ordinary samples from Campo were included in LA-ICP-MS Group E, which is characterized by high Rb and Cs. This group is tentative and further studies may suggest these samples are better considered to be outliers. It should be noted that these samples were all included in INAA Group MG8 (including ordinary wares from Aconquija and Campo, see above), which was also defined based on its extreme values of Cs and Rb. These results strongly support the hypothesis that Condorhuasi wares from these two areas were made at sites in Campo, or a nearby area.

Discussion

Ceramic results show a strong agreement among analytical techniques for ordinary and decorated wares, highlighting both the existence of clear distinctions in ordinary wares across specific valleys and areas, and at the same time, the absence of geographical specificity fabric and chemical composition of most decorated wares throughout the millennium. Clearly middle-range distance networks of this period involved the circulation of raw materials, artifacts, and the non-exclusionary transmission of skills. It can be said that the core study area had an enduring tradition of manufacture, with local variations, as initially proposed by petrographic analysis (Pereyra Domingorena 2010).

Against this long-term pattern of ceramic manufacture and circulation, the networks related to Condorhuasi and Vaquerías were temporally limited (400 BC-AD 100), directionally selective, and with fairly localized production. However, this should not lead to the conclusion that the areas of production dominated regional networks. More than ‘centres’ these areas were included within closely knit communities of practice (Gosselain 1998), Campo-Aconquija and the Lerma/Toro basin, with varying regional projection. Equally, the absence of Ambato Valley chemical compositions as described in Laguens et al. (2007) among our samples, minimizes the purported controlling capacity of Aguada Ambato sites over regional networks towards the middle and late portions of the first millennium AD.

While the core study area was highly integrated through the circulation of materials and skills, this integration was neither seamless across space, nor uniformly stable throughout the period considered. The results of this multi-analytical approach allow us to map the numerous and overlapping spaces for resource acquisition and exchange, hinting at the intricacy of the conflictive demands and expectations these communities experienced. The multiplicity of such networks, with overlapping mutual demands and expectations, surely put enormous pressure on this period’s small-scale economies, yet it also created spaces where it was possible to elude the cooptation attempts of those seeking to enhance their regional preeminence. The results of this study call for the re-examination of the centralized models of exchange, and of circulation and interaction more broadly, that are often used to account for emergent cultural complexity in the past, both in the Andes and elsewhere. We recognize that our conclusions are based on the recovered data and that future sampling may alter our interpretation.

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References

Aschero, C.A.
2007 Iconos, huancas y complejidad en la puna sur Argentina. In: Nielsen, A.E., Rivolta, M.C., Seldes, V., Vázquez, and Mercolli, P.H. (eds.), *Producción y circulación prehispánicas de bienes en el sur andino,* Vol. 1. Editorial Brujas, Córdoba, pp. 135-166.

Berenguer R., J. and Dauelsberg, P.
1989 El Norte grande en la órbita de Tiwanaku (400 a 1200 d.C.). In: Hidalgo, J., Schiappacasse, V., Niemeyer, H., Aldunate, C., and Solimano, I. (eds.), *Culturas de Chile.*

Prehistoria, desde sus orígenes hasta los albores de la conquista. Editorial Andrés Bello, Santiago de Chile, pp. 129-180.

Browman, D.L.
1984 Prehispanic Aymara expansión in the Southern Altiplano and San Pedro de Atacama. *Estudios Atacameños* 7: 236-252.

Burger, R.L., Mohr Chávez, K., and Chávez, S.J.
2000 Through the glass darkly: pre-Hispanic obsidian procurement and exchange in southern Peru and northern Bolivia. *Journal of World Prehistory* 14(3): 267-362.

Escola, P.S.
2004 Variabilidad en la exploitación y distribución de obsidians en la Puna Meridonal Argentina. *Estudios Atacameños* 28: 9-24.

González, A.R.
1998 *Arte precolombino. Cultura La Aguada. Arqueología y diseños*. Filmediciones Valero, Buenos Aires.

González, A.R. and Baldini, M.
1989 Vaquerías: la más antigua alfarería polícroma del Noroeste argentino. *Más allá del Objeto, Artinf* 78-79(14): 8-12.

Gosden, C.
1989 Prehistoric social landscapes of the Arawe Islands, West New Britain Province, Papua New Guinea. *Archaeology in Oceania* 24(2): 45-58.

Gosselain, O.P.
1998 Social and technical identity in a clay cristal ball. In: Stark, M.T. (ed.), *The Archaeology of Social Boundaries.* Smithsonian Institution Press, Washington, DC, pp. 78-106.

Korstanje, M.A.
2007 Territorios campesinos: producción, circulación y consumo en los valles altos. In: Nielsen, A.E., Rivolta, M.C., Seldes, V., Vázquez, and Mercolli, P.H. (eds.), *Producción y circulación prehispánicas de bienes en el Sur Andino*, Vol. 2. Editorial Brujas, Córdoba, pp. 191-223.

Laguens, A., Giesso, M., Bonin, M., Speakman, R.J., Glascock, M.D., Manasse, B., and Kristkautzky, N.
2007 Estudio de producción y distribución de la cerámica gris-negra grabada del valle de Ambato, Argentina (ca. 300–1000 d.C.). In: Cremonte, M.B. and Ratto, N. (eds.), *Cerámicas Arqueológicas: perspectivas arqueométricas para su análisis e interpretación*. EdiUNJu, San Salvador de Jujuy, pp. 147-167.

Llagostera, A.
1996 San Pedro de Atacama: nodo de complementariedad reticular. In: Albó, X., Arratia, M.I., Hidalgo, J., Núñez, L.A., Llagostera, A., Remy, M.I., and Revesz, B. (eds.), *La integración surandina: cinco siglos después*. Estudios y Debates Regionales Andinos, Vol. 91, Centro de Estudios Andinos Bartolomé de las Casas, Cuzco, pp. 17-42.

Lazzari, M.
2006 Travelling things and the production of social space. An archaeological study of value and circulation in NW Argentina, first millennium AD. PhD dissertation, Columbia University, New York.

Lazzari, M., Pereyra Domingorena, L., Scattolin, M.C., Glascock, M.D., Cecil, L., and Speakman, R.J.
2009 Ancient social landscapes of north western Argentina: preliminary results of an integrated approach to obsidian and ceramic provenance. *Journal of Archaeological Sciences* 36: 1955-1964.

Nielsen, A.E.
2013 Circulating objects and the constitution of South Andean society (500 BC - 1500 AD). In: Hirth, K.J. and Pillsbury, J. (eds.), *Merchants, Markets and Exchange in the Pre-Columbian World*. Dumbarton Oaks, Washington, DC, pp. 389-418.

Núñez A., L. and Dillehay, T.
1978 *Movilidad giratoria, armonía social y desarrollo en los Andes Meridionales: patrones de tráfico e interacción económica*, Antofagasta, Universidad Católica del Norte.

Núñez Regueiro, V.
1998 *Arqueología, Historia y Antropología de los Sitios de Alamito*. INTERDEA, San Miguel de Tucumán.

Núñez Regueiro, V.A. and Tartusi, M.
1990 Aproximación al estudio del área pedemontana de Sudamérica. *Cuadernos del Instituto Nacional de Antropología* 12: 126-154.

2002 Aguada y el proceso de integración regional. *Estudios Atacameños* 24:9-19

Pereyra Domingorena, L.
2010 Manufacturas alfareras de las sociedades aldeanas del primer milenio d.C. al sur de los valles Calchaquíes. PhD dissertation, Facultad de Filosofía y Letras, Universidad de Buenos Aires, Buenos Aires.

Pérez Gollán, J.A.
2000 El jaguar en llamas (La religión en el Noroeste argentino). In: Tarragó, M.N. (ed.), *Nueva Historia Argentina. Los pueblos originarios y la conquista*. Editorial Sudamericana, Buenos Aires, pp. 229-256.

Ratto, N., Feely, A., and Plá, R.
2007 La producción alfarera en el bolsón de Fiambalá (Departamento Tinogasta, Catamarca) y su alcance extra-regional. In: Cremonte, M.B. and Ratto, N. (eds.), *Cerámicas arqueológicas: perspectivas arqueométricas para su análisis e interpretación*. EdiUNJu, San Salvador de Jujuy, pp. 123-146.

Scattolin, M.C.
2006a De las comunidades aldeanas a los curacazgos en el Noroeste Argentino. *Procesos y expresiones de poder, identidad y orden tempranos en Sudamérica. Boletín de Arqueología PUCP* 10: 357-398.

2006b Contornos y confines del universo iconográfico precalchaquí del valle de Santa María. *Estudios Atacameños* 32: 119-139.

Scattolin, M.C. and Lazzari, M.
1997 Tramando redes: obsidianas al oeste del Aconquija. *Estudios Atacameños* 14: 189-209.

Smith, S.S. and Janusek, J.W.
2014 Political mosaics and networks: Tiwanaku expansion into the upper Desaguadero Valley, Bolivia. *World Archaeology* 46(5): 681-704.

Stanish, C., de la Vega, E., Moseley, M., Williams, P.R., Chávez, C., Vining, B., and LaFavre, K.
2010 Tiwanaku trade patterns in southern Peru. *Journal of Anthropological Archaeology* 29: 524-532.

Tarragó, M.N.
1996 El Formativo en el Noroeste Argentino y el Alto Valle Calchaquí. *Actas y memorias del XI Congreso Nacional de Arqueología Argentina (11ª parte). Revista del Museo de Historia Natural de San Rafael* 23(1-4): 103-119.

Yacobaccio, H.D., Escola, P.S., Pereyra, F.X., Lazzari, M., and Glascock, M.D.
2004 Quest for ancient routes: Obsidian sourcing research in Northwestern Argentina. *Journal of Archaeological Science* 31(2): 193-204.

Notes

[1] The pre-Columbian chronology of NWA is usually divided in the following way: Archaic or Pre-Ceramic Period (6000-1500 BC); Formative Period (ca. 1500 BC to AD 1000 - subdivided into Early, Middle and Late); Regional Developments Period (also known as Late Period, AD 1000-1436); Inca Period (AD 1436-1536).

[2] Whereas core groups represent a very conservative group structure, macrogroups represent a more liberal assignment of unknown samples into reference groups. A specimen is assigned to a macrogroup if it has more than one percent probability of belonging to a core group and more than three times higher probability than the probability of belonging to any other group.

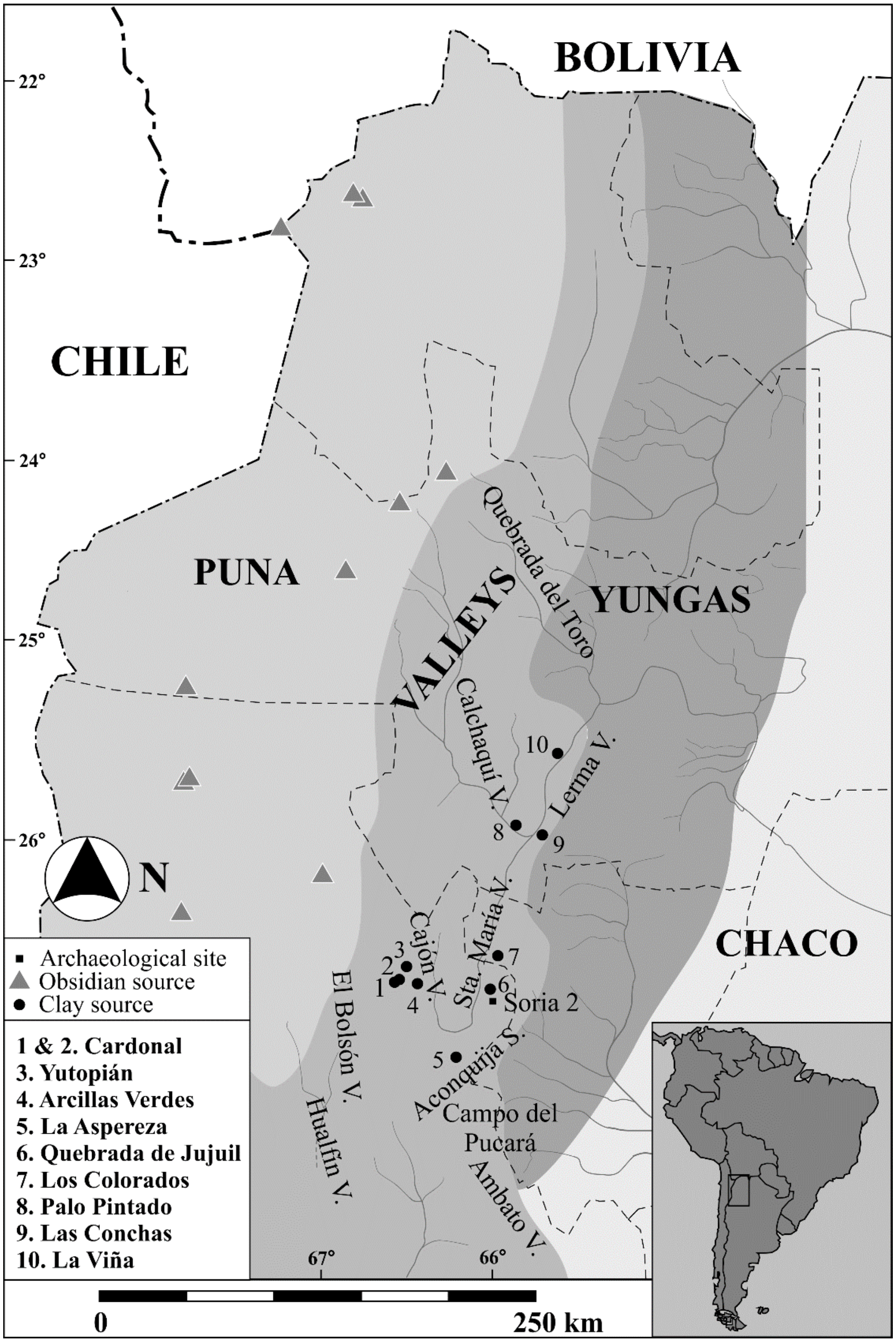

Figure 19.1. Map of study area showing principal areas and sites mentioned in the text.

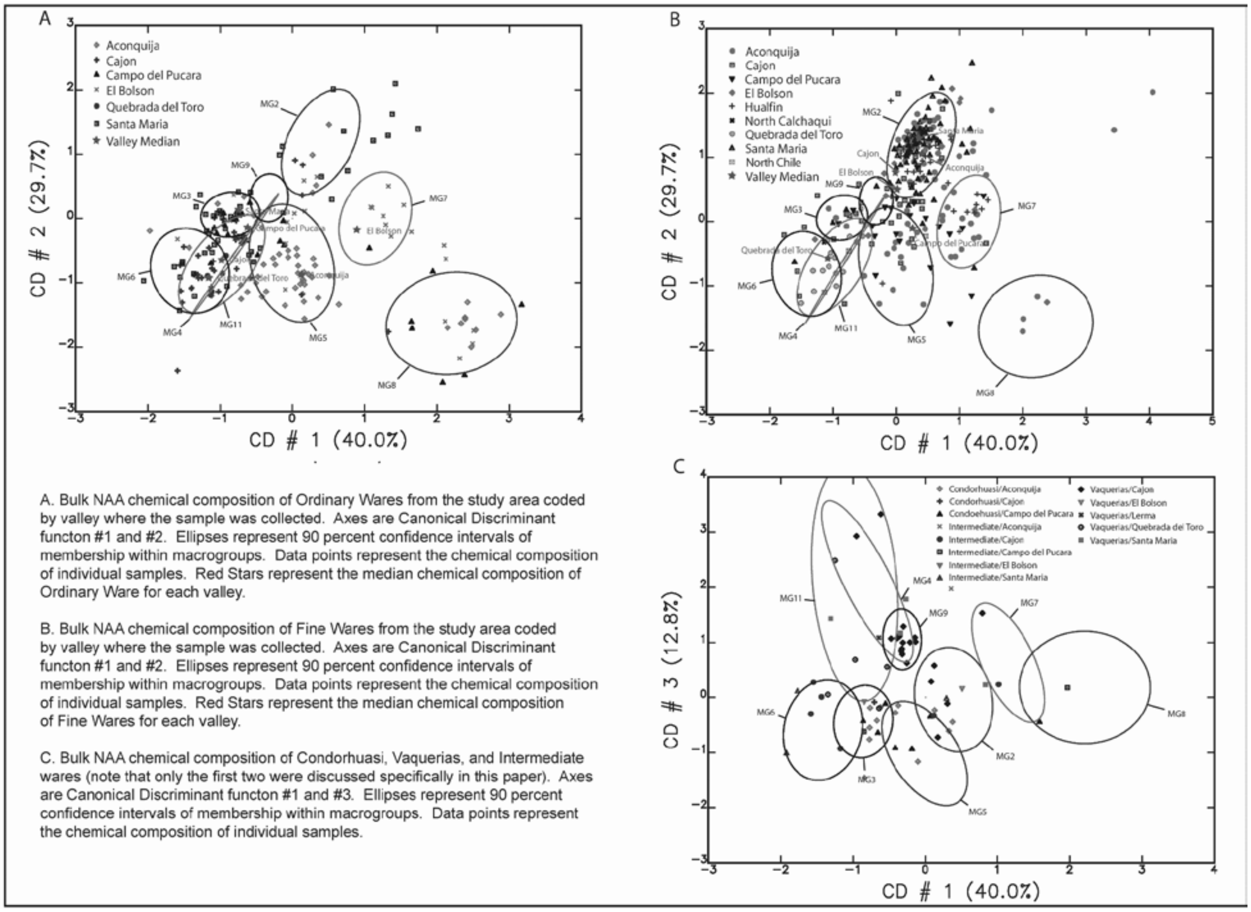

Figure 19.2. Bulk INAA data for (A) ordinary wares (B) decorated wares and (C) Vaquerías, Condorhuasi and intermediate fabric wares (note that only Vaquerías and Condorhuasi are discussed in this paper).