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Edited by Colin Renfrew, Olga Philaniotou, Neil Brodie, Giorgos Gavalas & Michael J. Boyd

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with contributions from
Myrto Georgakopoulou, Anno Hein, Jill Hilditch, Vassilis Kilikoglou, Daphne Lalayiannis, Yannis Maniatis, Peggy Sotirakopoulou & Dimitris Tambakopoulos

The sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008
Volume III

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Cover image: *The Special Deposit South from the southeast (foreground) with Dhaskalio in the background.* Inset: *(front) Head* **351***, from Trench D2, layer 1; (back) Torso* **25055** *from Trench RA, layer 14.*

Frontispiece image: *Torso, waist, pelvis and upper legs of folded-arm figurine of Spedos variety (***30028** *from Area P on Kavos).*

Edited for the Institute by James Barrett (*Series Editor*) and Anne Chippindale.

Undertaken with the assistance of the Institute for Aegean Prehistory.

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Digital Supplementary Material

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Frontispiece: *Torso, waist, pelvis and upper legs of folded-arm figurine of Spedos variety.*

Chapter 5

Tables

Abbreviations

cm	centimetre
D.	diameter
g	gram
H.	height
km	kilometre
L.	length
m	metre
mm	millimetre
PPL	plain polarized light
SEM-EDS	Scanning Electron Microscopy with Energy Dispersive Spectroscopy
SEM-BSE	Scanning Electron Microscopy with Back Scattered Electron imaging
SF	special find
T.	thickness
W.	width
Wt	weight
XPL	cross polarized light

Unless otherwise stated, the scale for finds is in centimetres.

Preface

Colin Renfrew & Michael J. Boyd

The status of Kavos on Keros as the earliest maritime sanctuary in the world is documented by the present volume, which includes (in Part A) the full publication of the marble finds from the Special Deposit South at Keros. These constitute the largest assemblage of Early Cycladic sculptures and vessels ever recovered in a controlled excavation, although they were all found in fragmentary condition. They add significantly to the already substantial corpus of finds from well-documented contexts in the Cycladic islands. They open new possibilities for the study of the production and the use of the rich repertoire of Cycladic artefacts of marble and thus to the understanding of ritual practice in Early Cycladic societies. The marble sculptures from the looted Special Deposit North at Kavos that have been recovered in systematic excavations will be discussed in Volume VII.

Also included here (in Part B) are chapters offering our concluding assessment of the roles of the settlement on Dhaskalio and of the two Special Deposits at Kavos. The publication The Settlement at Dhaskalio constitutes Volume I of the present series, while Kavos and the Special Deposits forms Volume II. The Pottery from Dhaskalio and The Pottery from Kavos, Volumes IV and V respectively, both by Peggy Sotirakopoulou, will complete the publication of the 2006 to 2008 excavations of the Cambridge Keros Project.

The existing and projected volumes of the Cambridge Keros Project are as follows:

Volume I: The Settlement at Dhaskalio (2013, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume II: Kavos and the Special Deposits (2015, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume III: The Marble Finds from Kavos and the Archaeology of Ritual (2018, edited by C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas & M.J. Boyd).

Volume IV: The Pottery from Dhaskalio (2016, by P. Sotirakopoulou).

Volume V: The Pottery from Kavos (in preparation, by P. Sotirakopoulou).

Volume VI: The Keros Island Survey (in preparation, edited by C. Renfrew, M. Marthari, A. Dellaporta, M.J. Boyd, N. Brodie, G. Gavalas, J. Hilditch & J. Wright).

Volume VII: Monumentality, Diversity and Fragmentation in Early Cycladic Sculpture: the finds from the Special Deposit North at Kavos on Keros (in preparation, by C. Renfrew, P. Sotirakopoulou & M.J. Boyd).

Here we present first the marble sculptures and vessels recovered from the Special Deposit South, which are fully described and illustrated in the chapters which follow. Their contexts are given in detail in Volume II where each is listed in the detailed tables accompanying chapter 4 of that volume. There the tables are organised by trench and then by layer number, each sculptural or vessel fragment being listed by its special find number, which is unique to the excavation. The other finds from the Special Deposit South are all dealt with in detail in that volume, with the exception of the pottery, whose publication will form Volume V. The weathering of the marble finds is discussed by Maniatis & Tambakopoulos in chapter 11 of Volume II. Various features of the contexts of the finds are analysed by Michael Boyd in chapter 12 of Volume II. The potential joins noted among the sculptures recovered from the Special Deposit South are discussed in appendix 13B of Volume II and those among the marble vessels in appendix 13A (see further Chapter 4 in this volume). The lack of joins observed between finds from the Special Deposit North and the Special Deposit South is noted there. The characterisation of the marble used to produce the sculptures and vessels from the Special Deposit South is discussed in Chapter 5 of the present volume.

The finds, among the various categories, from the settlement at Dhaskalio and from the two Special Deposits at Kavos are then compared and contrasted in Part B. This allows the differing functions of the settlement and of the Special Deposits to be brought into focus, and the intensity of their use during the different phases of activity in the early bronze age to be considered further. An attempt is then made, in Chapter 10, to set the ritual functions of the sanctuary on Keros into the wider context of early ritual practice in the Aegean and beyond.

Acknowledgements

The editors again wish to thank the many organisations and people who have offered help and support to the Cambridge Keros Project. The project has been based at the McDonald Institute for Archaeological Research at the University of Cambridge (Directors: Professor Graeme Barker and lately Professor Cyprian Broodbank) and supported by the British School at Athens (Directors: Dr James Whitley, followed by Professor Catherine Morgan and now Professor John Bennet) and our first debt is to them and to their management committees. It has been conducted with the permission of the Archaeological Service of the Hellenic Ministry of Culture and Sport, with the personal support of Dr Marisa Marthari, formerly Director of the then 21st Ephorate of Prehistoric and Classical Antiquities, now Honorary Ephor, and lately with the support of Dr Dimitris Athanasoulis, Director of the Cycladic Ephoreia.

The project was initiated with support from the Balzan Foundation and has been consistently supported with a series of grants from INSTAP (the Institute for Aegean Prehistory). The participation of Dr Michael Boyd was made possible by a generous grant from the Stavros S. Niarchos Foundation (in memory of Mary A. Dracopoulos): the Niarchos Foundation made subsequent grants in support of publication. Further financial support has come from the British Academy, the A. G. Leventis Foundation, the Leverhulme Trust, the Society of Antiquaries of London, the Research Fund of the McDonald Institute and the British School at Athens. The participation of Dr Sotirakopoulou in the post-excavation work in 2009 was supported by the N.P. Goulandris Foundation.

The staff of the British School at Athens has been particularly helpful in many practical matters. Helen Clark, and later Tania Gerousi, Secretary and Administrator respectively, gave their detailed attention to the many permit applications that a large project entails, with the support of the assistant director, Robert Pitt, and lately Dr Chryssanthi Papadopoulou. Maria Papaconstantinou was invaluable through her advice and practical support on financial matters. The staff of the Library, Penny Wilson and Sandra Pepelasis, have supported our researches, and we are particularly grateful to the archivist, Amalia Kakissis, for all her help. Much of the scientific work of the project was carried out by members of the Fitch Laboratory, and we are grateful to its director, Dr Evangelia Kyriatzi, for supporting this.

The project is grateful to Christos Doumas, Photeini Zapheiropoulou, and Lila Marangou for their warm support for the enterprise. In particular Christos Doumas and Photeini Zapheiropoulou encouraged us to examine material from their prior excavations in order to consider the possibility of joining material between the Special Deposits North and South.

The excavation personnel in the 2006 to 2008 excavation seasons were thanked by name in the acknowledgements of Volumes I and II and we are grateful for their participation. We are grateful also for the continuing support of our co-workers on Ano Kouphonisi, where we were based for the excavation seasons of 2006-2008 and the study season of 2009.

The study of the figurines and marble vessels was carried out in the Naxos Museum, as was the sampling for the marble study. We are grateful to the Museum, its director, Irini Legaki, and its staff, especially Daphne Lalayannis, Ilias Probonas and Vasiliki Chamilothori.

The drawings of finds have been contributed by Jenny Doole and Tassos Papadogonas.

Photographs of finds and many of the site photographs are by Michael Boyd, with other site photographs (and some finds) by Thomas Loughlin and by other members of the excavation team. We are grateful to Vicki Herring for undertaking final work on the figures during the production process, and to Anne Chippindale, for her work on the text, and for seeing the volume through the press, and to Jenny Doole for compiling the index.

The publication costs have been generously met by the Stavros S. Niarchos Foundation, the McDonald Institute, the A. G. Leventis Foundation and the Institute for Aegean Prehistory.

Chapter 7

The Fabric Study of the Pottery of Dhaskalio and Kavos

Jill Hilditch

Introduction

The aims of this chapter are threefold: 1) to compare and contrast the macroscopic study of the Dhaskalio (Volume I, chapter 23) and Special Deposit South assemblages (Volume II, chapter 6), and the Special Deposit North material (Broodbank 2007; Hilditch 2007); 2) to present the full petrographic and chemical analyses for the Dhaskalio and Kavos material; and 3) to discuss the results of the integrated fabric study and their implications for the interpretation of Dhaskalio and Kavos. The fabric study of the ceramic assemblage was carried out during the 2006–08 excavations and the 2008–09 post-excavation study seasons, in close collaboration with Peggy Sotirakopoulou. The typological and stylistic criteria draw heavily upon the observations of Sotirakopoulou (Volume IV). The macroscopic and petrographic analyses were undertaken by the author, with additional chemical analysis carried out by A. Hein and V. Kilikoglou (NCSR Demokritos, Athens) in collaboration with M. Glascock (Missouri).

Macroscopic analysis

As Broodbank noted for the Special Deposit North material, the study of fabrics is an excellent way to assess massive sherd assemblages, providing a clear summary of the diversity of the pottery while simultaneously reinforcing the lack of any one dominant fabric that might have represented local production at Dhaskalio-Kavos (Broodbank 2007). The overall picture, in this regard, remains largely unchanged after the macroscopic study of the 2006–08 excavated material from Dhaskalio and the Special Deposit South: the ceramic assemblage from Dhaskalio and Kavos is a rich, varied deposit, imported to the different parts of the sanctuary complex from multiple sources throughout the Cyclades and further beyond in the wider Aegean.

Before the two sites are compared in detail, it is worth remembering that the basic counts generated for each site differ in nature: the Special Deposit South was counted by sherd and Dhaskalio was counted by vessel. As Sotirakopoulou has noted in Chapter 6, 'that the fragments joining or belonging together rarely form a complete or nearly complete vase or figurine supports the view that the fragmentation process was generally not undertaken at Kavos itself but must have taken place elsewhere, possibly in the various Cycladic islands from which the materials for deposition at Kavos were brought, and that the materials were brought to the site already in fragmentary condition'. Nonetheless, the relative frequencies of each macroscopic fabric are fairly robust, given that many of the studied contexts consisted of whole trench deposits. Within the Special Deposit South, only diagnostic sherds were included in the counts, which will have inevitably skewed the data against the non-decorated, non-diagnostic body sherds of large vessels (storage jars, basins, cooking pots, baking pans, etc.), perhaps compounded further by the lower frequency of these vessel types within the Special Deposit South in general (see Volume V for a detailed account of coarse, medium and fine wares within each context, which are listed in the appendix to Volume II). However, the relative frequency percentages of macroscopic fabrics within the coarse-medium and the fine vessels should still provide a useful indicator of divisions within each category.

Within the Special Deposit South material studied macroscopically, Trench D1 contains 17 coarse-medium macroscopic fabrics, and 10 fine fabrics (see Table 7.1 for a comparative summary). In comparison, Trench D3 contains 20 coarse-medium and 11 fine fabrics. Both trenches show the Sandy variant C as their most frequent macroscopic fabric, with Fine Grey and Fine Hard Blue-Grey appearing most frequently within the fine fabrics. To contrast this picture with the Dhaskalio material, there are 18 coarse-medium macroscopic fabrics within the early Phase A and 22 coarse-medium fabrics within the later phases B and C. This would seem to suggest that the Dhaskalio assemblage is, at least with respect to the coarse-medium fabrics, more variable than the Special Deposit South

Table 7.1. *Comparison between the Special Deposit South, Dhaskalio and Kavos 1987 (Broodbank 2007, tables 6.4 & 6.5 for the latter) with respect to macroscopic fabric relative frequency. Percentages expressed to one decimal place so may not total 100%; and values are only given for Kavos 1987 where they correspond to groups within the 2006–08 excavated material, otherwise they are not comparable (NC).*

Relative frequencies (%)			Special Deposit South		Dhaskalio			Kavos 1987	
			Trench D1	Trench D3	Phase A	Phase B	Phase C	Surface	Trenches
Coarse-Medium Fabrics	Quartz	V1A	2.1	1.7	4.2	5.9	4.5	24.1	14.0
		V1B	3.1	1.2	–	0.8	3.1		
	Sandy	V2A	–	0.6	–	0.3	2.2	22.2	32.5
		V2B	4.4	9.4	2.8	0.8	4.0		
		V2C	12.1	12.2	2.8	2.4	14.5		
	Dark Phyllite	V3A	0.5	0.3	2.8	5.9	3.5	13.2	7.2
		V3B	2.1	0.2	1.4	13.4	5.6		
	Red Phyllite	V4	0.5	<0.1	2.8	4.8	1.7	5.6	3.3
	Micaceous Quartz	V5	4.8	4.5	16.9	10.7	2.0	13.2	13.0
	Micaceous Schist	V6A	0.7	0.3	2.8	3.2	1.9	3.0	4.9
		V6B	0.7	0.1	7.0	4.0	3.3		
		V6C	1.4	4.3	5.6	7.0	4.2		
		V6D	–	0.3	1.4	1.3	1.6		
	Calcite	V7A	7.5	0.8	7.0	10.5	7.8	5.7	5.5
		V7B	6.8	8.0	4.2	2.4	1.9		
		V7C	1.0	1.9	16.9	5.7	8.4		
	Talc	V8	0.2	<0.1	–	7.3	0.7	0.8	0.2
	Dark Volcanic	V10	–	0.1	2.8	1.4	3.2	0.3	0.1
	Non-micaceous Phyllite-Schist	V11	0.5	–	–	4.0	0.6	NC	NC
	Pale Volcanic	V12	–	<0.1	7.0	2.1	14.9		
	Granite	V13	0.4	0.3	7.0	1.4	5.4		
	Fine Buff with Temper	V14	–	–	1.4	0.5	0.2		
Fine Fabrics	Fine Buff		4.4	7.6	–	0.5	0.9	2.0	5.2
	Fine Dark Buff-Grey Micaceous		0.9	1.5	–	2.4	1.8	0.6	1.2
	Fine Mottled		0.7	1.9	–	–	–	1.1	2.2
	Fine Grey		14.2	13.7	1.4	0.8	0.9	NC	NC
	Fine Dark Grey		2.7	3.1	–	0.3	0.2	NC	NC
	Fine Hard Blue-Grey		15.5	12.2	–	–	–	NC	NC
	Fine Orange		7.5	8.2	1.4	–	0.2	1.4	1.9
	Fine Red-Brown		2.8	3.7	–	–	0.3	NC	NC
	Fine Dark Green-Brown Micaceous		0.4	0.6	–	0.3	0.3	NC	NC
	Fine Pink		2.1	1.1	–	–	0.1	NC	NC
	Fine White		–	<0.1	–	–	–	1.4	2.6

deposits. The fine fabrics show a somewhat different picture: only 2 fine fabrics appear within Phase A, 5 in Phase B and 8 within the latest Phase C. Even if the actual percentages of the Special Deposit South fine wares are positively biased, their broader range of fabrics still reveals a greater variety of fine wares within the Special Deposit South than those seen at Dhaskalio.

If we compare the range of fabrics found within the 2006–08 excavated material from Dhaskalio and Kavos with the 1987 study of the Special Deposit North and Kavos (both surface and trench material), there is broad compatibility with respect to the range of macroscopic fabrics, both in the coarse-medium and fine groups (variants of larger macroscopic groups, i.e. Blue Schist Platey, Dark, and Mixed, were not quantified within the 1987 study, though they were included in the detailed typological and stylistic correlations). In addition, there were a few macroscopic groups defined by Broodbank that were not identified within this study, and *vice versa*. The most significant new macroscopic appearances within the 2006–08 Dhaskalio and Kavos material are the Pale Volcanic (V12), Granite (V13), Fine Grey Micaeous (probably a variant of Broodbank's Fine Grey) and Fine Hard Blue-Grey (a variant of Broodbank's Fine Hard Grey) macroscopic fabrics. In summary, coarse-medium macroscopic fabrics dominate the Dhaskalio material, while fine fabrics are most frequent within the Special Deposit South.

Another factor strengthening the broad compatibility between the 1987 and 2006–08 assemblages is the close correlation of vessel shapes within each shared macroscopic fabric. For the Quartz fabric (V1A and V1B), a broad range of large and small vessels is found within both the Special Deposit South and the Special Deposit North deposits (miscellaneous jars, pithoi, bowls, hearths and cooking pots, pyxides, conical-necked pedestalled jars, one handled tankards and multiple-headed lamps). At Dhaskalio, the smaller shapes are less visible within the trench material: there are no multiple-headed lamps, conical-necked pedestalled jars or one-handled tankards in this macroscopic fabric, though medium bowls do appear. The Sandy fabric displays the widest range of vessels, both large and small, within the Special Deposit South. At Dhaskalio this macroscopic fabric becomes more frequent as the settlement develops, expanding from only conical-necked jars in Phase A to a range of large domestic shapes, smaller Kastri Group shapes (such as beak-spouted jugs and depas cups) and shapes of the later occupation of the settlement, such as barrel jars, within Phase C. At the Special Deposit North, the medium Sandy macroscopic fabric corresponds to a more limited repertoire of medium-sized shapes, such as collared jars, bowls, wide-mouthed jugs, multiple headed lamps and sauceboats. Interestingly there are no large storage or cooking vessels in Sandy fabric within the Special Deposit North, in contrast to the Special Deposit South and Dhaskalio assemblages which contain multiple examples.

The distinctive Dark Phyllite fabric (Blue Schist of the Special Deposit North assemblage) reveals a broad range of shapes within the Special Deposit North, including several jar types, a baking pan, a one-handled tankard and a depas cup (the last both Kastri Group shapes). Broodbank comments that the Platey variant (equivalent of V3A in this study) has the fewest corresponding shapes, a pattern echoed within both the Special Deposit South and Dhaskalio assemblages. In Phase A, both variants are limited in shape to miscellaneous jars and a baking pan, though they expand rapidly in Phase B (the most frequent of all the phases for this fabric) to include braziers, jugs, miniature conical cups, pithoid jars and pithoi. Significantly, the repertoire of shapes seen within this phase for the two variants of the Dark Phyllite fabric form almost discrete groups of shapes. In Phase C, the V3B fabric (Blue Schist Mixed) retains a broad range of shapes, with some new shapes too (barrel jar, depas cup and shallow bowl), while V3A (Blue Schist Platey) only appears in pithoi and a lid. The Special Deposit South assemblage also reveals a different suite of shapes for each of the two variants. In this instance, even though the relative frequencies and chronological phasing cannot be used for strict comparison, the typological picture seems to reinforce the similar appearance and behaviour of this fabric across the three assemblages.

The Red Phyllite (Special Deposit North—Red Schist), Micaceous Quartz, Micaceous Other and Dark Volcanic (Special Deposit North—Biotite) macroscopic fabrics all follow the same distribution pattern with regard to shapes, where the Dhaskalio assemblage reveals predominantly domestic shapes, such as jars, bowls and braziers or baking pans, in contrast to the Special Deposit South and Special Deposit North assemblages which reveal other shapes in addition to these domestic shapes, such as small drinking or pouring shapes (including sauceboats and Kastri Group shapes), multiple-headed lamps and pyxides. For the Talc macroscopic fabric this is the opposite case: a greater range of shapes is present within the Dhaskalio assemblage (albeit within the domestic repertoire) compared to extremely limited numbers and shapes within the Special Deposit South and Special Deposit North assemblages. As mentioned above, the Non-Micaceous Phyllite-Schist, Pale Volcanic, Granite and Fine Buff with Dark Temper fabrics do not appear within the Special Deposit North study. This is reflected to some degree in the much lower frequency of these fabrics within the Special Deposit South assemblage than in the Dhaskalio material. The last macroscopic fabric to summarize within the coarse-medium group is the Calcite fabric, which presents the opposite of the Red Phyllite and other fabrics by showing only domestic type shapes within the Special Deposit North assemblage but a much wider repertoire within both the Special Deposit South (multiple-headed lamps, pyxides, sauceboat) and Dhaskalio (barrel jars and beak-spouted jugs) assemblages.

With respect to the fine macroscopic fabrics, only 5 from a total of 11 identified groups correspond between the 1987 and 2006–08 assemblages and can, therefore, be discussed with respect to typo-stylistic criteria: Fine

Table 7.2. *List of trenches and phases (where relevant) sampled for petrographic analysis.*

Trench	Phase	Layers	No. of samples
Dhaskalio			*(vessels)*
I	A + B	1, 3, 4, 6, 7, 8, 9, 11, 12, 14, 16, 26, 40	46
II	A + B	3, 4, 6, 9, 15, 17, 19, 34, 35, 36, 38	19
IV	B	5, 6, 8, 9	13
V	B	3	5
VI	A + C	4, 8, 9, 15, 16, 18, 22, 23, 25, 26, 30, 33, 34, 35, 36, 37, 38, 47, 48, 50, 51, 52	67
VII	C	3, 4, 5, 24, 32	22
XXI	C	3, 7, 9, 11	8
XXIV	C	3, 5, 6, 7, 8	6
Kavos			*(sherds)*
B1	–	2, 3	2
B3	–	1, 3, 4, 5	4
B4	–	2, 6	5
C1	–	6, 14, 27	3
D1	–	3, 30	2
D2	–	6, 11, 14, 16	4
D3	–	1, 3, 4, 6, 8, 9, 10, 11, 12, 13	81
P01	–	2	2
AC	–		1
BA	–		1

Buff, Fine Dark Buff-Grey Micaceous (Fine Dark Buff Micaceous in the Special Deposit North), Fine Mottled, Fine Orange and Fine White. Of these, only 3 occur across all three contexts: Fine Buff, Fine Dark Buff-Grey Micaceous and Fine Orange. For the Fine Buff and Fine Orange fabrics, the same pattern can be observed by comparing the Kavos assemblages and Dhaskalio. In both cases, the Special Deposit South and Special Deposit North assemblages contain similar shapes within a fairly broad range, whereas the Dhaskalio material displays a slightly narrower range of shapes, but still overlaps with some shapes seen on Kavos: for the Fine Buff fabric the pyxis is found in all three contexts, with the sauceboat repeating within the Fine Orange fabric. In the Fine Dark Buff-Grey Micaceous fabric, the Dhaskalio repertoire is as equally broad as the Kavos assemblages, and includes several unique shapes such as the 'teapot' and plate. The remaining two fine fabrics are not found within the Dhaskalio material, but that is their only similarity as they show contrasting typological patterns. The sherds in a Fine Mottled fabric within the Special Deposit South and Special Deposit North assemblages appear almost exclusively in a single shape, the sauceboat, with only a lone one-handled footed cup appearing within the Special Deposit South assemblage. By contrast, the Fine White fabric has only a single shape within the Special Deposit South assemblage, a cup of Phylakopi I-iii type, but a large range of shapes within the Special Deposit North assemblage, including a necked jug, sauceboats, pyxides and a possible zoomorphic vessel. This discrepancy may indicate a less than perfect correlation between Broodbank's Fine White macroscopic group and the one presented within the 2006–08 material, or may simply reflect a genuine difference in fabric distributions between the two Kavos assemblages.

To summarize briefly the discussion so far, the typological patterns observed within the Special Deposit North assemblage cannot be extended generally onto the Special Deposit South assemblage, though it is clear that there are greater similarities between the two Special Deposit assemblages than in comparison to the Dhaskalio assemblage. The fine fabrics provide even less information to compare, as they are so rare within the Dhaskalio assemblage and not all fabrics correlate to earlier examples identified within the Special Deposit North. It is also difficult to correlate surface treatments quantitatively to typology for the 2006–08 material, and thereby by fabric, but an indication of the ranges has been given within each macroscopic fabric description, which is based upon detailed typological and stylistic study by Sotirakopoulou (volumes IV and V in this series).

Note

The typological information presented here is primarily derived from Sotirakopoulou's preliminary catalogue. This was constructed during the initial finds processing period and I am extremely grateful to Sotirakopoulou for giving me access to her catalogued sherds. The preliminary catalogue was not intended as a statistically valid sample of the assemblage.

Petrographic analysis

The petrographic study of the Keros 1987–88 assemblage (Hilditch 2007, 238–63) offered a valuable means of testing the coherence of the extensive macroscopic study by Broodbank and provided a more detailed discussion of possible provenance for the large range of fabrics found at the site. Despite the relatively small sample size and the large number of fabrics attested by only one sample, many of the wares defined by Broodbank were confirmed as coherent fabrics with respect to provenance and technological behaviours under the microscope. The petrographic study of the 2006–08 ceramic assemblage is significantly larger, with 291 samples taken in total. Of these, 186 samples were taken from the site of Dhaskalio, across all three chronological phases: Phase A, 21 samples; Phase B, 62 samples; and Phase C, 103 samples. A range of catalogued and non-diagnostic sherds was sampled at both Dhaskalio and Kavos, as well as limited numbers of ceramic special finds, from a wide selection of trenches across the site (see Table 7.2).

A number of the fabric groups identified and described within the 1987–88 publication is present within this study. However, where descriptions for the same group differ between volumes, the more robust sample size and detailed macro-micro identification should mean that all descriptions published here supersede those of the previous 2007 volume.

Petrographic fabric summaries

The petrographic fabrics identified (Table 7.3) are summarized here with regard to their correlating typological forms, the range of macroscopic fabrics exhibited, their colour after refiring tests (at 1100°C for 1 hour), their numbers from either Dhaskalio or Kavos (Dh:K) and, for the former, the corresponding chronological phases. To distinguish between petrographic and macroscopic fabric categories, each petrographic fabric is denoted by P, whereas macroscopic fabrics are denoted by V. Parallels with petrographic fabrics identified and characterized at other sites are given for each fabric. The symbol * is used to highlight samples chosen for chemical analysis, which are discussed in full by Hein & Kilikoglou at the end of this chapter.

P1: Quartz (Meta-quartz and granite) (Plate 14)

These coarse-medium groups were expected to provenance predominantly from Naxos, given the petrographic parallels from Late Neolithic/EBA material at Zas Cave and Grotta (Hilditch 2005a,b) and the later MBA site of Mikre Vigla (Vaughan 1989). However, the large number of petrographic fabrics in which samples characterized as V1A or V1B appear (see Volume I, 478, table 23.22) shows that at greater resolution there are significant compositional and technological features that can indicate specific production units. Given the range of variation beyond current comparatives on Naxos, we may also consider similar raw material sources on Paros, Amorgos and other Cycladic islands with coarse-grained quartz-rich igneous intrusions.

Coarse to medium wares within this petrographic class are mostly large vessels, such as pithoi, miscellaneous storage jars with different neck types, basins, baking pans and braziers. There are less common instances of one-handled tankards, pyxides, multiple-headed lamps and jugs. The latter appear exclusively within the petrographic subgroups P1F and the Calcite fabric subgroup P6A, which suggests a 'local Keros Triangle' source on Amorgos due to the presence of 'patelia' inclusions. The semi-fine fabrics (P1a–P1e) are undoubtedly related to the coarse-medium production, and contain more than a few sauceboats, jugs and conical-necked jars, reinforcing the potentially local 'Keros Triangle' production of supposedly exotic, non-Cycladic shapes.

P1A: High biotite, fossil-bearing, granitic-derived fabrics

Shapes	concave-necked jar, coarse closed vessel (2)
Macro (V)	1A, 2B, 2C
Refired colours	red (3)
Dh:K	4:0
Phases	B, C (2)

Parallels: known Naxian group 'Metamorphosed granite with calcareous inclusions', present in EBA pottery at Zas Cave & Grotta (Hilditch 2005a,b), also present at MBA Mikre Vigla (Vaughan 1989). Jug 08/27 has a two-paste construction, one of which appears to calcareous-tempered, perhaps showing the link between the calcareous and non-calcareous versions of this category (P1A *versus* P1F and P1G).

P1B: Coarse, macrofossils, calcareous-rich clays, possible mixing, granitic-derived coarse fraction

Shapes	jug (3), baking pan (2), neckless jar
Macro (V)	1A (2), 13, FG, FDBM (2)*
Refired colours	red (4), pink (2)
Dh:K	4:2
Phases	B, C (3)

Parallels: bridges the 'Calcareous meta-granite' of EBA Zas Cave and Grotta (Hilditch 2005a,b), and 'Granite+Biogenic' of Keros 1987–88 (Hilditch 2007), so most likely Naxian in origin.
* The two VFDBM samples were analysed chemically and found to correlate to Groups C and D: the former resembles the main group of ceramics sampled from Panormos on Naxos (Day *et al.* 2009), whereas the latter corresponds to a group of three dark brown burnished goblets from Aghia Irini, the origin of which is unconfirmed (Day *et al.* 2009).

P1C: Sand temper common, clay mixing?

Shapes	baking pan, barrel jar, basin, coarse closed vessel (3), concave-necked jar, conical-necked jar, tuyère
Macro (V)	1A (3), 2C (3), 7C, 13 (2)
Refired colours	red (7), pink (2)
Dh:K	8:1
Phases	A, B (3), C (4)

Parallels: related to P1A, P1B and P1E, but with deliberate use of sand-sized temper during paste processing—all extremely large, coarse vessels so this is unlikely to be a different production unit, but rather a specific technological choice for larger vessels by the production units responsible for producing other vessels in this fabric.

P1D: Sandstone clusters

Shapes	conical-necked jar
Macro (V)	2C
Refired colours	pink
Dh:K	1:0
Phases	C

Parallels: none known. Quartz-feldspar sandstone inclusions could be compatible with a range of sources throughout the Keros Triangle.

P1E: Deliberate, well sorted sand temper—as Keros 1987

Shapes	conical-necked jar (4), cooking pot or deep bowl (2)
Macro (V)	2C (5)*, 14
Refired colours	buff, pink (4), red
Dh:K	2:4
Phases	C (2)

Parallels: direct parallel to 'Metamorphic calcareous-rich' from Keros 1987–88 (Hilditch 2007). Also similar to Canaanite jar fabric, perhaps as simply coastal sand tempered so implying same technique rather than same origin. Possible parallels with some sand-tempered jars found at EBA Aghia Irini (Hilditch 2004). Kouphonisi should not be ruled out as a possible source, as geological sampling

Table 7.3. *Summary of samples by petrographic fabric.*

Petrographic fabric		Sample no.
Quartz	1A	07/11, 07/46, 08/134
	1B	07/24, 07/59, 08/09, 08/27 – variants 08/02, 08/102
	1C	07/09, 07/33, 07/72, 08/05, 08/07, 08/39, 08/172, 09/08, 09/23
	1D	07/57
	1E	08/36, 08/42, 08/43 – variants 08/37, 08/123, 08/126
	1F	07/02, 07/17, 07/18, 08/18, 08/83, 08/99, 08/106, 08/110, 08/129, 08/142, 08/183 -– variants 07/19, 09/14
	1G	07/40, 08/12, 08/29, 08/56, 08/75, 08/81, 08/104, 08/128, 08/131, 08/167, 08/174, 09/26
	1H	07/07, 07/37, 07/38, 08/34, 08/38, 08/40, 08/48, 08/49, 08/79, 08/85, 08/87, 08/89, 08/90, 08/98, 08/103, 08/116, 08/122, 08/124, 08/125, 08/139, 08/140, 08/147, 08/176, 08/178, 08/179, 08/180, 08/181, 09/01, 09/03, 09/13, 09/21, 09/31
	1I	08/01, 08/149, 08/150, 08/153
	1J	08/10, 08/114
	1K	07/58, 08/04, 08/182
	1a	07/60, 08/20, 08/84, 08/101, 08/117, 08/161, 08/163, 08/164, 08/168
	1b	08/46, 08/50, 08/86, 08/146, 08/159, 08/160, 09/20
	1c	08/67, 08/148, 08/155
	1d	08/143, 09/18
	1e	08/61, 08/156
Micaceous	2A	07/05, 07/10, 07/14, 07/15, 07/32, 07/42, 07/62, 08/03, 08/30, 08/47, 08/77, 08/80, 08/93, 08/94, 08/96, 08/118, 08/130, 08/150A, 08/150B, 08/169, 09/06, 09/11, 09/12, 09/17, 09/22, 09/24 – variants 07/26, 07/35, 08/92, 09/02, 09/28
	2B	08/127
	2C	08/06, 08/100
	2D	07/25, 07/27, 07/31, 07/41
	2E	08/120
	2F	08/82
	2G	08/76

Petrographic fabric		Sample no.
Volcanic	3A	07/16, 07/43, 07/44, 07/48, 07/50, 07/61, 07/63, 07/65, 07/68, 07/69, 07/71, 08/08, 08/11, 08/13, 08/14, 08/16, 08/17, 08/70, 08/71, 08/73, 08/105, 08/108, 08/109, 08/111 – variants (organics) 07/63, 08/52, 08/105
	3B	07/12, 07/64, 07/66, 07/73, 07/75, 08/15, 08/53, 08/54, 08/113
	3C	09/04, 09/05
	3D	07/74, 08/57, 08/72
	3E	07/36, 07/49, 07/67, 08/55, 08/58
	3F	07/47, 07/51, 07/70, 08/69, 08/107, 08/112
	3G	07/06, 07/45, 07/52, 07/54, 08/74, 08/132, 08/173, 09/16
	3H	08/44, 08/97, 08/137
	3I	07/56
	3J	09/30
	3K	09/25
Phyllite	4A	07/04, 07/29, 08/41, 08/45, 08/133, 09/33
	4B	07/03, 07/23, 07/39, 08/28, 08/78, 08/88, 08/95, 08/165, 09/09, 09/15, 09/32, 09/34
	4C	09/10
Talc	5	07/13, 07/20, 07/21, 07/28, 07/53, 08/166, 08/170, 09/19
Calcite	6A	07/08, 08/175
	6B	08/26, 08/138
	6C	08/51, 08/91, 08/121, 08/177
Loners		07/30, 07/55
Fine Wares		07/01, 07/22, 07/34, 08/19, 08/21, 08/22, 08/23, 08/24, 08/25, 08/35, 08/59, 08/60, 08/62, 08/63, 08/64, 08/65, 08/66, 08/68, 08/115, 08/135, 08/136, 08/141, 08/144, 08/145, 08/151, 08/152, 08/154, 08/157, 08/158, 08/162, 08/171, 09/07, 09/27

of coastal sand on the western coast produced extremely calcareous grains (marl and fossiliferous grains) and contained fragments of altered volcanic rock particles (microlitic rhyolite, devitrified glass, zoned feldspars).
* A V2C sample was analysed chemically and found to correlate with Group J, which corresponds to a group of Late Helladic ceramics from Attica (Gilstrap 2015).

P1F: Coarse meta-granite inclusions with dense biotite-rich fine fraction and varied accessory minerals

Shapes	baking pan, coarse closed vessels (5), cooking pot or deep bowl, cylindrical-necked jar, pithoid jar, pithos (3), side-spouted pyxis
Macro (V)	1A (6)*, 1B, 2B*, 2C, 5, 10, 13
Refired colours	red (11), pink (2)
Dh:K	9:4
Phases	A, B (4), C (4)

Parallels: a more micaceous variant of the non-calcareous P1G, showing a higher degree of metamorphism in the granitic-derived inclusions. The frequency of fine fraction mica is variable in both the Zas Cave and Grotta granitic fabrics (Hilditch 2005a,b), which suggests that this group may reflect a distinct source within the granite-granodiorite dominated landscape of Naxos.
* A V1A and a V2B sample were analysed chemically and both found to correlate with Group C, a composition which resembles the main group of ceramics sampled from Panormos on Naxos (Day *et al.* 2009).

P1G: Non-fossiliferous, non-calcareous, granitic-derived fabric with brown clay

Shapes	barrel jar, basin (2), brazier, coarse closed vessel (5), cooking pot or deep bowl (2), pithoid jar
Macro (V)	1A (9), 2C, 13 (2)
Refired colours	red (11) pink
Dh:K	10:2
Phases	A, B (2), C (7)

Parallels: present within all known assemblages from Naxos (Grotta, Zas Cave, Mikre Vigla: Hilditch 2005a,b; Vaughan 1989) and forms the bulk of the assemblage at Grotta and Zas Cave, suggesting strong links to Naxos. Direct parallel to the 'Granite+Schist' group from Keros 1987–88 (Hilditch 2007).

P1H: Granite and flysch deposits, altered and decomposed volcanic rock grains and rare garnets

Shapes	baking pan, basin, bowl, brazier, CCV (7), conical-necked jar (7), cooking pot (3), jug (2), multiple-headed lamp (7), pithoid jar (2)
Macro (V)	1A, 2B (2), 2C (13), 5 (7), 6A, 6B, 6D, 7B (2), 7C (2), 10, 11
Refired colours	red (7), pink (25), buff
Dh:K	13:19
Phases	A (4), B (4), C (5)

Parallels: no direct parallels with fabrics from the Keros 1987–88 material, nor the assemblages of Zas Cave or Grotta, but there are similarities with some medium-coarse examples from Mikre Vigla (Vaughan 1989).

P1I: High organic content, very coarse granitic-derived sand, densely packed

Shapes	brazier, furnace lining? (2), mould
Macro (V)	1A, 2A, 3A, 5
Refired colours	red (4)
Dh:K	1:3 (2 from Kavos promontory)
Phases	C

Parallels: no organic-tempered examples of the granitic Naxian fabric suite have been characterized to date. The texture of this fabric reflects a deliberately coarse granitic sand-tempered fabric with a high level of organic material which has almost entirely burnt out (some reduced haloes visible on surface).

P1J: Calcareous sediment

Shapes	baked clay (2)
Macro (V)	1A, 2C
Refired colours	buff (2)
Dh:K	2:0
Phases	C

Parallels: a paler brown clay groundmass which appears to correlate to calcareous sediment infill seen in other sherds, including infill from multiple-headed lamps within the Kavos assemblage. These baked clay fragments may have been architectural elements made using clayey sediment from the surface of the Dhaskalio and Kavos complex, as geological sampling of this area would suggest.

Semi-fine fabrics:

P1a: Non-calcareous, quartz-feldspar inclusions, biotite-rich fine fraction with accessory green amphibole, clinozoisite and garnet

Shapes	conical-necked jar (5), medium closed vessel, fine closed vessel, pithos, sauceboat
Macro (V)	FB*, FDBM* (5), FGrM* (2), 7C
Refired colours	red (8), pink
Dh:K	3:6
Phases	B, C (2)

Parallels: a semi-fine version of the coarser non-calcareous granitic-derived P1G, which also present within other Naxian assemblages, including Zas Cave, Grotta and Mikre Vigla (Hilditch 2005a,b; Vaughan 1989).
* Five samples were analysed chemically: the four micaceous samples (VFGrM and VFDBM) correspond to Group D, which exhibits close similarities to a group of three dark brown burnished goblets from Aghia Irini, the origin of which is still unknown (Day *et al.* 2009). The VFB sample is characterized in Group J, which shows strong similarities to Late Helladic vessels from Attica (Gilstrap 2015).

P1b: Calcareous-rich (micrite, filaments and microfossils), granitic-derived with fine fraction mica

Shapes	bowl (with Syros-type decoration), conical-necked jar (4), fine closed vessel, fine open vessel
Macro (V)	FB*, FG*, FDBM (2), FGrM* (3)
Refired colours	red (5), pink (2)
Dh:K	1:6
Phases	B

Parallels: a semi-fine version of the coarser calcareous, fossiliferous meta-granite fabrics (P1A and P1B). Also present within other Naxian assemblages, including Zas Cave, Grotta and Mikre Vigla (Hilditch 2005a,b; Vaughan 1989).
* Four samples were analysed chemically with three samples corresponding to Group D, as described for P1a above, and an VFG sample characterized as a chemical loner. This would suggest a single provenance for the bowl exhibiting Syros-type decoration with the conical-necked jars from both P1a and P1b.

P1c: Granitic-derived fabric with biotite-rich and micrite-bearing fine fraction, silty textural concentration features (TCFs)

Shapes	jug (2), sauceboat
Macro (V)	FG* (3)
Refired colours	pink (3)
Dh:K	0:3
Phases	N/A

Parallels: a less calcareous, non-fossiliferous semi-fine version of P1A, as yet not recorded in other Naxian assemblages.
* Two samples were analysed chemically and both corresponded to Group E, which resembles a group of yellow mottled sauceboats found in Aghia Irini and a group of fine painted ceramics found in Koropi (Day *et al.* 2009; Ntouni 2015, 208-209). Hein & Kilikoglou highlight the high chromium and nickel concentrations in this

group, typical of ophiolitic environments, which are known for example in mainland Greece (Attica, Boeotia), central Crete or the Dodecanese (Rhodes).

P1d: Non-calcareous, muscovite-rich, quartz-feldspar inclusions with accessory green amphibole

Shapes	semi-fine closed vessels
Macro (V)	FG*, FDG*
Refired colours	red (2)
Dh:K	1:1
Phases	N/A

Parallels: the abundance of muscovite in the fine fraction may suggest an alternative source to the other medium and semi-fine fabrics amongst the Quartz category, possibly on Naxos, although Paros should not be ruled out, given the higher muscovite levels in the quartz-rich plutonic rocks on this island.
* Both samples of this fabric were analysed chemically, with the VFG corresponding to Group F (only one parallel in an unassigned sample of a burnished bowl found in Koropi: Ntouni 2015), and the VFDBM corresponding to Group A, thought potentially to provenance from Phylakopi on Melos (Day *et al.* 2009).

P1e: Non-calcareous, densely packed quartz-feldspar and chert-bearing inclusions with accessory green amphibole and biotite

Shapes	one-handled footed cup, sauceboat
Macro	FG* (2)
Refired colours	red (2)
Dh:K	0:2
Phases	N/A

Parallels: none found amongst Naxian assemblages to date, though these samples may be less micaceous variants of P1a.
* Both samples in this fabric were analysed chemically and found to correspond to Group A (potential Melian provenance) and a chemical loner, which resembles an Early Helladic transport jar found at Panormos on Naxos (Day *et al.* 2009).

P2. Micaceous (schist & mica-schist) (Plates 14 & 15)

This class was predominantly thought to be a range of fabrics from Ios and Naxos, and even Siphnos. Naxos may be the source of the more biotite-rich fabrics, as the southeast of the island is intercalated bedded marbles and pelitic schists. Petrographic comparatives from Skarkos on Ios (Hilditch & Kiriatzi 2005) contain garnet-mica schists with distinct marl or micrite inclusions within the coarse and fine fraction, and correlate to fabric P2E within this study. The presence of glaucophane schist in fabric P2A may hint at other high-metamorphic zones beyond Ios, as no parallels for this fabric have been observed within the Skarkos assemblage to date. Currently, there are Cycladic islands with contemporary EBA sites, such as Chalandriani and Kastri on Syros, that remain almost entirely unknown with respect to available potting raw materials. No Cycladic parallels have been identified for the lone chlorite schist fabric (P2H), though the coarse temper texture is somewhat reminiscent of the Talc Ware tempering tradition and may reflect a primary clay from a freshly weathering parent rock.

The subgroups of this fabric appear to be easier to spot in hand specimen (smaller range of macroscopic groups), but there is considerable overlap between the variants of the Micaceous Quartz and Micaceous Other macroscopic groups, reinforcing the difficulties in considering provenance at the macroscopic level only.

The shapes are mostly jars, cooking pots, baking pans and deep bowls, a narrower range than the Quartz group, suggesting perhaps a narrower range of potential sources, or a more specialized use of micaceous fabrics in cooking wares during the EBA Cyclades.

P2A: Micaceous schist with glaucophane, garnet and variable levels of micrite inclusions

Shapes	baking pan (8), bowl (6), coarse closed vessel (5), cooking pot/deep bowl (4), hearth, funnel-necked jar (2), jug, metallurgical ceramic (2), pithoid jar (2)
Macro (V)	5 (9), 6A, 6B (2), 6C (11), 6D (2), 13 – variants: 1A, 5 (2), 11, 13
Refired colours	red (30), pink
Dh:K	23:8 (2 from Middle area)
Phases	A (5), B (11), C (7)

Parallels: no immediate parallels with the Keros 1987–88 material. Significant quantities of garnet-bearing and glaucophane-bearing schist strongly suggests an Iotic provenance (Hilditch & Kiriatzi 2005), although these schists are also found on Schinousa and Irakleia. The variable micrite content of the fine and coarse fractions suggests the use of a heterogeneous clay source. The variants within this large group reflect a wider range of macroscopic fabrics.

P2B: Quartz-feldspar-mica schist inclusions with common iron oxides

Shape	cooking pot or deep bowl
Macro (V)	6B
Refired colour	red
Dh:K	1:0
Phases	C

Parallels: most likely a variant of P2A, compatible with an Iotic source but with fossiliferous micrite sand, which may suggest the inclusion of coastal beach sand as temper (Hilditch & Kiriatzi 2005).

P2C: Semi-coarse fabric with quartz-feldspar-mica-epidote-clinozoisite schist and shell filaments

Shapes	conical-necked jar, tuyère
Macro (V)	2B, 13
Refired colours	red, pink
Dh:K	1:1
Phases	B

Parallels: similar to the 'Quartz-mica Schist' group from the 1987–88 Keros material (Hilditch 2007).

P2D: Quartz-feldspar-clinpoyroxene-green amphibole-mica schist, showing severely altered feldspars

Shapes	cooking pot, funnel-necked jar, neckless jar, baking pan
Macro (V)	5 (3), 6D
Refired colours	red (4)
Dh:K	4:0
Phases	B (3), C

Parallels: no direct parallels in the Keros 1987–88 material, although this fabric is compatible with a Naxian origin, as green amphibole-bearing schist fragments have appeared in other Naxian fabrics (Hilditch 2005a,b; 2007). The state of the feldspars would suggest a distinct clay source from the main Naxian fabrics in the P1 category.

P2E: Quartz-garnet phyllite

Shapes	cooking pot/deep bowl
Macro (V)	5
Refired colours	red
Dh:K	1:0
Phases	C

Parallels: none known from Naxian assemblages or the Keros 1987–88 material. Garnet-bearing metamorphic rocks are associated with the central-eastern migmatite zone of Naxos as well as more extensively on Ios (Hilditch & Kiriatzi 2005).

P2F: Biotite phyllite-rich

Shapes	cooking pot/deep bowl
Macro (V)	1A
Refired colours	red
Dh:K	0:1
Phases	N/A

Parallels: none known from Naxian assemblages or the Keros 1987–88 material, although these components are widely compatible with the metamorphic complexes of the central Cyclades (Hilditch 2007).

P2G: Chlorite schist

Shapes	baked clay
Macro (V)	1A
Refired colours	red
Dh:K	0:1
Phases	N/A

Parallels: none known, very unusual fabric consisting of coarse fragments of yellow chlorite schist, probably tempered.

P3. Volcanic (Plate 15)

There are important divisions within this category, the most prominent of which is the distinction between the calcareous-fossiliferous, calcareous-non-fossiliferous and non-calcareous. It is likely that given the EB II date of the site, and that the calcareous-fossiliferous fabric also appears in the earliest Phase A deposits, subgroup P3A is related to ceramic production on Thera, where early production of pale volcanic wares has been confirmed (Vaughan 1990). There may still be a pale fossiliferous component coming from Melos, or indeed Aegina, in the later Phase C, but this requires further consideration at the chemical level. The calcareous-non-fossiliferous and non-calcareous fabrics may possibly come from Melos. There is only one sample that resembles an andesitic fabric typical of Aegina (Kiriatzi *et al.* 2011); the others lie on the wide spectrum of acidic volcanic fabrics from Melos, which can be rich in obsidian, ignimbrite and pumice, and have already been shown to be far from homogeneous at Phylakopi (Vaughan & Williams 2007).

Shapes are diverse, as the Quartz category, including bowls, cooking pots and pans, miscellaneous jars, pithoi, jugs and rare pyxides and depas cups. The latter may suggest local Cycladic imitation of such exotic shapes.

P3A: Calcareous clay with fossil-bearing calcareous rock fragments and volcanic inclusions: minor phyllite and wackestone

Shapes	bowl (2), coarse closed vessel (13), concave-necked jar, conical cup, depas cup (2), jug, neckless jar, pithoid jar, pithos (3)
Macro (V)	1A, 1B, 2B*, 2C (5), 12* (13), FG*
Refired colours	red (4), pink (12), buff (7)
Dh:K	21:0
Phases	B, C (24)

Parallels: strong parallels to the EBA Calc-volcanic fabric at Akrotiri (Vaughan 1990) and the later MBA local fabric (Hilditch 2009); no parallels from the EBA analysis at Phylakopi, but some samples from the MBA do compare well (Vaughan & Williams 2007). Interesting to note that the lower fired samples all registered as V2C/VFG in macroscopic analysis, whereas the overfired samples all had a greenish tinge and were recorded as V12.

* Four samples of this petrographic fabric were analysed chemically and all were identified as Group B, compatible with an assumed local ceramic group of Early Cycladic dark-on-light and black burnished vessels from Akrotiri on Thera (see Hein & Kilikoglou, appendix to this chapter).

P3B: Calcareous clay with volcanic rock inclusions and micrite (fossiliferous?)

Shapes	coarse closed vessel, pithoid jar (4), pithos (3), pyxis
Macro (V)	1A, 2B (5), 2C (3)
Refired colours	red
Dh:K	8:0
Phases	B, C (8)

Parallels: has parallels with some non-calcareous volcanic fabrics from EBA Aghia Irini (attributed to Phylakopi: Hilditch 2004), but no direct parallels with the EBA assemblage from Phylakopi (Vaughan & Williams 2007). This would suggest a Theran origin, exploiting a similar calcareous source to P3A, but which is either non-fossiliferous or in which the biogenic component is more poorly preserved (Hilditch 2009).

P3C: Non-calcareous clay with volcanic rock inclusions and common fine fraction mica: sand tempered?

Shapes	baking pan, coarse closed vessel
Macro (V)	1A, 2B
Refired colours	red
Dh:K	2:0
Phases	A (2)

Parallels: parallels to the Various Pink-Red volcanic samples at EBA Akrotiri attributed to Aegina (Vaughan 1990). However, mafic mineral frequency is lower than volcanic-derived Aeginetan fabrics generally (A. Pentedeka pers. comm., 2010). The few micrite inclusions could show links to P3B and a possible Melian origin, with similarities to the Pitchstone and Quartz fabric from EBA Melos (Vaughan & Williams 2007).

P3D: Non-calcareous clay with volcanic rock sand temper

Shapes	coarse closed vessel, pithoid jar, pithos
Macro (V)	2A, 2C (2)
Refired colours	red
Dh:K	3:0
Phases	C

Parallels: strong parallels to the EBA non-calcareous volcanic samples from Phylakopi (Vaughan & Williams 2007), as sand-tempering seems to be a clear tradition within the Melian assemblage.

P3E: Non-calcareous clay with dominant ash and devitrified volcanic glass

Shapes	basin or bowl, bowl, cooking pot, deep open jar, neckless jar
Macro (V)	2C (3), 12 (2)
Refired colours	pink (3), red (2)
Dh:K	5:0
Phases	A, C (4)

Parallels: some parallels to the non-calcareous, mica-poor, sand-tempered P3D, except the coarse temper is almost exclusively devitrified volcanic glass and ash particles. The non-calcareous nature of the samples suggests a Melian rather than Theran origin, although the mafic minerals in the fine fraction do not rule out Aegina as a possible source. There are no direct parallels with the published Phylakopi (Vaughan & Williams 2007) or Kolonna assemblages (Kiriatzi *et al.* 2011).

P3F: Calcareous clay with fossil-bearing calcareous rock fragments, devitrified volcanic glass and fine-grained volcanic inclusions

Shapes	baking pan, bowl, coarse closed vessel, jug, pithoid jar, pithos
Macro (V)	12*
Refired colours	pink (4), buff (2)
Dh:K	6:0
Phases	C

Parallels: related to P3A with respect to the fossiliferous calcareous rock fragments, although these samples are richer in devitrified

glass and ash particles, so most likely a Theran fabric based on the compositional profile (Hilditch 2009).
* One sample was taken for chemical analysis and identified as Group B, which is compatible with an assumed local ceramic group of Early Cycladic dark-on-light and black burnished vessels from Akrotiri on Thera (see Hein & Kilikoglou, appendix to this chapter). Parallels are strong between this fabric and P3A, where other samples were shown to belong chemically to Group B.

P3G: Non-calcareous clay with volcanic rock and biotite-rich phyllite inclusions

Shapes	baking pan (2), bowl, cooking pot (2), coarse closed vessel (4), pithoid jar
Macro (V)	10
Refired colours	red
Dh:K	10:0
Phases	A, B (3), C (6)

Parallels: the distinctive frequent phyllite inclusions are biotite- and quartz-rich, not the iron-manganese variety that characterize the P4 Phyllite category. The volcanic and phyllitic grains are rounded, so probably mature sand was used to temper the paste (this would rule out recycling of volcanic stone tools in a non-volcanic source area). Basement phyllites exist on Melos and Thera but the strongest parallels for this fabric are to the Metamorphic and Volcanic fabric identified at EBA Phylakopi (Vaughan & Williams 2007).

P3H: Non-calcareous clay with andesitic volcanic rock inclusions

Shapes	jug (3)
Macro (V)	2B (2), 2C
Refired colours	red
Dh:K	0:3
Phases	N/A

Parallels: strong parallels to the Bronze Age red-brown Aeginetan volcanic fabrics published by Kiriatzi *et al.* (2011), so this fabric should be considered an import from Aegina.

P3I: Very fine, plagioclase feldspar, biotite-rich

Shapes	coarse closed vessel
Macro (V)	2C*
Refired colours	buff
Dh:K	1:0
Phases	C

Parallels: none known.
* This sample was analysed chemically and found to be a loner with no assigned provenance as yet.

P3J: Red oxidized lava, microlitic volcanic rock

Shapes	coarse closed vessel
Macro (V)	12
Refired colours	red
Dh:K	1:0
Phases	B

Parallels: none known.

P3K: Volcanic rock sand-tempered, muscovite-rich

Shapes	small jar
Macro (V)	FG*
Refired colours	red
Dh:K	1:0
Phases	B

Parallels: a sample with an obvious coil join, shows perhaps one sand-tempered paste and another untempered? Parallels to the Ignimbrite fabric from EBA Phylakopi (Vaughan & Williams 2007).
* This sample was chemically analysed and identified as a variant of Group A, which shows clear similarities with jars and bowls from Phylakopi on Melos (Day *et al.* 2009).

P4. Phyllite (dark/red phyllite) (Plate 15)

The subgroups within this petrographic class are dominated by phyllite inclusions of various types. P4A contains the characteristic iron-manganese phyllite inclusions, known on Amorgos as 'patelia', and matches the fabric identified at EBA Markiani (Vaughan 2006). Although this fabric is easily recognized in hand specimen, variation does exist with respect to inclusion density and the relative percentage of angular to sub-angular calcite inclusions and optically active reddish shale inclusions. It is uncertain whether this reflects chronological variation throughout the EBA or perhaps the existence of more than one production unit within the vicinity of Markiani on Amorgos. One of the Calcite fabrics (P6A) also displays the distinctive 'patelia' inclusions, possibly representing the opposite end of a heterogeneous continuum composed of 'patelia' and calcite inclusions.

Shapes are relatively broad, incorporating bowls, cooking pots, pans, pyxides and jars, and so could form a discrete ceramic set that travelling groups may have brought with them whole. No imitation of 'exotic' shapes has been noted; it is questionable whether this reflects upon the limitation of the local raw materials or the unwillingness of local communities on Amorgos to engage in such behaviours.

P4A: Dark phyllite with sparite or micrite (non-biogenic) and quartzite

Shapes	coarse closed vessel, conical-necked jar, pyxis
Macro (V)	2C, 3A (3), 3B, FDG*
Refired colours	red
Dh:K	4:2
Phases	B (3), C

Parallels: direct parallel to the 'Dark Phyllite' as described in the Keros 1987–88 material (Broodbank 2007; Hilditch 2007) and documented at Markiani (Vaughan 2006).
* This sample was analysed chemically and found to belong in Group J, paired with a fine closed vessel in P1a. Chemically, this group is related to previously analysed Late Helladic ceramics from Attica (Group I: Gilstrap 2015), but the macroscopic and petrographic analyses would strongly argue for an Amorgian provenance.

P4B: Red phyllite (crenulated)

Shapes	baking pan, bowl, coarse closed vessel, cooking pot, deep bowl, pedestalled jar
Macro (V)	1A, 2B, 3A (3), 3B, 4 (6)
Refired colours	red (11), pink (1)
Dh:K	9:2
Phases	A (2), B (6), C (1)

Parallels: direct parallel to the 'Red Shale' fabric at Markiani (Vaughan 2006), and present in the macroscopic fabrics of the Keros 1987–88 material, but not sampled for the petrographic study (Broodbank 2007).

P4C: Red/dark brown phyllite with calcite

Shapes	coarse closed vessel
Macro (V)	4
Refired colours	red
Dh:K	1:0
Phases	A

Parallels: similarity to the 'Phyllite+Calcite' fabric of the Keros 1987–88 material (Hilditch 2007), but less calcite (see P6A).

P5. Talc (Plate 16)

There is absolute correlation between the observed macroscopic and petrographic fabrics. Canonical Talc Ware is easily recognizable, with hardly any internal microscopic variation—a single source is once again suggested, though no further evidence is offered to support

Siphnos over any other talc source within the region (see discussion in Vaughan & Williams 2007, 118–19; Vaughan & Wilson 1993). Geological reconnaissance on Naxos by John Dixon (pers. comm., 2011) also revealed isolated talc deposits in southern Naxos, though whether these deposits could have served as potential raw materials for potting has yet to be investigated experimentally. Given the large range of other materials sourced from Naxos present at Dhaskalio, these talc deposits may deserve further attention.

Vessel shapes are relatively broad, including baking pan, various jars and a tray, but this is comparable to other sites during the EBA, such as Aghia Irini (Wilson 1999), Akrotiri (Vaughan 1990) and Phylakopi (Vaughan & Williams 2007).

Shapes	baking pan, deep open jar, funnel-mouthed pithoid jar, tray
Macro (V)	8
Refired colours	red (3), pink (5)
Dh:K	8:0
Phases	B (7), C (1)

Parallels: canonical talc ware (Vaughan & Wilson 1993; Hilditch 2007).

P6. Calcite (limestone, marble) (Plate 16)

There is considerable variation within this category, as it appears that compositionally different raw materials were deliberately tempered with crushed calcite, reinforcing the picture of a regional tradition of calcite tempering throughout the Cyclades, and beyond, during the EBA. There are strong links to Amorgos for one of the variants (P6A, and see Phyllite and marble discussion for P4C), which represents the end spectrum of one of the Dark Phyllite subgroups. Otherwise, it is difficult to give any further detailed information on provenance from specific islands as the different clays used create lone samples, rather than coherent compositional groups.

P6A: Crushed calcite, micrite sand and dark phyllite

Shapes	coarse closed vessel, multiple-headed lamp
Macro (V)	3B
Refired colours	red
Dh:K	1:1
Phases	B

Parallels: direct parallel with the 'Phyllite+Calcite' fabric of the 1987–88 Keros material (Hilditch 2007).

P6B: Crushed calcite, no micrite, quartz-series rock fragments

Shapes	multiple-headed lamp
Macro (V)	1A, 7B
Refired colours	red
Dh:K	0:2
Phases	N/A

Parallels: lack of phyllite may mean a non-Amorgian source, so possibly from Naxos considering the frequency of quartz-bearing inclusions in identified Naxian fabrics.

P6C: Crushed calcite, quartz and mica (variable)

Shapes	bowl, cooking pot, multiple-headed lamp
Macro (V)	1A, 6C, 7A, 11
Refired colours	red
Dh:K	1:3
Phases	C

Parallels: hard to identify individual provenance, as samples contain such common quartz-mica inclusions.

Loners (Plate 16)

a) *Serpentinite* (sample 07/55). The Cretan and wider Minoan tradition seems a possible candidate for this sample and may reflect the 'oatmeal fabric' identified amongst Cycladic assemblages by Vaughan (1990). The South Coast fabric is highly compatible (Myrtos–Fournou Korifi: Whitelaw *et al.* 1997), both compositionally and technologically, as discussed for a lone sample within the 1987 material (Hilditch 2007), and supported by the fact there are no known Cycladic parallels.

Shape	coarse closed vessel
Macro (V)	14
Refired colour	pink
Dh:K	1:0
Phase	C

b) *Micrite* (sample 07/30). This fabric seems to be most compatible with fine calcareous Neogene sediments, found on the Kouphonisia and Crete. There is a parallel with one of the geological samples taken during the field season from Ano Kouphonisi (the small bay north of the main harbour). A Cycladic provenance may be more likely given the vessel type in question, a cylindrical necked jar.

Shape	cylindrical-necked jar
Macro (V)	2C
Refired colour	pink
Dh:K	1:0
Phase	B

Fine wares (Plate 16)

The petrographic summaries of the identified fine wares give correlations with the chemical groupings of Hein & Kilikoglou, presented in full in the appendix to this chapter. The parallels and connections between the fine ware fabrics are considered in the discussion section.

F1: Calcareous fossiliferous

Shapes	sauceboat (2)
Macro (V)	FG (2)
Chemical	A, G
Refired colours	buff
Dh:K	0:2
Phases	N/A

F2: Pale fabric with calcareous haloes

Shapes	jug (2), sauceboat
Macro (V)	FB, FDBM, 2C
Chemical	G
Refired colours	buff
Dh:K	0:3
Phases	N/A

F3: Micrite, non-biogenic

Shapes	fine closed vessel, one-handled footed cup, sauceboat (4)
Macro (V)	FB, FG (3), FGMed, FP
Chemical	A, E, G
Refired colours	buff (2), pink, red (3)
Dh:K	1:5
Phases	C

F4: Grey fabric with occasional quartz and iron oxide in FF

Shapes	sauceboat (3)
Macro (V)	FDG, FGMed, FP
Chemical	G, H, I
Refired colours	red (3)
Dh:K	0:3
Phases	N/A

F5: Low fired, polycrystalline quartz and muscovite rich

Shapes	conical-necked jar (2), fine closed vessel, jug, one-handled tankard, plate, pyxis lid, sauceboat
Macro (V)	FB, FDBM (3), FGMed, FGrM, FO, FP
Chemical	A, F, I, LONER (2)
Refired colours	buff, red (7)
Dh:K	4:4
Phases	A (2), B (2)

F6: Fine clay with high percentage of biotite in FF

Shapes	one-handled footed cup, sauceboat (3)
Macro (V)	FB, FG, FO, FGMed
Chemical	A, E, H
Refired colours	buff, pink, red (2)
Dh:K	0:4
Phases	N/A

F7: micaceous fabric with amphiboles and clinozoisite

Shapes	fine closed vessel (2)
Macro (V)	FDGM, FGrM
Chemical	F
Refired colours	pink, red
Dh:K	1:1
Phases	B

F8: Fine, iron-rich fabric

Shapes	jug, sauceboat (2)
Macro (V)	FO, FP (2)
Chemical	G2, J
Refired colours	pink (3)
Dh:K	0:3
Phases	N/A

F9: Fine with calcite and micrite

Shapes	sauceboat (2)
Macro (V)	FGMed, FO
Chemical	H, SB-YM1
Refired colours	red (2)
Dh:K	1:1
Phases	B

Discussion

The integrated fabric study of the Dhaskalio and Kavos assemblage builds upon the earlier ceramic investigations by Broodbank (2007) and Hilditch (2007) and was designed to address the following questions:

a) How do the ceramic assemblages at Dhaskalio and Kavos compare with each other and the Keros 1987–88 assemblage?
b) Can local production of ceramics at Dhaskalio-Kavos or Keros be identified?
c) What range of potential sources do the imported ceramics indicate?
d) Can the suite of ceramic fabrics give insight to the activities and interactions of the ancient islanders situated at Dhaskalio and Kavos?

Reference should be made here to the discussion of the provenance of the ceramic material from Dhaskalio (Volume I, chapter 23) and from Kavos (Volume II, chapter 6).

At the macroscopic level

As with the earlier investigations of the Special Deposit North, a range of potential off-island sources for the ceramic assemblage was indicated by the macroscopic analysis, with even more macroscopic groups identified in this study. In total, 33 distinct macro groups were identified, 22 coarse-medium and 11 fine groups, each displaying a specific suite of characteristics with respect to compositional and technological factors. Given the limited geological profile of Keros, only 6 coarse-medium groups, spread between the Quartz (V1A, V1B), Sandy (V2A, V2B) and Calcite (V7A, V7B) macroscopic classes, were potentially compatible with locally available raw materials. In addition, macroscopic parallels with published EBA Cycladic assemblages indicated probable imports from Naxos (Quartz, Micaceous Schist, Calcite, Granite), Amorgos (Dark and Red Phyllite, Calcite), Ios (Micaceous Schist), Melos (Dark Volcanic) and Thera (Pale Volcanic). This picture matched the overall impression given from macroscopic analysis of the Special Deposit North, with the major exception of the Pale Volcanic group: this group was frequent within the Dhaskalio assemblage, in comparison to its extremely rare frequency in the Special Deposit South and total absence in the Special Deposit North.

How coherent are the macroscopic groupings with respect to the microscopic analysis?

Overall, more than two-thirds of the ceramics sampled for petrographic analysis were compatible with the compositional profile assigned to them at the macroscopic level, with an additional 15 per cent falling consistently into a single compositional profile, albeit different to the one predicted at the macroscopic level. As with the Keros 1987–88 study, the Sandy group displayed the highest level of variation, with samples appearing throughout several different petrographic classes, but mostly split between the Volcanic and Quartz classes. The macroscopic groups Dark Volcanic, Granite, Non-Micaceous Phyllite and Calcite were the least coherent at the microscopic level, though some samples did still appear within the anticipated compositional range.

In general, the macroscopic analysis of the assemblage was a valuable exercise, confirming initial speculation on provenance, providing more detail for the macroscopic observations of the Special Deposit North, as well as highlighting general trends of frequency for the different fabrics across all three occupational phases.

The potential for no local Keros ceramic production seems to have been strengthened through the integrated macroscopic and microscopic analysis, with specific shapes and chronological phases revealing no direct correlation to locally compatible raw materials. Instead, the microscopic analysis has provided a clearer picture of where specific macroscopic fabrics may originate, whilst elaborating upon which macroscopic groups vary with respect to discrete sources. We can be confident that future macroscopic analysis of EBA pottery found on Keros provides a reliable means of identifying imported pottery and their potential sources.

Where did the pottery come from?

Coarse and medium wares

So a logical, if unusual, conclusion from the fabric analysis is that no local raw materials were used for ceramic production. Is there the possibility that raw clays from other sources were imported to Dhaskalio-Kavos for ceramic production activities 'on-site'? It is perhaps only the baking pans recovered in the excavations that might give some hint to this type of behaviour within the production process. In some cases, the rough and uneven bases of the baking pans may indicate that they were effectively 'built into the ground' and fired *in situ*. However, these vessels are not sufficient evidence on their own for regular importation of clays, as we might also imagine that preformed baking pans with uneven bases were secured into place in their new surroundings on Dhaskalio with loose sediment. The causeway notwithstanding, the islet of Dhaskalio creates natural boundaries for the settlement located there and, given the density of settlement uncovered to date, it seems unlikely that significant pottery production and firing activities, even with imported raw clay, took place there. Perhaps of note here are the samples of possible metal smelting 'furnace lining' (08/149 and 08/150), both of which contained dense sand-sized quartz temper and organic material (P1I), typical tempering materials of this period, yet such quartz temper would have been difficult (if not impossible) to find naturally in the vicinity of Kavos and across the island of Keros more widely. These samples are also unlikely, then, to represent locally sourced materials for the metallurgical activities taking place in this area and were probably imported as part of a larger metallurgical kit carried by specialist craftspeople (for a broader discussion of metallurgical activities, see Chapter 8).

The most common petrographic class is Quartz, within which are 15 individual fabrics reflecting a range of specific technological choices within the production sequence, as well as the use of distinct raw materials. In theory, all of the Quartz petrographic fabrics are *compatible* with a Naxian source, given the comparative analysis with petrographic fabrics found within the Grotta, Zas Cave and Mikre Vigla assemblages on the island. There are also other sources of coarse igneous rocks composed mainly of quartz and feldspar within the Cyclades, including the neighbouring islands of Paros and Mykonos, and so we cannot discount alternative sources entirely at this point. Of course, the general heterogeneity of coarse to medium hand-made EBA pottery may mask specific production centre characteristics, particularly in light of the range of vessel sizes and functions within the assemblages that may have required specific paste processing behaviours such as tempering, mixing or levigating to produce the intended finished vessel successfully, or represent small-scale island-wide pottery production with a continuum of local raw material compositions, which may better reflect the large number of known occupation sites across Naxos during the EBA period.

The second surprise of the petrographic analysis is the Volcanic class, which contains almost as many petrographic fabrics as the Quartz class. Samples characterized macroscopically as Sandy (Grey-V2B, and Buff-V2C), Dark Volcanic (V10) and Pale Volcanic (V12) form the bulk of this class, with clear separation of the Dark Volcanic and Pale Volcanic at the microscopic level. There is considerable overlap between macroscopic groups V2C and V12 with respect to petrographic characterization, which raises a note of caution for future characterization of these macroscopic groups in the field. As mentioned above, the Pale Volcanic (V12) macroscopic group was not identified within the Keros 1987–88 material and appears extremely rarely within the Special Deposit South deposits too, in stark contrast to the Dhaskalio assemblage, where Pale Volcanic constitutes 7 per cent of the Phase A deposits studied, 2 per cent of Phase B and practically 15 per cent of the final Phase C deposits. The main potential sources for petrographic fabrics within this class are Melos and Thera, two Cycladic islands with an intense volcanic history within the Cycladic Volcanic Arc.

Previous petrographic studies of EBA ceramics from Phylakopi on Melos (Vaughan & Williams 2007) and Akrotiri on Thera (Vaughan 1990) highlighted one key difference: locally produced EBA ceramics at Phylakopi use predominantly calcareous-poor clays, whereas locally produced Akrotiri ceramics are manufactured using calcareous clays, often with microfossils. In support of this observation, there is a clear separation between potentially non-calcareous

Table 7.4. *Correlation of chemical, petrographic and macroscopic samples analysed. S=Kavos, Special Deposit South; D=Dhaskalio. See also the appendix to this chapter.*

Number	Shape	Chemical	Petrographic	Macroscopic	Context	Phase
KER 07/01	sauceboat	H	PF9	VFO	D/I/1	B
KER 07/17	side-spouted pyxis	C	P1F	V1A	D/I/16	B
KER 07/22	one handled tankard	LONER	PF5	VFDBM	D/II/3	B
KER 07/34	jug	A	PF5	VFP	D/II/4	A
KER 07/51	bowl	B-	P3F	V12	D/VII/24	C
KER 07/56	coarse closed vessel	LONER	P3I	V2C	D/VII/5	C
KER 07/61	depas cup	B	P3A	V2B	D/VI/4	C
KER 07/65	conical cup	B	P3A	V12	D/VI/8	C
KER 07/71	bowl	B	P3A	V12	D/VI/23	C
KER 08/08	depas cup	B	P3A	VFG	D/XXI/9+11	C
KER 08/09	jug	C	P1B	VFDBM	D/XXI/9+11	C
KER 08/19	sauceboat	G3	PF1	VFG	S/D3/10	
KER 08/20	sauceboat	D	P1a (SF)	VFDBM	S/D3/10	
KER 08/21	sauceboat	E	PF6	VFB	S/D3/10	
KER 08/22	sauceboat	G2	PF8	VFP	S/D3/10	
KER 08/23	sauceboat	I	PF4	VFDG	S/D3/10	
KER 08/24	sauceboat	I	PF5	VFO	S/D3/10	
KER 08/25	sauceboat	A	PF6	VFG	S/D3/10	
KER 08/27	jug	D	P1B	VFDBM	S/D3/10	
KER 08/35	conical-necked jar	A	PF5	VFGMed	S/D3/6	
KER 08/43	conical-necked jar	J?	P1E	V2C	S/D3/6	
KER 08/45	fine closed vessel	J	P4A	VFDG	S/D3/6	
KER 08/46	bowl	D	P1b (SF)	VFB	S/D3/6	
KER 08/59	sauceboat	G3	PF3	VFG	S/D3/4	
KER 08/60	sauceboat	G1	PF2	VFDBM	S/D3/4	
KER 08/61	sauceboat	PNR U/Th	P1e (SF)	VFG	S/D3/4	
KER 08/62	sauceboat	H	PF4	VFP	S/D3/4	
KER 08/63	sauceboat	SB-YM1	PF9	VFGMed	S/D3/4	
KER 08/64	sauceboat	G3	PF4	VFGMed	S/D3/4	
KER 08/65	sauceboat	G1	PF3	VFP	S/D3/4	
KER 08/66	sauceboat	H	PF6	VFO	S/D3/4	
KER 08/67	sauceboat	E	P1c (SF)	VFG	S/D3/4	
KER 08/68	sauceboat	E	PF3	VFGMed	S/D3/4	

Melian petrographic fabrics (P3E and P3G) and calcareous fabrics compatible with a Theran origin (P3A and P3F). At the macroscopic level, P3G, one of the Melian compatible petrographic fabrics, corresponds exclusively to the Dark Volcanic group (V10), while the calcareous P3F corresponds to the Pale Volcanic group (V12), thought to provenance from Thera. Only three Volcanic class members were identified within the Kavos petrographic sample, all of which are jug fragments (including a tripartite example) and grouped within P3H, which is characterized by coarse inclusions of volcanic rocks with a higher mafic mineral percentage, i.e. more andesitic than rhyolitic in composition, suggesting an Aeginetan origin rather than a Melian or Theran source. All the jug fragments were found within Trench D3 (layers 6, 9 and 12). Interestingly, these volcanic imports from the furthest potential source (Aegina) were found on Kavos, while the bulk of the Volcanic class (compatible with Melian and Theran provenance) is found on Dhaskalio, particularly during Phase C, though it is present in smaller quantities during Phases A and B also.

The Micaceous class has a smaller level of variation than the Quartz and Volcanic classes and is dominated by one petrographic fabric (P2A), which most likely represents one or more production locations on the island of Ios. The fabric is relatively heterogeneous, containing a mixture of garnet- and lilac glaucophane-bearing schists found throughout Ios, alongside terrigenous (non-marine) calcareous inclusions, which find direct petrographic parallels within

Table 7.4. *(Continued.)*

Number	Shape	Chemical	Petrographic	Macroscopic	Context	Phase
KER 08/99	medium closed vessel	C	P1F	V2B	S/D3/12	
KER 08/100	conical-necked jar	LONER	P2C	V2B	S/D3/12	
KER 08/102	jug	LONER	P1B	VFG	S/D3/12	
KER 08/115	fine closed vessel	G1	PF3	VFB	D/VI/34	C
KER 08/117	fine closed vessel	J	P1a (SF)	VFB	D/VI/34	C
KER 08/135	jug	G1	PF2	V2C	S/D3/9	
KER 08/136	jug	G all	PF2	VFB	S/D3/9	
KER 08/141	sauceboat	A	PF3	VFG	S/D3/9	
KER 08/143	fine closed vessel	F	P1d (SF)	VFG	S/D3/9	
KER 08/144	fine closed vessel	F	PF7	VFGrM	S/D3/9	
KER 08/145	fine closed vessel	F	PF5	VFGrM	S/D3/9	
KER 08/151	sauceboat	G2	PF8	VFP	S/C1/6	
KER 08/152	sauceboat	A	PF1	VFG	S/D1/3	
KER 08/154	jug	J-	PF8	VFO	S/B1/3	
KER 08/155	jug	E	P1c (SF)	VFG	S/D2/11	
KER 08/156	one-handled footed cup	A	P1e (SF)	VFG	S/D3/13	
KER 08/157	one-handled footed cup	A	PF3	VFG	S/D3/13	
KER 08/158	one-handled footed cup	A	PF6	VFGMed	S/D2/6	
KER 08/159	conical-necked jar	D	P1b (SF)	VFGrM	S/B3/1	
KER 08/160	conical-necked jar	D	P1b (SF)	VFGrM	S/B3/4	
KER 08/161	conical-necked jar	D	P1a (SF)	VFGrM	S/B4/2	
KER 08/162	conical-necked jar	F	PF5	VFDGM	S/B4/6	
KER 08/163	conical-necked jar	D	P1a (SF)	VFGrM	S/D1/30	
KER 08/164	conical-necked jar	D-	P1a (SF)	VFDBM	S/D2/16	
KER 08/171	plate	LONER	PF5	VFDBM	D/I/4	B
KER 09/07	pyxis lid	A-	PF5	VFB	D/II/34	B
KER 09/18	fine closed vessel	A	P1d (SF)	VFDG	D/V/3	B
KER 09/20	open vessel	LONER	P1b (SF)	VFG	D/V/3	B
KER 09/25	small jar	A?	P3K	VFG	D/IV/5	B
KER 09/27	fine closed vessel	F	PF7	VFDBM	D/IV/5	B

the EBA assemblage from Skarkos on Ios (Hilditch & Kiriatzi 2005). Other micaceous variants within this class are potentially compatible with Naxian raw materials, though as yet we are still generally unaware of what types of potting raw materials are exploitable on Syros. Isolated samples within this category have parallels with the petrographic analysis of 1987 Kavos material, though these groups were also not attributed to specific sources.

The remaining petrographic classes can be commented upon as follows:

- Phyllite reflects a likely range of Amorgian sources, as it matches the petrographic analysis of material from Markiani (Vaughan 2006).
- Talc reflects a coherent fabric petrographically, probably indicating a single source given the generally low compositional variation (Siphnos?) but some variants do exist, albeit rarely. However, the debate over the provenance of this fabric is not much further advanced than Vaughan & Wilson's synthesis in 1993, where the potential for discrete, localised talc sources throughout the Cyclades (Kea and Naxos have deposits too) to have been utilized in local imitations of an established imported ware have yet to be investigated fully.
- Calcite most likely is a complete mixture of sources, reflecting multiple raw materials derived from quartz-series rocks, all tempered with crushed calcite rocks—probably some can be attributed to a production centre on Amorgos, especially considering the Marble Ware from Markiani (Vaughan 2006), but also a range of locations on Naxos too (Hilditch 2005a,b).

The macroscopic fabrics are discussed with respect to origin in Volume I, 480–81 and Volume II, 245–7.

Fine wares

Unsurprisingly, given the fine nature of these samples and the scarcity of visible inclusions in the coarse fraction, there is very poor coherence between the macroscopic and petrographic groupings. The main classifiers for the macroscopic groups relied heavily upon the colour of the sample, including core to margin differences, as well as the relative frequency of visible mica particles: for example, leading to distinctions between Fine Buff (VFB) and Fine Grey (VFG), as well as the identification of Fine Dark Buff Micaceous (VFDBM) as a distinct grouping. In addition, when inclusions were visible petrographically, many of these samples were able to be classified as semi-fine variants, and appear predominantly within four subgroups of the Quartz petrographic class. Given the discussion above on the variability of the Quartz class (and potential range of production centres compatible with these fabrics), very little more can be said on the issue of specific provenance without reference to the chemical analysis.

Fabric correlation with chemical analysis

This section considers correlations between the macroscopic, petrographic and chemical datasets which are presented in Table 7.4 (the full description of chemical procedures and groupings are found in the appendix to this chapter). In total, 53 fine ware samples were chosen for chemical analysis, based upon their initial groupings at the macroscopic and petrographic level, with an additional 10 samples chosen to assess the compositional variability between the coarser Sandy and Pale Volcanic macroscopic groupings.

As Hein & Kilikoglou note, a wide range of potential provenance for the fine wares at Dhaskalio and Kavos has been tentatively identified, including Melos (Phylakopi: Group A), Thera (Akrotiri: Group B), and Naxos (Panormos: Group C) in the neighbouring Cyclades, as well as more than one potential source within the Argolid and Attica regions (Groups G, I and J), and parallels with other unprovenanced ceramics within EBA assemblages of the region (Koropi, Aghia Irini and Phylakopi). A compositional profile consistent with potting materials derived from an ophiolitic source (Group E) may also suggest links with central Crete, the Dodecanese and additional sources on the Greek mainland in Attica and Boeotia, but this has yet to be resolved in more detail.

When considered by vessel shape, the integrated fabric analyses do offer some insight into patterns of pottery production during the EBA. All three one-handled footed cups sampled from the Kavos material are compatible chemically with a possible Melian provenance, most likely the settlement of Phylakopi on the northern coast of the island, despite being classified into three distinct petrographic fabrics and two macroscopic groupings. This would seem to confirm the archaeological associations for this vessel type (Volume V). In contrast, the conical-necked jar correlates to five distinct chemical groupings (including a possible Melian and a possible Attic sample) despite relative coherence at the macroscopic (6 of the 9 samples are fine micaceous sub-groups) and petrographic levels. Over half of the conical-necked jars correspond to the chemical Group D (unknown provenance), which in turn predominantly corresponds to the Fine Green Micaceous (VFGrM) macroscopic grouping and two subgroups of the semi-fine Quartz petrographic class. As no fabric or chemical analysis has been undertaken on ceramic assemblages from Syros and the Chalandriani cemetery, it is impossible to assign these vessels to a provenance on Syros (as suspected by Sotirakopoulou: Volume IV, 44–5, type A-9b), but the overall range of chemical groups does seem to support Sotirakopoulou's comments on a range of potential provenances for the decorated varieties within the Keros Triangle (Volume IV, 43–5). Another shape with associations to the Chalandriani cemetery is the side-spouted pyxis, of which one example from Dhaskalio Trench I was taken for analysis. This sample did not group with any of the conical-necked jars, instead correlating to known ceramics from the site of Panormos in southeast Naxos.

A small number of Kastri shapes was also chosen for analysis from Dhaskalio, including two depas cups, a one-handled tankard and a possible beaked jug fragment. The one-handled tankard and beaked jug samples were ungrouped during the chemical analysis, perhaps suggesting a more exotic provenance for these Kastri vessels (although no parallels with Liman Tepe were highlighted chemically by Hein & Kilikoglou), but the depas cups reveal potential links to Dark-on-Light and Black Burnished ceramics assumed to be local to Akrotiri on Thera (Group B).

Finally, the sauceboat was the most frequent shape of the fine wares sent for chemical analysis (n=21). All but one of the samples were taken from Kavos with poorly preserved surfaces and therefore decorative treatments were difficult to identify, though the large number of samples was justified to investigate the number of macroscopic variations in colour and mica-content. As the most frequent shape it is unsurprising, then, that these samples also exhibit the greatest range of chemical groups (A, D, E, all G subgroups, H, I, and two loners thought to have some similarity to Group J). This excludes Thera and Panormos from the list of potential production centres, as well as the unidentified centre that corresponds to

Group F (which also corresponds to a conical-necked jar and several closed vessels). Three sauceboats correspond to the possible Melian group, another three show strong indicators of an ophiolitic environment that could relate to central Cretan, Dodecanese or Greek mainland sources, as well as a further seven samples across three sub-groups of Group G, all of which are suspected to provenance from the Argolid region of the Greek mainland. To these we can add a couple of possible Attic parallels, including another two potential Attic outliers, as well as three samples with the highest levels of rare earth elements that show parallels to Urfirnis sauceboats found at Aghia Irini (but not assumed to have been produced locally on Kea). This iconic ceramic shape continues to reinforce the highly mobile and well-connected nature of Early Cycladic communities with the larger Aegean region, even though the precise locations of production for these vessels have still yet to be pinned down with certainty. In this vein, the Keros samples will form an important contribution to the ceraDAT chemical database for the Bronze Age Aegean.

Chronological differences?

Looking at Table 7.5, there are some interesting chronological differences highlighted, though not quantifiable in the same detail as the macroscopic analysis.

a) Potentially a more limited range of sources for imported pottery during Phase A (same classes as the later phases but less variety within each class), with a visible expansion in the range of fabrics present in Phase B and a significant increase in the range of fabrics during the last Phase C.
b) Quartz, Micaceous and Volcanic petrographic classes dominate the assemblage throughout all three phases at Dhaskalio (with the Micaceous class falling away slightly in the final Phase C), but the Volcanic class is almost absent from the Kavos assemblage, with the notable exception of three jug samples tentatively identified as compatible with Aeginetan fabrics of the EB II period.
c) Lastly, the specific petrographic fabrics present at Kavos tend to be a little different from those dominating Dhaskalio: Quartz class fabrics (P1D, P1a, P1b, P1c and P1d) are more visible within the Kavos material, as well as Micaceous fabrics P2C, P2F and P2G, and, of course, the fine wares.

Specific shapes?

Table 7.6 reveals the frequency of each specific shape sampled by petrographic fabric. Shapes have been grouped using the following classification: 'Drinking-

Table 7.5. *Summary of petrographic samples by site and phase.*

		Dhaskalio Phase			Kavos
		A	B	C	
Quartz	1A		1	2	
	1B		1	3	2
	1C	1	3	4	1
	1D			1	4
	1E			2	
	1F	1	4	4	4
	1G	1	2	7	2
	1H	4	4	5	19
	1I			1	3
	1J			2	
	1a		1	1	6
	1b		1		6
	1c				3
	1d		1		1
	1e				2
Micaceous	2A	5	11	7	8
	2B			1	
	2C		1		1
	2D		3	1	
	2E			1	
	2F				1
	2G				1
Volcanic	3A		1	24	
	3B		1	8	
	3C	2			
	3D			3	
	3E		1	4	
	3F			6	
	3G	1	3	6	
	3H				3
	3I			1	
	3J		1		
	3K		1		
Phyllite	4A		3	1	2
	4B	2	6	1	3
	4C	1			
Talc	5		7	1	
Calcite	6A		1		1
	6B				2
	6C			1	3
Loners			1	1	
Fine wares		2	5	1	27

Table 7.6. *Summary of shape frequency by petrographic fabric.*

	0	1–3	4–7	8–10	>10

Petrographic Fabric		Drinking / Eating / Pouring									Storage										Cooking / Heating						Other						Unknown		
		Bowls (incurving)	Conical cup	Deep bowls / Vessels	Depas Cups	Jugs	One-handled footed cup	One-handled tankard	Plate	Sauceboat	Barrel jar	Concave-necked Jars	Conical-necked jar (ST)	Cylindrical-necked Jars	Funnel-necked Jars	Miscellaneous Jars	Neckless Jars	Pedestalled jar	Pithoid Jars	Pithos	Baking pan	Basin	Braziers / Masks	Cooking pots	Hearth	Tray?	Lids	Multiple-headed lamp	Pyxides	Zoomorphic vessel	Metallurgical*	Side-spouted pyxis	Open vessels	Coarse closed vessels	Fine closed vessels
Quartz	1A																																		
	1B																																		
	1C																																		
	1D																																		
	1E																																		
	1F																																		
	1G																																		
	1H																																		
	1I																																		
	1J																																		
	1K																																		
	1L																																		
	1M																																		
	1N																																		
	1O																																		
Micaceous	2A																																		
	2B																																		
	2C																																		
	2D																																		
	2E																																		
	2F																																		
	2G																																		

Table 7.6. *(Continued.)*

		Drinking / Eating / Pouring									Storage										Cooking / Heating						Other						Unknown		
Petrographic Fabric		**Bowls (incurving)**	**Conical cup**	**Deep bowls / Vessels**	**Depas Cups**	**Jugs**	**One-handled footed cup**	**One-handled tankard**	**Plate**	**Sauceboat**	**Barrel jar**	**Concave-necked Jars**	**Conical-necked jar (ST)**	**Cylindrical-necked Jars**	**Funnel-necked Jars**	**Miscellaneous Jars**	**Neckless Jars**	**Pedestalled jar**	**Pithoid Jars**	**Pithos**	**Baking pan**	**Basin**	**Braziers / Masks**	**Cooking pots**	**Hearth**	**Tray?**	**Lids**	**Multiple-headed lamp**	**Pyxides**	**Zoomorphic vessel**	**Metallurgical***	**Side-spouted pyxis**	**Open vessels**	**Coarse closed vessels**	**Fine closed vessels**
Volcanic	3A																																		
	3B																																		
	3C																																		
	3D																																		
	3E																																		
	3F																																		
	3G																																		
	3H																																		
	3I																																		
	3J																																		
	3K																																		
	3L																																		
Phyllite	4A																																		
	4B																																		
	4C																																		
Talc	5																																		
Calcite	6A																																		
	6B																																		
	6C																																		
Loners																																			
Fine wares																																			

Eating-Pouring' (DEP), 'Cooking-Heating' (CH), 'Storage', and 'Other'. There is no strong correlation between petrographic class and typology, either by functional class or specific vessel shape.

- The Quartz class is well represented across a range of DEP shapes, particularly common for storage and CH vessels and also one of the main fabrics for the unusual multiple-headed lamp vessel.
- The Micaceous class has few DEP vessels, slightly more storage vessels but is particularly frequent for baking pans and cooking pots.
- The Volcanic class contains a range of DEP, storage and CH vessels, with a large number of pithoi and unidentified coarse closed vessels (most likely storage vessels?) across the almost the full range of volcanic petrographic fabrics. There are very few 'Other' shapes within the Volcanic class (no multiple-headed lamps, metallurgical ceramics or zoomorphic vessels).
- The multiple-headed lamp appears in Quartz and Calcite fabrics only, possibly suggesting a narrow range of production centres either on Naxos or within the Keros Triangle region.
- Conical-necked jars (with and without Syros-type decoration) are predominantly produced in a wide range of quartz-derived petrographic fabrics, with occasional examples appearing within the canonical Amorgian Dark Phyllite fabric (P4A) and a lone fabric of the Micaceous class (P2C).
- Cooking pots contain a range of fabrics compatible with Quartz, Micaceous, Volcanic, Phyllite and Calcite classes, displaying a broad pan-Cycladic distribution of production centres and probably indicating a very mixed population bringing these vessels to Dhaskalio and Kavos. There is no other Cycladic site at which the author has undertaken analyses which reveals such a large range of provenances for cooking vessels. This observation strengthens the idea that the Dhaskalio-Kavos complex represents a unique gathering of people from within the Keros Triangle region and even beyond.
- Metallurgical ceramics display a range of petrographic fabrics compatible with quartz-derived and micaceous schist fabrics, suggesting a mixture of Naxian, Iotic, and possible other sources for the moulds, tuyères and 'furnace linings' analysed.
- The fine wares appear within predominantly DEP vessel shapes, with a few examples of conical-necked jars with Syros-type decoration, pyxis lids and zoomorphic vessels. As noted above, the provenance of the fine wares is difficult to determine on petrographic grounds, and the main insights come from the chemical analysis (see appendix to this chapter).

The inhabitants and visitors to Dhaskalio and Kavos

The integrated fabric analysis supports the view that no significant ceramic production took place near Dhaskalio and Kavos and that a wide range of Cycladic communities were in contact with the site, either in direct travel or through a smaller selection of highly mobile people visiting multiple islands within the region. Changes in the character of the ceramic assemblage towards transporting or storing provisions during Phases B and C at Dhaskalio are suggested by Sotirakopoulou to reflect periodic rather than permanent occupation of the settlement at Dhaskalio, although a small core population might have been present throughout the year (Volume IV, 389). The argument for direct importation of pottery brought by a wide range of communities gathering for participation in ritual activities centred around the sanctuary at Kavos (Renfrew 2013, 705–21) is supported by the range of petrographic fabrics seen within the Dhaskalio assemblage. An expansion of raw material sources in Phase B (compared to Phase A, which Sotirakopoulou defines as a small permanent settlement focused on processing and cooking activities: Volume IV, 389) suggests an increased range of people visiting the site, and while Phase C does not display a wider range of sources, the suggested source areas differ in their relative frequencies and their distance from the settlement at Dhaskalio does seem to increase (Volume 1, chapter 23; see Table 7.1).

The unique character of Dhaskalio and Kavos is not disputed and the sheer range of petrographic fabrics indicating multiple production locations on multiple islands across a wide range of typological shapes with no single function is, as yet, unparalleled in other Cycladic settlements of this period.

At the petrographic class level, it would be too simplistic to interpret these patterns as representing a portable ceramic kit, albeit somewhat varied, for people travelling to Dhaskalio and Kavos from distinct islands. We must remember that each class contains multiple fabrics representing a range of production locations using broadly compatible raw materials, and so we cannot identify full ranges of shapes to have been produced within the same community and transported as a coherent set. No single petrographic fabric contains all typologies, though the broadest range of shapes can be found within the following fabrics (see Table 7.7).

There are no specific fabrics that have been positively correlated as yet with significant ceramic production on Keros, or within the smaller islands of the Erimonisia, and as such the ceramic assemblage does

Table 7.7. *Summary of petrographic fabrics with the greatest identified range of vessel function.*

Petrographic fabric	DEP	S	CH	O	Potential provenance
Quartz P1H	2	3	4	1	Naxos (west coast, such as Grotta)
Micaceous P2A	3	2	3	1	Ios (Skarkos)
Volcanic P3A	4	4	0	0	Thera (Akrotiri)
Phyllite P4B	2	2	2	0	Amorgos (Markiani)

not indicate specific control of Dhaskalio-Kavos by a single Cycladic community—perhaps a conclusion that importation of all building materials from Naxos might have suggested. The assemblage is dominated by coarse-medium wares that are compatible with the immediately surrounding larger islands, particularly Naxos; however, the scale and extent of EC occupation on Naxos does not necessarily argue for a single coherent community from Naxos participating in these regional interactions. For the fine wares, these items were most likely already in circulation within the wider Cycladic community and then deposited for prestige purposes rather than directly imported for deposition in their own right. This is strengthened by the observation that there are no coarse or medium wares identified that are not compatible with a Cycladic source: this does not mean that they absolutely did not come from elsewhere, but the *simplest* explanation is that they are 'locally' produced within the region.

Petrographic fabric descriptions

Quartz

P1A: **Table 7.8.** *High biotite, fossil-bearing, granitic-derived.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/11	concave-necked jar	1A		D/I/7	B	red
07/46	coarse closed vessel	2C		D/VII/9	C	red
08/134	coarse closed vessel	2B	micaceous dark slip on exterior	D/VI/47	C	red

Microstructure
Few to rare voids: micro and meso vughs (random orientation, sometimes with calcareous halo) with occasional meso channels (strongly aligned to the vessel walls). The inclusions are single to open-spaced with the long axes weakly aligned to the vessel margins.

Groundmass
The group is moderately homogeneous with respect to the clay matrix. The samples occasionally show margin–core colour differences (sample 07/11, sample 08/27 and sample 08/100). The colour of the margins range from light brown to brown with a brown to dark brown core in PPL and light brown to brown with a dark brown core in XPL. Very little optical activity is attested in the samples of this group indicating that the fabric was high fired.

Inclusions
c:f:v$_{10\mu m}$ *c.* 35:60:5
Coarse fraction = 1.9–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with poor sorting. The inclusions are a to s-r in shape.

Coarse fraction:
Predominant: **granitic-derived particles**: i) slightly metamorphosed polycrystalline quartz (quartzite); ii) monocrystalline quartz with undulose extinction; iii) plagioclase feldspar, showing pronounced zoning and multiple twinning; iv) biotite laths; v) muscovite laths
Very few: **calcareous inclusions**, biogenic (shells?) and non-biogenic

Fine fraction (in order of frequency):
Quartz
Muscovite
Biotite
Amphibole

Textural concentration features:
None

P1B: **Table 7.9.** *Coarse, granitic-derived, macrofossils, calcareous-rich clays, possible mixing.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/24	neckless jar	1A		D/II/3	B	red
07/59	pan	1A		D/VII/5	C	red
08/09	jug	FDBM	red slipped & burnished on exterior	D/XXI/9+11	C	pink
08/27	jug	FDBM		S/D3/10		red
08/02	baking pan	13	red slipped & burnished on exterior	D/XXI/7	C	red
08/102	jug	FG		S/D3/12		pink

Microstructure
Few to common voids, mostly meso circular and vughs with fewer macro and micro circular and vughs. Some of the voids may be burned-out microfossils indicated by the shape and calcareous halo. The inclusions are single to open-spaced, with no preferred orientation.

Groundmass
With the exception of two samples (sample 08/05 and 08/110), no core–margin colour differences are attested within the group. The colour of the margins vary from dark red to brown with a brown to dark brown core in PPL and light brown to dark brown margins with a dark brown to black core in XPL. The samples are slightly to moderately optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 50:30:20
Coarse fraction = 3–0.15 mm
Fine fraction = <0.15 mm
Bimodal grain size distribution with very poor sorting. The inclusions are s-a to s-r.

Coarse fraction:
Predominant: **Granitic derived particles:** i) metamorphosed polycrystalline quartz (quartzite); ii) plagioclase feldspar, showing pronounced zoning and multiple twinning; iii) monocrystalline quartz with undulose extinction; iv) biotite laths
Rare to common: **calcareous micrite**, biogenic structures such as algal remains and ostracods
Fine fraction (in order of frequency):
Monocrystalline quartz with undulose extinction
Plagioclase feldspar
Biotite laths
Muscovite
Green amphibole

Textural concentration features
None

Variation
Sample 07/33 has a higher percentage of microfossils than the other samples of the group. Sample 08/114 and sample 08/110 have more calcareous particles in the CF and in the clay matrix.

P1C: **Table 7.10.** *Granitic sand temper, with clay mixing?*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/09	basin	2C		D/I/4	B	red
07/33	concave-necked jar	13		D/II/17	B	pink
07/72	baking pan	1A		D/VI/23	C	red
08/05	closed vessel	2C	whitish slip on exterior with black paint splashes on interior	D/XXI/7	C	red
08/07	tuyère	13	exterior self-slipped or smoothed with incisions?	D/XXI/3	C	red
08/39	conical-necked jar	2C	incised decoration	S/D3/6		pink
08/172	barrel jar	1A		D/VII/32	C	red
09/08	closed vessel	7C	black wash on exterior	D/II/35	A	red
09/23	closed vessel	1A		D/IV/5	B	red

Microstructure
Rare to few voids: mostly meso and micro vughs with occasional micro and meso channels (strongly aligned to vessel walls). The inclusions are close to open-spaced with no preferred orientation.

Groundmass
The samples of this group exhibit margin-core differences. The fabric has dark red to dark brown margins with a brown to dark brown core in PPL and reddish brown to dark brown margins with a dark brown core in XPL. The samples show no to little optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 60:37:3
Coarse fraction = 4.8–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with very poor sorting. Inclusion shape s-a to s-r.

Coarse fraction:
Predominant: **Granitic-derived particles:** i) polycrystalline quartz, occasionally metamorphosed (quartzite) and with undulose extinction, sometimes with high 2nd order BI grains (clino-pyroxene?); ii) plagioclase feldspar showing multiple twinning, occasionally weathered; iii) biotite laths; iv) monocrystalline quartz with undulose extinction
Rare to absent: **Limestone**
Rare to absent: **Iron oxide particles, black**

Fine fraction (in order of frequency):
Monocrystalline quartz
Plagioclase feldspar
Muscovite
Biotite

Textural concentration features
None

Variation
Sample 07/24, 07/59, 07/72, 08/106 and 08/129 contain more calcite in the clay matrix, sample 08/02 has a higher percentage of iron and calcite in the clay matrix.

P1D: **Table 7.11.** *Sandstone-rich.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/57	conical-necked jar	2C		D/VII/5	C	pink

Microstructure
Very few voids: predominantly meso vughs with occasional micro vughs. The inclusions are close- to single spaced with no preferred orientation.

Groundmass
This fabric does not exhibit margin-core differences in colour. The sample has a light brown colour in PPL and a dark brown colour in XPL throughout. The fabric shows moderate optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 50:48:2
Coarse fraction = 2–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with poor sorting. The inclusions are s-a to r.

Coarse fraction:
Few to common: i) **metamorphosed quartz-feldspar sandstone**; ii) **polycrystalline quartz**, occasionally mica-bearing; iii) **chert**, occasionally with iron; iv) **monocrystalline quartz** with undulose extinction
Few to rare: **Muscovite laths, biotite laths, iron oxides**
Fine fraction (in order of frequency):
Sandstone
Monocrystalline quartz
Muscovite
Biotite

Textural concentration features
None

P1E: **Table 7.12.** *Sand-tempered metamorphic quartz and calcareous-rich inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/36	conical-necked jar	2C	incised decoration	S/D3/6		red
08/42	conical-necked jar	2C	incised decoration	S/D3/6		pink
08/43	conical-necked jar	2C	incised decoration	S/D3/6		buff
08/37	conical-necked jar	2C	incised decoration	S/D3/6		pink
08/123	cooking pot/deep bowl	7C	microspalling on interior	D/VI/34	C	pink
08/126	cooking pot/deep bowl	14		D/VI/34	C	pink

Microstructure
Voids are few to common: mostly meso vughs with occasionally macro channels (strongly aligned to vessel walls) and vughs. The inclusions are single to open-spaced and do not show any preferred alignment to the vessel walls.

Groundmass
The samples display a margin-core colour difference: the margins range from reddish brown to brown with a brown to dark grey core in PPL and dark grey to brown to reddish brown margins with a brown to dark grey core in XPL. The samples are slightly to moderately optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 50:45:5
Coarse fraction = 2.5–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with moderate sorting. Inclusions are mostly equant in shape but elongated inclusions are also present and are s-a to s-r in shape.

Coarse fraction:
Predominant: **Granitic-derived particles**: i) metamorphosed polycrystalline quartz (quartzite); ii) plagioclase feldspar, showing pronounced zoning and multiple twinning, sometimes heavily weathered; iii) monocrystalline quartz with undulose extinction; iv) biotite laths
Few: **Calcareous grains:** biogenic and non-biogenic micrite and sparite
Rare to absent: **Epidote**
Chert
Fine fraction (in order of frequency):
Monocrystalline quartz
Plagioclase feldspar
Biotite
Muscovite
Epidote

Textural concentration features
None

P1F: **Table 7.13.** *Coarse meta-granite inclusions with dense biotite-rich fine fraction and varied accessory minerals.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/02	coarse closed vessel	1A		D/I/1	B	red
07/17	side-spouted pyxis	1A		D/I/16	B	red
07/18	coarse closed vessel	1A		D/I/6	B	pink
08/18	pithos	13	relief bands with rope pattern	D/XXIV/8	C	red
08/83	cooking pot/deep bowl	1A		S/D3/8		red
08/99	coarse closed vessel	2B	with vertical rib	S/D3/12		red
08/106	coarse closed vessel	7C		D/VI/9	C	red
08/110	coarse closed vessel	2C		D/VI/33	C	red
08/129	pithos	1B	relief bands with rope pattern	D/VI/50	C	red
08/142	pithos	1A	relief bands with rope pattern	S/D3/9		pink
08/183	cylindrical-necked jar	5	vertical ribs in low relief equally spaced on body	S/D2/14		red
07/19	pithoid jar	10		D/I/6	B	red
09/14	baking pan	1A		D/VI/48	A	red

Microstructure
Common voids: meso and macro vughs and channels (moderately to strongly aligned to vessel walls) often surrounded by calcareous haloes. The inclusions are predominantly equant with occasional elongated shaped particles (no preferred alignment to vessel walls).

Groundmass
Most of the samples of this groups display margin-core colour differences: the colour of the margins ranges from reddish brown to brown with a brown to dark brown core in PPL and light brown to brown margins with a brown to dark grey core in XPL. The samples are slightly to moderately optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 45:45:10
Coarse fraction = 2.2–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are equant and elongated and s-a to s-r in shape.

Coarse fraction:
Predominant: **Granitic derived particles**: i) metamorphosed polycrystalline quartz (quartzite), occasionally mica-bearing; ii) plagioclase feldspar, showing pronounced zoning and multiple twinning; iii) monocrystalline quartz with undulose extinction; iv) biotite laths; v) muscovite
Few to common: **Flysch deposits (?):** calcareous micrite patches and chert, rounded to subrounded
Few: A**ltered serpentinite**
Rare: **Garnet**
Very rare: **Quartz-based sandstone**
Very rare: **Hornblende amphibole**
Fine fraction (in order of frequency):
Monocrystalline quartz
Plagioclase feldspar
Muscovite
Biotite
Serpentinite
Micrite

Textural concentration features
None.

Variation
Sample 08/38 has no plagioclase in the CF. Sample 08/34 has a darker clay matrix (very dark red-brown) than the other samples of this group.

P1G: **Table 7.14.** *Non-fossiliferous, non-calcareous, granitic-derived inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/40	brazier	1A		D/II/4	A	red
08/12	coarse closed vessel	2C	orangey exterior slip	D/XXIV/6	C	red
08/29	basin/bowl	1A		S/D3/10		red
08/56	coarse closed vessel	1A	red slipped	D/VI/30	C	red
08/75	coarse closed vessel	13	red slipped exterior	D/VI/22	C	red
08/81	cooking pot/deep bowl	1A		S/D3/8		red
08/104	coarse closed vessel	1A		D/VI/26	C	red
08/128	cooking pot/deep bowl	13		D/VI/34	C	red
08/131	pithoid jar	1A		D/VI/47	C	red
08/167	basin	1A		D/VII/5	C	red
08/174	barrel jar	1A	relief bands with rope pattern	D/II/3	B	pink
09/26	coarse closed vessel	1A	relief rope pattern band	D/IV/5	B	red

Microstructure
Rare voids: meso and macro channels (strongly aligned to the vessel walls). The inclusions are single to open-spaced, predominantly equant in shape. The elongated inclusions have a moderate to strong alignment to the vessel walls.

Groundmass
The group is relatively homogeneous with respect to the clay matrix. There is a very weak margin-core colour difference ranging from brown margins with a dark brown core in both PPL and XPL. The fabric shows very little optical activity, indicating that the clay was very high fired.

Inclusions
c:f:v$_{10\mu m}$ *c.* 45:50:5
Coarse fraction = 3.75–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Predominant: **Granitic-derived particles:** i) weakly metamorphosed polycrystalline quartz (quartzite), occasionally with feldspar and muscovite; ii) plagioclase feldspar, showing pronounced zoning and multiple twinning, sometimes fairly weathered; iii) monocrystalline quartz with undulose extinction; iv) biotite laths; v) muscovite
Few to common: **Micrite (non-biogenic)**
Rare: **Iron oxide**
Fine fraction (in order of frequency):
Calcareous particles
Monocrystalline quartz
Muscovite
Biotite
Serpentinite

Textural concentration features
None

P1H: **Table 7.15.** *Granite and flysch-derived sand-tempered inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/07	conical-necked jar	5		D/I/3	B	pink
07/37	basin	2C		D/II/6	A	pink
07/38	pithoid jar	10		D/II/15	B	pink
08/34	conical-necked jar	2B	incised decoration	S/D3/6		pink
08/38	conical-necked jar	2C	incised decoration	S/D3/6		buff
08/40	conical-necked jar	2C	incised decoration	S/D3/6		pink
08/48	brazier	6D		S/D3/1		pink
08/49	coarse closed vessel	2C		S/D3/1		pink
08/79	jar	5		D/VI/35+36	C	pink
08/85	conical-necked jar	2B		S/D3/11		pink
08/87	multiple-headed lamp	5		S/D3/11		pink
08/89	coarse closed vessel	2C		S/D3/11		pink
08/90	bowl	7C		S/D3/12		red
08/98	conical-necked jar	2C		S/D3/12		pink
08/103	conical-necked jar	2C		S/D3/12		pink
08/116	coarse closed vessel	2C	red slipped & burnished exterior	D/VI/34	C	pink
08/122	cooking pot/deep bowl	2C	dark slipped exterior	D/VI/34	C	pink
08/124	cooking pot/deep bowl	6B		D/VI/34	C	pink
08/125	cooking pot/deep bowl	7C		D/VI/34	C	pink
08/139	multiple-headed lamp	1A	kerbschnitt decoration	S/D3/9		pink
08/140	multiple-headed lamp	7B		S/D3/9		pink
08/147	jug	6A		S/D3/9		pink
08/176	jug	5	incised & impressed decoration	S/B1/2		red
08/178	multiple-headed lamp	11	incised & impressed decoration (converging incisions & kerbschnitt)	S/B4/2		red
08/179	multiple-headed lamp	5	incised (two pairs of slanting lines)	S/B4/2		red
08/180	multiple-headed lamp	2C		S/B4/5		red
08/181	multiple-headed lamp	2C	incised & impressed (parallel grooves & kerbschnitt in vertical zone)	S/C1/27		red
09/01	baking pan	5		D/1/40	A	red
09/03	coarse closed vessel	5	red slipped exterior	D/I/40	A	pink
09/13	coarse closed vessel	2C	black slipped exterior	D/VI/38	A	pink
09/21	coarse closed vessel	7B		D/V/3	B	pink
09/31	coarse closed vessel	2C		D/IV/6	B	pink

Microstructure
Rare to few voids: mostly meso vughs and circular. Inclusions are close to single-spaced and do not show any preferred alignment to the vessel walls.

Groundmass
The group is relatively homogeneous in terms of the clay matrix. The colours of the margins are light brown to brown with a brown to dark brown core in PPL and dark brown throughout in XPL. The samples show little to moderate optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 80:15:5
Coarse fraction = 1.30–0.15 mm
Fine fraction = <0.15 mm
Unimodal grain size distribution with moderate to well sorting. Inclusions are predominantly equant; elongated inclusions show moderate to strong alignment to the vessel walls.

Coarse fraction:
Predominant: **Monocrystalline quartz**, with undulose extinction
Common: **Plagioclase feldspar,** showing multiple twinning
Polycrystalline quartz
Calcareous particles (micrite and limestone)
Rare to few: **Epidote**
Rare: **Pyroxene, possibly clinopyroxene**
Muscovite
Biotite
Sandstone
Fine fraction (in order of frequency):
Muscovite
Epidote
quartz

Textural concentration features
None

Variation
Sample 08/102, 08/123 and 08/126 are much less well sorted than the other samples of this group.

P1I: **Table 7.16.** *Very coarse granitic-derived sand with organic-temper.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/01	mould	3A		D/XXI/7	C	red
08/149	furnace lining?	2A		P/P01/2		red
08/150	furnace lining?	1A		P/P01/2		red
08/153	brazier	5		S/D3/12		red

Microstructure
Few to common voids: mostly meso and macro channels (moderately aligned to the vessel walls) with occasional meso and macro vughs. Inclusions are close to single-spaced with the long axes strongly aligned to the vessel walls. Frequent reduced haloes to voids within the fabric.

Groundmass
This group is slightly heterogeneous with respect to the clay matrix. There is a core-margins colour difference: in PPL, the core ranges from reddish brown to greyish brown with brown margins. In XPL, the core ranges from reddish brown to dark grey with dark grey to brown margins. The samples show little optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 75:20:5
Coarse fraction = 4.80–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are a to s-r.

Coarse fraction:
Predominant: **Polycrystalline quartz,** metamorphosed, and often with plagioclase feldspar grains
Common: **Monocrystalline quartz,** undulose extinction
Plagioclase feldspar, showing multiple twinning
Few: **Biotite laths**
Muscovite laths
Rare: **Chert**
Fine fraction (in order of frequency):
Monocrystalline quartz
Plagioclase feldspar
Muscovite
Biotite
Iron oxide
Micrite

Textural concentration features
None

Variation
Sample 09/14 has a higher percentage of calcite and iron in the clay matrix than the other sample of this group.

P1J: **Table 7.17.** *Calcareous sediment.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/10	baked clay	1A		D/VI/23	C	buff
V	baked clay	2C		D/VI/8	C	buff

Microstructure
Voids are varied: samples 07/58, 08/04, 07/08, 10/08 and 09/01 display few meso and micro vughs with very few meso and micro channels (moderately to strongly aligned to the vessel walls). Samples 08/01, 08/149 and 08/153 show common to frequent meso and macro channels, often with a calcareous infill. Inclusions are single- to open-spaced with the long axes moderately aligned to the vessel walls.

Groundmass
Some of the samples of this group display margin-core colour differences (sample 08/01, 08/07, 08/149). The colour of the margins ranges from orange to reddish brown to dark brown with a reddish to brown to dark grey core in PPL. In XPL, the margins range from light orange to red to very dark brown with a red to brown to very dark grey core. The samples show no to little optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 70:25:5 to 60:15:25
Coarse fraction = 3.05–0.25 mm
Fine fraction = <0.25mm
Bimodal grain size distribution with moderate to very poor sorting. Inclusions are s-a to r.

Coarse fraction:
Predominant: **Polycrystalline quartz,** slightly metamorphosed and often with sutured grain-boundaries. Also occasionally accompanied by muscovite laths and high 2nd-order BI minerals (epidote?)
Common: **Monocrystalline quartz,** undulose extinction
Few to common: **Calcareous micrite and limestone particles**
Iron oxide
Sandstone
Rare: **Plagioclase feldspar,** showing multiple twinning and pronounced zoning
Garnet
Epidote
Biotite
Fine fraction (in order of frequency):
Quartz
Muscovite
Clinopyroxene/epidote (?)
Iron oxide
Biotite

Textural concentration features
None

Variation
Samples 07/58 and 08/01 have a higher percentage of iron in the clay matrix, samples 08/01, 08/04 and 08/07 contain more calcareous inclusions in both the coarse and fine fraction as well as the clay matrix. Samples 08/149 and 08/153 are much better sorted than the other samples of this group.

Quartz semi-fine fabrics

P1a: **Table 7.18.** *Non-calcareous, quartz-feldspar inclusions, biotite-rich fine fraction with accessory green amphibole, clinozoisite and garnet.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/60	medium closed vessel	FDBM		D/VI L4	C	red
08/20	sauceboat	FDBM		S/D3/10		red
08/84	conical-necked jar	FDBM		S/D3/11		red
08/161	conical-necked jar	FGrM	stamped & incised (concentric circles with tangents) Syros-type	S/B4/2		red
08/163	conical-necked jar	FGrM	stamped (concentric circles)	S/D1/30		red
08/164	conical-necked jar	FDBM	incised & impressed (horizontal lines & stamped concentric circles)	S/D2/16		red
08/168	pithos	7C		D/II/surface	B	red
08/101	conical-necked jar	FDBM		S/D3/12		red
08/117	coarse closed vessel	FB	dark slipped & burnished exterior	D/VI/34	C	pink

Microstructure
Voids are rare to few: predominantly micro and meso channels (strongly aligned to vessel walls) with few micro and meso vughs and rare rounded voids. Inclusions are open-spaced with the long axes weakly aligned to the vessel walls.

Groundmass
The vast majority of the group is fairly homogeneous with respect to the clay matrix. The colour ranges from light brown to brown throughout in PPL and brown to dark brown throughout in XPL. The samples are slightly to moderately optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 30:65:5
Coarse fraction = 1.35–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with moderate to poor sorting. Inclusions are s-a to r.

Coarse fraction:
Dominant: **Polycrystalline quartz**
Common to frequent: **Monocrystalline quartz,** with undulose extinction
Biotite laths
Few: **Plagioclase feldspar,** showing multiple twinning and pronounced zoning
Iron oxide
Rare to absent: **Muscovite laths and muscovite schist**
Micrite patches, occasionally formed around the voids
Green amphibole
Garnet

Fine fraction (in order of frequency):
Monocrystalline quartz
Biotite laths
Plagioclase feldspar
Iron oxide
Clinopyroxene

Textural concentration features
None

P1b: **Table 7.19.** *Calcareous-rich (micrite, filaments and microfossils), granitic-derived with fine fraction mica.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/46	bowl	FB	Syros-type jar decoration	S/D3/6		pink
08/50	conical-necked jar	FDBM	impressed & incised (kerbschnitt & concentric circles)	S/D3/3		red
08/86	conical-necked jar	FDBM		S/D3/11		red
08/146	fine closed vessel	FGrM		S/D3/9		red
08/159	conical-necked jar	FGrM	stamped & incised (spirals & kerbschnitt)	S/B3/1		red
08/160	conical-necked jar	FGrM	stamped & incised (concentric circles connected by tangents)	S/B3/4		red
09/20	fine open vessel	FG	scored on interior?	D/V/3	B	pink

Microstructure
Voids are very few to rare: meso and micro vughs and occasional channels (strongly aligned to vessel walls). Inclusions are open-spaced with the long axes strongly aligned to the vessel walls.

Groundmass
This group is relatively homogeneous with respect to the clay matrix and voids. Margin-core colour differences are not common: the fabric is light brown to brown throughout in PPL and brown throughout in XPL. The samples show little to moderate optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 35:60:5
Coarse fraction = 3.50-0.20mm
Fine fraction = <0.20mm
Bimodal grain size distribution with moderate to poor sorting. Inclusions are a to s-r.

Coarse fraction:
Predominant: **Granitic-derived particles:** i) polycrystalline quartz, sometime with muscovite laths; ii) plagioclase feldspar, showing pronounced zoning and multiple twinning; iii) monocrystalline quartz with undulose extinction; iv) biotite laths
Calcareous inclusions, micrite patches and microfossils (often rounded or semi-circular)
Few to absent: **Peloids**

Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite laths
Biotite laths
Micrite

Textural concentration features
None

P1c: **Table 7.20.** *Granitic-derived fabric with silty clay inclusions, biotite-rich and micrite-bearing fine fraction.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/67	sauceboat	FG		S/D3/4		pink
08/148	jug	FG	whitish slip on exterior	S/D3/9		pink
08/155	jug	FG	DOL of hatched triangles arranged in a horizontal zone	S/D2/11		pink

Microstructure
Voids are common: mostly meso channels (strongly aligned to the vessel walls) with occasional meso and micro vughs. Inclusions are open-spaced.

Groundmass
This group does not display any margin-core colour differences: the fabric is light brown throughout in PPL and brown throughout in XPL. The samples show moderate optical activity. There is some decomposed calcareous material visible within the groundmass and around the voids which may be secondary.

Inclusions
c:f:v$_{10\mu m}$ *c.* 30:30:40
Coarse fraction = 1.35–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with moderate sorting. Inclusions are s-a to s-r.

Coarse fraction:
Common: **Sandstone**
Siltstone (?)
Rare: **Polycrystalline quartz**
Monocrystalline quartz
Iron oxide
Fine fraction (in order of frequency):
Monocrystalline quartz
Biotite laths
Muscovite laths
Micrite (?)
Plagioclase feldspar
Iron oxide

Textural concentration features
None

P1d: **Table 7.21.** *Non-calcareous, muscovite-rich, quartz-feldspar inclusions with accessory green amphibole.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/143	fine closed vessel	FG	incised decoration	S/D3/9		red
09/18	fine closed vessel	FDG		D/V/3	B	red

Microstructure
Voids are few: mostly micro rounded and vughs with occasional meso channels (weakly to moderately aligned to the vessel walls) and rare macro rounded. Inclusions are open-spaced.

Groundmass
There is no margin-core colour differentiation within this group. All samples are brown in PPL with a brown, slightly mottled appearance. The samples are highly optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 20:70:10
Coarse fraction = 1.20–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with moderate sorting. Inclusions are s-a to s-r.

Coarse fraction:
Few to common: **Sandstone**
Muscovite laths
Few: **Polycrystalline quartz**
Epidote
Iron oxide, dark red to black, rounded
Fine fraction (in order of frequency):
Muscovite
Monocrystalline quartz
Green amphibole
Plagioclase feldspar
Clinopyroxene?
Epidote

Textural concentration features
None

Variation
Sample 08/143 has a much denser FF than the other sample of this group, mainly consisting of high second order minerals such as muscovite.

P1e: **Table 7.22.** *Non-calcareous, densely packed quartz-feldspar and chert with accessory green amphibole and biotite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/61	sauceboat	FG		S/D3/4		red
08/156	one-handled footed cup	FG		S/D3/13		red

Microstructure
Voids are few to common: mostly meso channels (weakly aligned to the vessel walls) with few meso and micro vughs. Inclusions are single to double-spaced with the long axes moderately to strongly aligned to the vessel walls.

Groundmass
The sample displays margin-core colour differences: the margins range from dark red to brown with a brown core in PPL and dark red to dark brown margins with a dark brown core in XPL. The sample show very little optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 30:60:10
Coarse fraction = 0.75–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Common: **Polycrystalline quartz,** grain size of the quartz minerals strongly varies
Biotite laths
Monocrystalline quartz
Fine grained volcanic rock, predominantly composed of feldspar micro laths
Rare: **Muscovite laths**

Fine fraction (in order of frequency):
Monocrystalline quartz
Biotite laths
Muscovite laths
Plagioclase feldspar
Iron oxide
Clinopyroxene?

Textural concentration features
None

Micaceous

P2A: **Table 7.23.** *Micaceous schist with glaucophane, garnet and variable micrite inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/05	baking pan	5		D/I/1	B	red
07/10	pithoid jar	5		D/I/4	B	red
07/14	deep open jar	5		D/I/4	B	red
07/15	pan	6C		D/I/11	B	red
07/32	incurving bowl	5		D/II/17	B	red
07/42	funnel-necked jar	6C		D/VII/3	C	red
07/62	jug	5		D/VI/4	C	red
08/03	baking pan	6D	self-slipped interior & exterior	D/XXI/7	C	red
08/30	shallow bowl	6C		S/D3/10		red
08/47	hearth	6C		D/VII/24	C	red
08/77	cooking pot	5		D/VI/35+36	C	red
08/80	cooking pot/deep bowl	6C		S/D3/8		red
08/93	bowl	6A		S/D3/12		red
08/94	bowl	6C		S/D3/12		red
08/96	bowl	6D		S/D3/12		red
08/118	baking pan	6C		D/VI/34	C	red
08/130	cooking pot	6C		D/VI/47	C	red
08/169	funnel-necked jar	5		D/II/17	B	red
08/150A	clay with metal on surface	6C		M/AC		red
08/150B	clay with metal on surface	13		M/BA		red
09/06	coarse closed vessel	5		D/I/40	A	red
09/11	deep bowl	5		D/II/38	A	pink
09/12	baking pan	6B		D/VI/37	A	red
09/17	baking pan	6C		D/V/3	B	red
09/22	closed vessel	6B		D/IV/5	B	red

Table 7.23. *(Continued.)*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
09/24	baking pan	6C		D/IV/5	B	red
Variants						
07/26	coarse closed vessel	13		D/II/3	B	red
07/35	coarse closed vessel	1A		D/II/4	A	red
08/92	bowl	5		S/D3/12		red
09/02	baking pan	5		D/I/40	A	red
09/28	closed vessel	11		D/IV/6	B	red

Microstructure
Voids are common: mostly meso and macro vughs with occasional micro and meso channels, no preferred orientation. Inclusions are close to single-spaced with the long axes moderately to strongly aligned to the vessel walls.

Groundmass
Two samples (sample 07/15 and 09/17) of this group display minor margin-core colour differences, the rest of the group is homogeneous in colour. The two samples mentioned above have margins which are red to reddish brown with a brown core in PPL and reddish brown margins with a greyish brown core in XPL. The other samples of this group are reddish brown in both PPL and XPL throughout. The samples show moderate optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 65:25:10
Coarse fraction = 3.30–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Predominant: **Polycrystalline quartz**, heavily metamorphosed, and mica-bearing (muscovite)
Muscovite laths
Common: **Muscovite-schist,** with lilac glaucophane and occasional garnet
Micrite patches, fossiliferous micritic sand
Few: **Iron oxide**
Garnet?
Rare: **Monocrystalline quartz**
Clinozoisite?
Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite laths
Micrite
Iron oxide

Textural concentration features
None

Variation
Sample 08/47 contains a small number of inclusions in the CF which do not occur in the other samples of this group. The inclusions are built up of the same minerals as the predominant inclusions of this fabric but display a wavy texture.

P2B: **Table 7.24.** *Quartz-feldspar-mica schist with common iron oxides.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/127	cooking pot/deep bowl	6B		D/VI/34	C	red

Microstructure
Voids are few to common: mostly meso and macro vughs with occasional meso and macro channels (moderately to strongly aligned to the vessel walls) and rare macro circular voids. Inclusions are close to single-spaced.

Groundmass
Only one sample (sample 08/93) shows clear margin-core colour differences: in PPL, the margins are orange to red with a pale brown core and in XPL, the margins are yellow to red with a brown core. The other samples of this group are dark red to brown to dark brown throughout in PPL and dark red to dark brown in XPL. The samples are slightly to moderately optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 60:33:7
Coarse fraction = 2.50–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are a to s-r.

Coarse fraction:
Predominant: **Polycrystalline quartz**, slightly to heavily metamorphosed, occasionally muscovite-bearing
Few to common: **Muscovite-schist,** sometimes iron oxide-bearing
Muscovite laths
Monocrystalline quartz
Iron oxides
Biotite laths
Chert
Rare to absent: **Epidote**
Garnet
Clinozoisite
Fine fraction (in order of frequency):
Monocrystalline quartz
Polycrystalline quartz
Muscovite laths
Iron oxides
Clinozoisite

Textural concentration features
None

P2C: **Table 7.25.** *Semi-coarse fabric with quartz-feldspar-mica-epidote-clinozoisite schist and shell filaments.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/06	tuyère	13	exterior self-slipped or smoothed with incisions?	D/I/26	B	pink
08/100	conical-necked jar	2B	incised decoration	S/D3/12		red

Microstructure
Voids are few: predominantly macro vughs with few meso vughs, circular voids and channels (strongly aligned to the vessel wall). Inclusions are single to open-spaced, the long axes are strongly aligned to the vessel walls.

Groundmass
The samples of this group are relatively homogeneous with respect to the clay matrix. The colour ranges from light red to reddish brown in PPL and reddish brown to brown in XPL throughout. The samples display very little optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 53:40:7
Coarse fraction = 2–0.25 mm
Fine fraction = <0.25mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r in shape.

Coarse fraction:
Dominant: **Polycrystalline quartz,** occasionally mica-(muscovite) and clinozoisite-epidote bearing
Common: **Muscovite-quartz schist**
Few: **Monocrystalline quartz**
Iron oxide
Clinozoisite
Muscovite laths
Epidote
Rare to absent: **Micrite patches**

Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite laths
Clinozoisite
epidote

Textural concentration features
None

P2D: **Table 7.26.** *Quartz-feldspar-clinopyroxene-green amphibole schist with severely altered feldspars.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/25	neckless jar	5		D/II/3	B	red
07/27	funnel-necked jar	5		D/II/9	B	red
07/31	cooking pot	5		D/II/17	B	red
07/41	pan	6D		D/VII/3	C	red

Microstructure
Voids are rare: mostly meso and macro circular voids with fewer meso and micro vughs and channels (strongly aligned to the vessel walls). Inclusions are single to open-spaced with the long axes moderately to strongly aligned the vessel walls.

Groundmass
Only one sample (07/25) within the group displays margin-core colour differences: in PPL the margins are dark red with a light brown to dark grey core and in XPL dark orange to reddish brown margins with a reddish brown to dark grey core. The other samples of the group, which display an even firing, are orange to reddish brown in PPL and dark red to reddish brown in XPL.

Inclusions
c:f:$v_{10\mu m}$ *c.* 65:30:5
Coarse fraction = 4.35–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Dominant: **Polycrystalline quartz,** occasionally with muscovite laths and feldspar grains
Common: **Clinozoisite-schist:** i) clinozoisite; ii) epidote iii) clinopyroxene; iv) quartz
Epidote
Clinopyroxene
Muscovite laths
Few: **Muscovite-schist**
Iron oxide
Peloids
Plagioclase feldspar, showing pronounced zoning and multiple twinning
Fine-grained igneous inclusions, predominantly composed of plagioclase micro laths in a glassy matrix that has undergone various levels of decomposition (replacement by chlorite and oxides)
Monocrystalline quartz
Calcareous inclusions: micrite patches, sponge spicules
Biotite laths
Garnet

Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite laths
Muscovite schist
Iron oxide
Micrite
Amphibole

Textural concentration features
None

P2E: **Table 7.27.** *Quartz-garnet phyllite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/120	cooking pot/deep bowl	5	black slipped exterior	D/VI/34	C	red

Microstructure
Voids are few: mostly macro vughs and channels (strongly aligned to the vessel walls) with fewer meso and micro vughs. Inclusions are close to single-spaced.

Groundmass
Two samples of this group do not display any margin-core colour differences: they are orange-red in PPL and dark red in XPL throughout. The other two samples of this group have orange-red margins with a grey to brown core in PPL and reddish brown margins with a dark brown to dark grey core in XPL. The fabric is slightly to moderately optical active.

Inclusions
c:f:$v_{10\mu m}$ *c.* 50:45:5
Coarse fraction = 3.90–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with moderate to very poor sorting. Inclusions are a to s-r.

Coarse fraction:
Dominant: **Garnet-bearing phyllite:** i) quartz; ii) garnet; iii) muscovite; iv) biotite; v) albite; vi) red oxides
Common: **Muscovite laths**
Few to common: **Micrite patches**
White mica
Rare to absent: **Oxidized volcanic sand**
Clinozoisite with accessory tourmaline
Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite
White mica
Biotite

Textural concentration features
None

P2F: **Table 7.28.** *Biotite phyllite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/82	cooking pot/deep bowl	1A		S/D3/8		red

Microstructure
Voids are common: meso and macro channels (strong alignment to vessel walls) and vughs dominate but meso and micro circular voids are also present. Inclusions are close to single-spaced.

Groundmass
Sample 08/82 is fairly homogeneous with respect to the clay matrix: margin-core colour differences are very small. The colour of the fabric is brown in PPL and light brown to reddish brown in XPL throughout, with high optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 60:30:10
Coarse fraction = 3.6–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Common: M**icrocline-bearing schist**: i) microcline feldspar, showing cross-hatched twinning; ii) monocrystalline quartz
Polycrystalline quartz, occasionally with muscovite laths, sometimes displaying sutured grain boundaries
Monocrystalline quartz
Few: **Muscovite-schist**
Micrite patches
Plagioclase feldspar
Iron oxide
Rare: **Biotite laths**

Fine fraction (in order of frequency):
Monocrystalline quartz
Microcline
Muscovite laths
Micrite
Iron oxide

Textural concentration features
None

P2G: **Table 7.29.** *Chlorite schist.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/76	baked clay	1A		S/D3/11		red

Microstructure
Voids are common to frequent: mostly meso and macro vughs with less macro and meso channels (strongly aligned to the vessel walls). Inclusions are single- to open-spaced.

Groundmass
This sample does not display any margin-core colour difference: in PPL, the colour of the fabric ranges from dark red to dark brown throughout. In XPL, the fabric colour ranges from dark red to very dark red. The optical activity of the sample is low.

Inclusions
c:f:$v_{10\mu m}$ *c.* 55:30:15
Coarse fraction = 3.15–0.25 mm
Fine fraction = 0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are a to s-r in shape.

Coarse fraction:
Common to frequent: **Yellow chloritic schist**
Few to common: **Quartz-feldspar,** some microcline twinning visible**,** often metamorphosed
White mica
Monocrystalline quartz
Iron oxides
Few: **Biotite laths**

Fine fraction (in order of frequency):
Monocrystalline quartz
Yellow chlorite
Biotite
White mica
Iron oxides

Textural concentration features
None

Volcanic

P3A: **Table 7.30.** *Calcareous clay with fossil-bearing calcareous rock fragments and volcanic inclusions: minor phyllite and wackestone.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/16	coarse closed vessel	2C		D/I/11	B	buff
07/43	jug	1A		D/VII/3	C	pink
07/44	neckless jar	2C		D/VII/3	C	buff
07/48	coarse closed vessel	2C		D/VII/9	C	red
07/50	coarse closed vessel	2C	red slipped exterior	D/VII/9	C	red
07/61	depas cup	2B		D/VI/4	C	pink
07/65	conical cup	12	pellet just below rim	D/VI/8	C	pink
07/68	concave-necked jar	2C		D/VI/18	C	pink
07/69	pithoid jar	12	white-greenish slip?	D/VI/15	C	buff
07/71	bowl	12	red-slipped interior and exterior	D/VI/23	C	red
08/08	depas cup	FG	black/brown slipped & burnished	D/XXI/9+11	C	buff
08/11	pithos	12	relief band with rope pattern & red slipped exterior	D/XXIV/6	C	pink
08/13	coarse closed vessel	12	overfired?	D/VI/4+25	C	pink
08/14	coarse closed vessel	12		D/VI/4+25	C	pink
08/16	coarse closed vessel	12		D/XXIV/5	C	pink
08/17	coarse closed vessel	12	red slipped & burnished exterior	D/XXIV/7	C	pink
08/70	coarse closed vessel	12		D/VI/15	C	buff
08/71	pithos	12	horizontal ribs	D/VI/9	C	buff
08/73	bowl	12	red slipped & burnished interior & exterior	D/VI/23	C	pink
08/108	coarse closed vessel	12	red slipped	D/VI/33	C	pink
08/109	coarse closed vessel	12		D/VI/33	C	buff
08/111	pithos	1B	relief bands with rope pattern	D/VI/33	C	red
Variants						
07/63	coarse closed vessel	12	white-greenish slip?	D/VI/8	C	pink
08/52	coarse closed vessel	2B		D/VI/30	C	red
08/105	coarse closed vessel	2B		D/VI/9	C	red

Microstructure
Very few to rare voids, predominantly meso and micro vughs, very rare macro vughs (07/16), no preferred orientation. Inclusions double to open spaced, no preferred orientation.

Groundmass
Homogeneous with respect to inclusion composition, though some relative frequencies do change throughout the group. Colour range and voids are relatively homogeneous. OA – 07/48, 50 & 68: PPL – pale orange-brown to pale brown; XPL – yellow to orange-yellow
High fired: PPL – yellow-brown to dark brown; XPL – brown to dark brown.
Overfired – 07/69 & 08/13: PPL – dark brown; XPL – dark brown-black.
No rim-core colour differentiation.

Inclusions
c:f:v$_{10\mu m}$ *c.* 15:83:2 to 25:67:8
Coarse fraction = 3.5–0.3 mm
Fine fraction = <0.3 mm
Unimodal grain size distribution with very poor sorting. Inclusions are predominantly round in shape, s-a to r.

Coarse fraction:

Frequent: **Fossil- and microfossil-bearing limestone/micrite** grains, in various states, from relatively fresh with well preserved calcareous shell structures, to partially decomposed and patchily replaced with iron-oxides (often seen within internal compartments of fossils)
Volcanic rock particles: i) plagioclase feldspar crystals, occasionally attached to microlitic lava composed predominantly of feldspar microlaths; ii) microlitic lava grains, predominantly composed of feldspar microlaths, frequently displaying partial to total oxidation within the groundmass, rarely containing pyroxene crystals (rhyodacite?); iii) volcanic glass, yellow-grey to pink-purple, occasionally showing perlitic cracking, frequently displaying partial decomposition and optically active mica/clay minerals internally, with some iron-oxide replacement; iv) welded volcanic tuff fragments, showing slight flow, containing decomposing glass and lava particles with common plagioclase feldspar crystals; v) isolated pyroxene crystals, showing partial embayment, probably dissociated from ii).

Few: **Phyllite**, composed of biotite-muscovite-white mica and rare iron-oxides
Wackestone, fine-grained grey to black opaque matrix with sa-sr quartz and feldspar grains
Calcite, crystalline, unusually shaped grains (not post-depositional but possibly void/pore fills from carbonate rocks?)
Iron oxide aggregates, dark red to black
Partially/completely burnt-out organic inclusions, elongate (grass?) leaving a dark brown to black halo within the groundmass (07/63 & 08/105)

Fine fraction (in order of frequency):
Calcareous microfossils
Quartz
Plagioclase feldspar
Biotite
Muscovite
White mica (sericite?)
Iron oxides (dark red to black)
Volcanic glass
Volcanic lava fragments (microlitic feldspar)
Pyroxene
Calcite

Textural concentration features
Slightly more calcareous clay particles?

Variation
Samples 07/63, 08/52 and 08/105 contain rare traces of burnt organic particles, often with a darkened halo within the groundmass.

P3B: **Table 7.31.** *Calcareous clay with volcanic rock inclusions and micrite (fossiliferous?)*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/12	pyxis	2C		D/I/7	B	red
07/64	pithoid jar	2B	oblique rib decoration	D/VI/8	C	red
07/66	pithoid jar	2C	successive horizontal rib decoration just below rim	D/VI/15	C	red
07/73	pithoid jar	1A	self-slipped with successive horizontal rib decoration below rim and groove circling the mouth	D/VI/23	C	red
07/75	pithoid jar	2C	pale wash or slip on exterior	D/VI/25	C	red
08/15	pithos	2B	flat projecting rim with inwards sloping horizonal groove	D/VI/4+25	C	red
08/53	coarse closed vessel	2B	black washy slip on exterior	D/VI/30	C	red
08/54	pithos	2B	red slipped & burnished	D/VI/30	C	red
08/113	pithos	2B		D/VI/8	C	red

Microstructure
Voids are varied: samples 07/73 and 08/15 display few macro to micro vughs (random orientation) with very few micro channels (weakly aligned parallel to vessels margins); samples 07/12 and 07/75 display frequent meso and micro channel voids aligned parallel to vessel margins, with very rare meso and macro vughs (weakly aligned parallel to vessel margins). Inclusions are single- to open-spaced with long axes weakly aligned to vessel margins.

Groundmass
This group is relatively heterogeneous with respect to the clay matrix and voids. Margin to core differentiation is common, with cores showing no optical activity, though margins display moderate to low optical activity. Samples 08/53 and 08/113 have no margin-core colour difference, are paler yellow-brown in colour and show moderate optical activity. The colour ranges from pale brown to red brown margins with dark brown-black cores (×40 PPL), with yellow to orange-red margins, with brown to dark brown/black cores (XPL).

Inclusions
c:f:v$_{10\mu m}$ *c.* 15:80:5 to 25:65:10
Coarse fraction = 2.4–0.25 mm
Fine fraction = <0.25 mm
Unimodal grain size distribution with moderately poor to poor sorting. Inclusions are randomly shaped, a to sr.

Coarse fraction:
Dominant: **Volcanic rock particles**: i) plagioclase feldspar crystals, occasionally attached to microlitic lava composed predominantly of feldspar microlaths; ii) microlitic lava grains, predominantly composed of feldspar microlaths, frequently displaying partial to total oxidation within the groundmass, rarely containing pyroxene crystals (rhyodacite?); iii) volcanic glass, yellow-grey to pink-purple, occasionally showing perlitic cracking, frequently displaying partial decomposition and optically active mica/clay minerals internally, with some iron-oxide replacement; iv) welded volcanic tuff fragments, showing slight flow, containing decomposing glass and lava particles with common plagioclase feldspar crystals; v) isolated pyroxene crystals, showing partial embayment, probably dissociated from ii).
Calcareous micrite patches, possibly biogenic (internal rounded dark patterns – shell wall?), occasionally containing extremely fine inclusions of quartz/feldspar.

Fine fraction (in order of frequency):
As coarse fraction

Textural concentration features
Very rare depletion features (low in clay minerals), swirled into matrix. Iron-rich pellets.

Variation
07/64 – Paler, finer clay matrix, displaying moderate optical activity. The micrite 'patches' are more obvious within the fabric, with some calcareous-rich clay pellets showing a different internal alignment to the main groundmass. The inclusions are as the main group.

P3C: **Table 7.32.** *Non-calcareous clay with volcanic rock inclusions and common fine fraction mica: sand tempered?*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
09/04	baking pan	1A		D/1/40	A	red
09/05	coarse closed vessel	2B		D/1/40	A	red

Microstructure
Voids are frequent, single to double-spaced, mostly meso vughs with fewer meso and micro channels (aligned parallel to vessel margins), often surrounding the coarser inclusions within the fabric. Inclusions are also single- to double-spaced, with no preferred orientation.

Groundmass
Both samples exhibit margin-core colour differentiation. Sample 09/05 has reddish (×40 PPL) to red-brown (XPL) margins with moderate optical activity and a dark brown (PPL) to dark red-brown and grey mottled (XPL) core with no optical activity. Sample 09/04 has brown margins and a dark brown-black core (in both PPL and

XPL) with no optical activity within the fabric, and appears to have been extremely highly fired (no surviving calcareous component).

Inclusions
c:f:$v_{10\mu m}$ *c.* 35:50:15
Coarse fraction = 2.8–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with poor sorting. Inclusions are predominantly rounded in shape, sa-r.

Coarse fraction:
Predominant: **Volcanic rock particles**: i) plagioclase feldspar crystals, showing pronounced zoning and multiple twinning; ii) microlitic lava grains, predominantly composed of feldspar microlaths, with common feldspar and rare biotite phenocrysts, frequently displaying partial to total oxidation within the groundmass, occasional orange crystalline replacement; iii) volcanic glass, grey to pale yellow-brown, rarely showing vesicles, frequently displaying partial decomposition (resembles chert!), with some iron-oxide replacement; iv) welded volcanic tuff fragments, showing slight flow, containing decomposing glass and lava particles with common plagioclase feldspar crystals.
Very few to absent: **Calcareous micrite patches**, possibly biogenic (internal rounded dark patterns – shell wall?), occasionally containing extremely fine inclusions of quartz/feldspar.
Fine fraction (in order of frequency):
Quartz
Plagioclase feldspar
Biotite
Muscovite
White mica (sericite?)
Iron oxides (dark red to black)
Volcanic glass, partially devitrified
Volcanic lava fragments (microlitic feldspar with iron oxides)
Micrite patches, as coarse fraction.

Textural concentration features
None

P3D: **Table 7.33.** *Non-calcareous clay with volcanic rock sand temper.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/74	pithoid jar	2C	red-slipped with successive horizontal rib decoration	D/VI/23	C	red
08/57	coarse closed vessel	2C	red slipped & burnished	D/VI/30	C	red
08/72	pithos	2A	horizontal ribs	D/VI/9	C	red

Microstructure
Voids are very few to rare, predominantly meso vughs with rare meso channels, aligned parallel to vessel margins. Inclusions are single to double-spaced with no preferred orientation.

Groundmass
This group is homogeneous with no visible margin-core differentiation. All samples are orange-red to brown (×40 PPL) and orange-brown (XPL) with moderate optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 25:72:3
Coarse fraction = 1.6–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with moderate sorting, predominantly rounded, sa-r.

Coarse fraction:
Predominant: **Volcanic rock particles**: i) plagioclase feldspar crystals, occasionally attached to microlitic lava composed predominantly of feldspar microlaths; ii) microlitic lava grains, predominantly composed of feldspar microlaths with phenocrysts of plagioclase feldspar, amphibole and biotite, frequently displaying partial to total oxidation within the groundmass, rarely containing pyroxene crystals (rhyodacite?); iii) volcanic glass, yellow-grey to pink-purple, occasionally showing perlitic cracking, frequently displaying partial decomposition and optically active mica/clay minerals internally, with some iron-oxide replacement; iv) welded volcanic tuff fragments, showing slight flow, containing decomposing glass and lava particles with common plagioclase feldspar crystals; v) isolated pyroxene crystals, showing partial embayment, probably dissociated from ii).
Few: **Iron oxide particles**, black.
Fine fraction (in order of frequency):
Quartz
Plagioclase feldspar
Iron oxides (black)
Volcanic glass, partially devitrified
Volcanic lava fragments (microlitic feldspar with iron oxides)
Amphibole
Biotite
Muscovite
Pyroxene
Olivine

Textural concentration features
None

P3E: **Table 7.34.** *Non-calcareous clay with volcanic rock inclusions and common fine fraction mica: sand tempered?*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/36	bowl	2C		D/II/6	A	pink
07/49	neckless jar	2C	dark crackly interior and exterior surfaces	D/VII/9	C	pink
07/67	deep open jar	2C		D/VI/18	C	pink
08/55	basin/bowl	12 (pink)		D/VI/30	C	red
08/58	cooking pot	12		D/XXIV/3	C	red

Microstructure
Voids are very few, double to open-spaced, mostly meso vughs with fewer meso and micro channels (no preferred orientation), often surrounding the coarser inclusions within the fabric. Inclusions are single to double-spaced, with no preferred orientation.

Groundmass
This group does not exhibit margin-core differences in colour. Samples are orange-brown to dark brown throughout (×40 PPL), while 07/36 and 07/67 show a brown colour, with low optical activity in XPL. Samples 07/49 and 08/55 have a dense dark brown with hints of red mottling, typical of very high firing, and display no optical activity. Sample 08/55 contains secondary calcite around rims of voids.

Inclusions
c:f:$v_{10\mu m}$ *c.* 30:65:5
Coarse fraction = 2.8-–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with moderately poor sorting. Inclusions are randomly shaped, sa-r.

Coarse fraction:
Predominant: **Volcanic rock particles**: i) devitrified volcanic glass / ash, grey to yellow in PPL, resembles microcrystalline quartz in XPL, very rare inclusions of plagioclase feldspar, often showing internal sub-concentric zoning shadows; ii) microlitic lava grains, predominantly composed of feldspar microlaths with phenocrysts of plagioclase feldspar and amphibole, rare examples of pyroxene and olivine, frequently displaying partial to total oxidation within the groundmass (rhyodacite?); iii) plagioclase feldspar crystals, with distinct zoning and multiple twinning; iv) isolated pyroxene crystals, showing partial embayment, probably dissociated from ii).
Few: **Iron oxide particles**, black.
Fine fraction (in order of frequency):
Quartz
Plagioclase feldspar
Iron oxides (black)
Volcanic glass/ash, devitrified
Volcanic lava fragments (microlitic feldspar with iron oxides)
Amphibole
Biotite
Pyroxene
Olivine

Textural concentration features
None

Variation
Sample 08/58 contains very few isolated calcareous microfossil tests within the fine fraction, often partially decomposed, with rare microcrystalline quartz aggregates (possible resilicification of volcanic glass?).

P3F: **Table 7.35.** *Calcareous clay with fossil-bearing calcareous rock fragments, devitrified volcanic glass and fine-grained volcanic inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/47	jug	12	white-slipped	D/VII/9	C	pink
07/51	bowl	12	red-slipped interior and exterior	D/VII/24	C	pink
07/70	pithoid jar	12	vertical rib decoration and white-greenish slip?	D/VI/23	C	pink
08/69	coarse closed vessel	12	overfired?	D/VI/15	C	buff
08/107	pithos	12	overfired?	D/VI/9	C	buff
08/112	baking pan	12		D/VI/33	C	pink

Microstructure
Voids are few, predominantly meso vughs with rare macro vughs (plucking?), double to open-spaced, often lining coarse inclusions. Inclusions are single to double-spaced, though their boundaries under XPL can be difficult to identify.

Groundmass
There is no margin-core differentiation within this group. All the samples are brown in PPL (×40) with a dark brown, slightly mottled appearance with no optical activity in XPL. There is a significant level of decomposed calcareous material within the groundmass and lining of voids, some of which may have collected during burial.

Inclusions
c:f:$v_{10\mu m}$ *c.* 20:72:8 to 25:70:5
Coarse fraction = 2.6–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with poor sorting. Inclusions are randomly shaped, sa-r.

Coarse fraction:

Predominant: **Volcanic rock particles**: i) devitrified volcanic glass / ash, grey to yellow in PPL, resembles microcrystalline quartz in XPL, very rare inclusions of plagioclase feldspar, often showing internal iron oxide 'staining'; iii) plagioclase feldspar crystals, with distinct zoning and multiple twinning; ii) microlitic lava grains, predominantly composed of feldspar microlaths with phenocrysts of plagioclase feldspar and amphibole, rare examples of pyroxene and olivine, frequently displaying partial to total oxidation within the groundmass (rhyodacite?).

Few: **Iron oxide particles**, black.
Micrite 'grains', indistinct shapes, frequently containing fine inclusions of quartz/feldspar(?), with a grey colour in XPL.

Rare: **Calcareous rock fragments**, potentially fossiliferous but no clear tests visible, generally badly decomposed and dark brown-grey in XPL.

Rare to absent: **Metamorphic rock fragment,** bright orange and brown, possibly amphibole and biotite, with visibly deformed laminations.
Organic grain, mostly burnt out but dark brown porous structure remains around the edge of the void.

Fine fraction (in order of frequency):
Quartz
Plagioclase feldspar
Iron oxides (black)
Volcanic glass/ash, devitrified
Volcanic lava fragments (microlitic feldspar with iron oxides)
Amphibole
Biotite
White mica

Textural concentration features
None

P3G: **Table 7.36.** *Non-calcareous clay with volcanic rock and biotite-rich phyllite inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/06	baking pan	10		D/I L3	B	red
07/45	pithoid jar	10		D/VII L3	C	red
07/52	cooking pot	10		D/VII L24	C	red
07/54	bowl	10		D/VII L4	C	red
08/74	coarse closed vessel	10		D/VI/16	C	red
08/132	coarse closed vessel	10		D/VI/47	C	red
08/173	baking pan	10	horizontal rib along circumference	D/I/4	B	red
09/16	coarse closed vessel	10		D/VI/52	A	red
Variants						
08/119	cooking pot	10		D/VI/34	C	red
09/29	coarse closed vessel	10		D/IV/5+6+8	B	red

Microstructure
Voids are common, mostly meso and macro channels with very few meso and macro vughs. All voids are weakly to strongly aligned parallel to vessel margins, and are double to single-spaced. Inclusions are predominantly elongate in shape, with long axes parallel to vessel margins, and double to single-spaced.

Groundmass
Most samples do not display differences between the margin and core: they are red-brown to brown in PPL (×40) and orange-red, red or brown in XPL, displaying moderate to high optical activity (paler colours with higher OA). Samples 07/45 and 07/52 exhibit clear margin-core differences: 07/45 has red margins with a grey core in PPL and red-brown margins with a dark brown-black core in XPL, with low to no optical activity from margin to core; 07/52 has pale brown margins and a dark brown core in PPL with yellow-orange margins and a red-brown core in XPL, with moderate to low optical activity from margin to core. Sample 07/45 has extensive secondary calcite infilling of channel and vugh voids.

Inclusions
c:f:v$_{10\mu m}$ *c.* 25:65:15 to 35:50:15
Coarse fraction = 4.6–0.25 mm
Fine fraction = <0.25 mm

Bimodal grain size distribution with moderately good sorting. Inclusions are predominantly elongate in shape, a-r.

Coarse fraction:

Frequent: **Volcanic rock particles**: i) devitrified volcanic glass/ash, grey to yellow in PPL, resembles microcrystalline quartz in XPL, often showing internal iron oxide 'staining'; ii) plagioclase feldspar crystals, with distinct zoning and multiple twinning; iii) microlitic lava grains, predominantly composed of feldspar microlaths with phenocrysts of plagioclase feldspar, frequently displaying partial to total oxidation within the groundmass.
Biotite-quartz phyllite, equant to elongate, sr-r, some showing small augen-like quartz crystals, others with crenulation

Few: **Quartz aggregates**
Pyroxene, showing partial embayments
Iron oxide particles, black.

Rare to absent: **Chert**
Siltstone
Micrite, partial fossil test?

Fine fraction (in order of frequency):
Quartz
Feldspar
Phyllite
Volcanic lava
Pyroxene
Biotite
Muscovite

Textural concentration features
None

Variation
08/119 & 09/29: These samples display the same large volcanic particles in the coarse fraction, though they lack the phyllite-series inclusions (in both coarse and fine fractions) of the main group. Sample 08/119 corresponds to the main group, orange-red with high optical activity (XPL) but it also contains an orange crystalline replacement (serpentinite?) of perlitic crack structures within volcanic glass, present in coarse volcanic inclusions and also dissociated within the fine fraction.

Sample 09/29 is high fired with no optical activity and contains significant secondary calcite deposits within voids (as 07/45).

P3H: **Table 7.37.** *Non-calcareous clay with andesitic volcanic rock inclusions.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/44	jug	2B		S/D3/6		red
08/97	tripartite jug handle	2C		S/D3/12		red
08/137	jug	2B		S/D3/9		red

Microstructure
Very few voids, predominantly meso vughs, double to open-spaced with no preferred orientation. Inclusions are randomly shaped with no preferred orientation.

Groundmass
No margin-core differences, samples are brown to dark brown in PPL (×40) and brown in XPL with moderate optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 20:76:4
Coarse fraction = 4–0.25 mm
Fine fraction = <0.25 mm
Unimodal grain size distribution with moderate sorting. Inclusions are randomly shaped, a-sa.

Coarse fraction:
Predominant: **Volcanic rock particles**: i) andesite rock fragments with a plagioclase microlitic groundmass and phenocrysts of plagioclase feldspar, brown and green amphibole, clinopyroxene, and biotite, often showing heavily oxidized haloes; ii) plagioclase feldspar crystals, occasionally attached to a microlitic groundmass; iii) brown and orange amphibole and biotite crystals, probably dissociated from i);
Few: **Iron oxide particles**, black.
Rare to absent: **Organic particles**, elongate, <4mm, partially to fully burnt out, dark haloes.

Fine fraction (in order of frequency):
Quartz
Feldspar
Biotite
Amphibole
Pyroxene
Lava fragments
Iron oxides (black)

Textural concentration features
None

Variation
08/137: Lacks the concentration of amphibole fragments found within the main group, though large biotite laths are still found commonly throughout the groundmass. There are fewer lava fragments in this sample, with plagioclase feldspar dominating the coarse fraction.

P3I: **Table 7.38.** *Very fine, plagioclase feldspar, biotite-rich.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/56	coarse closed vessel	2C	fugitive black slip	D/VII/5	C	buff

Dark brown in both PPL and XPL, no optical activity. Significant secondary calcite within the groundmass.
Coarse fraction: rare, dominated by plagioclase feldspar (<1 mm) and rare microlitic lava grains (with fine amphibole).
Fine fraction: dominated by plagioclase feldspar, biotite laths (often oxidized) and iron oxides.

P3J: **Table 7.39.** *Red oxidized lava, microlitic volcanic rock.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
09/30	coarse closed vessel	12		D/IV/6	B	red

Dark brown-grey in both PPL and XPL, with no optical activity. Frequent voids, orientated weakly parallel to vessel margins, random inclusion shape.
Coarse fraction: dominated by red and black oxidized lava (microlitic and phenocryst feldspar, rarely dark red amphibole?), with few plagioclase feldspar, volcanic glass (various states of devitrification) and rare pyroxene.
Fine fraction: contains quartz and/or feldspar crystals, microlitic lava fragments, volcanic glass and white mica.

P3K: **Table 7.40.** *Volcanic rock sand-tempered, muscovite-rich.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
09/25	small jar	FG		D/IV/5	B	red

This sample displays an obvious coil join, with one coarser paste and one finer paste, but no visible join between pastes. Brown in PPL and dark brown in XPL, with low optical activity.
Coarse paste: dominated by volcanic glass, quartz, plagioclase feldspar, biotite laths and iron oxides in the coarse fraction, with rare examples of quartz-feldspar-mica phyllite and chert. Fine fraction as the fine paste description below.
Fine paste: rare vughs, quartz/feldspar crystals, rich in white mica and biotite, occasional orange amphiboles, and iron oxides.

Phyllite

P4A: **Table 7.41.** *Dark phyllite with sparite/micrite (non-biogenic) and quartzite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/04	coarse closed vessel	3A		D/I L1	B	red
07/29	pyxis	3A		D/II L9	B	red
08/41	conical-necked jar	2C	incised decoration	S/D3/6		red
08/45	coarse closed vessel	FDG	with breast-type decoration	S/D3/6		red
08/133	coarse closed vessel	3B		D/VI/47	C	red
09/33	coarse closed vessel	3A		D/IV/9	B	red

Microstructure
Voids are varied: sample 08/45 and 08/133 predominantly contain thin meso and macro channels, strongly aligned to the vessel walls. The other samples of this group contain mostly meso and micro vughs with lesser circular meso voids. Inclusions are single to double-spaced with the long axes strongly aligned to the vessel walls.

Groundmass
The samples of this group do not display any margin-core colour difference: in PPL, the fabric is dark red to brown and in XPL the colour range from very dark red to dark brown. The samples are moderately to highly optical active.

Inclusions
$c{:}f{:}v_{10\mu m}$ *c.* 65:30:5
Coarse fraction = 3.30–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Dominant: **Dark phyllite,** brown and very dark grey in colour
Common: **Calcareous inclusions (non-biogenic):** i) spartite; ii) micrite
Quartzite
Fine fraction (in order of frequency):
Monocrystalline quartz
Micrite
Spartite
Muscovite laths
Epidote/cpx (?)

Textural concentration features
None

Variation
Samples 08/45 and 08/133 also contain mafic minerals such as iron oxide and have a darker groundmass than the other samples of the group.

P4B: **Table 7.42.** *Red phyllite (crenulated).*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/03	cooking pot?	3A		D/I L8	B	red
07/23	coarse closed vessel	4		D/II L3	B	red
07/39	pedestalled jar	4		D/II L15	B	pink
08/28	deep bowl	4		S/D3/10		red
08/78	coarse closed vessel	4		D/VI/35+36	C	red
08/88	deep bowl	4		S/D3/11		red
08/95	bowl	2B		S/D3/12		red
08/165	jar	4		D/II/19	B	red
09/09	baking pan	3B		D/II/36	A	red
09/15	deep bowl	3A		D/VI/51	A	red
09/32	coarse closed vessel	2B		D/IV/9	B	red
09/34	coarse closed vessel	3A		D/IV/6	B	red

Microstructure
Voids are few to common: mostly macro vughs with occasional meso and micro vughs and channels (strongly aligned to the vessel walls). Inclusions are single to open-spaced with the long axes moderately aligned to the vessel walls.

Groundmass
With the exception of one sherd (sample 07/23), all samples of this group are evenly fired resulting in a minimal margin-core colour difference. The fabric is orange-red to brown in PPL and dark red to brown in XPL. The one sample which does display margin-core colour differences has orange margins with a brown core in PPL and yellow-orange margins with a brown core in XPL. The samples of this group are moderately to highly optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 60:30:10
Coarse fraction = 3.10–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Predominant: **Phyllite,** dark red in colour, sometimes with a crenulated texture
Common: **Quartzite**
Polycrystalline quartz
Few: **Monocrystalline quartz**
Rare: **Iron oxide**
Weathered feldspar
Rare to absent: **Micrite**
Fine fraction (in order of frequency):
Monocrystalline quartz
Quartzite
Phyllite

Textural concentration features
Rare grog

P4C: **Table 7.43.** *Red/dark brown phyllite with calcite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
09/10	coarse closed vessel	4		D/II/38	A	red

Microstructure
Voids are common: predominantly meso and macro vughs, occasional micro vughs and channels (strongly aligned to the vessel walls). Inclusions are open-spaced.

Groundmass
The sample displays minor margin-core colour differences: the colour of the margin is light red with a light brown core in PPL and dark orange with a light brown core in XPL. The fabric shows moderate optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 60:30:10
Coarse fraction = 2.25–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. Inclusions are a to s-r.

Coarse fraction:
Dominant: **Phyllite,** red and dark brown in colour
Common: **Quartzite**
Calcite
Feldspar, plagioclase showing pronounced zoning and multiple twinning and sanidine
Very few: **Monocrystalline quartz**
Fine fraction (in order of frequency):
Calcite
Quartzite
Monocrystalline quartz
Feldspar

Textural concentration features
None

Talc (P5)

Table 7.44. *Talc.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/13	pan	8		D/I/7	B	pink
07/20	funnel-mouthed pithoid jar	8		D/I/12	B	red
07/21	funnel-mouthed pithoid jar	8		D/I/14	B	red
07/28	baking pan	8		D/II/9	B	pink
07/53	deep open jar	8		D/VII/4	C	pink
08/166	baking pan	8		D/II/6	B	pink
08/170	tray?	8		D/I/4	B	pink
09/19	deep bowl	8		D/V/3	B	red

Microstructure
Voids are few: meso vughs and channels (moderately to strongly aligned to the vessel wall) dominate. Very few macro and micro vughs also occur within this fabric. Inclusions are close to single-spaced with the long axes moderately aligned to the vessel walls.

Groundmass
With the exception of one sample (07/20), the samples of this group do not display margin-core colour differences. The sample which is unevenly fired has dark red margins and a dark grey core (both in PPL and XPL). The other samples are dark orange to light brown in PPL throughout and reddish brown to brown throughout in XPL. The samples show very little optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 65:30:5
Coarse fraction = 4.05–0.25 mm
Fine fraction = <0.25 mm
Bimodal grain size distribution with very poor sorting. The inclusions are sa-r.

Coarse fraction:
Predominant: **Talc,** showing 1st- to 2nd-order BR
Associated minerals: **tremolite**
Few: **Muscovite laths**
Rare: **Muscovite-schist**
Quartzite
Monocrystalline quartz
Rare to absent: **Iron oxide**

Fine fraction (in order of frequency):
Talc
Lava
White mica
Biotite
Epidote
Amphibole
Iron oxide

Textural concentration features
None

Variation
Sample 07/13, 07/21 and 09/19 contain much less high 2nd-order BI mineral and rock fragments in the CF than the other samples of the group.

Calcite

P6A: **Table 7.45.** *Crushed calcite, micrite sand and dark phyllite.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/08	coarse closed vessel	3B		D/I/9	B	red
08/175	multiple-headed lamp	3B		S/B3/5		red

Microstructure
Voids are few: predominantly meso and macro channels (strongly aligned to the vessel walls) with fewer micro and meso vughs. Inclusions are close to double-spaced with the long axes strongly aligned to the vessel walls.

Groundmass
Both samples of this group are evenly fired: the colour ranges from dark red (sample 07/08) to light brown (sample 08/175) both in PPL and in XPL. The samples display little (sample 07/08) to high (sample 08/175) optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 70:25:5
Coarse fraction = 2.5–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with very poor sorting. Inclusions are predominantly angular in shape, a to s-a. Unimodal grain size distribution suggests the fabric may have been tempered.

Coarse fraction:
Predominant: **Calcite**
Common: **Phyllite,** dark red to brown to dark grey in colour
Micrite
Few: **Plagioclase feldspar,** showing multiple twinning
Quartzite
Muscovite laths
Rare: **Iron oxide**
Rare to absent: **Lava,** predominantly composed of feldspar microlaths

Fine fraction (in order of frequency):
Calcite
Micrite
Monocrystalline quartz

Textural concentration features
None

P6B: **Table 7.46.** *Crushed calcite, no micrite, quartz-series rock fragments.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/26	multiple-headed lamp	7B		S/D3/10		red
08/138	multiple-headed lamp	7A		S/D3/9		red

Microstructure
Voids are few to common: mostly meso vughs and channels (weakly aligned to the vessel walls) with occasional macro channels (weakly aligned to the vessel walls). Inclusions are close to double-spaced with the long axes weakly to moderately aligned to the vessel walls.

Groundmass
Both samples of this group are evenly fired and do not display any margin-core colour differences. The colour of the fabric is light brown (slightly reddish) in PPL and orange brown to brown in XPL. The samples show moderate to high optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 70:25:5
Coarse fraction = 1–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with moderate sorting. Inclusions are predominantly angular, a to-s-r.

Coarse fraction:
Predominant: **Calcite**
Few: **Microcrystalline quartz**
Monocrystalline quartz
Polycrystalline quartz
Iron oxide

Fine fraction (in order of frequency):
Calcite
Iron oxide
Muscovite laths

Textural concentration features
None

P6C: **Table 7.47.** *Crushed calcite, quartz and mica (variable).*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
08/51	cooking pot	11		S/D3/3		red
08/91	bowl	7A		S/D3/12		red
08/121	cooking pot/deep bowl	6C		D/VI/34	C	red
08/177	multiple-headed lamp	1A		S/B3/3		red

Microstructure
Voids are few: micro and meso vughs and channels (moderately aligned to the vessel walls) are common, macro vughs and channels (strongly aligned to the vessel walls) also appear. Inclusions are close to single-spaced with the long axes moderately aligned to the vessel walls.

Groundmass
One of the samples of this group (sample 08/177) displays margin-core colour differences: in PPL the margins are dark brown to brown with a light brown core. In XPL, the margins dark grey to dark brown with a brown core. The other two samples of this group are evenly fired: the colour is reddish brown to brown throughout in PPL and reddish brown throughout in XPL.
The samples show moderate to high optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 60:33:7
Coarse fraction = 6.5–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with poor sorting. Inclusions are predominantly angular, a to s-r.

Coarse fraction:
Predominant: **Calcite**
Common: **Monocrystalline quartz,** with undulose extinction
Polycrystalline quartz, sometimes slightly metamorphosed
Common to absent: **Red Phyllite(?)** (sample 08/51)
Few: **Microcrystalline quartz**
Iron oxide

Fine fraction (in order of frequency):
Calcite
Monocrystalline quartz
Muscovite
Epidote/cpx (?)
Biotite

Textural concentration features
None

Loners

Table 7.48. *Loners.*

No.	Vessel	Fabric	Surface treatment	Context	Phase	Refiring
07/30	cylindrical-necked jar	2C		D/II/17	B	pink
07/55	coarse closed vessel	14		D/VII/5	C	pink

Serpentinite
Brown in PPL and dark brown in XPL, with low optical activity. Common voids, dominantly meso channels and vughs, channels aligned parallel to vessel margins, and inclusion margins. Inclusions frequently elongated with long axes also parallel to vessel margins. Coarse fraction: predominantly serpentinized rock fragments (amphibole or chlorite) showing varying degrees of alteration and oxidation. Inclusions are subrounded to rounded, suggesting deliberate temper of mature sand fraction.

Fine fraction: dominated by quartz and/or feldspar crystals, mica and iron oxides.

Micrite/calcareous
Brown in PPL and pale brown in XPL, with moderate optical activity. Rare voids, meso and micro vughs, no orientation.
Coarse fraction: rare, predominantly calcareous particles, including sparite, micrite and possible fossil tests (rare internal structure visible).

Fine fraction: dense, dominated by calcareous particles, including micrite and sparite, quartz or feldspar crystals, muscovite laths, white mica laths and iron oxides.

Fine wares

F1: **Table 7.49.** *Calcareous fossiliferous.*

No.	Vessel	Macro	Context	Phase	Refiring
08/19	sauceboat	FG	S/D3/10		buff
08/152	sauceboat	FG	S/D1/3		buff

Microstructure
Voids are very few: predominantly meso and micro channels (strongly aligned to the vessel walls) with very occasional micro vughs. Inclusions are open-spaced with no preferred orientation.

Groundmass
The sample does not display any margin-core colour differences: the fabric is light brown in PPL and dark brown in XPL, with moderate optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 5:45:50
Coarse fraction = 0.55–0.05 mm
Fine fraction = <0.05 mm
Unimodal grain size distribution with moderate sorting. Inclusions are s-r to r.

Coarse fraction:

Common:	**Iron oxide**, dark brown. Occasionally also iron streaks
Few:	**Mica laths**, completely black, no pleocroism (overfired?)
Rare:	**Micrite**, possibly biogenic (shell?)

Fine fraction (in order of frequency):
Micrite
Quartz
Iron oxide

Textural concentration features
None

F2: Pale fabric with calcareous haloes

Table 7.50. *Pale fabric with calcareous haloes.*

No.	Vessel	Macro	Context	Phase	Refiring
08/60	sauceboat	FDBM	S/D3/4		buff
08/135	jug	2C	S/D3/9		buff
08/136	jug	FB	S/D3/9		buff

Microstructure
Voids are few: predominantly meso and macro circles with very occasional micro vughs. Inclusions are open-spaced with no preferred orientation.

Groundmass
The samples do not display any margin-core colour differences: the fabric is light brown in PPL and dark brown to very dark green in XPL, with moderate optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 30:45:25
Coarse fraction = 1.75–0.15 mm
Fine fraction = <0.15 mm
Bimodal grain size distribution with poor sorting. Inclusions are s-r to r.

Coarse fraction:
Common: **Iron oxide**, brown to black.
Few: **Microcrystalline quartz**, occasionally iron-bearing
Few to common: **Micrite patches**, usually formed around the voids

Fine fraction (in order of frequency):
Micrite
Quartz
Iron oxide

Textural concentration features
None

F3: **Table 7.51.** *Micrite, non-biogenic.*

No.	Vessel	Macro	Context	Phase	Refiring
08/59	sauceboat	FG	S/D3/4		red
08/65	sauceboat	FP	S/D3/4		buff
08/68	sauceboat	FGMed	S/D3/4		red
08/115	fine closed vessel	FB	D/VI/34	C	buff
08/141	sauceboat	FG	S/D3/9		pink
08/157	one-handled footed cup	FG	S/D3/13		red

Microstructure
Voids are common: meso and macro channels (moderately aligned to the vessel walls) and vughs dominate but micro and meso circles also occur. Inclusions are open-spaced.

Groundmass
The group is fairly homogeneous with respect to the clay matrix. The colour ranges from light brown to brown in PPL and brown to dark brown in XPL. The samples display little to moderate optical activity.

Inclusions
$c:f:v_{10\mu m}$ *c.* 5:70:25
Coarse fraction = 0.55–0.20 mm
Fine fraction = <0.20 mm

Coarse fraction:
Common: **Micrite patches**
Few: **Polycrystalline quartz**
Biotite laths
Rare: **Microcrystalline quartz**
Fine fraction (in order of frequency):
Monocrystalline Quartz
Muscovite
Micrite

Textural concentration features
None

Variation
Sample 08/65 is denser in calcareous inclusions in the fine fraction and the clay matrix.

F4: **Table 7.52.** *Grey fabric with occasional quartz and iron oxide in FF.*

No.	Vessel	Macro	Context	Phase	Refiring
08/23	sauceboat	FDG	S/D3/10		red
08/62	sauceboat	FP	S/D3/4		red
08/64	sauceboat	FGMed	S/D3/4		red

Microstructure
Voids are very few: predominantly meso and micro channels (strongly aligned to the vessel walls) with very occasional micro and meso vughs. Inclusions are open-spaced with no preferred orientation.

Groundmass
The samples do not display margin-core colour differences: the fabric is light to reddish to greyish brown in PPL and dark reddish brown to dark grey in XPL, with very little optical activity.

Inclusions
$c:f:v_{10\mu m}$ *c.* 10:40:50
Coarse fraction = 0.50–0.10 mm
Fine fraction = <0.10 mm
Unimodal grain size distribution with moderate sorting. Inclusions are s-r to r.

Coarse fraction:
Common: **Iron oxide**, dark brown to black
Rare: **Polycrystalline quartz**
Monocrystalline quartz, with undulose extinction
Fine fraction (in order of frequency):
Quartz
Iron oxide
Orange/red particles (not pleochroic)

Textural concentration features
None

F5: **Table 7.53.** *Highly OA, polycrystalline quartz and muscovite rich.*

No.	Vessel	Macro	Context	Phase	Refiring
08/23	sauceboat	FDG	S/D3/10		red
08/62	sauceboat	FP	S/D3/4		red
08/64	sauceboat	FGMed	S/D3/4		red

Microstructure
Voids are few to common: mostly micro and meso vughs with occasionally micro and meso channels (strongly aligned to the vessel walls). Inclusions are open spaced, with the long axes weakly aligned to the vessel walls.

Groundmass
This group is fairly homogeneous with respect to the clay matrix: the colour ranges from light brown to brown in PPL and orange-brown to brown in XPL. The samples of this group display very high optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 20:60:20
Coarse fraction = 0.35–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with moderate to poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Common: **Polycrystalline quartz**
Iron oxide
Few: **Biotite laths**
Rare to absent: **Muscovite-schist**
Fine fraction (in order of frequency):
Muscovite laths
Iron oxide
Monocrystalline quartz
Biotite laths

Textural concentration features
None

Variation
Sample 08/162 is much denser in muscovite and monocrystalline quartz in the FF.

F6: **Table 7.54.** *Fine clay with high percentage of biotite in FF.*

No.	Vessel	Macro	Context	Phase	Refiring
08/21	sauceboat	FB	S/D3/10		pink
08/25	sauceboat	FG	S/D3/10		red
08/66	sauceboat	FO	S/D3/4		buff
08/158	one-handled footed cup	FGMed	S/D2/6		red

Microstructure
Voids are few to common: mostly micro vughs and rounded voids, meso vughs and channels (moderately aligned to the vessel walls) also occur. Inclusions are open-spaced, with the long axes strongly aligned to the vessel walls.

Groundmass
The group is fairly homogeneous with respect to the clay matrix: the fabric is greyish brown to brown in PPL and dark brown in XPL. The samples show very little optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 5:70:25
Coarse fraction = 0.35–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with moderate to well sorting. Inclusions are s-a to r.

Coarse fraction:
Few: **Quartzite**
Iron oxide
Fine fraction (in order of frequency):
Biotite laths
Monocrystalline quartz
Muscovite
Quartzite

Textural concentration features
None

F7: **Table 7.55.** *Micaceous fabric with amphiboles and clinozoisite.*

No.	Vessel	Macro	Context	Phase	Refiring
08/144	fine closed vessel	FGrM	S/D3/9		red
09/27	fine closed vessel	FDGM	D/IV/5	B	pink

Microstructure
Voids are common: mostly meso and macro vughs, micro and meso channels (strongly aligned to the vessel walls) also occur. Inclusions are close to single-spaced, with the long axes moderately to strongly aligned to the vessel margins.

Groundmass
One of the samples (sample 08/144) of this group is homogeneous with respect to the clay matrix: the fabric displays a light brown colour throughout both in PPL and XPL. The other sample (sample 09/27) of this group shows clear margin-core colour differences: the margins are red with a greyish brown core in PPL. In XPL, the sample has reddish brown margins with a dark grey core. The samples are moderately to highly optical active.

Inclusions
c:f:v$_{10\mu m}$ *c.* 20:60:20
Coarse fraction = 1.45–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with poor sorting. Inclusions are s-a to s-r.

Coarse fraction:
Common: **Iron oxide**
Calcareous shell fialments and tests, often retaining internal structures
Calcareous micrite patches, possible secondary (infill of voids)
Few: **Muscovite laths**
Rare: **Clinozoisite**
Fine fraction (in order of frequency):
Monocrystalline quartz
Muscovite laths
Biotite laths
Iron oxide
Micrite
Clinozoisite
Amphibole

Textural concentration features
None

F8: **Table 7.56.** *Fine, iron-rich fabric.*

No.	Vessel	Macro	Context	Phase	Refiring
08/22	sauceboat	FP	S/D3/10		pink
08/151	sauceboat	FP	S/C1/6		pink
08/154	jug	FO	S/B1/3		pink

Microstructure
Voids are rare: predominantly meso vughs (occasionally with secondary calcareous material) and very few micro and meso circles (possibly biogenic?) and channels. The inclusions are open-spaced.

Groundmass
The group is very homogeneous with respect to the clay matrix. In PPL, the colour ranges from light brown to reddish brown and in XPL, the colour is dark reddish brown. The samples show very little optical activity.

Inclusions
c:f:v$_{10\mu m}$ *c.* 10:70:20
Coarse fraction = 2.20–0.20 mm
Fine fraction = <0.20 mm
Unimodal grain size distribution with moderate sorting. Inclusions are s-a to r.

Coarse fraction:
Predominant: **Iron oxide,** ranging from reddish brown to dark brown
Fine fraction (in order of frequency):
Iron oxide
Monocrystalline quartz
Muscovite
Biotite

Textural concentration features
None

F9: **Table 7.57.** *Fine with calcite and micrite.*

No.	Vessel	Macro	Context	Phase	Refiring
07/01	sauceboat	FO	D/I L1	B	red
08/63	sauceboat	FGMed	S/D3/4		red

Microstructure
Voids are common: mostly meso vughs with occasional micro and macro vughs and channels (strongly aligned to the vessel walls). Calcareous material is often formed around the voids. Inclusions are single to open-spaced with the long axes strongly aligned to the vessel margins.

Groundmass
The samples of this group display some margin-core colour differences: the margins range from orange-brown to light brown with a greyish brown core in PPL. In XPL, the margins are brown to dark grey with a dark grey core. One of the samples (07/01) shows very little optical activity whereas the other sample of this group (08/63) displays high optical activity.

Inclusions
c:f:$v_{10\mu m}$ *c.* 25:50:25
Coarse fraction = 1.10–0.20 mm
Fine fraction = <0.20 mm
Bimodal grain size distribution with poor sorting. Inclusions are s-a to s-r.

Coarse fraction:

Common:	**Calcareous micrite and calcite particles**
Rare:	**Polycrystalline quartz,** slightly metamorphosed
	Muscovite laths
	Iron oxide

Fine fraction (in order of frequency):
Monocrystalline quartz
Micrite
White mica
Muscovite
Iron oxide

Textural concentration features
None

Acknowledgements

I am extremely grateful to the staff of the British School at Athens for all their help and support during this study, in particular to Evangelia Kiriatzi (Director of the Fitch Laboratory) for access to the facilities and reference collections at the Fitch Laboratory and Michalis Sakalis for the preparation of the thin sections. Many thanks also to Marisa Mathari (then director of the then KA' Ephoreia) for giving me permission to work on this material, Photeini Zapheiropoulou and Olga Philaniotou for allowing access to the Gerani and Kouphonisi material respectively, and Daphne Lalagianni for her expertise and hospitality in the Naxos Museum. Last but not least, this study would not have been possible without the expertise and generosity of Peggy Sotirakopoulou.

Appendix

Neutron Activation Analysis of Early Cycladic Ceramics from Kavos and Dhaskalio

Anno Hein & Vassilis Kilikoglou

Introduction

From the Early Cycladic sites of Kavos and Dhaskalio 63 ceramic fragments were sampled to be studied for their chemical trace element composition with neutron activation analysis (NAA). After powdering the cleaned fragments in an agate mortar, samples of *c.*100 mg were prepared and sent for neutron irradiation at the University of Missouri Research Reactor together with standard reference materials. The γ-spectrum analysis of the irradiated samples, carried out one week and three weeks after irradiation, revealed the concentrations of 27 elements. The resulting chemical trace element compositions were statistically evaluated in terms of chemical variation of the assemblage and identification of possible chemical reference patterns. The data were examined with hierarchical cluster analysis and principal component analysis. Furthermore, the data were included in the ceramic database of the IMS (*ceraDAT*: Hein & Kilikoglou 2012) in order to be compared with ceramics from other sites in the vicinity and in the broader region.

Results and discussion

Chemical variability

In order to assess the chemical variability of the dataset the total variation was determined (Aitchison 1986; Buxeda i Garrigos & Kilikoglou 2001). Some of the measured elements (As, Ni and Sr) were removed either for missing values or for their known natural variation. The remaining 24 elements were: Ba, Ca, Ce, Co, Cr, Cs, Eu, Fe, Hf, La, Lu, Na, Nd, Rb, Sb, Sc, Sm, Ta, Tb, Th, U, Yb, Zn and Zr. The total variation of the dataset was 4.11, which is quite high, indicating a comparably inhomogeneous pottery assemblage in terms of chemical composition. The largest variation was contributed by Ca, Cr, Na, Sb and Zn. One reason is probably that ceramics from different production places were analysed. In order to exclude any other influence of natural variation or alteration, Ca, Na and Sb were also excluded from the element suite and the total variation of the dataset was determined again. The total variation was still high, 2.19, indicating clearly different production places. The largest variation was contributed by Ba, Co, Cr, Cs and Zn. In particular, chromium, with concentrations from *c.* 50 ppm up to *c.* 1000 ppm, indicated the use of geochemically very different raw materials.

The total variation was further investigated by random sampling (Buxeda i Garrigos & Kilikoglou 2001; Kilikoglou *et al.* 2007). Certain numbers of samples are selected randomly and the total variation is determined repeatedly for these subsets. The total variations show a distribution around the total variation of the entire dataset, at the same time providing information regarding the structure of the dataset. Figure 7.1 shows three distributions for 5, 10 and 25 random samples. The total variation distribution for 5 random samples present asymmetry towards lower values corresponding to ceramic groups of the same provenance, while already the distribution for 10 random samples is relatively symmetrical. The interpretation of these distributions is that there is no large group of clearly more than 10 chemically similar ceramic samples in the dataset, corresponding to the same provenance. On the contrary, a number of small chemical groups with 5 to 10 samples can be expected.

The hierarchical clustering of the log-ratio transformed dataset confirms the assumption based on the total variation examination (Figure 7.2). There is no really large cluster corresponding to a large reference group, but rather a couple of small clusters representing ceramic groups from various production places. In order to study provenance, the data were uploaded into the *ceraDAT* database which comprises more than 8500 chemical datasets of ceramics from the Aegean Region and reference patterns of known production places. Based on discovered relations to other ceramic datasets in the database and on the result of the cluster analysis, initial chemical groups

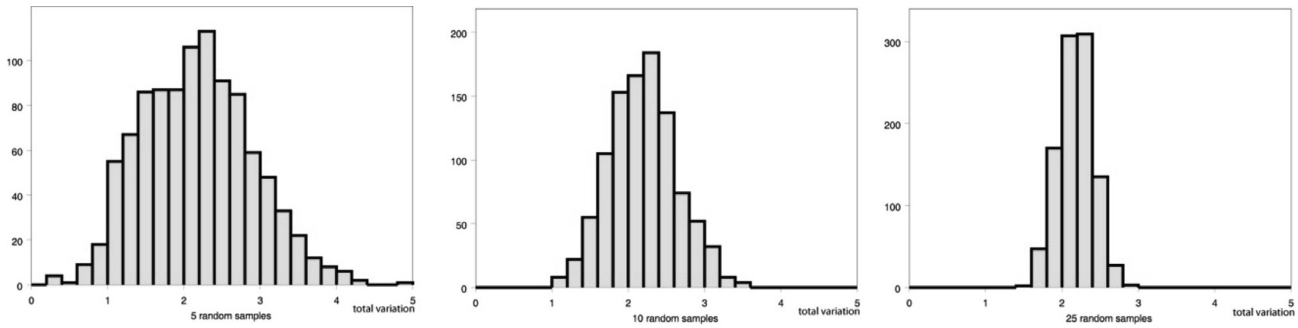


Figure 7.1. *Total variation distributions of random subsets of the dataset: 5 random samples, 10 random samples, 25 random samples.*

were formed of the data in the present dataset and tested for their consistency. Therefore, the similarity or dissimilarity of individual samples to average compositions of assumed groups was tested with a modified Mahalanobis distance, in order to decide about including or excluding them in the chemical group (Beier & Mommsen 1994; Kilikoglou *et al.* 2007). The procedure was applied iteratively until a stable group composition was found.

Samples and results are listed in Tables 7.4, 7.58 and 7.59.

Chemical groups

Group A

KER 07/34, 08/25, 08/35, 08/141, 08/152, 08/156, 08/157, 08/158 and 09/18 (+ KER 09/07 and potentially also KER 09/25)
This group shows high chromium and nickel concentrations, which indicate commonly ophiolitic environments and furthermore high barium and uranium concentrations. A comparison with other samples in the database indicates Melos as possible origin of this ceramic group, even though the Cr, Ni and Sc concentrations are significantly higher than the respective reference group from Phylakopi (mainly jars and bowls: Day *et al.* 2009).

Group B

KER 07/61, 07/65, 07/71 and 08/08 (+ KER 07/51)
These samples present a comparably high calcium content and low concentrations of chromium, iron, nickel, scandium, caesium, rubidium and europium. The composition is similar to an assumed local ceramic group from Akrotiri, comprising mainly Early Cycladic dark-on-light and black burnished ceramics (Day *et al.* 2009).

Group C

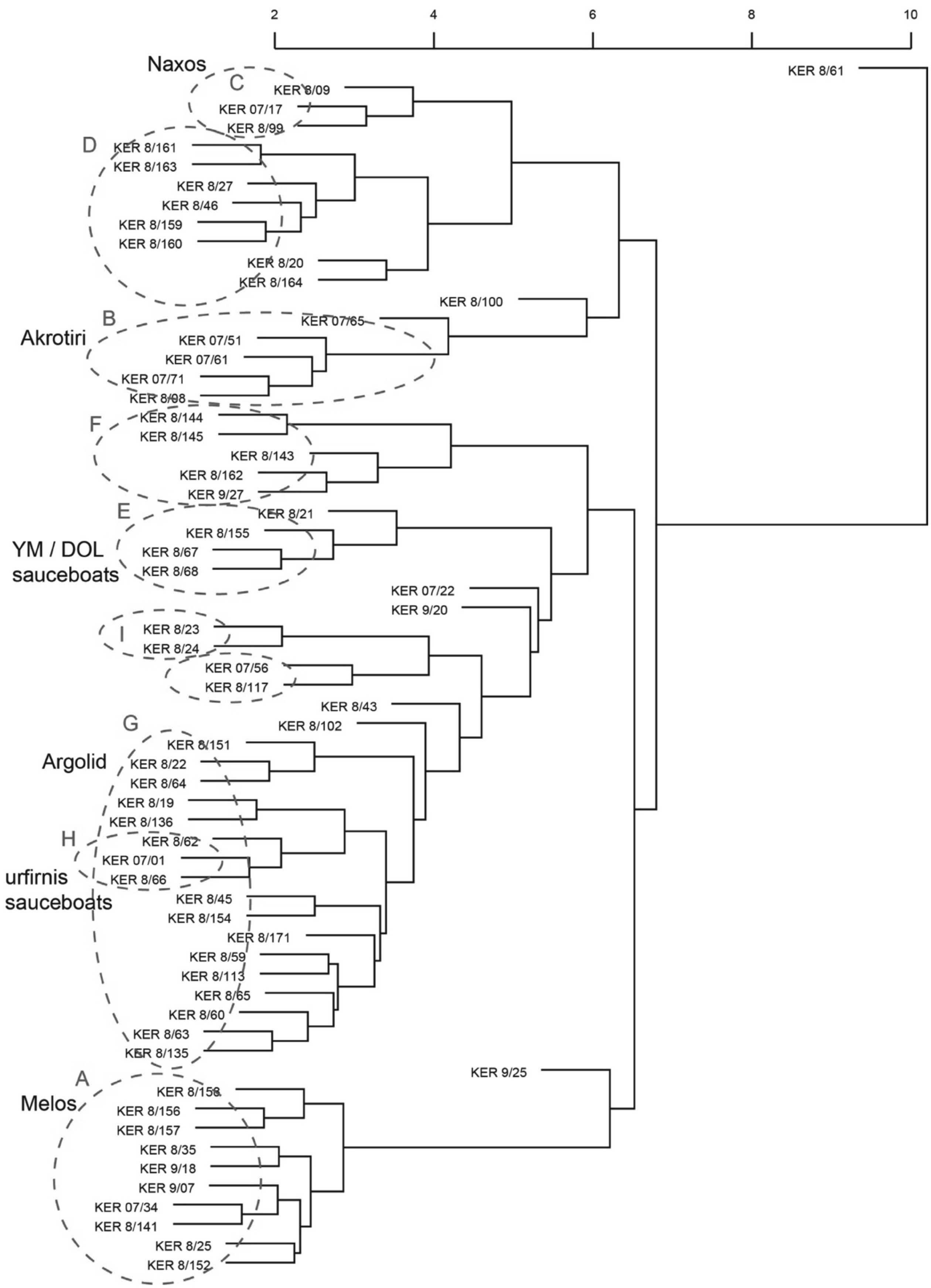
KER 07/17, 08/09 and 08/99
These three samples show low barium, chromium and nickel and concentrations, but comparably high concentrations of the lanthanides and actinides, with particularly high thorium concentrations. Sample KER 08/09 is calcareous in contrast to the other two and the lower trace element concentrations have to be adjusted with a best relative fit factor (1.25). The composition resembles the main group from Panormos (Day *et al.* 2009).

Group D

KER 08/20, 08/27, 08/46, 08/159, 08/160, 08/161 and 08/163 (+ KER 08/164)
The group comprises mainly conical-necked jars. The chemical compositions show low chromium and nickel concentrations and on the other hand high hafnium and rubidium concentrations. A comparison with other samples in the database reveals a similarity to a group of three dark brown burnished goblets from Aghia Irini, the origin of which has not yet been confirmed (Day *et al.* 2009).

Group E

KER 08/21, 08/67, 08/68 and 08/156
These samples show the highest cobalt, chromium and nickel concentrations in the data set and moreover high concentrations of caesium and iron and low concentrations of the lanthanides and thorium. The group comprises three sauceboats and a jug. It resembles a group of yellow mottled sauceboats found in Aghia Irini and a group of fine painted ceramics found in Koropi (Day *et al.* 2009; Ntouni 2015, 208–9). The origin of this group has not yet been confirmed, but chromium and nickel concentrations at this high level



2
4
6
8
10
KER 8/61
Naxos
C
KER 8/09
KER 07/17
KER 8/99
D
KER 8/161
KER 8/163
KER 8/27
KER 8/46
KER 8/159
KER 8/160
KER 8/20
KER 8/164
KER 8/100
B
KER 07/65
Akrotiri
KER 07/51
KER 07/61
KER 07/71
KER 8/08
F
KER 8/144
KER 8/145
KER 8/143
KER 8/162
KER 9/27
E
KER 8/21
KER 8/155
YM / DOL
sauceboats
KER 8/67
KER 8/68
KER 07/22
KER 9/20
I
KER 8/23
KER 8/24
KER 07/56
KER 8/117
KER 8/43
KER 8/102
G
KER 8/151
Argolid
KER 8/22
KER 8/64
KER 8/19
KER 8/136
H
KER 8/62
KER 07/01
urfirnis
KER 8/66
sauceboats
KER 8/45
KER 8/154
KER 8/171
KER 8/59
KER 8/113
KER 8/65
KER 8/60
KER 8/63
KER 8/135
KER 9/25
A
Melos
KER 8/158
KER 8/156
KER 8/157
KER 8/35
KER 9/18
KER 9/07
KER 07/34
KER 8/141
KER 8/25
KER 8/152

Table 7.58. *Chemical groups A, B, C, D, E and F: average concentrations and standard deviations considering a best relative fit. The concentrations are given in µg/g (ppm) if not indicated otherwise.*

	KER-A		KER-B		KER-C		KER-D		KER-E		KER-F	
	9 samples +2(–)		4 +1(–)		3		7 +1(–)		4		5	
	average	st. dev.	average	st. dev	average	st. dev	average	st. dev	average	st. dev	average	st. dev
As	33.0	2.3	5.4	0.8	3.9	1.4	4.1	1.0	19.6	7.6	10.1	3.5
Ba	621	121	355	41	248	8	581	123	350	50	425	100
Ca (%)	1.7	0.7	8.8	2.8	4.4	4.0	5.0	3.0	7.1	1.3	2.1	0.5
Ce	60.9	1.4	51.2	2.9	72.3	4.9	68.4	3.0	48.4	1.9	51.9	0.9
Co	30.7	2.4	11.0	1.3	13.6	0.5	18.5	1.1	38.3	2.5	38.2	1.6
Cr	553	9	85	8	55	3	83	3	941	45	457	18
Cs	10.6	0.7	3.3	0.2	13.5	0.7	12.5	0.8	20.8	3.9	5.1	0.3
Eu	0.99	0.02	0.89	0.04	1.36	0.03	1.19	0.03	0.94	0.02	1.24	0.03
Fe (%)	4.66	0.07	3.41	0.13	4.42	0.07	5.78	0.25	6.05	0.23	6.54	0.13
Hf	4.10	0.12	4.31	0.35	6.46	0.20	7.18	1.29	3.77	0.08	4.25	0.16
La	31.2	0.9	26.6	1.9	35.7	2.5	35.0	1.5	23.0	1.1	24.3	1.9
Lu	0.44	0.02	0.39	0.01	0.47	0.01	0.41	0.02	0.33	0.03	0.36	0.02
Na (%)	0.3	0.1	1.0	0.1	1.8	0.2	1.3	0.3	0.4	0.1	0.9	0.1
Ni	295	34	58	1	30	0	43	12	490	38	266	29
Rb	165	8	61	4	191	10	201	7	100	8	82	3
Sb	5.59	0.68	0.84	0.28	0.36	0.04	0.27	0.06	0.72	0.07	0.98	0.13
Sc	16.5	0.3	11.3	0.2	14.5	0.9	18.0	0.8	23.7	1.4	27.3	0.9
Sm	5.1	0.1	4.4	0.1	7.2	0.5	6.4	0.1	4.6	0.1	5.1	0.2
Sr	77	17	300	98	344	144	381	167	126	31	83	21
Ta	0.99	0.04	0.85	0.10	1.65	0.18	1.64	0.06	0.82	0.05	0.78	0.02
Tb	0.62	0.07	0.57	0.08	0.86	0.10	0.92	0.05	0.61	0.10	0.76	0.11
Th	13.6	0.4	13.4	1.7	28.2	1.6	18.8	0.4	8.4	0.3	7.2	0.3
U	4.48	0.23	3.75	0.24	4.43	0.17	3.14	0.55	2.10	0.29	1.38	0.24
Yb	2.69	0.24	2.54	0.24	3.04	0.16	2.90	0.18	2.11	0.09	2.56	0.22
Zn	433	27	65	3	91	4	129	14	113	6	106	4
Zr	105	19	125	8	194	27	177	34	100	9	120	30

are clearly related to ophiolitic environments which are known for example in mainland Greece (Attica, Boeotia), central Crete or the Dodecanese (Rhodes).

Group F

KER 08/143, 08/144, 08/145, 08/162 and 09/27
These samples show the highest Co, Fe and Sc concentrations in the dataset. They are low calcareous with low concentrations of Cs, Rb and Th. The group comprises mainly closed vessels. There are no similar compositions on the database apart from one hitherto unassigned sample of a burnished bowl found in Koropi (Ntouni 2015).

Group G

KER 08/19, 08/22, 08/59, 08/60, 08/64, 08/65, 08/115, 08/135, 08/136 and 08/151
The group is not very homogeneous and it could be subdivided into three groups: KER08/60, 08/65, 08/115 and 08/135 in subgroup G1; KER 08/22 and 08/151 in subgroup G2; and KER08/19, 08/59 and 08/64 in subgroup G3. The subgroups can be mainly distinguished by the higher Ca concentration of the G1 samples with related lower trace element levels. A comparison with the database reveals similarity to EBA ceramics assigned to the Argolid or Corinth, such as from Tiryns, Kranidi or Korakou. The high chemical variability

Figure 7.2 (*opposite*)**.** *Hierarchical clustering of the dataset. Indicated are the initial clusters which were formed to chemical groups. The data were log-ratio transformed with the Sm concentration as common divisor.*

Table 7.59. *Chemical groups G, H. I and J including subgroups G1, G2 and G3: average concentrations and standard deviations considering a best relative fit. The concentrations are given in µg/g (ppm) if not indicated otherwise.*

	KER-G		KER-G1		KER-G2		KER-G3		KER-H		KER-I		KER-J	
	10 samples		4		2		3		3		2		2+1(–)	
	average	st. dev.	average	st. dev.	average	st. dev.	average	st. dev.	average	st. dev.	average	st. dev.	average	st. dev.
As	6.6	2.8	5.3	2.8	7.9	2.0	8.0	3.5	17.4	1.7	8.2	0.1	16.8	8.3
Ba	433	102	464	118	453	43	402	8	469	102	368	60	348	72
Ca (%)	7.5	3.2	9.1	0.8	3.4	0.1	6.1	1.7	3.7	0.4	0.9	0.0	5.2	3.6
Ce	71.7	3.2	65.7	2.0	84.5	0.4	76.4	2.3	80.1	0.3	62.2	1.0	57.4	0.4
Co	27.4	7.4	31.9	6.0	22.8	0.4	24.7	0.8	32.8	1.2	33.4	1.9	32.4	1.5
Cr	230	11	215	6	249	11	253	17	374	16	385	17	406	9
Cs	8.8	2.4	10.3	1.6	7.0	0.2	7.7	0.3	7.8	0.1	5.1	0.2	12.4	5.9
Eu	1.25	0.05	1.15	0.03	1.32	0.00	1.38	0.03	1.55	0.02	1.47	0.02	1.17	0.03
Fe (%)	4.86	0.26	4.59	0.06	5.61	0.15	5.07	0.25	5.97	0.07	6.73	0.19	5.68	0.21
Hf	4.52	0.40	4.05	0.09	5.75	0.15	4.67	0.41	5.17	0.20	5.99	0.06	4.22	0.14
La	35.6	0.7	32.4	0.8	39.4	0.3	39.3	0.2	39.9	0.5	32.4	0.9	26.3	1.1
Lu	0.41	0.02	0.37	0.01	0.48	0.01	0.44	0.02	0.47	0.02	0.56	0.00	0.40	0.01
Na (%)	0.7	0.1	0.7	0.1	0.8	0.0	0.6	0.1	0.6	0.1	1.2	0.1	0.9	0.1
Ni	138	18	129	12	172	16	136	22	235	20	164	11	218	28
Rb	121	14	110	18	125	6	136	5	127	3	93	0	112	10
Sb	0.79	0.31	0.58	0.09	1.37	0.02	0.84	0.38	1.28	0.03	0.81	0.05	1.29	0.54
Sc	19.5	1.1	18.4	0.4	19.9	0.0	21.2	1.2	21.4	0.2	26.9	0.0	21.8	0.6
Sm	6.2	0.2	5.7	0.1	6.7	0.0	6.8	0.2	7.5	0.1	6.9	0.1	5.6	0.1
Sr	285	144	397	46	177	16	150	41	55	0	39	0	86	40
Ta	1.09	0.09	0.94	0.03	1.33	0.07	1.21	0.11	1.16	0.02	1.19	0.02	0.92	0.02
Tb	0.79	0.13	0.61	0.01	0.96	0.06	0.95	0.14	0.94	0.10	0.84	0.03	0.69	0.06
Th	11.9	0.4	10.9	0.3	13.7	0.2	12.7	0.3	13.4	0.2	10.3	0.0	9.7	1.3
U	3.37	0.54	2.74	0.29	4.12	0.23	3.93	0.74	2.39	0.07	3.33	0.26	2.70	0.21
Yb	2.77	0.26	2.55	0.33	3.30	0.15	2.82	0.03	3.14	0.08	3.60	0.02	2.45	0.02
Zn	116	13	101	8	140	24	126	3	119	2	131	3	95	4
Zr	127	17	109	10	137	15	139	17	139	12	138	1	120	2

reflects supposedly different production places in the region, which are known to be difficult to distinguish (Hein & Kilikoglou 2017).

Group H

KER 07/01, 08/62 and 08/66

These three sauceboats show the highest rare earth element concentrations in the dataset. The average chemical composition is not completely different from Group KER-G and the higher trace element concentrations can be adjusted to some extent with a best relative fit factor (0.85). The chemical pattern resembles a group of Urfirnis sauceboats from Aghia Irini which can also be found at other sites, such as Akrotiri or Liman Tepe (Day *et al.* 2009).

Group I

KER 08/23 and 08/24

These two sauceboats are non- to low calcareous and they show high concentrations of the heavy rare earth elements and Sc and a low Cs concentration. There is a certain similarity to some Late Helladic cooking wares from Attica, which present, however, lower trace element concentrations, assumedly because their fabric is considerably coarser (Gilstrap 2015).

Group J

KER 08/45 and 08/117 (+ KER 08/154)

The two closed vessels constitute another chemical 'pair' with KER 08/154 as a potential third group member. The chemical composition is not completely

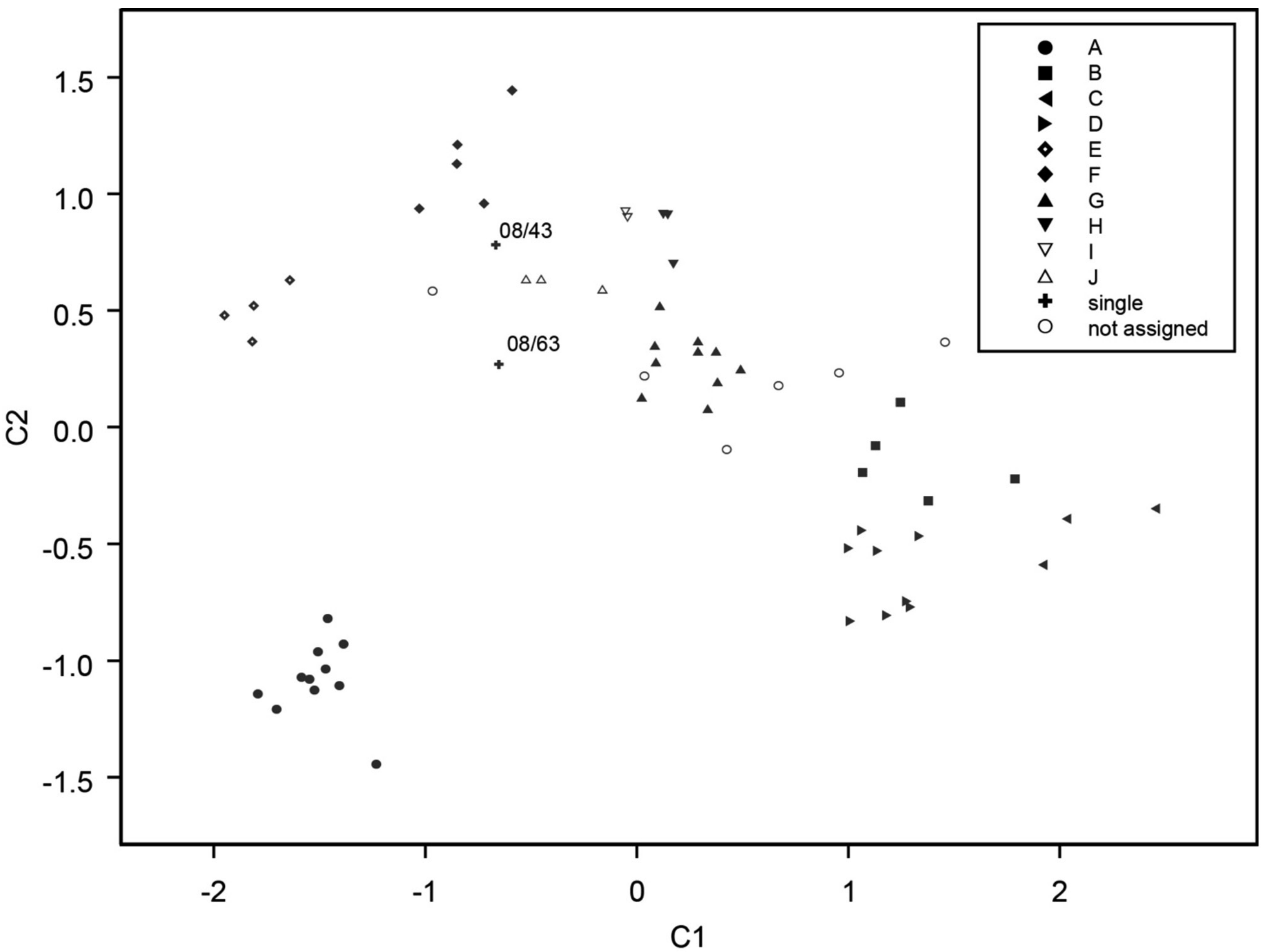


Figure 7.3. *Principal component analysis of the dataset. The different chemical groups are indicated with symbols. The data were log-ratio transformed with the Sm concentration as common divisor. Sample KER 08/61 was removed from the dataset because it proved to be chemically considerably different, affecting the overall variation.*

different from Group I and a comparison with other samples on the *ceraDAT* database indeed indicates chemical similarity with another group of Late Helladic ceramics from Attica.

KER 08/43
This jar presents a general similarity to Group J, even though the trace element concentrations are considerably smaller and the composition has to be adjusted for by a best relative fit factor of c. 1.3. This could indicate a higher content of non-plastic inclusions.

KER 08/61
This sauceboat presents considerably high concentrations of lanthanides and actinides, which could be related to the presence of heavy minerals, such as monazite. Similarly high concentrations of these trace elements can be found in an Early Helladic transport jar from Panormos.

KER 08/63
This sauceboat presents chemical similarity to another group of Yellow Mottled sauceboats found in Aghia Irini, which is different from the sauceboats which resemble Group E.

Chemical loners

KER 07/22, 07/56, 08/100, 08/102, 08/171 and 09/20
These six samples could not as yet be assigned to any reference group, even if they are chemically not completely different from other samples (Figure 7.3). Therefore, it can be expected that further analyses will provide more information.

Conclusions

The Keros dataset presented a considerably high chemical variation. At the same time, the hierarchical clustering of the data indicated that a series of small chemical groups could be expected, presenting presumably different production places for the ceramics which were imported to Keros. Indeed, the chemical grouping taking account of reference data from other sites provided clues to the origin of some of the Early Cycladic ceramic wares found in Keros, or at least to relations with ceramics found at other Early Cycladic sites.