Atlas of Ceramic Fabrics

1

Italy: North-East, Adriatic, Ionian

Bronze Age

Impasto

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Introduction: Q and A

What is the relevance of pottery for archaeology?

In his famous and global presentation, MacGregor (2010) illustrates the world's history in 100 objects. Only 10% of the entire selection is made with clay, six are pots[1] and one is a cluster of sherds: the Kilwa potsherds (Tanzania, AD 900-1400), a collection of 'rubbish' useful to reveal networks.[2]

We are not here going to add more arguments to the never-ending discussion about the role of pottery in archaeology, the relationship between archaeology and archaeometry and the lack of real interdisciplinary approaches… (Cuomo di Caprio 2007, 2017; Levi and Muntoni 2014; Levi and Sonnino 2006, Levi and Vertuani 2017; Tite 2008; Vidale 2007). We simply think that technological variability is as important as morphological/stylistic distinctions in archaeology.

Our team grew up in a sophisticated environment concerning the typological classification of shape and decoration (Levi 1990, 1991). We have been inspired in numerous heterogeneous ways, for example by working with Renato Peroni (1967, 1985, 1998), by David Clarke's analytical method (1968, 1970), by experimental archaeology (Brodà et al. 2009; Desogus et al. 1995; Vanzetti et al. 2014) and ethnoarchaeology (Vidale 2004) (see Plate 16). Trial and error took their place in our search for more efficient methods in pottery treatment, documentation, interpretation and publication (Levi and Vanzetti 2017; Levi and Vertuani 2017). Refreshing perspectives flourished with the enthusiasm and curiosity of many

[1] Jomon pot, Japan, 5000 BC; Moche warrior pot, Peru, 100-700 AD; Chinese Tang tomb figures, China, about 728 AD; David Vases, China, 1531 AD; Early victorian tea set, England, 1840-1845 AD; Russian Revolutionary Plate designed by Mikhail Adamovich, Russia, 1921 AD. The others clay objects are: Clay model of a cattle, Egypt, 3500 BC; Early writing tablet, Iraq, 3100-3000 BC; Flood tablet, Iraq, 700-600 BC.

[2] 'These broken pieces of pots were found on the shores of Kilwa Kiswani, an island off Tanzania, which was once home to a major medieval African port. The pale green porcelain pieces are from China, the dark green and blue pieces come from the Persian Gulf and the brown unglazed pieces were made in East Africa. This rubbish reveals a complex trade network that spread across the Indian Ocean, centuries before the European maritime empires of Spain, Portugal and Britain. Who brought these pots to Kilwa?...' (see **Plate 1**, McGregor 2010).

students in class and fieldwork (from Modena, Ferrara, Hunter College and many others).

We consider that we need a more refined and standardised methodology to investigate technology in order to better understand social organisation, trade, function, environment, complexity and change in ancient societies.

The relevance, use and abuse of pottery in archaeology have been discussed with numerous scholars who shared with us passion and practice.[3] Without them, how can the gap be bridged between the single observation and the big picture?

Our project has the ambition and the desire to push the mass of our data toward a (reasonably) big picture.

Why an Atlas of Ceramic fabrics?

One crucial point in studying ancient pottery is to find significant taxonomic units which can describe a specific potter's behaviour and choices. For the ceramic pastes one goal is to discover the 'recipes' in their preparation.

A new extensive standardised description of the petrographic compositions of, and the consequent definition of fabrics is one of the first results of our database project (see chapter 2).

Other works have inspired our project, for example the recent Mediterranean survey of Stirrup Jars (Haskell *et al*. 2011), and some Italian regional projects (Capelli and Mannoni 1998; Martini *et al*. 1996). And, of course, the pioneering work of John Williams in the 1960s (1967, 1980, 1991).

But we decided to change the perspective a little. We aim at proposing here a different perspective presenting the data in the form of an Atlas in order to provide a tool that can be used easily to compare the different components of the ceramic pastes. For this reason the fabrics are

[3] Alberto Cazzella, Alessandro Vanzetti, Andrea Cardarelli, Andrea Di Renzoni, Anna Maria Bietti Sesteri, Annunziata Ollà, Daniele Brunelli, David Jankins, Domenica Gullì, Elisabetta Borgna, Ernesto De Miro, Francesca Ferranti, Gabriella Tigano, Giovanna Vezzalini, Giovanni Leonardi, Giulia Recchia, Gunter Kopcke, Italo Maria Muntoni, John Williams, Lorenzo D'Alfonso, Lucia Vagnetti, Malcolm Wiener, Marco Bettelli, Maria Antonietta Castagna, Maria Clara Martinelli, Massimiliano Di Pillo, Massimo Vidale, Maurizio Mazzucchelli, Ninina Cuomo di Caprio, Paola Vertuani, Peter Day, Peter Van Dommelen, Richard Jones, Robert Koehl, Sander van der Leeuw, Stefano Lugli, Valentina Cannavò and many others.

presented by composition and not only according to site. The Atlas can be therefore used also to check possible provenance of the non-local pots.

Which pottery is in the Atlas?

The majority of the pottery in the Atlas belongs to *Impasto* ware: the typical prehistoric and protohistoric pottery in the Central and Western Mediterranean. It is hand–made[4] (coils or mold), usually burnished, with incised or impressed geometrical decoration, and fired in open or single chamber kilns (Borgna and Levi 2015; Carpenito *et al*. 2009; Levi 2010; Jones *et a*l. 2014). The pots show a great variety of shapes and functions (Cocchi Genick 1999) **(Figure 1)**. The ceramic paste is often coarse and characterised by abundant and large clasts (see **Plate 1**). This ware is known in the Eastern Mediterranean as Handmade Burnished Ware-HBW) (Bettelli 2009; Lis 2009).

Other wares belong to more specialised productions (painted, manufactured with fine calcareous raw materials, wheelmade, fired in complex kilns), for example: Serra D'Alto, Diana, Italo-Mycenaean, Grey, Dolii, South Italian Protogeometric and Geometric, Piumata). The social organisation of production ranges from household to workshop levels (Bernabò Brea *et al*. 2006; Levi 1999, 2010; Rice 1984; Van der Leeuw 1984). A general classification of the central Mediterranean Bronze Age wares based on technological characteristic has been presented recently (Borgna and Levi 2015: fig. 1; Levi 2010).

What about sampling strategy and analyses?

The samples have been mainly personally collected since the 1990s in close collaboration with the *Soprintendenze*'s agencies, museums, universities and archaeological teams.

Samples have been selected according to their archaeological contexts and their typological/functional characteristics after careful evaluation and preliminary classification of the finds. In some cases (for example Montale, Casinalbo, Coppa Nevigata, Broglio di Trebisacce, Taureana, Aeolian Islands, Milazzo, Cannatello) an extensive macroscopic investigation and classification of the entire ceramic assemblage was performed before and during the samples' selection. The selection was made in several

[4] In few cases wheel-made, from the Recent BA (see **Plate 1**).

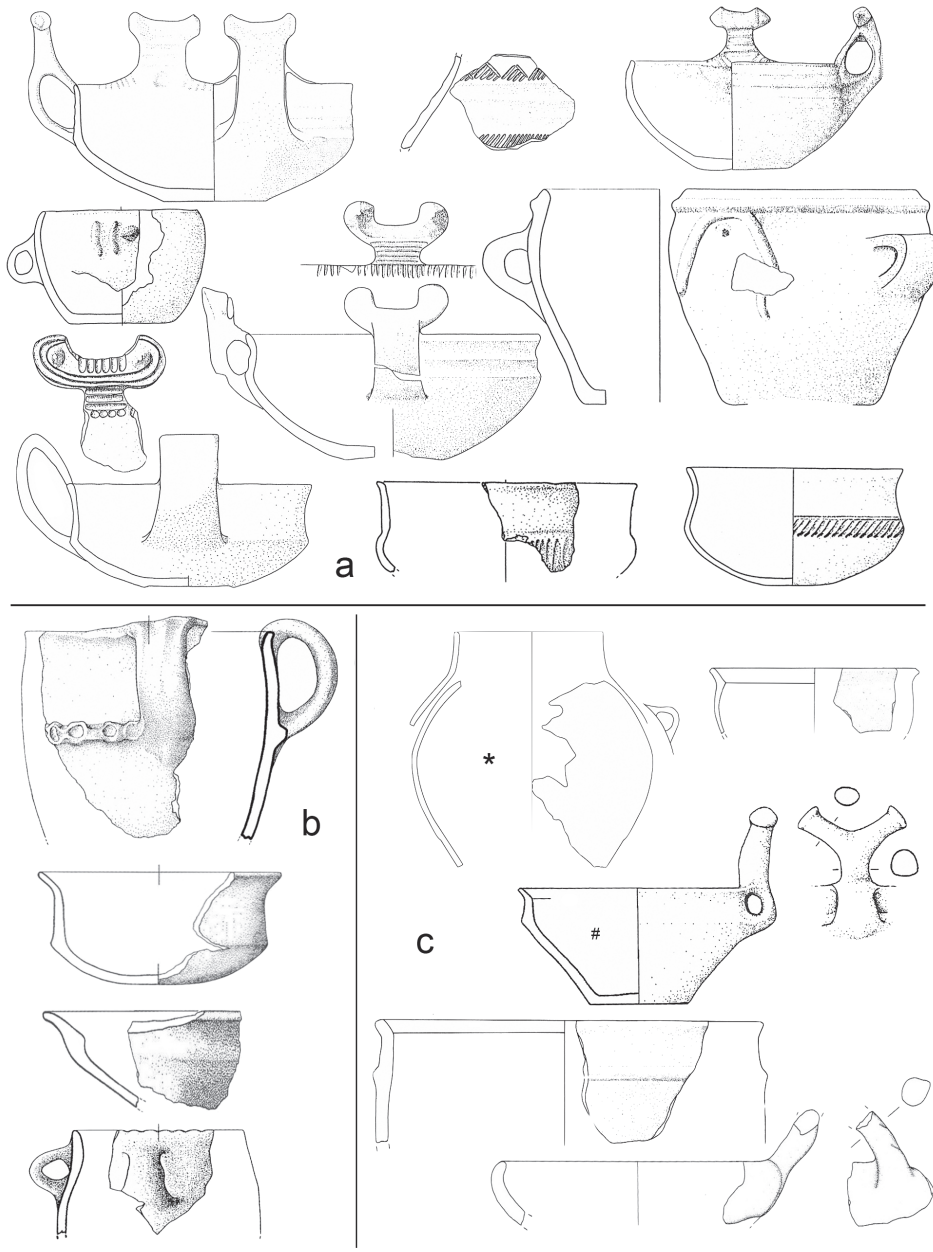

Figure 1 Examples of Bronze Age Impasto pottery.
a. NorthEast (Terramare sites); b. Adriatic (Coppa Nevigata); c. Ionian (Broglio di Trebisacce). Scale 1:4 (* 1:10, # 1:5).

steps according to the archaeometric results in order to better focus both on archaeological questions and on sampling strategy.

When possible, an intensive geological survey of the areas surrounding the sites and raw materials completed the collection.

The samples have been mainly prepared and analyzed at the University of Modena- Department of Chemical and Geological Sciences[5] and at Glasgow University - Department of Archaeology.[6] A great number of thin sections have been prepared by John Williams (in his pioneering work in the 1960s) and by Armando Coeli (famous for his giant thin section of a chocolate).

The compositional analyses[7] have been performed and interpreted in close collaborations with scholars working in the field of archaeometry.[8]

How are fabrics described and defined?

Fabrics are defined through petrography because the focus here is mainly on the characteristic Central Mediterranean prehistoric and protohistoric pottery: the coarse *Impasto* ware with abundant and large clasts. Often the clasts are added by the potters during the paste preparation (temper), sometimes they are naturally present in the clay.

Only a visual inspection by a petrographic microscope of the various types of clasts, their abundance, dimensions and shape can give an idea of the whole composition (of course for finer wares, chemical data are often more relevant).[9]

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[5] Massimo Bortolotti, Simona Bigi, Simona Marchetti Dori, Tina Giliberti.

[6] Lorna Campbell, Lorraine McEwan.

[7] Including petrographic and also: mineralogical, chemical (AAS, XRF, INAA, ICP-ES, ICP-MS), microchemical (SEM, electron micropobe) and radiographies.

[8] Alberto Renzulli, Anna Loschi Ghittoni, Daniele Brunelli, David Jenkins, Effie Photos-Jones, Elena Pecchioni, Fabio Fratini, John Williams, Letizia Amadori, Luca Bondioli, Marco Pistolesi, Massimo Vidale, Maurizio Mazzucchelli, Maurizio Sonnino, Mauro Rosi, Patrizia Santi, Peter Day, Raffaello Cioni, Richard Jones, Stefano Lugli, Vassili Kilikoglou, Yannis Maniatis.

[9] Other sets of compositional data (mineralogical, chemical and microchemical) are also available for some samples (see analyses and bibliography in **Table 1**). However they have not been considered in the present classification, due to the well-known problems linked to their interpretation, relating to both experimental (Levi 1999; Neff *et al*. 1988, 1989) and archaeological investigations (Day and Kiriatzi 1999). More specifically, for the samples presented in this volume, the relationship between petrographic data and bulk chemical data have been discussed in Gorgolione *et al*. 2006; Jones *et al*. 2014; Levi 1999, 2010; Levi *et al*. 1995a.

The description follows the main criteria proposed for ceramic petrology, including clasts, void, and matrix (Quinn 2013; Whitbread 1986, 1989).

In our system at a more general level there are groups, linked to geological/lithological environments:

- E=Effusive
- I=Intrusive
- M=Metamorphic
- S=Sedimentary
- ES=Effusive + Sedimentary
- ….

In some cases the components are too generic to be assigned to a specific lithology and they are indicated with G=Generic. Fabrics characterised mainly by Grog are indicated with G (Grog)=Generic with grog; they are often poorly characterised in terms of lithology (and therefore difficult to link to specific geological environments/production areas) but are relevant in terms of technical choices. Grog is also present in several other contexts in other groups.

In the frame of the groups, the fabrics are defined according to the main components (predominant, dominant and – in some cases – frequent clasts). Each fabric has a unique number in the general lithological group. Other characteristics such as minor components, size and abundance of clasts and the matrix are also considered.

What is the meaning of these fabrics?

The fabrics here proposed are tentatively coherent in terms of potters' practices: ceramic pastes prepared with a certain set of raw materials, normally but not always locally available. For our coarse pottery the 'recipe' usually involves mixing different materials (clay, soil, rocks, minerals, grog, shells, organic materials…).

Our classification tries to merge minor differences and to separate what appears to be a deliberate choice of the potter or a result of a different availability of raw materials. The variability/standardisation also considers the social organisation of production from household to workshop levels.

As a matter of fact, we think that our fabrics are mainly the result of a heuristic and ethical approach,[10] useful for the archaeologist's perspective.

[10] Regarding emic/ethic opposition in pottery typology and classification see, for example: Ford 1954a, 1954b; Klejn 1982; Spaulding 1953, 1954; Wallon and Brown 1982.

Nevertheless, in several cases a positive connection with ancient craftsmanship emerged from this classification, witnessing its significance and value in ancient society.

Despite the encouraging results, we tend to believe that further development of method and theory are needed for the further classification of ceramic pastes. The structure of the classification needs further consideration and selection of key criteria needs to be refined.

The hope is that in the future there will be a deeper debate on this field, following the example of archaeological classification in other fields.

Some open questions:

- What are the implications of clay selection, refinement and mixing?
- What is the relative importance of the base material/groundmass (clay, silt, soil…) and the clasts?
- Are some components more important than others?
- When are the minor components (very few or rare) crucial in the definition of the fabrics?
- The classification should follow a monothetic (hierarchical) (Whallon 1972) or a polithetic structure (Clarke 1970)?
- When and how can we be sure that the clasts are added?
- How much does the degree of lithological variability in available raw material influence potters' choices?
- Are we always able to distinguish technological variability and production areas?
- What is the meaning of *local* and of *regional*?
- How should we tackle the relatively frequent ambiguities about the circulatioin of pots vs. raw materials?
- How crucial is the social organisation of production to defining the boundaries of significant variability?
- What is the relationship between technology and style for the definition of cultural interactions and identities?
- ……

How is the Atlas organised and published?

The fabric Atlas is to be published in a series of volumes organised according geographical areas and/or chronology.

The geographical division is made according to maritime and not territorial boundaries.

This choice derives from both social/historical and geological/raw material reasons:

- from a social/historical perspective, in ancient Mediterranean, the sea was a means of connection, often more than by land (Broodbank 2013; Dawson 2006; Knapp and van Dommelen 2015; van Dommelen and Knapp 2010);
- from a geological/raw materials perspective, because of the distribution of the lithologies, some fabrics can be more directly and efficiently compared than others. For example, in the Western Adriatic raw materials are mainly sedimentary whilst in the Tyrrhenian area (peninsular Italy and islands) there is a great availability of effusive rocks.

However, in the Atlas the fabrics are named and defined in a unique series for each group (see above).

What are the geographical areas and the sites in this volume?

In this volume we consider 63 sites (mainly settlements) in the North-East and in the Adriatic and Ionian areas of Peninsular Italy (**Figure 2, Table 1**).

From a geological/lithological standpoint, the majority of the sites are located in sedimentary areas[11] whilst the south-western margin of the Ionian arc (corresponding to actual southern Calabria) is characterised by intrusive and metamorphic lithologies.

Geographical areas are not equally represented. For the North-East, samples are concentrated in the Po Valley and surrounding areas (present-day Veneto and Emilia Romagna). For the Adriatic the samples are from the central area (present-day Marche) and are particularly abundant from the south (present-day Apulia). The Ionian area corresponds to the present regions of Apulia, Basilicata and Calabria, samples are mainly from site in Taranto area, in the plain of Sybaris and nearby Crotone.

In the peninsula the majority of the sites is coastal or close to the coast. This is due partially to the actual distribution of the archaeological evidence and partially to the massive sampling sessions performed by

[11] An unusual feature is the discovery of effusive raw materials in the southern Adriatic area (see chapter 2).

Figure 2 Archaeological sites (for numbers see Table 1).

Site N.	Site	Area	Samples (PE)	Chronology	Publications linked to this project	Chemical	Other analyses	Code
1	Castel de Pedena	NorthEast	6	EBA-IA		XRF		CDP
2	Montebelluna	NorthEast	4	IA	Bianchin Citton et al. 2000			MBL
3	Bovolone	NorthEast	11	RBA	Cannavò and Levi 2009; Cannavò et al. 2017; Jones et al. 2014; Salzani et al. 2006	XRF, ICP	XRD	BOV-BOVa-BOVb
4	Castion d'Erbè	NorthEast	21	RBA-FBA				CDE
5	Terranegra	NorthEast	6	RBA	Cannavò et al. 2017; Jones et al. 2014; Salzani et al. 2006	INAA		TNE
6	Lovara	NorthEast	6	RBA	Jones et al. 2014; Salzani et al. 2006	ICP		LOV
7	Fondo Paviani	NorthEast	12	MBA-RBA	Cupitò et al. 2015; Cannavò and Levi 2009; Cannavo' et al. 2012, 2017; Jenkins et al. 1999; Jones et al. 2002, 2014	INAA, ICP	XRD	FPA-FPAa-FPAb
8	Castello del Tartaro	NorthEast	3	MBA3-RBA	Jenkins et al. 1999; Jones et al. 2002, 2014	INAA		CTA
9	Fabbrica dei Soci	NorthEast	7	MBA3-RBA	Cannavò and Levi 2009; Cannavo' et al. 2012, 2017; Jenkins et al. 1999; Jones at al. 2002, 2014	XRF, INAA	XRD	FDS-FDSa
10	Canova	NorthEast	5	MBA	Jenkins et al. 1999; Jones at al. 2002	ICP		CAN
11	Casinalbo	NorthEast	39	MBA-RBA	Brodà et al. 2009; Cannavò and Levi 2014; Cannavò et al. 2017; Carpenito et al. 2009	XRF	XRD	CAS
12	Montale	NorthEast	81	MBA2-RBA1	Brodà et al. 2009; Carpenito et al. 2009; Cannavò et al. 2012, 2017; Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	MON
13	Spilamberto	NorthEast	4	MBA-RBA				SP
14	Montebarello	NorthEast	12	MBA	Brodà et al. 2009; Cannavò et al. 2012, 2017: Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	MBA
15	Pontenuovo	NorthEast	13	MBA-RBA	Brodà et al. 2009; Cannavò et al. 2012, 2017; Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	PON
16	Gorzano	NorthEast	54	MBA-RBA	Brodà et al. 2009; Cannavò et al. 2012, 2017; Cardarelli et al. 2007; Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	GOR-GORZ
17	Ca de Monesi	NorthEast	5	MBA-RBA	Brodà et al. 2009; Cannavò et al. 2017; Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	CAM
18	Castiglione di Marano	NorthEast	13	MBA-RBA	Brodà et al. 2009; Cannavò et al. 2017; Levi 1997; Loschi Ghittoni and Levi 1997	XRF	XRD, X-Ray, Experimental	CDM
19	San Giuliano Toscanella	NorthEast	8	MBA3-RBA	Amadori et al.1996; Cannavò et al. 2017	XRF	XRD, X-Ray	MSG
20	Monte Castellaccio	NorthEast	12	MBA-RBA	Amadori et al.1996; Cannavò et al. 2017	XRF	X-Ray	MCA
21	Ancona	Adriatic	4	MBA-FBA	Cannavò et al. in press; Jones et al. 2014, Vagnetti et al. 2006	ICP		ANC
22	Jesi	Adriatic	5	MBA-RBA	Cannavò et al. in press; Jones et al. 2014, Vagnetti et al. 2006	ICP		JES
23	Tolentino	Adriatic	5	MBA-RBA	Cannavò et al. in press; Jones et al. 2014, Vagnetti et al. 2006	ICP		TOL
24	Coppa Nevigata	Adriatic	155	MBA-RBA	Aldi et al. 1997; Boccuccia et al. 1995; Cannavò et al. in press; Cioni et al. 2000; Jones and Levi 2012; Jones et al. 2014; Levi in press; Levi and Cioni 1998; Levi et al. 1995a, 1995b, 1998a, 1999a, 1999b, 2002, 2005; Recchia and Levi 1999	XRF, INAA, ICP	XRF, Porosity, X-Ray, SEM	CN
25	Madonna di Loreto	Adriatic	3	MBA3	Cannavò et al. in press; Cioni et al. 2000; Levi et al. 1999b;	INAA	SEM	MLO
26	Terra di Corte - Ipogeo 3	Adriatic	7	MBA2	Cannavò et al. in press; Cioni et al. 2000; Levi et al. 1999b;	INAA	SEM	TDC
27	Madonna di Ripalta	Adriatic	10	MBA-IA	Cannavò et al. in press; Cioni et al. 2000; Levi et al. 2002	XRF-INAA	SEM	RIP
28	Lavello T.743	Adriatic	5	MBA				LAV
29	Diga Rendina - Sito 2	Adriatic	5	MBA	Cannavò et al. in press;			REN
30	Punta le Terrare	Adriatic	5	MBA	Bettelli et al. 2010; Cannavò et al. in press; Jones et al. 2014	INAA		PT
31	Scoglio del Tonno	Ionian	8	MBA-EIA	Gorgoglione et al. 2006, Jones et al. 2014; Vagnetti et al. 2009	ICP		SDT
32	San Domenico-Taranto	Ionian	1	MBA-RBA	Jones et al. 2014	INAA		SDO
33	Lugovivo-Pulsano	Ionian	1	RBA	Jones et al. 2014	INAA-ICP		LV
34	Porto Perone	Ionian	3	MBA-RBA	Jones et al. 2014; Vagnetti et al. 2006			PPE
35	Torre Castelluccia	Ionian	3	MBA-IA	Jones and Levi 2002; Jones et al. 2014; Vagnetti et al. 2009	INAA-ICP		TCA
36	Roca	Adriatic	10	MBA-IA	Cannavò et al. in press; Cioni et al. 2000; Guglielmino et al. 2010, Jones et al. 2014	ICP	SEM	RO
37	Leuca-Punta Meliso	Adriatic	9	RBA-FBA	Cannavò et al. in press;Jones et al. 2014	INAA		PM
38	Tursi Castello	Ionian	1	BA	Levi 1999; Levi et al. 1998b, 1998c	INAA		TUC

Site N.	Site	Area	Samples (PE)	Chronology	Publications linked to this project	Chemical	Other analyses	Code
39	Tursi San Martino	Ionian	2	BA	Levi 1999; Levi et al. 1998b, 1998c	INAA		TUM
40	San Cavalcatore	Ionian	4	BA	Levi 1999: Levi et al. 1998b, 1998c	INAA		SCAV
41	Timpone Golla	Ionian	3	BA	Levi 1999; Levi et al. 1998b, 1998c			TGO
42	Tarianne	Ionian	7	MBA	Levi 1999; Levi et al. 1998b, 1998c	INAA		TA
43	Timpone Lacco	Ionian	5	RBA(FBA?)	Levi 1999; Levi et al. 1998b, 1998c			LAC
44	Valle Carlodraga	Ionian	4	BA	Levi 1999; Levi et al. 1998b, 1998c			VC
45	Broglio di Trebisacce	Ionian	182	MBA-IA	Buxeda i Garrigós et al. 2003; Jones et al. 1994, 2014; Levi 1999, 2002; Levi and Odoguardi 1990-91; Levi and Sonnino 1997; Levi et al. 1998b, 1998c; Vagnetti et al. 2009; Vanzetti et al. 2014	AAS, INAA, ICP	XRD, X-Ray, SEM, Experimental	BT
46	Villapiana	Ionian	7	MBA-RBA	Levi 1999; Levi et al. 1998b, 1998c	INAA		VP
47	Timpone Motta Cerchiara	Ionian	5	MBA-IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		TMC
48	Timpone Motta Francavilla	Ionian	7	MBA-IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		FMA-TMF
49	Timpa Castello Francavilla	Ionian	6	MBA-IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		TCF
50	Raganello	Ionian	2	BA	Levi 1999; Levi et al. 1998b, 1998c			RAG
51	Monte S. Nicola	Ionian	3	FBA-IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		MSNC
52	Pietra Castello Cassano Ionio	Ionian	4	IA	Levi 1999; Levi et al. 1998b, 1998c			PCCI
53	Torre Mordillo	Ionian	15	MBA-IA	Jones 2001; Jones et al.1994, 2014; Levi 199; Levi et al. 1998b, 1998c; Vagnetti et al. 2009	INAA	XRD	TM-TDM
54	Fontana del Finocchio	Ionian	7	FBA-IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		FF
55	Serra Castello	Ionian	8	IA	Levi 1999; Levi et al. 1998b, 1998c	INAA		SCS
56	Serra Cagliano	Ionian	6	MBA-RBA	Levi 1999; Levi et al. 1998b, 1998c	INAA		SCG
57	Rosa Russa	Ionian	13	MBA	Buxeda i Garrigós et al. 2003; Jones et al. 2014; Levi 1999; Levi et al. 1998b, 1998c;	INAA	SEM	RR
58	Basili di Rossano	Ionian	4	RBA	Levi 1999	INAA		BRS
59	Strange	Ionian	7	MBA	Levi 1999; Levi et al. 1998b, 1998c	INAA		STR
60	Bisignano	Ionian	15	IA	Levi 1999			BSG
61	Acri	Ionian	5	MBA	Levi 1999			ACR
62	Capo Piccolo	Ionian	44	MBA1-2	Jones et al. 2014	INAA		CP
63	Capo Rizzuto	Ionian	8	BA	Jones et al. 2014	INAA		TTCR-CRNE
			935					

Table 1 Sites, analyses and archaeometric bibliography.

our team in sites with Mycenaean pottery: samples of various wares were often used as reference groups (Jones *et al*. 2014).[12]

How many samples are used in this volume?

In this volume we consider 935 samples[13] of *Impasto* (see **Table 1**).

[12] Archaeological information and bibliography of the sites with Mycenaean and Italo-Mycenaean pottery are in Jones *et al*. 2014. For other archaeological information see for example (with bibliography): Bernabò Brea *et al*. 1997; Cardarelli 2014; Cazzella *et al*. 2017; Levi 1999; Peroni and Trucco 1994.

[13] Samples in this volume have been selected and collected in collaboration with: Alberto Cazzella, Alessandro Vanzetti, Andrea Cardarelli, Angela Cinquepalmi, Anna Maria Bietti Sestieri, Anna Maria Tunzi, Annalisa Zarattini, Antonio De Siena, Armando De Guio, Assunta Orlando, Domenico Marino, Edvige Percossi, Elena Lattanzi, Elodia Bianchin Citton, Flavia Trucco, Francesca Radina, Giovanni Leonardi, Giulia Recchia, Luciano Salzani, Mara Silvestrini, Maria Antonietta Gorgoglione, Maurizia De Min, Maurizio Moscoloni, Michele Cupitò, Mirella Cipolloni, Pier Giovanni Guzzo, Renato Peroni, Raffaele De Marinis, Riccardo Guglielmino, Salvatore Bianco, Silvana Luppino.

Some sites are very well represented because they belong to case studies of specific projects: Broglio di Trebisacce and Coppa Nevigata (more than 150 samples), Montale, Gorzano and Capo Piccolo (more than 50 samples).

For the other sites the number usually ranges from a few (possibly > 5) to about a dozen.

The complete list of the samples is in the databases: DB1 detailing fabrics and DB2 detailing archaeological sites. 73 fabrics have been defined and are described in DB3 and illustrated in DB4.

What is the chronology of the samples in this volume?

The majority of the samples presented in this volume belong to the Bronze Age (23-10 cent. BCE). Some few samples are more recent: Early Iron Age (9-8 cent. BCE).

For the correlation with the Aegean chronology see Jones *et al*. (2014).

For Italian chronology the main phases[14] are summarised in **Table 2**.

Phase	*BCE*
Early Iron Age	950-725
Final Bronze Age 1-3	1150-950
Recent Bronze Age 2	1200-1150
Recent Bronze Age 1	1300-1200
Middle Bronze Age 3	1400-1300
Middle Bronze Age 1-2	1700/1650-1400
Early Bronze Age	2300-1700/1650

Table 2 Chronology of the Italian protohistory (Bronze Age-Early Iron Age).

What are the main projects included in this volume?

The distribution of the samples reflects of the history of the research of our team.

North-East

All the samples considered in this study are located in the eastern side of the Po Valley corresponding to the regions of Veneto and Emilia-Romagna. During the Bronze Age several sites were directly linked to

[14] For the Italian Bronze Age chronology there is not a complete agreement between scholars. For an absolute chronology, radiocarbon dates are not very common (as a result of a diffused distrust or simply lack of habit) and dendrochronology rare (for climatic conditions). Crossdating with the Aegean's finds is possible in some areas and from the Middle Bronze Age (Late Helladic I), but it is still difficult to define a precise synchronicity. For relative chronology the situation is chaotic as clearly emerged in the recent Conference *Facies e culture nell'età del Bronzo italiana?* (Academia Belgica, Roma, December 2015).

the Adriatic Sea through the ancient fluvial network of the Po and Adige rivers.

Archaeometric and technological analyses were linked to several projects in the vicinity of Modena, such as the Terramare exhibition (Museo Archeologico Etnologico di Modena, 1997) and the creation, in 2001, of the 'Parco Archeologico e Museo all'aperto della Terramare di Montale'.

This investigation includes radiographies (structural analyses for the manufacturing techniques) and several experimental reproductions (Brodà *et al*. 2009).

The study received new impulse from the PhD theses at Modena University, about Gorzano by Giulio Carpenito in 2007 and about Montale by Valentina Cannavò in 2010.

Samples have been collected also in other areas, sometimes focusing on specific topics such as Apennine pottery (Cannavò and Levi 2009; Dalla Longa *et al*. 2015).

Peninsula: Adriatic

The starting point of investigation is the study of pottery from the Bronze Age sequence of *Coppa Nevigata* by Sara T. Levi during her PhD at Sapienza University-Rome in 1996.

This investigation includes structural analyses (X-ray) for the manufacturing techniques, and porosity analysis for the functional aspects. In another nearby site (Grotta Manaccora) a detailed study of the surface treatments (burnishing and smoothing) was carried out in collaboration with Giulia Recchia.

Several other projects, often linked to the study of other specialised wares (Jones *et al*. 2014), so abundant in the southern part of the Adriatic, allowed us to collect several samples from various sites.

More recently the entire set of data was reconsidered and included in the dissertation of Luca Trentuno (Cannavò *et al*. in press).

Peninsula: Ionian

The Plain of Sybaris is the core of the investigation. Previous archaeometric analyses had already been carried out during the 1980s (one of the first

systematic projects coordinated by Richard Jones). The expansion during the 1990s had been directly linked to the Broglio di Trebisacce excavation in combination with the PhD of Sara T. Levi: a macroscopic examination of the entire protohistoric ceramic complex of the plain was performed (about 2000 pots/sherds which were typologically relevant) and more than 300 *Impasto* samples analyzed (Levi 1999).

Manufacturing technique has been investigated through X-ray analysis in collaboration with Luigi Odoguardi. This project was characterised also by an intensive geological survey and sampling of local raw material with the crucial collaboration of Maurizio Sonnino. More recently, experimental archaeology has been performed in the Archaeological Park of Broglio adding further input to the investigation of ancient technology (Vanzetti *et al*. 2014).

Other Ionian investigated areas are the Taranto area, including the crucial site of Scoglio del Tonno, and the area of Crotone.

Have some data been preliminary published?

The complete set of the data has never been published in this format.

The following list includes the previous publications by our team on archaeometric and technological investigations into *Impasto* pottery from the areas considered in this volume. Some publications had only a limited circulation.

In the recent general volume about Italo-Mycenaean pottery (Jones *et al*. 2004), several *Impasto* samples are also presented and discussed.

The previous results have been extensively reconsidered and revised in this volume and, in the frame of the general picture here proposed, sometimes modified.

North-East

Amadori *et al*. 1996; Bettelli *et al*. 2015; Bianchin Citton *et al*. 2000; Brodà *et al*. 2009; Cannavò and Levi 2009, 2014; Cannavò *et al*. 2012, 2017; Dalla Longa *et al*. 2015; Cardarelli *et al*. 2007; Carpenito *et al*. 2009; Jenkins *et al*. 1999; Jones *et al*. 2002a; Levi 1997; Levi and Loschi Ghittoni 1997; Levi *et al*. 1997a; Salzani *et al*. 2006.

Peninsula: Adriatic

Aldi *et al*. 1997; Amadori *et al*. 1995; Bettelli *et al*. 2010; Boccuccia *et al*. 1995; Cannavò *et al*. in press; Cazzella *et al*. 1994; Cioni *et al*. 2000; Guglielmino *et al*. 2010; Jones and Levi 2012; Levi in press; Levi and Cioni 1998; Levi and Recchia 1995, Levi *et al*. 1995a, 1995b, 1997b, 1998a, 1999a, 1999b, 2000, 2002, 2005; Recchia and Levi 1999; Vagnetti *et al*. 2006.

Peninsula: Ionian Arc

Buxeda I Garrigos *et al*. 2003; Jones *et al*. 1994; Gorgoglione *et al*. 2006; Jones 2001; Jones *et al*. 2002; Levi and Odoguardi 1990-91; Levi and Sonnino 1997, 2006; Levi *et al*. 1998b, 1998c; Levi 1999, 2002; Vagnetti *et al*. 2006.