Journal of Anthropological Archaeology 61 (2021) 101253

Contents lists available at ScienceDirect

Journal of Anthropological Archaeology

journal homepage: www.elsevier.com/locate/jaa

When edges become centered: The ceramic social geography of early pottery communities of the American Southeast

Kenneth E. Sassaman[a,*], Zackary I. Gilmore[b]

[a] University of Florida, United States
[b] Rollins College, United States

A R T I C L E I N F O

Keywords:
Early pottery
Social geography
Ceramic petrography
American Southeast
Archaic period

A B S T R A C T

Along the geographic edges of regional populations lies latent potential for innovation and change accruing from interactions with those beyond the edges. This arguably was the case among some of the first pottery-making communities of the American Southeast. Centuries of interactions between these mobile communities and those beyond the geographic distribution of early pottery in the Savannah River valley culminated in places of permanent residence and ritual gathering at the overlapping edges of settlement ranges. Coupled with geochemical data on clay provenance, petrographic thin sections of Stallings fiber-tempered pottery register changes in social affiliation attending the emergence of gathering places. Despite continuity in the use of fiber for temper, innovations in the decoration and form of Stallings pottery coincide with changes in clay provenance and mineral composition to suggest a reorientation away from ancestral ties downriver and towards novel connections upriver. New relationships at the overlapping edges of ancestral lands were brokered at places of settlement and mortuary activity, notably at Stallings Island, which was abandoned for as much as three centuries after pottery appeared in the region. Revealed by petrographic data on the choices potters made in either maintaining or reinventing tradition is perspective on the ceramic social geography of Classic Stallings Culture that has implications for studies of social networks worldwide.

Looking obliquely at the edges of things, where they come together with other things, can tell you as much about them, often, as can looking at them directly, intently, and straight on.
Clifford Geertz (2001:12)

1. Introduction

The geographic edges or frontiers of regional populations are understood as places of innovation and transformation by virtue of interactions with those beyond the borders (e.g., Feuer, 2016; Harry and Herr, 2018; Green and Perlman, 1985; Lightfoot and Martinez, 1995). In investigating borderlands, archaeologists guard against the tendency to attribute geographic edges to perceived breaks in the regional distribution of diagnostic material culture, especially in static terms. Social network analysis (SNA), for instance, is able to avoid this pitfall by elucidating the *relational* properties of clusters or nodes with quantitative methods for characterizing the strength of ties among them as a proxy for interaction (Mills, 2017). Places at the edges of nodes—where things come together with other things—are viewed as places of *brokerage*, where "individuals or larger groups mediate interactions between actors that would otherwise not be directly connected" (Peeples and Haas, 2013:232; see also Hart et al., 2019). Places of brokerage and other properties of networks are revealed by analyses of large-scale databases, generally those of pottery, that sacrifice the specificity of individual relations for perspectives on network structure (Palsson, 2020). Potential for increasing the resolution of network structures and the edges at which innovations erupt exists in the granular data of ceramic provenance and composition.

Informed by the results of ceramic petrography, here we take a granular look at the edges of an archaeological culture known for making the first pottery in North America. Stallings Culture of ca. 5000–3800 cal B.P. factors prominently in narratives about the ancient Southeast and its collection of complex hunter-gatherer societies, those who variously built mounds (Saunders, 2012), dwelled in permanent villages (Thompson, 2018), interred their dead in formal cemeteries

* Corresponding author.
E-mail address: sassaman@ufl.edu (K.E. Sassaman).

https://doi.org/10.1016/j.jaa.2020.101253
Received 30 July 2020; Received in revised form 5 November 2020;
0278-4165/Published by Elsevier Inc.

(Claassen, 2010), or, in this case, made pottery well before agriculture (Sassaman, 1993). Known to us best from work in the middle Savannah River valley of Georgia and South Carolina (Fig. 1), Stallings Culture was anointed long ago as a regional affiliate of the Shell Mound Archaic (Crusoe and DePratter, 1976), an archaeological imaginary that ascribes special status to hunter-gatherers in the Southeast who mounded freshwater shellfish shells over human burials and abandoned living floors. When the concept of "complex hunter-gatherer" began to take shape in the 1980s (Price and Brown, 1988), shellfishing was seen as a measure of economic intensification, mounds as a measure of settlement permanence, and differential mortuary treatments as a measure of social inequality. Although little of this holds up to modern scrutiny (Claassen, 2010), the Shell Mound Archaic survives in metanarratives about hunter-gatherer complexity because it stands in contrast to things around its edges that appear less intensive and less permanent. In elapsing far from the center of Shell Mound Archaic history in the Midsouth and lower Midwest, the history of Stallings Culture appears independent, akin one might say to the parallel evolution of biological forms. The innovation of pottery in Stallings Culture adds to this sense of distinctiveness.

Beyond its early age, Stallings pottery is distinct for its fiber-tempered paste and its elaborate surface decorations. Coeval fiber-tempered wares existed in coastal Georgia (St Simons [Thompson et al., 2008]) and northeast Florida (Orange [Gilmore, 2016]) but Stallings pottery stands out in its repertoire of punctated design motifs, notably "drag-and-jab" linear punctate (Fig. 2). Remarkably, drag-and-jab punctate became popular only late in the history of Stallings culture—during the Classic Stallings phase of ~ 4100–3800 cal B.P. —and was most prevalent on the geographic edges of fiber-tempered pottery distributions. Indeed, the namesake site, Stallings Island, sits at the outer edge of a distribution of pottery spanning ~ 18,500 km^2, from the Atlantic coast to the lower Piedmont along the Savannah River and along the adjacent, Coastal Plain-draining Ogeechee River (Fig. 1). Stallings Island exemplifies traits of the Shell Mound Archaic that lend it "complexity" status: intensified subsistence, settlement permanence, and mortuary elaboration. However, as with its signature punctated pottery, these attributes arrived late in the ~ 1200-year history of Stallings Culture.

Thus, in addition to being on the edge of the Shell Mound Archaic, the modality that makes Classic Stallings Culture so distinctive took form late in the sequence and on the geographical margins of its regional distribution. Understanding how a place like Stallings Island came to be a center of gathering after being on the edge for centuries is to understand the history of people who made and used pottery since its inception and how they interacted with those around them who did not. These respective populations overlapped in the Fall Zone of the middle Savannah River valley, locus of Stallings Island. As an ecotone between the Coastal Plain of the lowcountry and the Piedmont of the upcountry, the Fall Zone is both rich in resource diversity and a good place to cross the river on its expansive shoals, which supported productive freshwater shellfish. The exceptional environment of this locus alone may explain how Stallings Island became a center place, but history indicates otherwise. As Claassen (2010) convincingly argues for the lower Midwest, the availability of productive shellfish does not account for the inception, flourishment, and demise of the Shell Mound Archaic (see O'Donoughue [2017] for a similar argument regarding Archaic shell deposition along spring runs in Florida). Rituality, Claassen suggests, better explains the timing and distribution of large shell-bearing sites. Given the history of mortuary activity at Stallings Island, rituality no doubt factored into this place becoming a center of gathering, but here we want to investigate the role of social interactions between two distinct populations at the overlapping edges of their respective ranges. We employ the methods of ceramic social geography to do so.

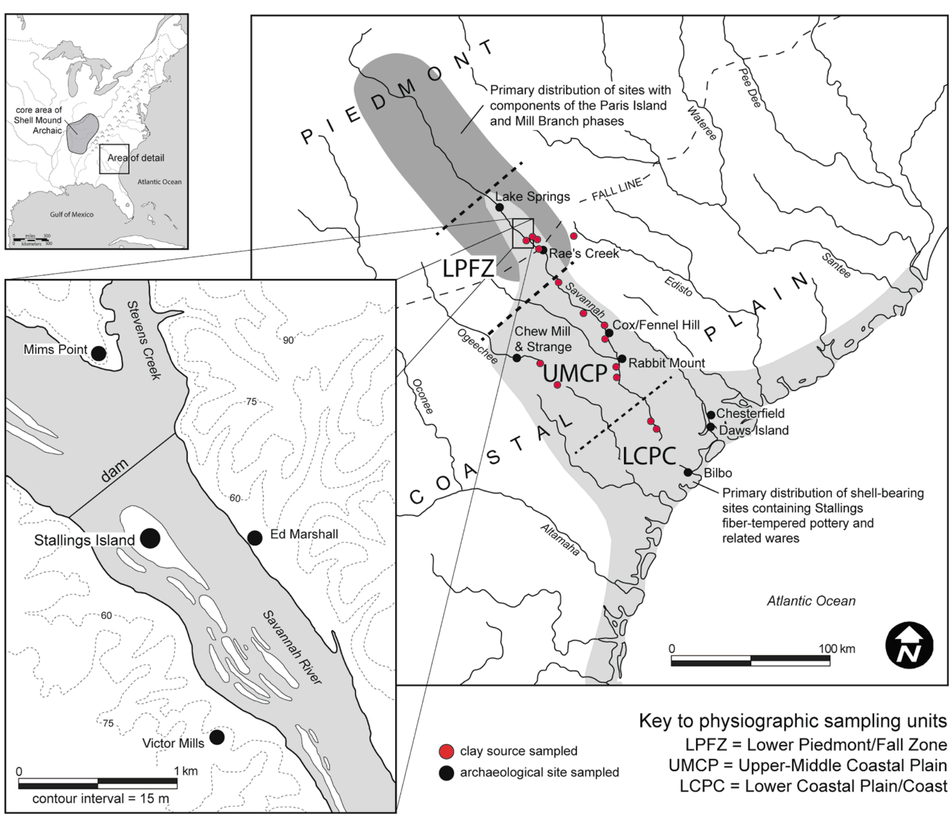


Fig. 1. Locator map of the greater Stallings Culture area, showing sites from which sherds were sampled for NAA and petrography, as well as sources of raw clays collected for reference samples. The study area is divided into three contiguous physiographic provinces. An inset of the middle Savannah River valley shows the locations of Stallings Island and three proximate sites.

Fig. 2. A selection of drag-and-jab punctated sherds of the Classic Stallings phase from Stallings Island, Mims Point, and Ed Marshall in the middle Savannah River valley.

2. Ceramic social geography of Stallings culture

Tracking the distribution and movements of social bodies through the things people made, used, and deposited has been standard practice in archaeology since its inception. Pottery has been particularly useful as a proxy for cultural identity as it is a cumulative outcome of multiple choices: selection and processing of clay, addition of temper, formation of walls and other features, finishing of surfaces, and decoration, if any, as well as how vessels were used, maintained, recycled, and finally discarded or cached. In comparing pottery from different contexts to draw inferences about cultural identity, the guiding logic is that material form covaries positively with social propinquity. This was the logic of ceramic sociology of the late 1960 s in the American Southwest (Hill, 1970; Longacre, 1970), as it is for the more recent application of SNA in the same region (e.g., Hill et al., 2015; Mills et al., 2013, 2015; Peeples and Haas, 2013). The former studies were site specific and sought archaeological evidence for the matrilocal postmarital residence practices known for ethnographic Pueblos. They were also implicitly static in their use of the direct historical method. The latter studies aim to track changes in networks of affiliated people precipitated by historical events such as regional abandonment, migration, and resettlement. Beyond the analytical rigor afforded by large databases and computational methods, SNA in the Southwest has a conceptual advantage over the ceramic sociology of 50 years ago in its spatial scale of relational properties, which can be vast, and in the explicit premise that networks are inherently dynamic and thus subject to structural change. The fine-grained chronology afforded by dendrochronology in the Southwest lends an eventful quality to historical narratives of network change.

Inspired by recent work in the American Southwest, we define *ceramic social geography* as the study of the regional distribution of pottery attributes as a proxy for the distribution of communities of potters, their movements among places, and—per historical events such as migration and coalescence—patterns of interaction among members of different communities. A focus on edges means that the spatial scale of ceramic social geography is necessarily beyond the total distribution of a given type or ware. Likewise, because the total spatial distribution of a particular type or ware is the long-term outcome of many individual movements of people and pots, ceramic social geographies are necessarily diachronic. Lacking the fine-grained chronologies of the American Southwest, our reconstructions are rather coarse-grained, no better than century scale. Likewise, our sample sizes pale in comparison to those marshalled for studies of the Ancestral Pueblo, precluding for now SNA. However, as colleagues in the Southwest expand and refine their use of SNA, archaeologists of the American Southeast continue to seek data on clay provenance and ceramic petrography to infer patterns of affiliation and movement, notably the transfer of pottery from locations of manufacture to locations of deposition (Gilmore, 2016; Wallis, 2011; Wallis et al., 2016; Pluckhahn and Cordell, 2011). Archaic and Woodland communities of the Southeast were never fully sedentary, nor agricultural, and thus evidence for nonlocal provenance of their pottery reflects movements beyond the migration of entire communities, such as seasonal moves or regional gatherings at places of ritual activity, often in the form of mortuary caching. As we aim to illustrate below, a comparison of the results of clay provenance and petrography from regional samples of Stallings pottery enables discrimination between the residential relocation of potters in a seasonal round, for instance, from the transfer of pottery independent of residential moves.

A defining quality of the ceramic social geography of the first pottery makers is that its edges are defined not by the presence of other pottery traditions, but rather the lack of pottery. In the case of Stallings history, communities existing beyond the distribution of early pottery included members of the Paris Island (5300–4700 cal B.P.) and Mill Branch (4700–4200 cal B.P.) phases of the upper Savannah River valley (Elliott et al., 1994; Ledbetter, 1995; Wood et al., 1986) (Fig. 1). For about five centuries that span the transition between these closely related phases (ca. 5000–4500 cal B.P.), Stallings Island was part of seasonal rounds that extended no farther south than the Upper Coastal Plain. Over these centuries, members of Paris Island and Mill Branch affiliation collected and deposited freshwater shell in large volume at Stallings Island and they interred their dead in and amongst the deposits of domestic living. Over these same centuries, communities of the Coastal Plain that made the first pottery likewise ventured into the Fall Zone on a seasonal basis (e.g., Sassaman et al., 2020), but left only a trace of activity at Stallings Island. In fact, Stallings Island was little used by anyone after ca. 4500 cal B.P. but reoccupied a few centuries later, when communities of the Classic Stallings phase (4100–3800 cal B.P.) established a permanent circular village and formal cemetery. The Lake Springs site ~ 20 km up the Savannah River is likely a coeval counterpart (Elliott, 1995:57–74). Other places of Classic Stallings affinity emerged elsewhere along the geographic margins of early pottery, in the Ogeechee River Valley of Georgia, and along the coast at places like Chesterfield in South Carolina. Comparatively little is known about these other places aside from the pottery they contained. We do know that the Ogeechee sites included burials (e.g., Ledbetter and O'Steen, 2013), many of which have been looted for funerary objects.

In an archaeological narrative now 30 years old, the elaboration of Stallings Culture at 4100 cal B.P. was the ethnogenetic consequence of interactions between early pottery-making communities of the lowcountry and their aceramic counterparts up river (Sassaman, 1993, 2006a). Evidence for interactions is found in a medium of material culture that was actually integral to the use of early pots. For many centuries before the innovation of pottery, communities in the Piedmont acquired locally available soapstone to craft objects for earth-oven cooking and, presumably, stone-boiling with nonceramic containers (e.g., baskets, hide-lined pits, wooden vessels). Soapstone has superior thermal properties and resists thermal shock; it would eventually be used to make cooking vessels but only after 3800 cal B.P. locally, at the end of the Classic Stallings phase (Sassaman, 2006b, 2010:130–137). Well before then—at the same time pottery appeared in the Coastal Plain—soapstone cooking stones had evolved from amorphous lumps to uniformly thinned and perforated slabs ideally suited for indirect-heat cooking. They also began to appear with regularity at early sites of pottery in the Coastal Plain, far from upriver sources of soapstone. The association between soapstone cooking stones and early pottery is hardly coincidental: the oldest Stallings vessels were wide-mouthed, shallow, and thick-walled basins suited to indirect-heat cooking but poorly designed for use over direct heat. Indeed, what is defined as the Early Stallings phase (5000–4100 cal B.P.) involved pottery that was not much more than a durable, portable pit for "stone boiling." Later innovations to improve the capacity of Stallings pottery for direct-heat cooking (e.g., taller and thinner walls, smaller orifice, sandier paste) appeared first on or near the coast, at places farthest removed from sources of soapstone. Interactions between those supplying soapstone and those consuming soapstone outside of source areas has long been thought to explain why it took so long for pottery and the innovations of direct-heat cooking to become widely adopted (Sassaman, 1993, 1995, 2006a).

To this point, reconstructions of the ceramic social geography of early pottery-making communities in the Savannah River valley have turned on technofunctional attributes that implicate the use of a medium (i.e., soapstone) that originated beyond the geographic range of early pottery. What is missing in this reconstruction is any means of monitoring variations in technical choices among potters that enable us to make inferences about their movements in the region. We know that soapstone was moving from geological source areas to remote places, but was early pottery moving as well? We may be safe in assuming that clay for making pottery was typically acquired locally because good potting clays were available throughout the study area (Gilmore et al., 2018). But given the results of recent sourcing studies in the Southeast, we cannot assume that pots never moved. For instance, in a study of Orange pottery from a shell-mound complex in northeast Florida, Gilmore (2016) found that half of the vessels deposited there were made on clays from southwest Florida, more than 200 km distant.

In the balance of this paper we present compositional data on Stallings pottery to investigate the circumstances under which places of gathering emerged at the geographic edges of distinct archaeological cultures. Our method is to compare variation in the chemical and physical composition of Early Stallings pottery from sites distributed across the region with pottery deposited at center places on the outer edges of this distribution. In contrast to the place-based communities of Classic Stallings times, Early Stallings communities left a material record of apparently greater mobility, less land-use redundancy, and more flexible group membership. We thus have a protracted period of time (up to nine centuries) when Early Stallings communities appear to have been distributed widely, moved about openly, and used pottery that is today undifferentiated to the naked eye. We refer to this as a *distributed community*, people with a shared repertoire of practice enabled through social learning networks that lacked the constraints of particular places or persons, but were instead generative of movement and interaction.[1]

Ultimately we aim to understand how the distributed communities of Early Stallings times become the place-based communities of Classic Stallings times. If, as we hypothesize, Stallings Island, Lake Springs, Ogeechee sites, and coastal shell rings like Chesterfield became places of increasingly circumscribed, sedentary communities, how was the shift to place-based communities anticipated by the organization of existing mobile networks? Alternatively, were existing networks contradicted or superseded by the organization of place-based communities? We seek answers to these questions from neutron activation analysis (NAA) and petrography of pottery from 13 sites across the greater Stallings region.

The results of NAA were published elsewhere (Gilmore et al., 2018) and are simply summarized below as a prelude to petrographic data published here for the first time. Because they exhibit different strengths and yield independent datasets, NAA and petrographic techniques are generally viewed as complementary techniques, most effective when combined (Bishop et al., 1982; Rice, 1987; Stoltman, 1989). In this case, petrographic data provide insight on choices potters made that cannot be inferred from NAA data. For instance, Stallings pottery varies significantly in the amount of fiber (usually Spanish moss [*Tillandsia usneoides*]) added to clay, and in the abundance and texture of sand. Whereas sand occurs naturally in clays throughout the study area, the amount and texture of sand vary even at the local level. It follows that potters working within a limited range of tolerance would have sought sources of clay with the appropriate aplastic qualities, or, alternatively, added sand as a tempering agent, as they did with fiber. Either way, it was a choice potters made, and petrographic data are useful in quantifying such choices.

As a matter of provenance, NAA data enable us to discriminate between pots that were made on local clays from those carried in from elsewhere. These data show that the majority of pots throughout Stallings history were made on clays proximate to locations of deposition, but with notable exceptions we discuss at length. Beyond sourcing, petrographic data enable us to infer that vessels of the Early Stallings period were made from a relatively consistent clay or paste “recipe” across the study area, an outcome we attribute to the mobility of potters themselves. With the advent of more sedentary, place-based settlement of the Classic Stallings period, interprovincial differences in paste recipes emerged within a regional repertoire of shared decorative (punctation) style. Under these conditions a new form of vessel appears at Stallings Island and Lake Springs and some of these were made from nonlocal clays. These new vessels consisted of large carinated bowls, forms suited to large-scale social feasting. NAA and petrographic data agree that the source of clays for nonlocal carinated bowls at Stallings Island is the Piedmont province up river, distant from the geography of Stallings ancestry. In explaining this exception, we necessarily refer to the history of interactions between Early Stallings communities and their Piedmont counterparts who visited Stallings Island long before it became a place of Classic Stallings communities. We discuss the implications of this history in detail at the close of this paper, but note here that the emergence of centers from edges appears to have involved novel social premises and not simply the consolidation of existing regional networks at places of gathering. It is a complex history that is in part illuminated by data on pottery provenance and composition.

3. Sampling and method

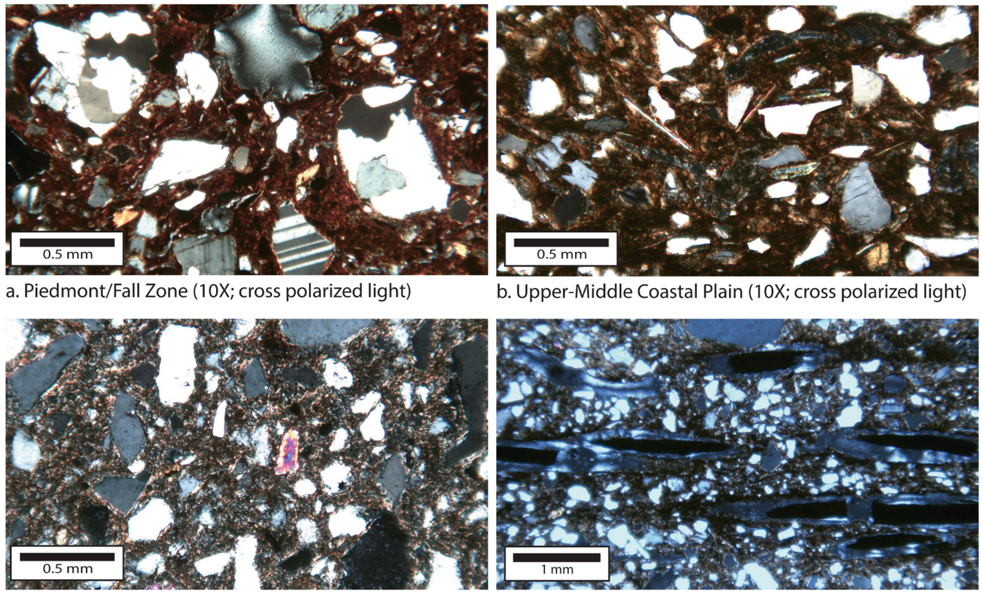
Investigating the ceramic social geography of Stallings pottery requires sampling across the entire time–space continuum of this ware. Beyond the financial and labor constraints of analysis, the usual biases of archaeology belie this level of sampling: survey of the study area has not been systematic; some assemblages lack context; some surface collections are biased towards decorated sherds; far too many sites have been looted, and others destroyed or inundated by reservoirs. Constraints and biases aside, we were able to sample sherds from 13 sites distributed across three contiguous physiographic provinces of the Savannah River Valley—Lower Piedmont/Fall Zone, Upper-Middle Coastal Plain, and Lower Coastal Plain/Coast—and the Upper-Middle Coastal Plain of the adjacent Ogeechee River Valley (Fig. 1). We divided our sample into Early and Classic Stallings subsamples based on established typological criteria (Sassaman, 1993), namely the prevalence of plain pottery, often with thickened or flanged lips, for Early Stallings, and the prevalence of punctated and other decorated pottery for Classic Stallings. We take into consideration more refined chronology to explain observed patterning in our discussion of results in a later section.

With two exceptions, sherds representing 30 vessel lots from each site were earmarked for NAA and usually half of those for petrographic analysis. The exceptions are a site with both Early and Classic Stallings components (Ed Marshall), which was sampled twice, and Stallings Island, whose large assemblage of carinated vessels constitutes a second subsample. Our total sample amounts to 450 sherds subjected to NAA and 224 of those to petrographic analysis.

An understanding of the raw materials available to ancient potters is essential to archaeological considerations of vessel composition and provenance. We therefore collected clay samples from across the study area and subjected these to the same NAA and petrographic analysis as the archaeological sherds. Raw clays were collected from 24 surface exposures, usually cut banks, including 18 from locations along the Savannah River, from the Lower Piedmont to the Lower Coastal Plain; three from Upper/Middle Coastal Plain sites along the Ogeechee River; and three from the upland Fall Zone near Aiken, South Carolina (Fig. 1). With the exception of upland samples, which were near the modern surface, all riverine samples came from cut banks as deep as four meters. Contamination from modern surface activities (i.e., fertilizing) is unlikely given the depth of our samples, and we scraped back cutbank profiles before collecting clay to avoid contamination from floodwaters. Clay samples were molded into briquettes and oven-fired using the methods outlined by Cordell et al. (2017). Grain-size data were also collected, indicating that the samples range from clay to sandy clay loam based on USDA standards and that all exhibit the minimum level of plasticity necessary for pottery manufacture (Rice, 1987:39).

NAA analyses of raw clays and archaeological sherds were carried

[1] *Distributed communities* is a modern term for the virtual communities of practice that use networked technology, especially the Web, to establish connections across space and time (Cianciolo and Evans, 2013). The salience of this term to ancient social networks lies in the sense that movement of objects can also establish connections among persons independent of particular times and places. Related alternatives to the usual sense of community are discussed in a review by Harris (2014), who expands the concept to include not only distributed members (see also papers in Canuto and Jason Yaeger, 2000), but also nonhuman agents. Likewise, we can extend the concept of distributed communities to that of *distributed persons* (*sensu* Strathern, 1988) to suggest that networks consisted of relationships established through gifting of objects, like pots, which then extend personhood across time and space in the absence of the bodies themselves (e.g., Wallis, 2011).



a. Piedmont/Fall Zone (10X; cross polarized light)
b. Upper-Middle Coastal Plain (10X; cross polarized light)
c. Lower Coastal Plain/Coast (10X; cross polarized light)
d. Voids with charred Spahish moss fibers (4X; cross polarized light)

Fig. 3. Photomicrographs of Stallings pottery thin sections in cross polarized light showing: (a–c) characteristic textural differences in the pastes among sampled physiographic provinces, and (d) linear voids with intact organic fiber temper.

out at the University of Missouri Research Reactor (MURR) using standard procedures (described in detail by Glascock, 1992; Glascock et al., 2004; see also Gilmore et al., 2018). Thin sections for petrography were cut from each of the 24 fired clay briquettes and 224 archaeological sherds and mounted to slides by Spectrum Petrographics Inc. Quantitative data for various thin section constituents were collected using the point-counting method developed by Stoltman (1989). Petrographic analyses were carried out using polarizing microscopes and mechanical stages housed at the Florida Museum of Natural History Ceramic Technology Laboratory and the Rollins College Archaeology Lab (Fig. 3). A 1-mm counting interval was used throughout the analysis. Point count categories include clay matrix, quartz sand, other mineral constituents, siliceous microfossils, and, for sherd samples, traces of fibers (i.e., voids or charred remnants). In addition, grain size estimates (ranging from very fine to very course) were obtained for all mineral sands using an eyepiece micrometer in reference to the Wentworth Scale (Rice, 1987:38). An average of 217.8 points were classified and counted for each clay briquette and 249.4 for each archaeological sherd.

4. Results

As noted earlier, the results of NAA are available elsewhere (Gilmore et al., 2018) and are thus only reviewed here in brief. Petrographic data reported here for the first time not only reinforce the patterns inferred from NAA but also enable us to infer variations in the choices potters made in preparing clays that speak to the mobility of communities, coalescence around particular places, and the emergence of subregional traditions. We start with a review of the results of NAA and petrography on geological sources of clay as a basis for interpreting variation in archaeological samples.

4.1. Chemical and physical composition of available clays

Patterned variation in the chemistry of clay resources along the length of the Savannah River is evident in the results of NAA. As might be expected based on the gradual sorting of riverine sediments, most measured elements are highest in concentration near the hard-rock geology of the Piedmont and gradually decrease downriver through the Coastal Plain as we move farther from the ultimate source of most clays in the region, the southern Appalachian Mountains.[2] Manganese (Mn) and the rare earth elements Terbium (Tb), Dysprosium (Dy), Ytterbium (Yb), and Lutetium (Lu) fit this pattern especially well. However, nine of the measured elements, and particularly Chromium (Cr), Arsenic (As), and Antimony (Sb), exhibit the inverse pattern, meaning that they are most enriched in clays nearer the coast and gradually decrease upriver. Upland Fall Zone samples yielded widely divergent clay signatures but generally exhibit relatively high levels of a few elements, such as Aluminum (Al) and As, and substantially lower concentrations of most others. Samples from the Ogeechee River are compositionally similar to those of the Upper/Middle Coastal Plain of the Savannah River, but with marked depletions in Sodium (Na), Potassium (K), Scandium (Sc), Mn, Iron (Fe), and Rubidium (Rb).

The results of petrography likewise show patterned variation in the mineral composition of clay resources, notably the type and texture of sand-sized aplastics. Significant differences are seen in the frequency of minerals and siliceous microfossils both along the length of the Savannah River and between the Savannah, the Ogeechee, and the Upland Fall Zone. Along the Savannah River, clays with the most abundant and coarsest sand-sized inclusions occur in the Lower Piedmont/Fall Zone. These clays also contain the most abundant quartzite, micas, feldspars, and heavy minerals, all of which gradually decrease in a downriver direction. Conversely, sampled clays in the Lower Coastal Plain are extremely fine-grained and contain substantial quantities of siliceous microfossils (sponge spicules, diatoms, and phytoliths), which gradually decrease in abundance farther upriver. Ogeechee River clays also contain siliceous microfossils. They are distinguished from Savannah River clays by their coarser texture and dearth of mica, feldspar, and heavy minerals. Finally, clays from the upland Fall Zone contain very few non-clay mineral inclusions and no siliceous

[2] This pattern likely emerges as a result of the winnowing of larger and heavier mineral grains (and their associated chemical constituents) as flow rate decreases downriver. Other chemical and physical weathering processes may also factor in, as does the addition of different clay constituents downriver, such as siliceous microfossils and quartz, which have a diluting effect on the concentrations of most measured elements in samples from that region.

microfossils.

In sum, the results of petrographic analysis and NAA show strongly patterned variation in both the mineralogical and chemical composition of clay resources in and around the Savannah River valley. These complementary data provide a strong basis for not only distinguishing between local and nonlocal pottery among vessels but also for inferring the direction (i.e., upriver versus downriver) of vessel movement.

4.2. Chemical and physical composition of Stallings pottery

As measured by NAA, the clay chemistry of Stallings pottery in our regionwide sample of 450 sherds reflects a pattern of local production and deposition during both the Early and Classic periods that is punctuated by occasional nonlocal sherds, particularly from carinated vessels of the Classic Stallings period. Statistical analysis of the elemental data of NAA enabled Gilmore et al. (2018) to identify four compositional groups (CG) that account for 334 of the samples; 116 were unassigned. Composed exclusively of sherds from sites in the Lower Coastal Plain/Coast, CG1 (n = 89) exhibits the lowest concentrations of most measured elements, with the exceptions of As, Zirconium (Zr), Sb, and Hafnium (Hf), which are highest in this group. Consisting mostly of sherds from the Upper-Middle Coastal Plain of both the Ogeechee and Savannah rivers, CG2 (n = 142) has slightly higher, yet still relatively low, concentrations of most elements with the exception of K and Rb, which are significantly elevated in this group. Higher levels of most elements are seen in CG3 (n = 92), sherds of which come mostly from sites in the Lower Piedmont/Fall Zone, but depleted in a few major ones, including Na, Mn, and Fe. Finally, CG4 (n = 11) is the small but distinctive group of sherds from carinated vessels from Stallings Island with enriched levels of Na, Fe, Co, and Zinc (Zn). Notably, the chemical composition of CG4 sherds is not matched in any of the clay sources we sampled. Given the geographic trends for clay chemistry along the Savannah River, the sherds of CG4 came from carinated vessels made on clays collected at locations far upriver from Stallings Island. We discuss the implications of this finding in our discussion of results below.

Although the provenance of most Stallings pottery is local,

Table 1
Summary Statistics for Three Variables of Petrographic Data by Site and Province of Early Stallings Period (top) and Classic Stallings Period (bottom).

EARLY STALLINGS	Lower Piedmont/Fall Zone				Upper/Middle Coastal Plain			Lower Coastal Plain/Coast			
	Ed Marshall	Victor Mills	Rae's Creek	Subtotal	Cox/Fennel Hill	Rabbit Mount	Subtotal	Bilbo	Daws Island	Subtotal	Total
vessels (n)	15	15	14	44	15	15	30	15	15	30	104
counts (n)	3,786	3,775	3,774	11,335	3,508	3,480	6,988	4,028	3,439	7,467	25,790
mean cts/vessel	252.4	251.7	269.6	257.6	233.9	232.0	232.9	268.5	229.3	248.9	248.0
Percent Fiber											
mean	16.5	13.1	12.0	13.9	14.0	14.1	14.0	11.8	15.1	13.4	13.8
stdev	4.7	3.4	4.4	4.6	3.5	5.5	4.5	6.4	4.7	5.8	4.9
min	5.4	7.1	3.9	3.9	3.6	6.5	3.6	2.8	7.3	2.8	2.8
max	23.2	20.3	19.5	23.2	19.4	26.9	26.9	20.7	23.0	23.0	26.9
cv	0.29	0.26	0.37	0.33	0.25	0.39	0.32	0.54	0.31	0.43	0.35
Percent Sand											
mean	15.8	11.7	13.3	13.6	18.4	17.2	17.8	11.9	23.0	17.4	15.9
stdev	9.7	5.2	4.9	7.0	6.4	5.8	6.0	7.9	8.2	9.7	7.8
min	4.0	2.9	6.2	2.9	7.5	4.7	4.7	0.4	8.9	0.4	0.4
max	34.1	19.8	25.0	34.1	27.3	24.0	27.3	25.1	35.0	35.0	35.0
cv	0.61	0.44	0.37	0.52	0.35	0.33	0.34	0.66	0.36	0.55	0.49
Sand Size Index											
mean	2.03	2.35	1.96	2.12	2.39	2.29	2.34	1.89	1.81	1.85	2.10
stdev	0.34	0.54	0.31	0.44	0.49	0.44	0.46	0.38	0.26	0.32	0.45
min	1.44	1.23	1.49	1.23	1.45	1.63	1.45	1.00	1.57	1.00	1.00
max	2.77	3.35	2.47	3.35	3.13	3.00	3.13	2.38	2.63	2.63	3.35
cv	0.17	0.23	0.16	0.21	0.20	0.19	0.20	0.20	0.14	0.17	0.21

CLASSIC STALLINGS	Lower Piedmont/Fall Zone					Upper/Middle Coastal Plain			Lower CP/Coast	
	Lake Springs	Stallings Island	Mims Point	Ed Marshall	Subtotal	(Ogeechee) Strange	Chew Mill	Subtotal	Chesterfield	Total
vessels (n)	15	30	15	15	75	15	15	30	15	120
counts (n)	3,770	7,577	3,879	3,651	18,877	4,196	3,964	8,160	3,740	30,777
mean cts/vessel	251.3	252.6	258.6	243.4	251.7	279.7	264.3	272.0	249.3	256.5
Percent Fiber										
mean	13.8	10.7	8.6	10.4	10.8	11.3	13.0	12.2	9.1	11.0
stdev	4.9	4.7	4.7	3.4	4.7	5.6	2.6	4.4	4.0	4.6
min	7.1	2.4	2.8	5.5	2.4	4.0	9.1	4.0	4.0	2.4
max	24.5	22.0	18.1	17.2	24.5	23.7	17.3	23.7	19.8	24.5
cv	0.36	0.44	0.55	0.33	0.44	0.49	0.20	0.36	0.43	0.42
Percent Sand										
mean	17.1	18.6	14.9	12.4	16.4	21.2	19.8	20.5	27.1	18.7
stdev	6.2	7.1	7.4	9.9	7.9	5.7	8.6	7.2	5.9	8.3
min	8.5	3.2	6.0	3.4	3.2	9.2	4.5	4.5	16.5	3.2
max	29.5	29.9	27.9	43.8	43.8	30.0	32.2	32.2	36.4	43.8
cv	0.36	0.38	0.49	0.80	0.48	0.27	0.43	0.35	0.22	0.44
Sand Size Index										
mean	2.20	2.50	2.34	2.32	2.37	2.75	2.93	2.84	2.05	2.45
stdev	0.40	0.46	0.47	0.45	0.45	0.42	0.49	0.46	0.43	0.51
min	1.64	1.43	1.64	1.58	1.43	2.00	1.94	1.94	1.45	1.43
max	3.20	3.21	3.46	3.31	3.46	3.46	3.51	3.51	3.16	3.51
cv	0.18	0.18	0.20	0.19	0.19	0.15	0.17	0.16	0.21	0.21

exceptions besides the carinated vessels are noteworthy. In fact, a full 10 percent (n = 21) of Early Stallings pottery exhibits nonlocal provenance. These include sherds from nine vessels made from CG2 clays that were deposited at Lower Piedmont/Fall Zone sites, and sherds from 12 vessels made for CG3 clays that were deposited in Upper-Middle Coastal Plain sites, a pattern of bi-directional movement. Petrographic data we review below supports the inference that some Early Stallings pottery was displaced from locations of manufacture during routine seasonal movements of communities up and down the river valley.

The full results of petrographic analysis of 224 sherds are available on the web site of the Laboratory of Southeastern Archaeology, University of Florida (https://lsa.anthro.ufl.edu/projects/middle-savannah-river-valley-projects/stallings-ceramic-social-geography/). Here we focus on three variables: percent fiber, percent sand, and sand size. The first of these is clearly a matter of potters' discretion. The other two vary with source of clay, as outlined earlier, but are also likely to be matters of choice as potters seek out local sources of clay that meet their specifications for texture.

Provided in Table 1 are descriptive statistics for percent fiber, percent sand, and the sand size index[3] of sherds from each site cross-tabulated by physiographic province and time period (Early and Classic). Shown in Fig. 4 are the relative frequency distributions of these same variables divided by time period and overlain with the mean and one-standard-deviation range of subsamples sorted by physiographic province. A variety of nonrandom patterns emerge from comparisons of assemblages over time and space.

Starting with fiber content, Early Stallings vessels in our sample of six sites express an average of 13.8 percent fiber (voids and charred fibers), compared to 11.0 percent in Classic Stallings vessels, a small but significant difference ($t = 4.48$, $p = <0.0001$) (Table 2). The range and variance of these subsamples are comparable. A more striking difference comes from interprovincial comparisons. Average percent fiber does not vary significantly across provinces among Early Stallings vessels, but it does for the later subsample.[4] A decrease in fiber over time is expected (Sassaman, 1993:163–165), but the shift in interprovincial variance has not before been documented.

Interprovinicial differences in percent sand and sand size index reflect variance in both local clay composition and potters' choices. A measure of the latter reveals itself through comparisons of Early and Classic vessels. On the whole, Early Stallings vessels average 15.9 percent sand, and those of Classic Stallings age average 18.7 percent, a significant difference ($t = 2.59$, $p = 0.005$). Although the interprovincial pattern evident with percent fiber is not as strongly expressed in percent sand, Early Stallings potters worked with clay averaging less sand than that of their Classic period counterparts in each of the three provinces. This difference is most striking in the Lower Coastal Plain/Coast province ($t = 3.52$, $p = <0.0001$).

Data on sand size index (SSI) accentuate the contrast between Early and Classic vessels and provide additional insight on interprovincial patterning. The difference of means for SSI between Early and Classic vessels is stark ($t = 5.27$, $p = <0.0001$). As with percent sand, all interprovincial comparisons of SSI averages show significant differences, with Early vessels containing consistently finer sand than their provincial counterparts. In this case the most striking difference is in the Upper/Middle Coastal Plain ($t = 4.20$, $p = <0.0001$), owing largely to Ogeechee River Classic Stallings samples that evidently mirror the local availability of relatively coarse clays.

To summarize these trends, Early Stallings pottery has on average more fiber, less sand, and finer sand than Classic Stallings pottery. Differences in mean values are highly significant across the board. At the provincial level, differences between Early and Classic Stallings pottery are likewise strong with minor exceptions. Among the weaker, yet significant differences, for instance, are mean values for SSI for Early and Classic Stallings of the Lower Coastal Plain/Coast ($t = 1.73$, $p = 0.05$). In this case, local geology is a limiting factor: coarse sand is entirely absent in clays near the coast, so potters had to make due with finely textured clays or find alternative aplastic materials. Classic Stallings potters at Chesterfield, on the coast, seem to have solved the problem by selecting clays with abundant sand (27.1 ± 5.9 percent), the highest percent of any Stallings pottery anywhere in the study area.

Whereas these results comport with prior assessments of change in Stallings pottery over time (e.g., Sassaman, 1993), the contrast between Early and Classic Stallings pottery in interprovincial comparisons sheds new light on differences in land-use patterns involving the movement of potters and their vessels. In short, Early Stallings potters appear to have followed a relatively consistent paste recipe across the entire study area, whereas Classic Stallings potters diverged provincially in their inclusion of fiber and in the textural composition of clay. If this contrast can be attributed to reduced mobility and increased social circumscription over time, petrographic data on vessels determined to be nonlocal by NAA ought to reflect the difference between vessels moving with potters and their coresidents, and vessels moving under different circumstances.

Our ability to investigate this proposition is hampered by the limited number of petrographic thin-sections on vessels determined to be nonlocal based on NAA. The subset of 15 vessel lots for petrography from the parent sample of 30 from each site was chosen before the results of NAA were available. Thus, not all sherds from nonlocal vessels were thin-sectioned. Of the 21 nonlocal specimens of Early Stallings age, only 12 were thin-sectioned: two from Rabbit Mount, four from Cox/Fennel Hill, three from Victor Mills, and three from Rae's Creek. Of the 16 nonlocal specimens of Classic Stallings age, only six were thin-sectioned: four from Stallings Island and two from Lake Springs. The small size of these subsamples preclude statistical tests of difference of means, but some potential patterning is worth noting.

First, the difference in fiber content between local (13.2 ± 4.3 percent) and nonlocal (13.6 ± 4.1 percent) Early Stallings vessels is negligible, but among Classic Stallings vessels the different is marked (11.2 ± 4.3 percent for local; 15.0 ± 3.2 percent for nonlocal). A similar but weaker contrast obtains with percent sand, but the opposite is true of SSI: nonlocal Early Stallings vessels express coarser paste (2.49 ± 0.68) than local vessels (2.19 ± 0.39), while counterparts of Classic Stallings age are virtually the same (2.43 ± 0.50 for nonlocal; 2.40 ± 0.46 for local). With this exception, Early Stallings vessels identified as nonlocal from NAA are not strongly distinguished from those identified as local, which is consistent with the inference that both nonlocal and local vessels were products of the same potters. We infer that the displacement of vessels in this context was a matter of settlement relocation involving the transport of some vessels from places of manufacture to places of deposition. Again, this pattern was bidirectional, presumably a function of seasonal movements up and down the valley, from the Coastal Plain to the Lower Piedmont/Fall Zone and back.

The same cannot be said for assemblages of Classic Stallings vessels. Interprovincial differences among them are greater than with Early Stallings assemblages, and those identified as nonlocal are not subsumed by the petrographic attributes of local counterparts. Unlike seasonal settlement mobility, a different sort of process must be considered to explain the displacement of some vessels. Because nine of the 16

[3] Following Stoltman's (2001:314) approach, SSI was calculated by assigning each counted sand grain a score based on its size class according to the Wentworth Scale. The scores for the entire specimen were then summed and divided by the total number of counted sand grains, resulting in a single index that can be used to compare variation in overall sand size across specimens. In this case, very fine grains were scored as 1, fine as 2, medium as 3, coarse as 4, and very coarse as 5.

[4] Actually, only one of three pairwise comparisons (UMCP v. LCPC) showed a significance level < 0.05 ($t = 2.26$, $p = 0.01$), but the other two were just under or at the 0.10 level of significance (LPFZ v. UMCP: $t = 1.32$, $p = 0.09$; LPFZ v. LCPC: $t = 1.30$, $p = 0.10$). Compared to pairwise comparisons of means for percent fiber among Early Stallings subsamples, none of which differ significantly, those of the Classic Stallings period express appreciable interprovincial differences.

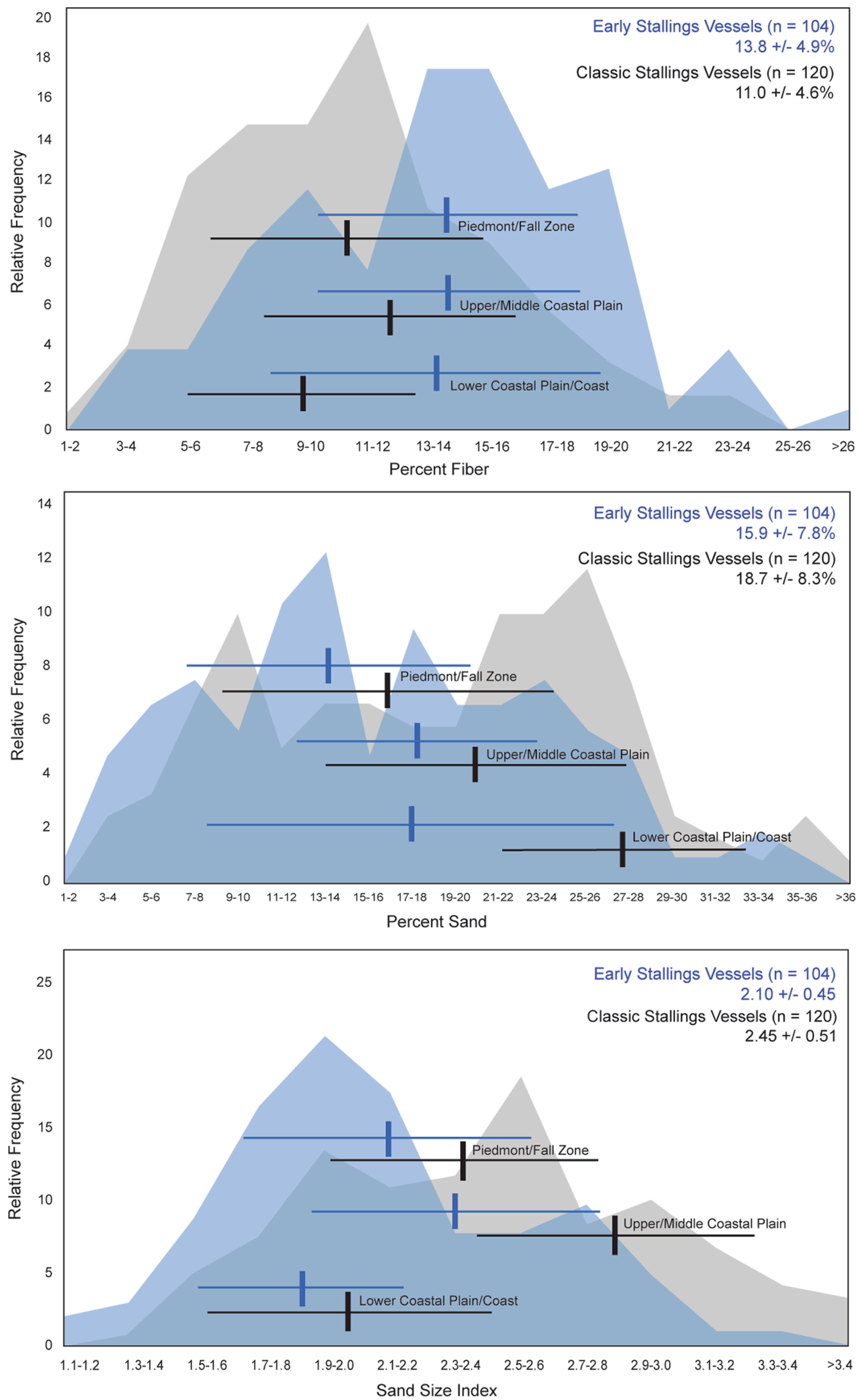


Fig. 4. Relative frequency distributions of percent fiber, percent sand, and sand size index divided by time period and overlain with the mean and one-standard-deviation range of subsamples sorted by physiographic province.

Table 2
Results of *t*-test of Difference of Means for Three Variables of Petrographic Data by Period and Province.

	Percent Fiber			Percent Sand			Sand Size Index		
	t value	df	p value	t value	df	p value	t value	df	p value
Early:Classic									
ALL	4.480	222	**<0.0001**	2.587	222	**0.0052**	5.266	222	**<0.0001**
LPFZ	3.455	117	**0.0004**	1.906	117	**0.0296**	2.967	117	**0.0018**
UMCP	1.612	58	0.0562	1.563	58	0.0618	4.198	58	**<0.0001**
LCPC	2.588	43	**0.0066**	3.522	43	**0.0005**	1.727	43	**0.0456**
Provinces, Early									
LPFZ:UMCP	0.105	72	0.4583	2.683	72	**0.0045**	2.076	72	**0.0207**
LPFZ:LCPC	0.383	72	0.3514	1.972	72	**0.0262**	2.889	72	**0.0026**
UMCP:LCPC	0.429	58	0.3348	0.187	58	0.4261	4.779	58	**<0.0001**
Provinces, Classic									
LPFZ:UMCP	1.324	103	0.0942	2.503	103	**0.0069**	4.759	103	**<0.0001**
LPFZ:LCPC	1.297	88	0.0990	4.989	88	**<0.0001**	2.561	88	**0.0061**
UMCP:LCPC	2.255	43	**0.0146**	3.054	43	**0.0019**	5.557	43	**<0.0001**

Provinces: LPFZ = Lower Piedmont and Fall Zone; UMCP: Upper-Middle Coastal Plain; LCPC = Lower Coastal Plain and Coast.

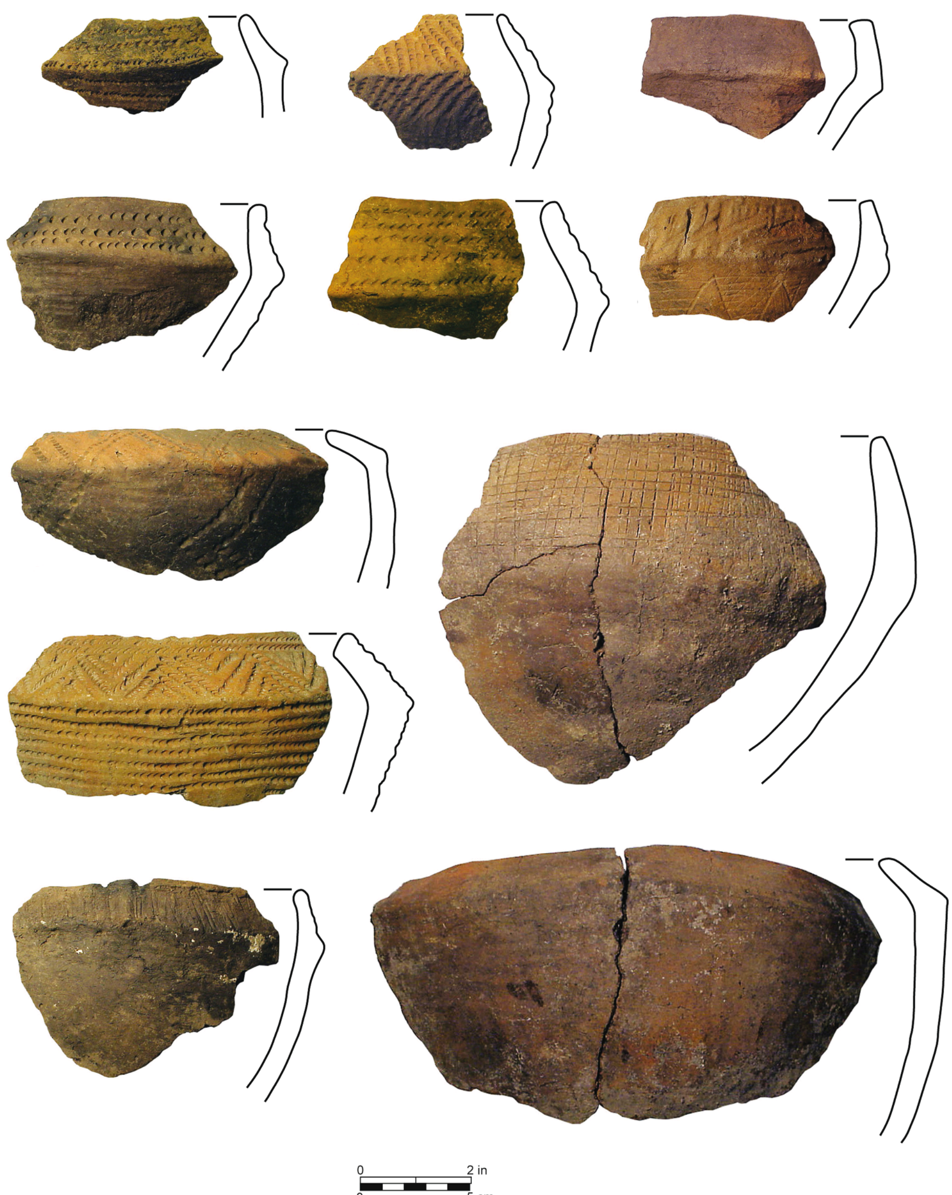


Fig. 5. A selection of sherds of carinated vessels from Stallings Island.

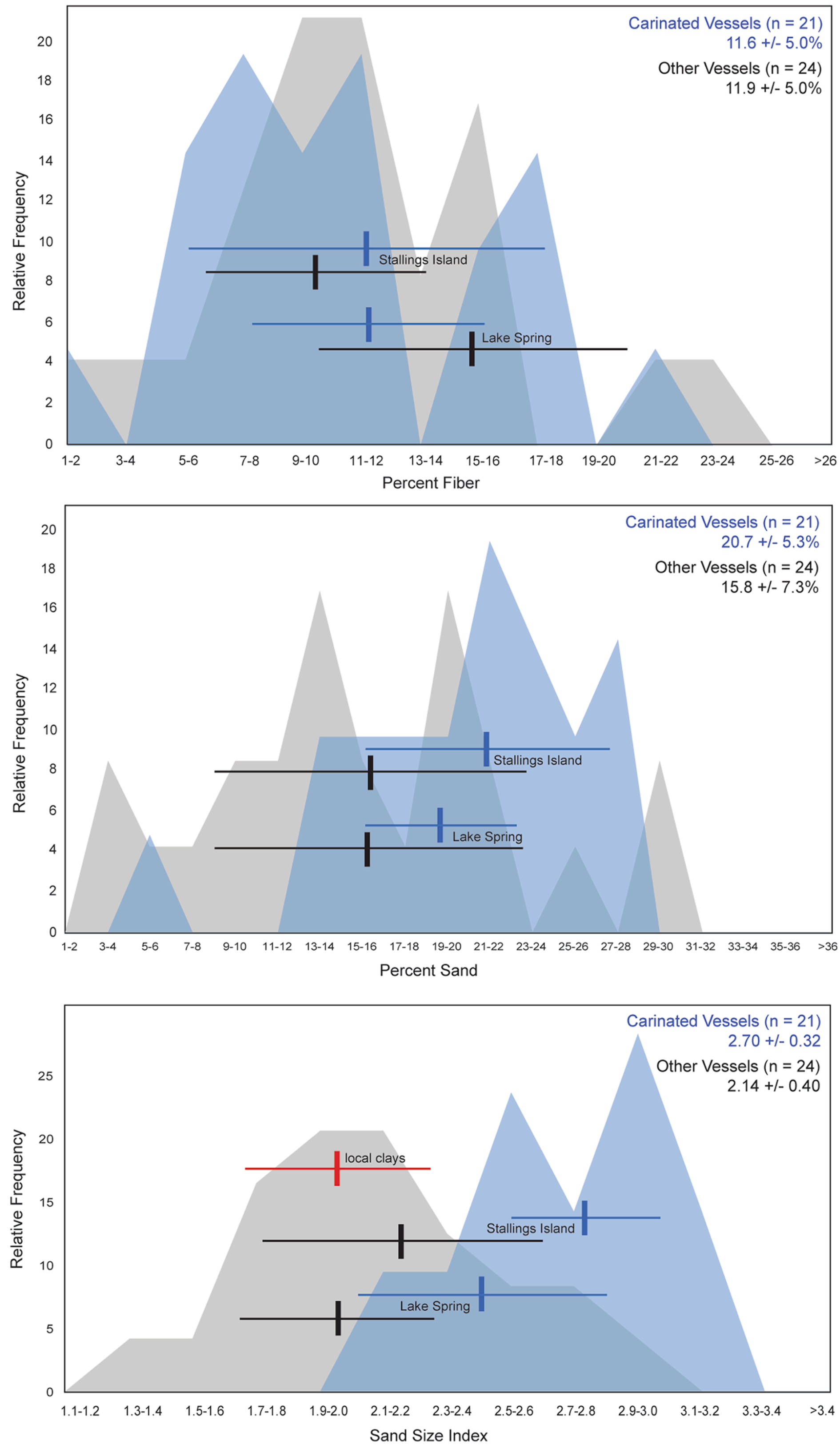


Fig. 6. Relative frequency distributions of percent fiber, percent sand, and sand size index divided by vessel form and overlain with the mean and one-standard-deviation range of subsamples from Stallings Island and Lake Springs.

nonlocal vessels of Classic Stallings age are carinated vessels, it is worth considering that this class of vessel was involved in an alternative process of displacement.

Our petrographic sample of 120 Classic Stallings vessel lots includes 21 with carinated rims (Fig. 5), all from two sites of the Lower Piedmont/Fall Zone: 15 from Stallings Island and six from Lake Springs. An occasional carinated rim sherd has turned up elsewhere in the region, but not near the coast nor in the Ogeechee Valley, and never in Early Stallings assemblages. The concentration of carinated vessels at Stallings Island is genuine. The subsample included in this study was drawn from an assemblage of 130 curated at the Peabody Museum at Harvard. Carinated forms in that collection make up 14 percent of Classic Stallings vessel lots (Sassaman et al., 2006:557). We are uncertain about the proportion of carinated vessels in assemblages from Lake Springs beyond the one reported here, but it is substantially smaller compared to Stallings Island.

Fig. 6 illustrates the relative frequency distributions of petrographic variables sorted by vessel form and overlain with the mean and one-standard-deviation range of subsamples from Stallings Island and Lake Springs. As these distributions show, carinated vessels cannot be discriminated from other forms based on percent fiber, but they are distinguished from other forms by percent sand and especially SSI. On average, carinated vessels contain more sand and considerably coarser sand than noncarinated counterparts at these two sites. SSI values for the latter subsample conform closely to those for raw clay samples from the province, particularly those from Lake Springs. The coarse and very coarse sands of carinated vessels are not found in local clays, but are expected to occur at sources of clay upriver. This expectation compares favorably to the inferred provenance of CG4 vessels (all carinated and all from Stallings Island) based on NAA. We hasten to add, however, that even though not all carinated vessels are expected to have been produced from clay sources up the Savannah River, in the Piedmont, they tend to follow a similar recipe for relatively coarse sandy pastes.

5. Discussion

Returning to the primary question of this study, how did the distributed communities of Early Stallings culture become the place-based communities of Classic Stallings times? It bears repeating that this shift took place on the geographic edges of the regional distribution of Early Stallings pottery, most conspicuously in the Lower Piedmont/Fall Zone of the Savanah River Valley. Were geographic edges also peripheral in social terms, which is to ask if the social geography of Early Stallings culture was differentiated in ways that anticipated place-based communities along its edges? The results of NAA and petrography would suggest not, although these results cannot address relationships between Early Stallings communities and those beyond their edges who did not make and use pottery. Taking into consideration longstanding interactions between these seemingly distinct communities, we suggest that nothing intrinsic to Early Stallings culture explains the emergence of place-based communities of Classic Stallings times, at least not at the namesake site, Stallings Island. Instead we find it fruitful to consider that Classic Stallings culture entailed social arrangements that privileged the ancestry of communities distributed beyond the range of early pottery.

Reconstructing social geographies in the study area requires chronology more fine-grained than the nominal Early and Classic dichotomy employed to this point. Although we will never achieve the level of resolution that our colleagues in the American Southwest enjoy, sufficient radiocarbon age estimates are available to begin to parse this millennium-plus history into centuries. As with most radiometric records, Stallings chronology is a mixed collection of assays: some made recently, others made as early as the 1960s; some with tight association between datable organics and pottery (e.g., direct dating of charred fibers [Gilmore, 2015]), others with vague associations; some taken from wood charcoal or nutshell, others from mollusk shell; and some with standard deviations of only a few decades, others more than a century. Beyond the scope of this paper, chronological hygiene of Stallings radiometric dates is in the offing. Here we note limits and biases of a chronology that is sufficiently detailed to address the question at hand.[5]

Fig. 7 is a compilation of OxCal summed probability distributions for calibrated radiometric assays from sites of our study sample. In keeping with our main interest on how center places emerging at the overlapping edges of regional populations, the discussion that follows focuses on the cluster of five sites in the Lower Piedmont and Fall Zone of the Savannah River Valley. With the exception of Rae's Creek, these sites are all reasonably well dated. With the same exception, these sites are also in close proximity to one another, with Stallings Island at the center. Excavations at each of these sites by the senior author resulted in large assemblages of artifacts, animal and plant remains, and subsurface features. Coupled with the results of the 1929 Peabody Museum expedition to Stallings Island (Claflin, 1931), this cluster of four sites—located at a geographic edge of the distribution of early pottery—provides good insight on the emergence of a place-based community in the context of overlapping social geographies.

Long before pottery appeared in the region, mobile communities of the Paris Island phase (5300–4700 cal B.P.) were distributed widely across the Piedmont of the Savannah River Valley. Stemmed bifaces, perforated soapstone slabs, and winged bannerstones of the Paris Island phase are found at sites as far upriver as the Richard B. Russell Reservoir of the Upper Piedmont (Anderson and Joseph, 1988; Wood et al. 1986) and as far downriver as Stallings Island (Sassaman et al., 2006), an expanse of about 120 km. It is unclear how people of Paris Island identity interacted with their Coastal Plain counterparts, members of the poorly defined, but presumably coeval Allendale phase (Sassaman et al.,

[5] Aside from the chronology of Stallings Island and sites in its vicinity, which is relatively robust, the radiocarbon chronology of Fig. 7 includes a variety of biases worth noting. First, two of three assays from Rae's Creek (Crook, 1990) have large standard deviations (110 years), which resulted in a diffuse probability distribution that is likely too far extended into the early fifth millennium B.P.A second bias involves the Rabbit Mount assays obtained by Stoltman (1974). Coupled with our review of the Rabbit Mount assemblage curated at the Peabody Museum, Harvard University, the results of work at other sites in the region over the past 30 years (Elliott et al., 1994; Sassaman et al., 2002, 2020) lead us to hypothesize that the ~ 5000 cal B.P. age estimates for the Early Stallings component Stoltman published actually pertain to a sub-shell-midden preceramic component of the Allendale phase. We suspect pottery at Rabbit Mount, and perhaps anywhere in the region, does not predate 4500 cal B.P. Age estimates we obtained on fibers of Early Stallings sherds from Rabbit Mount fall between 4300 and 3800 cal B.P. We also obtained three new assays on fibers from sherds from Cox/Fennel Hill, a nearby Early Stallings site whose assemblage mirrors Rabbit Mount. Its date range matches Early Stallings timing in the Lower Piedmont/Fall Zone (ca. 4400–4100 cal B.P.), as does one of the new fiber dates from Rabbit Mount. Third, the Ogeechee sites (Strange and Chew Mill) are poorly dated but our two dates on fiber from Classic Stallings sherds put them at the early end of the phase. The large assemblage of punctated pottery from these sites is dominated by sandy pastes bereft of fiber (Sassaman et al., 1995), although a third site in the vicinity contains sherds with abundant fiber (Ledbetter and O'Steen, 2013). Future efforts at characterizing Ogeechee pottery should include sherds from Gertrude Shell Midden. Fourth, the Lower Coastal Plain/Coast sites are the least well dated. An old chronology for Bilbo based on assays with large standard deviations got a boost from recent work by Crook (2009). It now conforms largely to Early Stallings timing elsewhere. Chesterfield is dated by a single assay on soot taken from a drag-and-jab punctated sherd. Although the calibrated date range comports with Classic Stallings timing elsewhere, a single assay is never adequate. And finally, the Daws Island site is the most problematic. Long thought to date to the late third millennium B.P. (Michie, 1973; Sassaman, 1993)—and thus post-Classic Stallings—this island site has an assemblage of plain fiber-tempered pottery, soapstone slabs, and stemmed bifaces that fit more comfortably in the Early Stallings phase. Lacking assays of more recent derivation, we cautiously assign Daws Island to this earlier phase and leave open the possibility that a post-Classic Stallings phase on and near the coast involved the revitalization of old traditions.

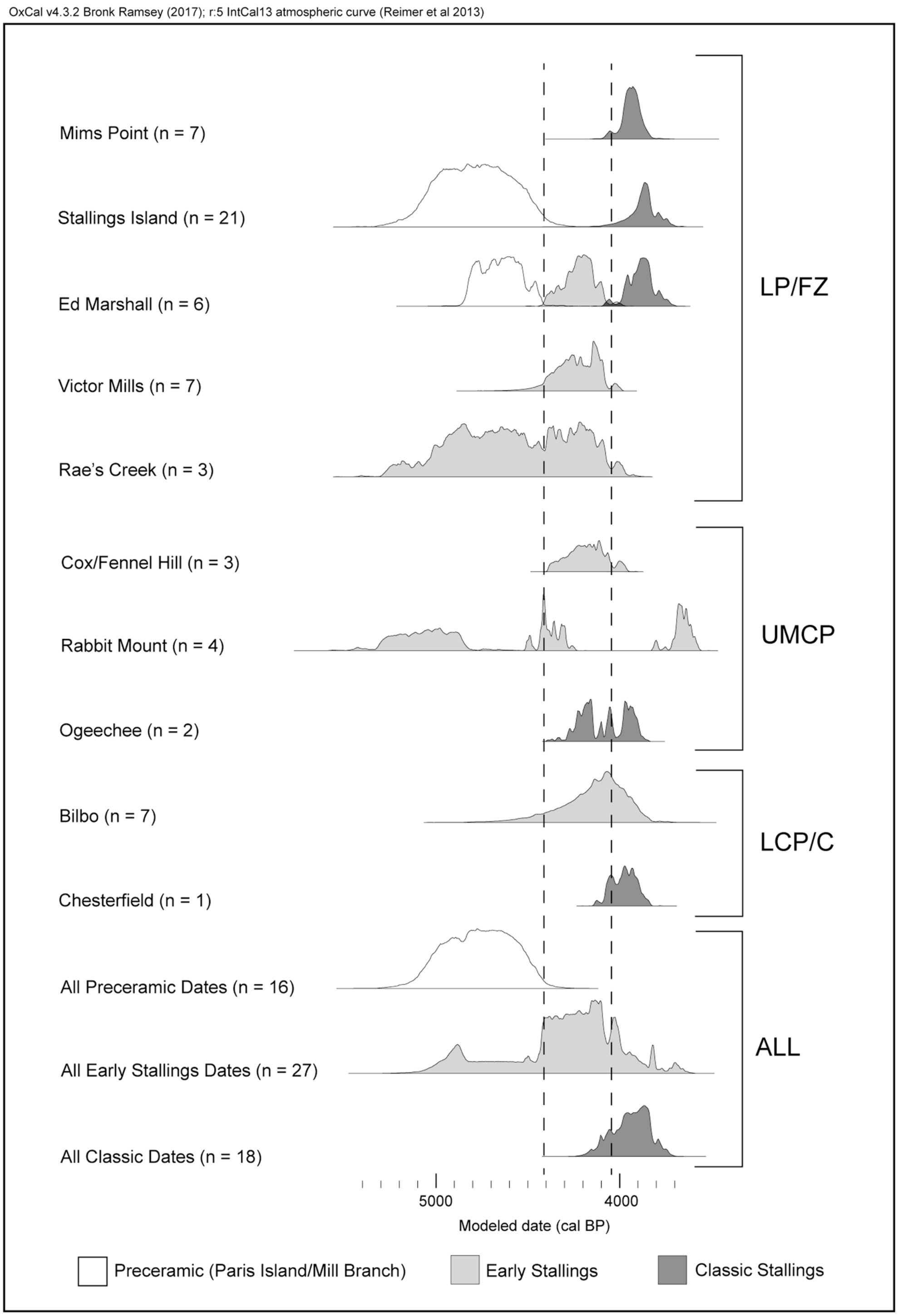


Fig. 7. Summed probability distributions of calibrated radiocarbon assays from sites sampled for this study divided by physiographic province and coded for the three consecuative phases in question. The dashed vertical lines on this figure mark the beginning and end dates of the Early Stallings phase. Calibration and probability distributions calculated using OxCal v4.3.2 (Bronk Ramsey, 2017) and the r.5 IntCal13 atmospheric curve (Reimer et al., 2013). For each site component the probability distributions were calculated as a single phase model using the "sum" function.

2002; Whatley, 2002). Occurrences of Allendale points made from Coastal Plain chert have been documented at sites in the Fall Zone (e.g., Elliott et al., 1994:192–193; Sassaman et al., 2020) and items of Paris Island identity show up at sites throughout the Coastal Plain (e.g., Stoltman, 1974:118), although not often in secure contexts. Marine shell beads in burials at Stallings Island and Lake Springs obviously passed through the Coastal Plain on their way to the Fall Zone and Lower Piedmont, but these too are not securely dated. We lack the necessary seasonality data on sites of these respective phases to know if face-to-face interactions in the Fall Zone were routine. Still, some sort of interaction between these provincial groups was likely given their overlapping distributions in the Fall Zone, and this elapsed for centuries before the innovation of pottery appeared.

A longstanding misconception in the archaeology of the region is that the inception of shellfishing coincided with the onset of pottery (Sassaman, 2006a:71–73). To the contrary, collection and deposition of freshwater shellfish at Stallings Island began during the Paris Island phase and continued through the ensuing Mill Branch phase (4700–4200 cal B.P.). The "preceramic" radiocarbon distribution for Stallings Island in Fig. 7 consists of assays from materials taken from deeply stratified shell midden on the margin of the site, along with a few pit features in the heart of the site, where burials abound. Four burials contained bannerstones that actually predate those of Paris Island and Mill Branch affinity (Sassaman and Randall, 2007:201–202), and many others clearly date to Classic Stallings times. We do not know how many of the 86 human interments excavated by Claflin and the Peabody expedition, as well as additional burials excavated by C. C. Jones (1861)—who described the site as a "necropolis"—predate the Classic Stallings phase, but we suspect that many do. Whether or not Stallings Island was ever a permanent place of residence for people of Paris Island and Mill Branch identity, it clearly was a place of considerable cultural gravity at the edge of their Piedmont ranges. Stallings Island was not, however, a place visited or occupied routinely by people who made Early Stallings pottery.

By about 4100 cal B.P., at least 300 years after Mill Branch people last occupied the place, Stallings Island became a major center of Classic Stallings settlement, human interment, and regional gatherings. The gap in radiocarbon ages shown in Fig. 7 is not a sampling error. People making Early Stallings pottery occupied sites within a kilometer of Stallings Island (Victor Mills and Ed Marshall) but seem to have avoided the "necropolis." The results of NAA and petrography on Early Stallings pottery suggests that although clay acquisition was generally local, selection for the percentage and texture of sand in local clays conformed to Coastal Plain specifications, as did the inclusion of fiber. As we argued earlier, we interpret this as a measure of seasonal mobility. Botanical and fauna remains from Victor Mills point to Fall site use on a bluff overlooking the river (Sassaman et al., 2020), and the floodplain location of Ed Marshall likely precluded late Winter and Spring use due to flooding. Coastal Plain chert in these assemblages attest to orientation downriver, and the use of soapstone slabs attests to procurement of Piedmont resources. The senior author has long argued that soapstone used with Early Stallings pottery was obtained through trade alliances with Paris Island and Mill Branch people (Sassaman, 1993, 2006a). Alternatively, Early Stallings interlopers could have obtained soapstone directly in the course of seasonal rounds.

By the time Stallings Island was reoccupied ca. 4100 cal B.P. by people who made and used ornate punctated pottery of the Classic Stallings phase, settlement was formalized and evidently perennial. Arranged in a circle about 30 m in outside diameter, houses with large storage pits and other features surrounded persons buried in the center of a plaza. A similar circular village sans cemetery was established at Mims Point one kilometer upriver from Stallings Island. A third circular village at Ed Marshall is not well defined but apparently without burials. Notably, Ed Marshall is the only site in the vicinity of Stallings Island to house components of all phases in question. Dating of each component is insufficient to know if they overlapped at all, but petrographic data on pottery argues against cultural continuity between the Early and Classic Stallings communities (Table 1). Difference of mean values for percent fiber, percent sand, and SSI are among the most statistically distinct of any pairwise comparisons. Like the absence of an Early Stallings component at Stallings Island, the divergence in pottery composition at Ed Marshall undermines the argument that Classic Stallings was simply an outgrowth of an antecedent pottery tradition.

Beyond the fiber tempering it shares with Early Stallings pottery, Classic Stallings pottery actually has little in common with the older ware. This is especially true of Classic Stallings pottery from the type site, and perhaps also Lake Springs, where carinated vessels also appear. Whether carinated or not, Classic Stallings vessels differ from those of the Early Stallings phase in both form and surface treatment. Unlike the flat-bottomed basins designed for indirect-heat cooking, Classic Stallings vessels of the area were typically hemispherical bowls averaging about 30 cm in orifice diameter and decorated with punctations that were applied in continuous, linear fashion (drag and jab). The NAA and petrographic data on Classic Stallings sherds from Stallings Island, Mims Point, Ed Marshall, and Lake Springs show local provenance and limited variation in paste except for carinated vessels, all of which come from Stallings Island and Lake Springs, some from the former site with nonlocal provenance. All data point upriver for the source of the clays and aplastics of nonlocal carinated vessels from Stallings Island, even beyond Lake Springs.

Drawing on an analogy with Mississippian-period pottery from the Barnett phase of Georgia (Hally, 1986), carinated vessels from Stallings Island and Lake Springs were designed for serving and perhaps reheating liquid-based foods in highly social contexts (i.e., feasts). Those from Stallings Island are as large as 50 cm in orifice diameter, and they sport diverse surface treatments, including some novel ones. It is hardly coincidental that these vessels are found only at sites with sizeable mortuary populations, in the case of Stallings Island, a formalized cemetery. What nonlocal carinated vessels at Stallings Island also signal is a gathering process similar to what Gilmore (2016) documented at Silver Glen Springs in northeast Florida. Like Stallings Island, Silver Glen was place of deep ancestry but not cultural continuity. Given the preferential direction of pottery displacement from the Upper Piedmont to Stallings Island, the ancestry in question was most directly that of Paris Island and Mill Branch forebears, not the Early Stallings phase. This does not preclude the participation of Coastal Plain denizens in gathering events, for a few noncarinated vessels at Stallings Island and Lake Springs exhibit downriver provenance.

This brings us to other centers of Classic Stallings culture in the study area, those of the Ogeechee River Valley and the Lower Coastal Plain/Coast. Petrographic and NAA data support the inference that these clusters of Classic Stallings sites represent circumscribed, sedentary communities. They shared a variety of traits—notably drag-and-jab punctated surface treatments—but each had its own history, owing in large measure, we suggest, to ancestral ties with those beyond the time–space distribution of Early Stallings pottery. We lack sufficient data from the Ogeechee sites and Chesterfield to comment on ancestral ties but note that none of the pottery from these locations was nonlocal and carinated forms were absent. These other centers on the edge of early pottery evidently did not follow in lockstep the development of Classic Stallings culture in the Piedmont of the Savannah River Valley, but it will take a great deal more work to begin to understand how they differed. Likewise, much of the relevant social geography of Classic Stallings culture in the upper Savannah is unknown to us largely because of reservoir construction. Many of the sites investigated by the River Basin Survey for the Clark Hill (now Strom Thurmond) Reservoir, including Lake Springs, are now underwater (Elliott, 1995).

Finally, to the extent that pottery was a gendered technology (Skibo and Schiffer, 1995), we are inferring with NAA and petrography the movements and residences of only one half of Stallings populations. In a prior study of the handedness of drag-and-jab punctation, Sassaman and Rudolphi (2001) inferred that the geographic circumscription of Classic Stallings communities was a function of matrilocal postmarital residence practices. Anchored to particular places, generational continuity among female potters would explain the sort of interprovincial variability we find in the NAA and petrographic data, while gathering events at places like Stallings Island explain how surface treatments like drag-and-jab punctation became widely shared among Classic Stallings communities. Judging from the lack of nonlocal vessels at Chesterfield and the Ogeechee sites, gatherings did not take place at all centers. Again, what sets the Classic Stallings community of Stallings Island apart from the others is not that it had a different relationship to Early Stallings history per se, but that its relationship to Early Stallings history was structured by a prior history with communities of Paris Island and Mill Branch identity. In this light, we think it may be worth considering that the drag-and-jab surface treatment of Classic Stallings pottery, along with its hemispherical form, is an example of skeuomorphism, in this case mimicry of baskets, as Blitz (2015) argues. This may help to explain why Classic Stallings pottery at Stallings Island and vicinity was not routinely used directly over fire (Sassaman 1993, 1995), but instead as containers for indirect-heat cooking with soapstone slabs in the age-old tradition of the Paris Island and Mill Branch phases.

6. Conclusion

Although early pottery may have been the last thing on his mind, Clifford Geertz (2001:12) was right to emphasize the vibrant nature of edges. That the type site for the oldest pottery in American Southeast sits at the geographical edge of its regional distribution is partly a matter of investigative precedence (i.e., it was first reported in the 19th century). However, NAA and petrographic data provide insight on how this particular edge became a place of innovation. What they show is that the ceramic social geography of Classic Stallings communities was much different than that of the Early Stallings period, long considered its direct ancestry. In the regional context of social circumscription along the geographic edges of Early Stallings communities, the Classic Stallings community that took form in and around Stallings Island seems to have been in historical dialogue with communities of the Piedmont who never used pottery but mastered the art of indirect-heat cooking with soapstone. Despite a three-century hiatus between the time people lacking pottery abandoned Stallings Island and a Classic Stallings community reanimated it, Mill Branch influences abound (e.g., Blessing, 2015; Sassaman and Randall, 2007). Over this hiatus people of Mill Branch descent occupied sites along the margins of the valley (e.g., Ledbetter, 1995), where they continued to cook with soapstone but not pottery and to craft elaborate winged bannerstones. Their descendants may have been among those who resettled Stallings Island, not only making pottery now, but pottery that differed from Early Stallings wares in form, composition, and surface treatment, belying any technical ancestry besides the use of fiber for temper. Most likely the Classic Stallings communities of Stallings Island were comprised of members with ancestral biographies both up and down the river, and perhaps beyond. It must have been a place of brokerage in the social network sense of being a place for mediating interactions among actors who would otherwise not be directly connected (Peeples and Haas, 2013), in this case by lack of common ancestry.

The Stallings Island case is not likely to explain the emergence of other centers of Classic Stallings settlement in the study area. Although all such centers may be construed as geographic edges of Early Stallings culture, what existed beyond each of those edges varied, and along the coast the edge was truncated by water. They each made their own history while participating in events that resulted in a veneer of similarity that archaeologists gloss as a tradition or a culture. Petrography and NAA help to locate and quantify variation in pottery that is otherwise not accessible to naked-eye inspection or possible to count consistently. We hope the value of using these two analytical tools in tandem is not lost in the details of this particular case study. Together they enabled us to parse displacement by potters on the move from events like gathering when pots made elsewhere ended up in communities of other potters. Specifically, when the nonclay constituents of pottery do not vary among subsamples of different clay provenance, potters with relatively fixed recipes for paste were on the move and applying their preferences to whatever local conditions allowed. With every relocation to a new settlement, some of their locally produced pottery traveled with them. Conversely, when the nonclay constituents of pottery covary with provenance data, pots were on the move from places of manufacture to places of deposition without changing residence of potters.

Finally, we refrain from generalizing about the sorts of social and historical processes that played out at Stallings Island to contexts of the Shell Mound Archaic or other complex hunter-gatherers worldwide. In most such cases, pottery did not exist. This of course should not hinder the development of sourcing and characterization methods for technologies made of stone, bone, shell, and other media. As an additive technology, however, pottery has advantages over technologies of reduction because its making involves many technical choices that are preserved in the composition and form of vessels. For reductive technologies like stone tools, the residues of production, rather than the products themselves, may be more insightful about the subtle decisions people make to craft objects out of raw material (cf. Sanger et al., 2020). No matter the medium and the technique for quantifying variation in its attributes, the scale of analysis must go beyond the geographic distribution of the things we hope to understand, where its edges bump up against other things to erupt in change.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

The research reported here was supported by a grant from the National Science Foundation (Award Number 1449893) and by a grant from the University of Missouri Research Reactor. Additional support was provided by the Hyatt and Cici Brown Endowment for Florida Archaeology, University of Florida. Access to pottery collections was kindly enabled by Sharon Pekrul (South Carolina Institute of Archaeology and Anthropology), Martha Zierden (Charleston Museum), Ashley Smallwood (Waring Laboratory, University of West Georgia), Diana Loren (Peabody Museum of Archaeology and Ethnology, Harvard University) and Amanda Roberts Thompson (University of Georgia). Albert Goodyear and Mark Brooks helped us to locate raw clay samples. Ann Cordell (Florida Museum of Natural History) generously provided equipment used to process clays and sample pottery. All petrographic analyses reported in this paper is the work of Zackary Gilmore. The advice of Editor George Milner, reviewers Victor Thompson and Matt Sanger, and one anonymous reader helped to improve the clarity and relevance of our work, for which are grateful.

References

Anderson, D.G., Joseph, J., 1988. Prehistory and History along the Upper Savannah River: Technical Synthesis of Cultural Resource Investigations. Richard B. Russell Multiple Resource Area, Russell Papers, Interagency Archeological Services Division, National Park Service, Atlanta.

Bishop, R.L., Rands, R.L., Holley, G.R., 1982. Ceramic Compositional Analysis in Archaeological Perspective. In: Schiffer, M.B. (Ed.), Advances in Archaeological Method and Theory. Academic Press, New York, pp. 275–330.

Blessing, M.E., 2015. Pits for the Ancestors. In: Gilmore, Z.I., O'Donoughue, J.M. (Eds.), The Archaeology of Events: Cultural Change and Continuity in the Pre-Columbian Southeast. University of Alabama Press, Tuscaloosa, pp. 77–92.

Blitz, J.H., 2015. Skeuomorphs, pottery, and technological change. Am. Anthropol. 117, 665–678.

Bronk Ramsey, C., 2017. Methods for summarizing radiocarbon datasets. Radiocarbon 59, 1809–1833.

Canuto, M.-A., Jason Yaeger, J. (Eds.), 2000. Archaeology of Communities: A New World Perspective. Routledge, London.

Cianciolo, A.T., Evans, K.M., 2013. Distributed Communities of Practice. In: Lee, J.D., Kirlik, A. (Eds.), The Oxford Handbook of Cognitive Engineering. Oxford University Press, New York, pp. 610–621.

Claassen, C., 2010. Feasting with Shellfish in the Southern Ohio Valley: Archaic Sacred Sites and Rituals. University of Tennessee Press, Knoxville.

Claflin Jr., W.H., 1931. The Stalling's Island Mound, Columbia County, Georgia. Peabody Museum Am. Archaeol. Ethnol. Papers, Cambridge 14 (1).

Cordell, A.S., Wallis, N.J., Kidder, G., 2017. Comparative clay analysis and curation for archaeological pottery studies. Adv. Archaeol. Pract. 5, 93–106.

Crook Jr., M.R., 1990. The Rae's Creek Site: A Multicomponent Archaeological Site at the Fall Line along the Savannah River. Department of Anthropology, Georgia State University, Atlanta, Report submitted to the Environmental Analysis Bureau, Georgia Department of Transportation.

Crook Jr., M.R., 2009. Bilbo and Delta. Occasional Papers in Cultural Resource Management 17. Georgia Department of Transportation, Atlanta.

Crusoe, D.L., DePratter, C.B., 1976. A new look at the Georgia coastal Shellmound Archaic. Florida Anthrop. 29, 1–23.

Elliott, D.T., 1995. The Clark Hill River Basin Survey. LAMAR Institute Publication Number 26. Savannah River Archaeological Research Papers 7. Occasional Papers of the Savannah River Archaeological Research Program. South Carolina Institute of Archaeology and Anthropology. University of South Carolina, Columbia.

Elliott, D.T., Ledbetter, R.J., Gordon, E.A., 1994. Data Recovery at Lovers Lane, Phinizy Swamp and the Old Dike Sites Bobby Jones Expressway Extension Corridor Augusta, Georgia. Occasional Papers in Cultural Resource Management 7, Georgia Department of Transportation, Atlanta.

Feuer, B., 2016. Boundaries, Borders, and Frontiers in Archaeology: A Study of Spatial Relationships. McFarland and Company, Jefferson, North Carolina.

Geertz, C., 2001. The Near East in the Far East: On Islam in Indonesia. Occasional Paper 12. School of Social Science. Institute for Advanced Study, Princeton, New Jersey.
Gilmore, Z.I., 2015. Direct radiocarbon dating of Spanish moss from early fiber-tempered pottery in the southeastern U.S. J. Archaeol. Sci. 58, 1–8.
Gilmore, Z.I., 2016. Gathering at Silver Glen: community and history in Late Archaic Florida. University Press of Florida, Gainesville.
Gilmore, Z.I., Sassaman, K.E., Glascock, M., 2018. Geochemical sourcing of fiber-tempered pottery and the organization of Late Archaic communities in the American Southeast. J. Archaeol. Sci. 99, 35–46.
Glascock, M.D., 1992. Characterization of archaeological ceramics at MURR by neutron activation analysis and multivariate statistics. In: Neff, H. (Ed.), Chemical Characterization of Ceramic Pastes in Archaeology. Prehistory Press, Madison, pp. 11–26.
Glascock, M.D., Neff, H., Vaughn, K.J., 2004. Instrumental neutron activation analysis and multivariate statistics for pottery provenance. Hyperfine Interact. 154, 95–105.
Green, S.W., Perlman, S.M. (Eds.), 1985. The Archaeology of Frontiers and Boundaries. Academic Press, Orlando.
Hally, D.J., 1986. The identification of vessel function: a case study from northwest Georgia. Am. Antiq. 51, 267–295.
Harris, O.J.T., 2014. (Re)Assembling communities. J. Archaeol. Method Theory 21, 76–97.
Harry, K.G., Herr, S.A. (Eds.), 2018. Life beyond the Boundaries: Constructing Identity in Edge Regions of the North American Southwest. University of Colorado Press, Boulder.
Hart, J.P., Winchell-Sweeney, S., Birch, J., 2019. An analysis of network brokerage and geographic location in fifteenth-century AD northern Iroquoia. PLoS ONE 14(1): e0209698. https://doi.org/10.1371/journal.pone.0209689 (accessed Sept. 17, 2020).
Hill, J.B., Peeples, M.A., Huntley, D.L., Carmack, H.J., 2015. Spatializing social network analysis in the late precontact U.S. Southwest. Adv. Archaeol. Pract. 3, 63–77.
Hill, J.N., 1970. Broken K Pueblo: Prehistoric Social Organization in the American Southwest. Anthropological Papers of the University of Arizona, No. 18. University of Arizona Press, Tucson.
Jones Jr., C.C., 1861. Monumental Remains of Georgia. John M. Cooper and Company, Savannah, Georgia.
Ledbetter, R.J., 1995. Archaeological Investigations at Mill Branch Sites 9WR4 and 9WR11, Warren County, Georgia. Technical Report No. 3. Interagency Archeological Services Division, National Park Service, Atlanta.
Ledbetter, R.J., O'Steen, L.D., 2013. Archaeological Investigations at the Gertrude Shell Midden Site, 9BK14, Burke County. Georgia, Prepared for Georgia Council on American Indian Concerns, Atlanta.
Lightfoot, K.G., Martinez, A., 1995. Frontiers and boundaries in archaeological perspective. Ann. Rev. Anthropol. 24, 471–492.
Longacre, W.A., 1970. Archaeology as Anthropology: A Case Study. Anthropological Papers of the University of Arizona, No. 17. University of Arizona Press, Tucson.
Michie, J.L., 1973. Archaeological indications for sea level 3,500 years ago. South Carolina Antiquities 5 (1), 1–11.
Mills, B.J., 2017. Social network analysis in archaeology. Ann. Rev. Anthropol. 46, 379–397.
Mills, B.J., Roberts, Jr., J.M., Clark, J.C., Haas, Jr., W.R., Huntley, D.L., Peeples, M., Trowbridge, M., Borck, L., Breiger, R.L., 2013. Late Prehistoric Social Dynamics in the Southwest U.S., AD 1200–1500. In: Knappett, C. (Ed.), Regional Network Analysis in Archaeology, Oxford University Press, Oxford, pp. 181–202.
Mills, B.J., Peeples, M.A., Haas Jr., W.R., Borck, L., Clark, J.J., Roberts Jr., J.M., 2015. Multiscalar perspectives on social networks in the late prehispanic Southwest. Am. Antiq. 80, 3–24.
O'Donoughue, J., 2017. Water from Stone: Archaeology and Conservation at Florida's Springs. University Press of Florida, Gainesville.
Palsson, G., 2020. Cutting the network, knotting the line: a linaeological approach to network analysis. J. Archaeol. Method Theory 2020. https://doi.org/10.1007/s10816-020-09450-1 (accessed Sept. 17.
Peeples, M.A., Haas Jr., W.R., 2013. Brokerage and social capital in the prehispanic U.S. Southwest. Am. Anthropol. 115, 232–247.
Pluckhahn, T.J., Cordell, A.S., 2011. Paste characterization of Weeden Island pottery from Kolomoki and its implications for specialized production. Southeastern Archaeol. 30, 288–310.
Price, T.D., Brown, J.A. (Eds.), 1988. Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity. Academic Press, New York.
Reimer, P.J., Bard, E., Bayliss, A., Beck, J.W., Blackwell, P.G., Bronk Ramsey, C., Grootes, P.M., Guilderson, T.P., Haflidason, H., Hajdas, I., Hatte, C., Heaton, T.J., Hoffmann, D.L., Hogg, A.G., Hughen, K.A., Kaiser, K.F., Kromer, B., Manning, S.W., Niu, M., Reimer, R.W., Richards, D.A., Scott, E.M., Southon, J.R., Staff, R.A., Turney, C.S.M., van der Plicht, J., 2013. IntCal13 and marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55, 1869–1887.
Rice, P.M., 1987. Pottery Analysis: A Sourcebook. University of Chicago Press, Chicago.
Sanger, M.C., Bourcy, S., Ogden, Q.M., Troutman, M., 2020. Post-marital residence patterns in the Late Archaic coastal southeast USA: similarities in stone tools revealed by geometric morphometrics. J. Archaeol. Method Theory 27, 327–359.
Sassaman, K.E., 1993. Early Pottery in the Southeast: Tradition and Innovation in Cooking Technology. University of Alabama Press, Tuscaloosa.
Sassaman, K.E., 1995. The Social Contradictions of Traditional and Innovative Cooking Technology in the Prehistoric American Southeast. In: Barnett, W., Hoopes, J. (Eds.), The Emergence of Pottery. Smithsonian Institution Press, Washington D.C., pp. 223–240
Sassaman, K.E., 2006a. People of the Shoals: Stallings Culture of the Savannah River Valley. University Press of Florida, Gainesville.
Sassaman, K.E., 2006b. Dating and explaining soapstone vessels: a comment on Truncer. Am. Antiq. 71, 141–156.
Sassaman, K.E., 2010. The Eastern Archaic, Historicized. AltaMira Press, Lanham, Maryland.
Sassaman, K.E., Blessing, M.E., Randall, A.R., 2006. Stallings Island revisited: new observations on occupational history, community patterning, and subsistence technology. Am. Antiq. 71, 539–566.
Sassaman, K.E., Daniel Jr., I.R., Moore, C.R., 2002. Early and Late Archaic Occupations along the Savannah River, Aiken County, South Carolina. Savannah River. In: Archaeological Research Papers, 12. Savannah River Archaeological Research Program. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
Sassaman, K.E., Randall, A.R., 2007. The cultural history of bannerstones in the Savannah River Valley. Southeastern Archaeol. 26, 196–211.
Sassaman, K.E., Rudolphi, W., 2001. Communities of practice in the early pottery traditions of the American Southeast. J. Anthropol. Res. 57, 407–425.
Sassaman, K.E., Wilson, K.J., Snow, F., 1995. Putting the Ogeechee in Its Place. Early Georgia 23 (1), 20–40.
Sassaman, K.E., Bartz, E.R., Randall, A.R., Blessing, M.E., Whitman, R.B., Auten, A.E., 2020. Victor Mills (9CB138): An Early Stallings Site of Mast Processing and Storage. Technical Report 26. Laboratory of Southeastern Archaeology, Department of Anthropology. University of Florida, Gainesville.
Saunders, J., 2012. Early Mounds in the Lower Mississippi River Valley. In: Burger, R.L., Rosenwig, R.M. (Eds.), Early New World Monumentality. University Press of Florida, Gainesville, pp. 25–53.
Skibo, J.M., Schiffer, M.B., 1995. The Clay Cooking Pot: An Exploration of Woman's Technology. In: Skibo, J.M., Walker, W.H., Nielson, A.E. (Eds.), Expanding Archaeology. University of Utah Press, Salt Lake City, pp. 80–91.
Stoltman, J.B., 1974. Groton Plantation: An Archaeological Study of a South Carolina Locality. Monographs of the Peabody Museum 1. Harvard University, Cambridge.
Stoltman, J.B., 1989. A quantitative approach to the petrographic analysis of ceramic thin sections. Am. Antiq. 54, 147–160.
Stoltman, J.B., 2001. The Role of Petrography in the Study of Archaeological Ceramics. In: Goldberg, P. Holliday V.T., Ferring, C.R. (eds.), Earth Sciences and Archaeology, Kluwer Academic/Plenum Publishers, New York, pp. 297–326.
Strathern, M., 1988. The Gender of the Gift. University of California Press, Berkeley.
Thompson, V.D., 2018. Collective Action and Village Life during the Late Archaic on the Georgia Coast. In: Birch, J., Thompson, V.D. (Eds.), The Archaeology of Villages in Eastern North America. University of Florida Press, Gainesville, pp. 20–35.
Thompson, V.D., Stoner, W.D., Rowe, H.D., 2008. Early hunter-gatherer pottery along the Atlantic Coast of the Southeastern United States: a ceramic compositional study. J. Island and Coastal Archaeol. 3, 191–213.
Wallis, N.J., 2011. The Swift Creek Gift. University of Alabama Press, Tuscaloosa.
Wallis, N.J., Pluckhahn, T.J., Glascock, M.D., 2016. Sourcing interaction networks of the American Southeast: neutron activation analysis of Swift Creek complicated stamped pottery. Am. Antiq. 81, 717–736.
Whatley, J.S., 2002. An overview of Georgia projectile points and selected cutting tools. Early Georgia 30, 7–133.
Wood, W.D., Elliott, D.T., Rudolph, T.P., Blanton, D.B., 1986. Prehistory of the Richard B. Russell Reservoir: The Archaic and Woodland Periods of the Upper Savannah River. Russell Papers. Interagency Archeological Services Division, National Park Service, Atlanta.