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Ceramic production and provenance in the Yiluo Basin (Henan, China): Geoarchaeological interpretations of utilitarian craft production in the Erlitou state

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ABSTRACT

Petrographic and portable X-ray fluorescence (pXRF) analysis performed on late Neolithic/early Bronze Age utilitarian ceramic assemblages from three high-level centers in the Yiluo River valley (Henan, China) – Erlitou, Huizui, and Shaochai – have identified discriminating features which serve as a basis for inferring community-level production loci on an intra-basinal scale. Principal among these are 1) a volcanic and sulfide-silica “Luo River” inclusion signature seen at Erlitou and Shaochai, 2) a metamorphic (amphibole gneiss and schist) signature seen almost exclusively in sherds from Huizui, and 3) a predominantly fine-grained siliciclastic and carbonate sedimentary lithic “Songshan Mountain” signature observed among sherds at both Huizui and Shaochai. The pXRF data help to further refine these petrographic provenance assignments. Identification of overwhelmingly “local” production signatures suggests that wares were not widely exchanged between the Erlitou urban core and the surrounding centers with much frequency during the Erlitou period (ca. 1900–1500 BCE). Domestic wares may have been produced for systems of local exchange among regional centers and surrounding rural potting communities utilizing ceramic raw materials found within shared geological resource zones. The persistence of local production signatures throughout the Yangshao (ca. 5000–3000 BCE), Longshan (ca. 3000–2000 BCE), and Erlitou periods at Huizui suggests that systems of localized ceramic production and exchange within the Yiluo basin were not significantly altered in response to processes of urbanism and regional economic integration characterizing formation of the Erlitou state.

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1. Introduction

The Yiluo River basin in western Henan, China (Fig. 1), is often considered “the heartland of early Chinese civilization” (Liu, 2005: 176). It was here, during the first half of the second millennium BC (the Erlitou period, ca. 1900–1500 BCE) that China's earliest state-level society¹ arose from among the various competing polities of the preceding Longshan period (ca. 3000–2000/1900 BCE) (Liu, 2000; Liu and Chen, 2003: 31). Processes of migration, population nucleation, and urban development throughout the early Erlitou period (Phases I and II, ca. 1900–1700 BCE) culminated in the emergence of a single large urban center – the Erlitou site (reaching a maximum extent of approximately 300 ha) – that dominated a political and economic landscape extending well beyond the confines of the Yiluo region (Liu and Chen, 2012: 263;

Liu and Xu, 2007). By Phase III (ca. 1700–1600 BCE), the Erlitou culture had developed a highly differentiated social hierarchy in which social status, prestige, and legitimacy were conveyed and maintained, in part, through highly specialized craft production systems (Liu, 2003; Liu and Chen, 2003: 62–63); a significant portion of Erlitou's estimated 18,000–30,000 inhabitants likely participated in craft production to some extent (Liu and Chen, 2003: 64). Highly centralized production of elaborate, labor-intensive prestige goods by the Erlitou state – including whiteware pottery and, most notably, ritual bronze vessels – provides evidence of a ruling political elite class preoccupied with the monopolization of exotic raw material resources, labor, means of skilled specialist production, and distribution networks (Liu, 2003; Liu and Chen, 2012: 268–272; Underhill, 2002). These state-controlled systems of craft production that developed during the Erlitou period ultimately outlived the Erlitou polity itself, which entered into a period of decline during Phase IV (ca. 1600–1500 BCE) that ultimately saw the Erlitou urban center reduced to an ordinary village during the Erligang period (ca. 1600–1250 BCE) prior to complete abandonment (Liu and Xu, 2007).

The study of the evolution of craft production systems in response to sociopolitical development, urbanism, and state formation is a common

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¹ Erlitou's status as the “first” Chinese state has been contested on the basis of subjectivity in the criteria for defining the state; similarly large, complex polities – e.g., Taosi in Shanxi, Shimao in Shaanxi, Liangchengzhen and Yaowangcheng in Shandong, Shijiaye in Hubei – may have dominated regional settlement hierarchies in the second half of the third millennium BC (see discussion in Shelach and Jaffe, 2014).

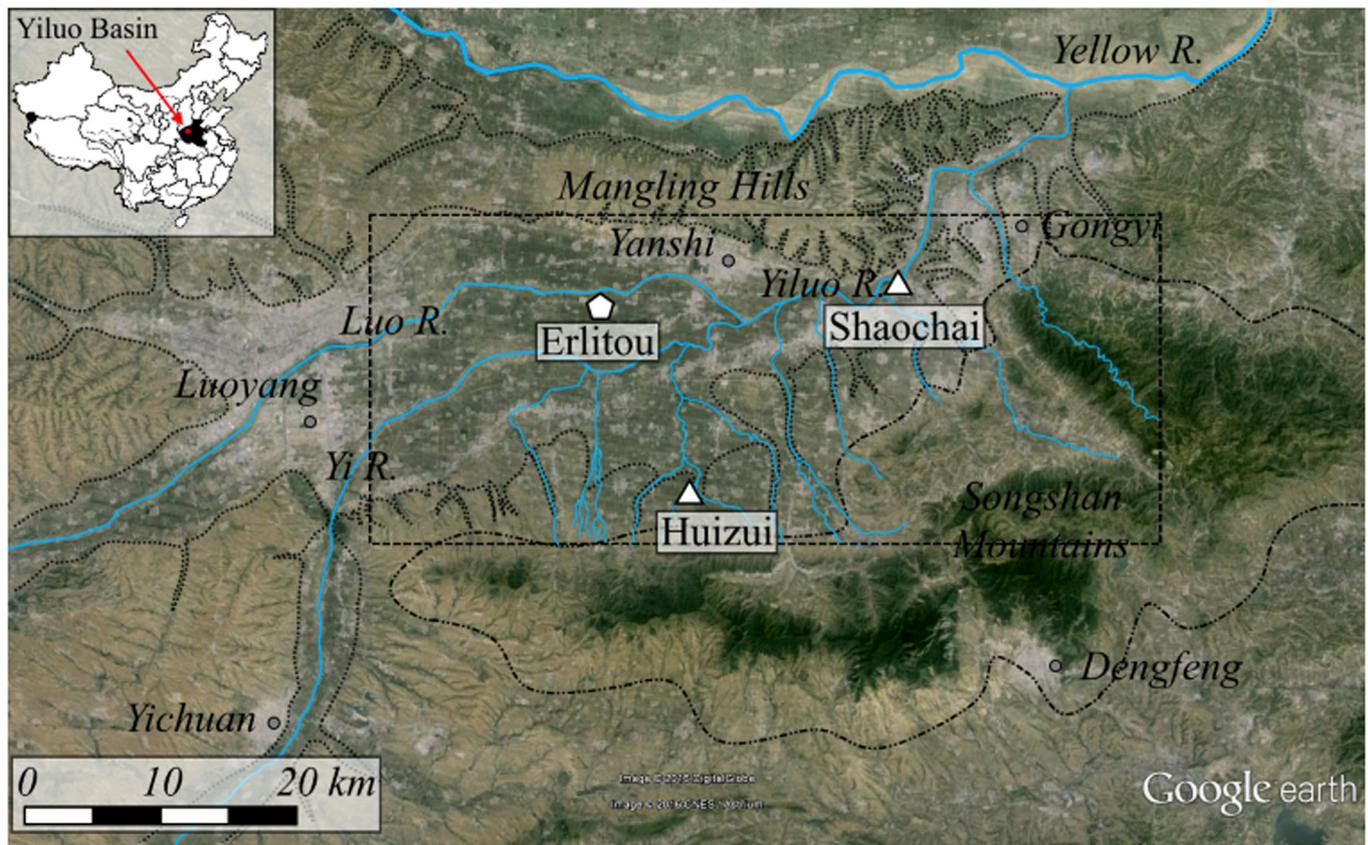


Fig. 1. The Yiluo River 1 basin in western Henan province, China, showing the locations of the primary urban center at Erlitou and secondary regional centers at Huizui and Shaochai. The bounding dashed rectangle depicts the area shown in Fig. 2.

archeological endeavor (e.g., Brumfiel, 1980; Dai, 2006; Fargher, 2007; Hirschman et al., 2010; Kurtz, 1987). Adaptive pressures on craft production systems are likely to develop first within systems characterizing production of elite goods: differential social demands are placed on objects with high social visibility that serve unique functions as media through which emerging elites are able to convey status, power, wealth, and the legitimacy of authority (Rice, 1981; Underhill, 2002). Archeological evidence from across the Erlitou political domain strongly suggests that the evolution of craft production systems characterizing elite or otherwise high-prestige goods were intimately associated responses to processes of urban development and state formation (Liu, 2003). However, knowledge of the timing and nature of relations between these processes and the production of non-prestige goods in the Erlitou state, particularly domestic or utilitarian ceramic wares, remains largely speculative due to a disproportionate focus in the archeological literature on the production of Erlitou's high-status objects. Such knowledge of non-elite production contexts is necessary in order to obtain a more holistic understanding of ancient craft economies and their relations to various sociopolitical phenomena (Stark and Heidke, 1998; Underhill, 2002).

The production and distribution of utilitarian ceramic utensils within the Erlitou state, relative to prestige goods, is speculated to have been less centralized and conducted over relatively local sub-regional levels, i.e., with infrequent movement of ceramics between large centers (Liu and Chen, 2003: 137). This hypothesized system contradicts traditional assumptions regarding ceramic production and distribution in large states elsewhere in the world, e.g., in Classic-period Mesoamerica (see Arnold et al., 1993; Fargher, 2007; Kurtz, 1987), where primary urban centers were largely responsible for the production and exportation of utilitarian ceramics over broader regional scales. This hypothesis has

yet to be tested, however, via ceramic provenance analysis focusing on regional production and distribution networks within the core territory of the early Erlitou state, i.e., the Yiluo basin (Liu and Chen, 2003: 137). Prior research on Neolithic and early Bronze Age ceramic production in northern China by Underhill (2002, 1991) and Dai (2006) focuses heavily on quantitative analyses of metric and morphological diversity among vessel assemblages from sites located *outside* the Yiluo basin. Ceramic assemblages from Henan comprise the majority of the Longshan period data in Underhill's (2002) study, but pre-Longshan archeological materials are largely derived from Dawenkou cultural sites in Shandong province, and post-Longshan materials from Anyang in northern Henan, at least 200 km from the core Yiluo region. Dai (2006) presents a more regionally-focused study relating changes in pottery production to developing social complexity throughout the state formation period solely within the Yuanqu basin in southern Shanxi and western Henan, immediately adjacent to the Yiluo basin. Though the Yuanqu basin may have followed a similar sociopolitical trajectory to that of the Yiluo basin, and may have even been subsumed into the Erlitou polity during the Erlitou period (Dai, 2006), comparative analyses from Erlitou and other regional centers within the Yiluo basin are absent from Dai's (2006) study.

The nature of craft production may show considerable regional variability during the state formation period (Underhill, 2002: 21), and regional-scale inter-site approaches are often critical to understanding certain aspects of production and economic relations (D. Arnold, 2000; Hegmon et al., 1997; Stark, 1991). The present study thus seeks to complement the existing literature by testing hypotheses regarding regional-scale ceramic production dynamics in response to urban development and political centralization within the confines of the Yiluo basin, with a specific focus on the Erlitou urban center and two additional high-level centers at Huizui and Shaochai. This study defines

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