AT THE CROSSROADS OF DATA

Presenting the CAMOTECCER relational database of archaeological ceramics from Central Asia

Andreas **Angourakis**, Verónica **Martínez Ferreras**, Josep M. **Gurt**, Enrique **Ariño Gil**, Shakir R. **Pidaev**

Session #312 - *Ancient pottery in Central Asia: large scale perspective on the production systems and the cultural interactions*

available at **https://andros-spica.github.io/EAA2018_ceramics/**

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

UNIVERSITAT DE BARCELONA
Facultat de Geografia i Història

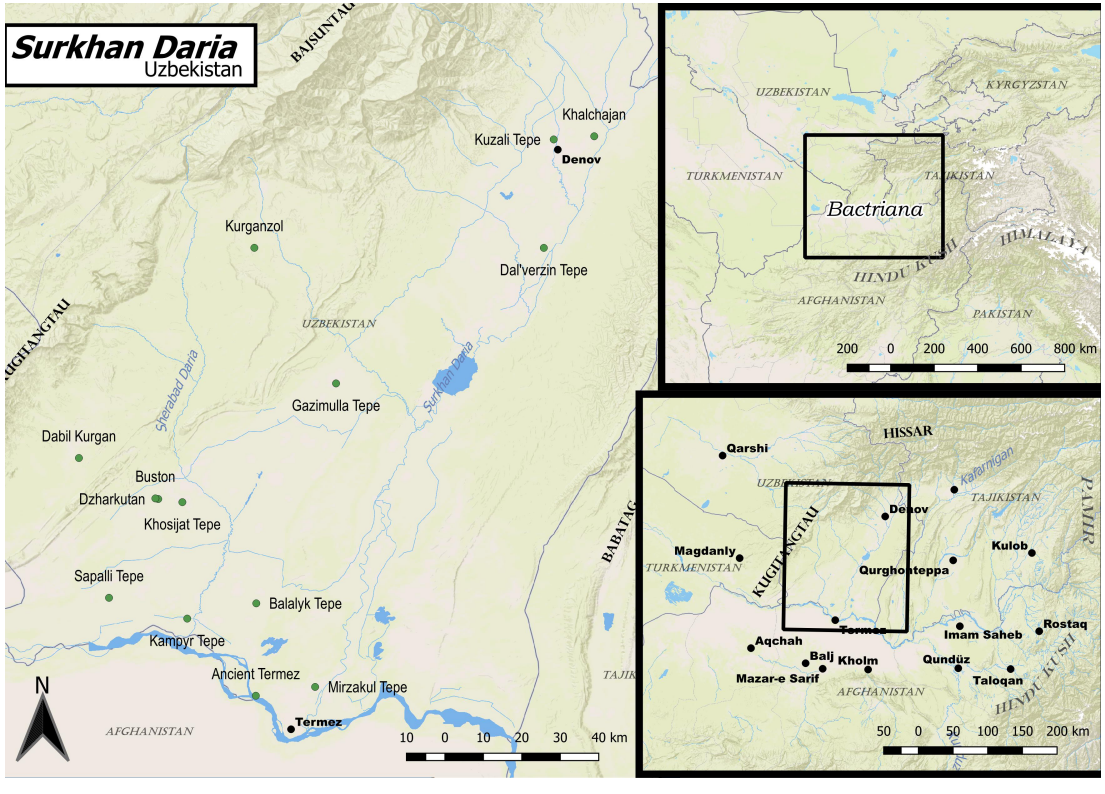
erαub
EQUIP DE RECERCA ARQUEOLÒGICA I ARQUEOMÈTRICA DE LA UNIVERSITAT DE BARCELONA

EAA 2018
BARCELONA, 5-8 SEPTEMBER
REFLECTING FUTURES

CONTEXT

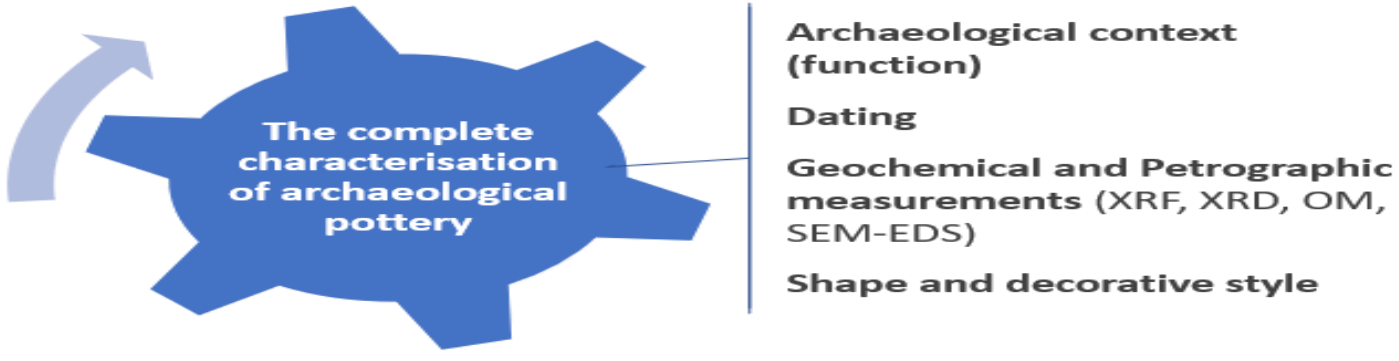
CAMOTECCER project (2013-17),
CERAC project (2017-20)

Archaeological and archaeometric study on ceramic production in Surkhan Darya region, southern Uzbekistan.

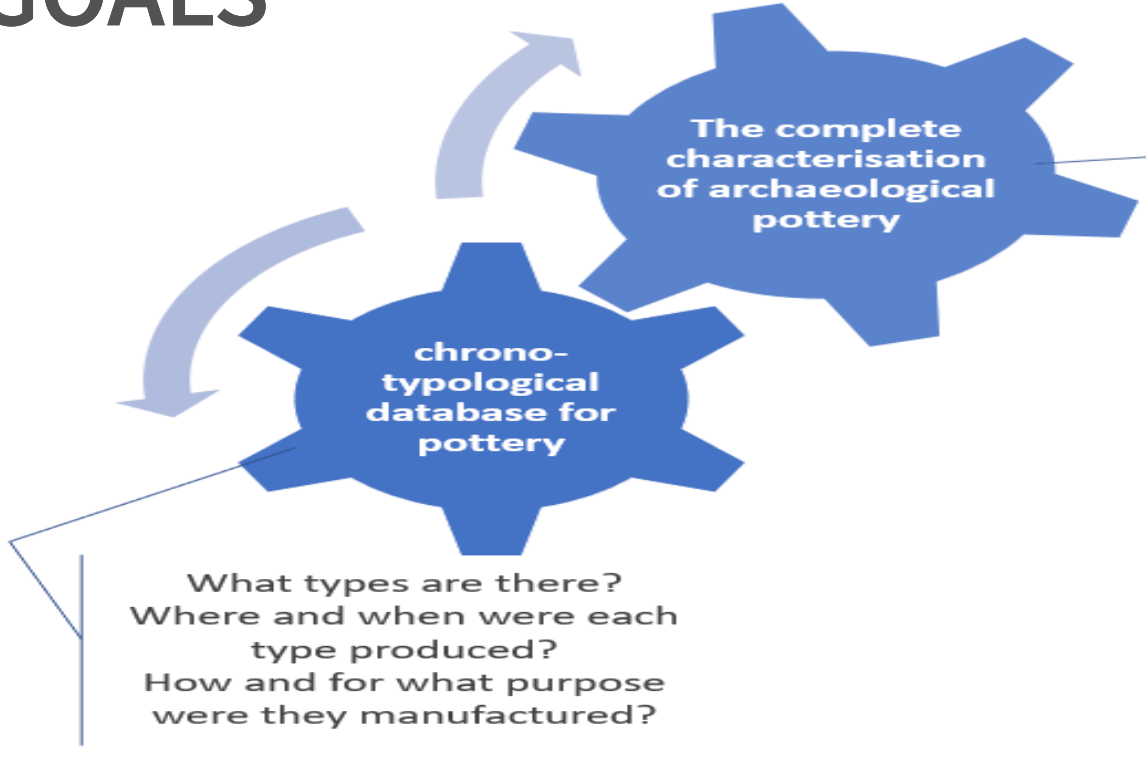


GOALS

GOALS


The complete characterisation of archaeological pottery
Archaeological context (function)
Dating
Geochemical and Petrographic measurements (XRF, XRD, OM, SEM-EDS)
Shape and decorative style

GOALS



Archaeological context (function)

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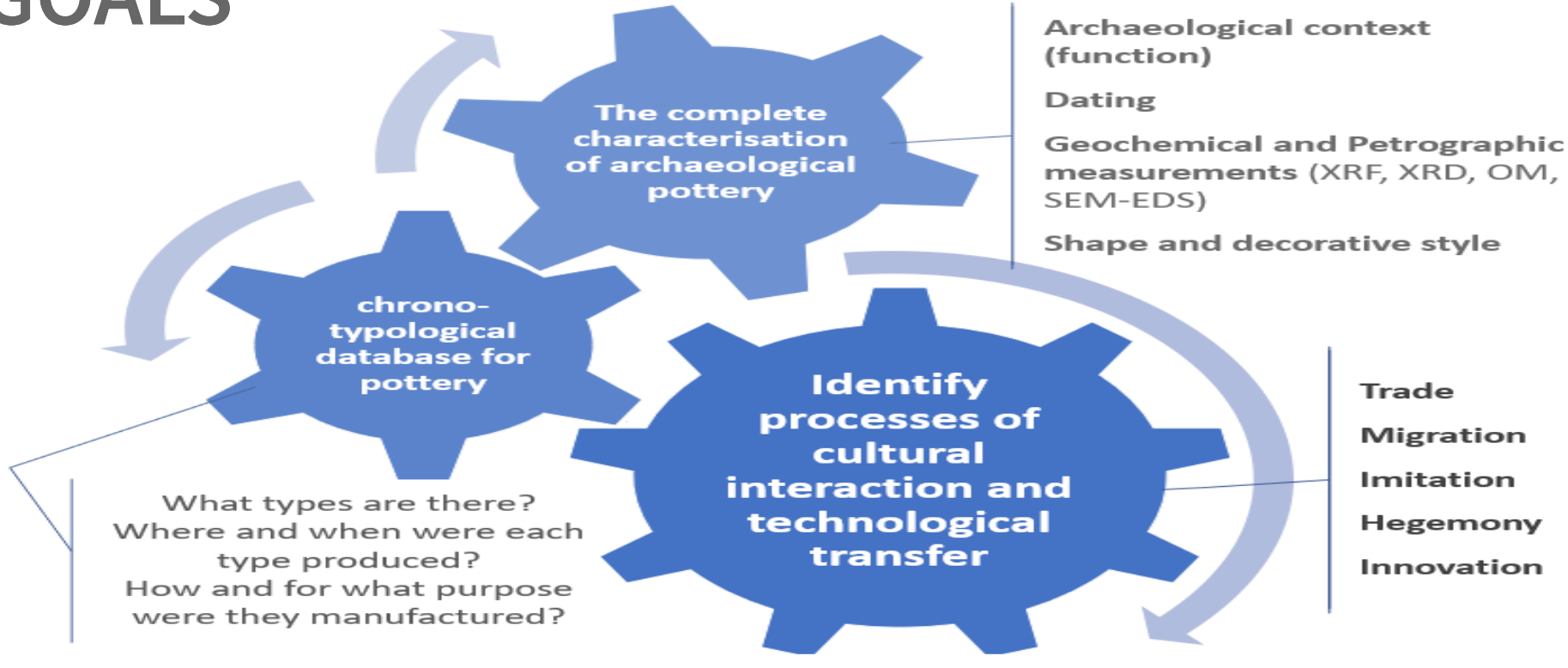
GOALS


The complete characterisation of archaeological pottery
Archaeological context (function)
Dating
Geochemical and Petrographic measurements (XRF, XRD, OM, SEM-EDS)
Shape and decorative style
chrono-typological database for pottery
What types are there?
Where and when were each type produced?
How and for what purpose were they manufactured?
Identify processes of cultural interaction and technological transfer
Trade
Migration
Imitation
Hegemony
Innovation

AREAS OF DEVELOPMENT:

- Historical and ethnographic research
- **Definition of a theoretical model for (non-industrial) pottery production**
- Archaeometric characterisation of archaeological pottery
- Geological characterisation of the region (raw materials)
- Experimentation regarding the properties and the functional capabilities of ceramic containers
- Formalisation of the theoretical model

AREAS OF DEVELOPMENT:

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WHY

Integrate results of many different archaeometric techniques on ceramics

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Concerns

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- centralize data management

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- standardise qualitative data

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- facilitate new entries

WHY

Integrate results of many different archaeometric techniques on ceramics

Concerns

- centralize data management
- standardise qualitative data
- facilitate new entries
- export data sets (.csv) for statistical analysis

WHAT

WHAT

- *relational* database

WHAT

- *relational* database
- combines *archaeological* and *archaeometric* data

WHAT

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- more than 700 ceramic individuals

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- Hellenistic to Islamic period

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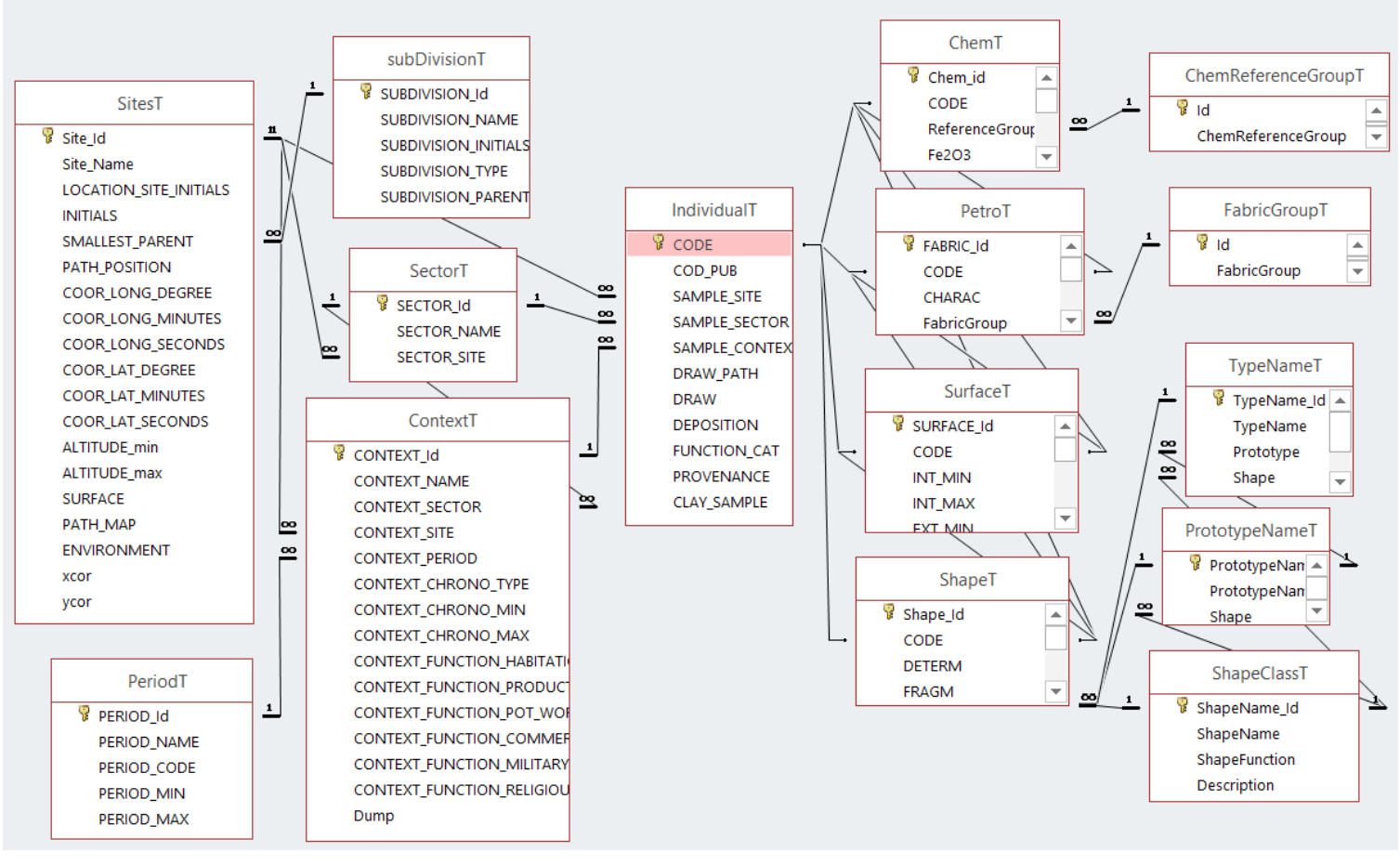
- Hellenistic to Islamic period
- + over 200 wine Roman amphorae from Catalonia (generality test)

TABLES AND RELATIONSHIPS

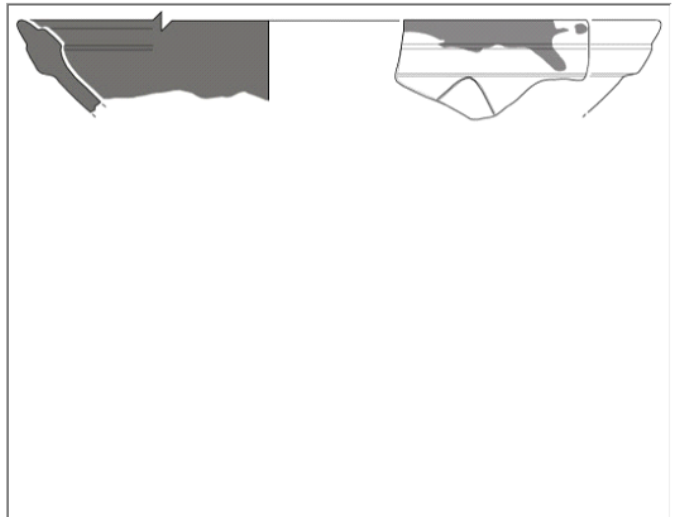


TABLES > INDIVIDUAL

IndividualT

Analytical code	TRZ001
Archaeological site	Termez - Kara Tepe
Sector	TZ-KT-Monastery
Archaeological context	TZ-KT-K2-SU11
Chronological interval	483 – 533
Period	Kushan-Sassanid Period
Deposition	indeterminate
Functional category	table ware
Provenance	

Drawing



Gathers the basic information on ceramic individuals
Links them to the archaeological and archaeometric data

TABLES > CONTEXT

ContextT

Context name	TZ-KT-K2-SU11	Has habitational function?	no
Site	Termez - Kara Tepe	Has productive function?	no
Sector	TZ-KT-Workshop-Kiln 2	Is a pottery workshop?	yes
Period	Kushan-Sassanid Period	Has commercial function?	no
Datation method	14C	Has military function?	no
Chronological range	min. 483 max. 533	Has religious function?	yes

MAIN

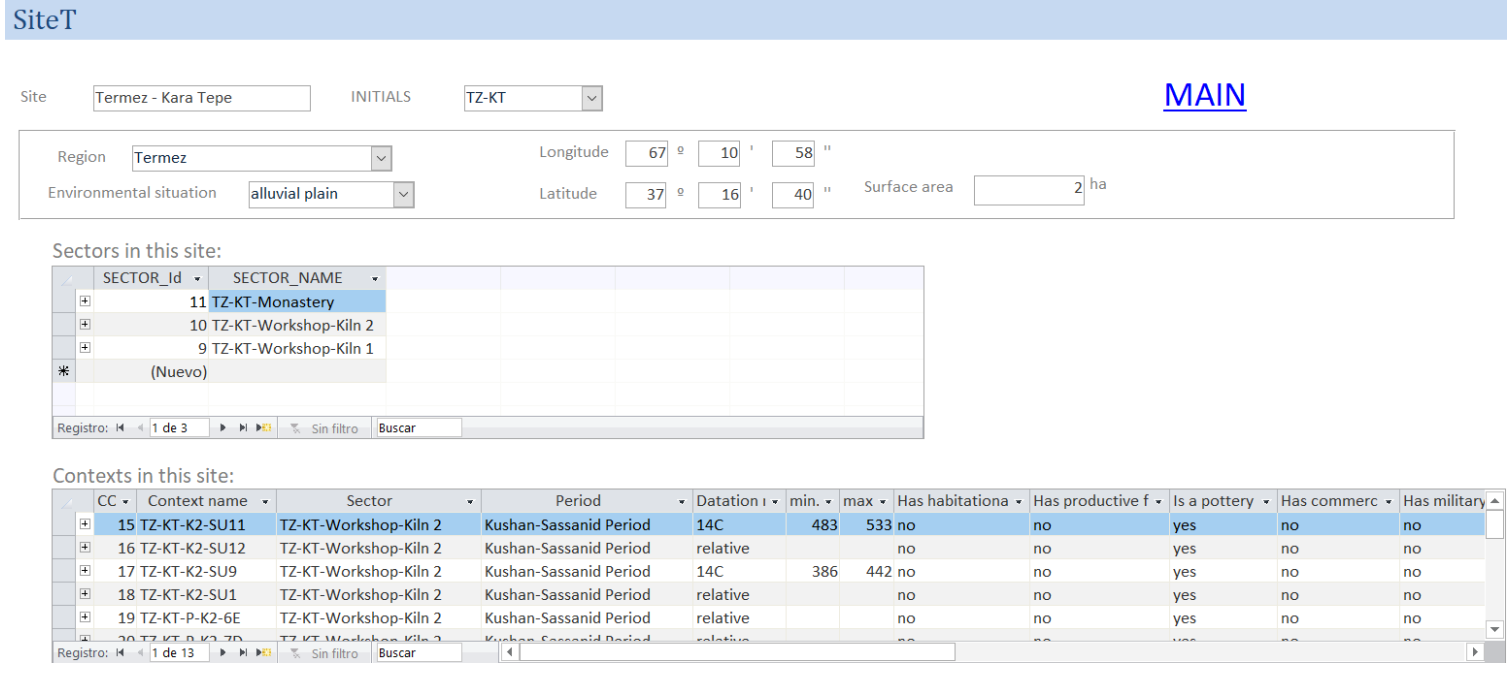
Samples

Analytica	Code for	Site	Sector	Drawings directory	Drawing	Deposition	Fu
TRZ001		Termez - Kara Tepe	TZ-KT-Monastery	https://www.dropbox.c	Imagen	indeterminate	table ware
TRZ004		Termez - Kara Tepe	TZ-KT-Workshop-Kiln 2	https://www.dropbox.c	Imagen	indeterminate	storage vessel
TRZ014		Termez - Kara Tepe	TZ-KT-Workshop-Kiln 2	https://www.dropbox.c	Imagen	indeterminate	table ware
TRZ022		Termez - Kara Tepe	TZ-KT-Workshop-Kiln 2	https://www.dropbox.c	Imagen	indeterminate	table ware
TRZ025		Termez - Kara Tepe	TZ-KT-Workshop-Kiln 2	https://www.dropbox.c	Imagen	indeterminate	storage vessel
TRZ035		Termez - Kara Tepe	TZ-KT-Workshop-Kiln 2	https://www.dropbox.c	Imagen	indeterminate	storage vessel
				https://www.dropbox.c		indeterminate	indeterminate

Registro: 1 de 6 Sin filtro Buscar

Stratigraphic unit related to individuals
Relates to a **site** and (optionally) to a **site sector**
Dated numerically and/or linked to a **period**
Variables regarding inferred **function**

TABLES > SITE

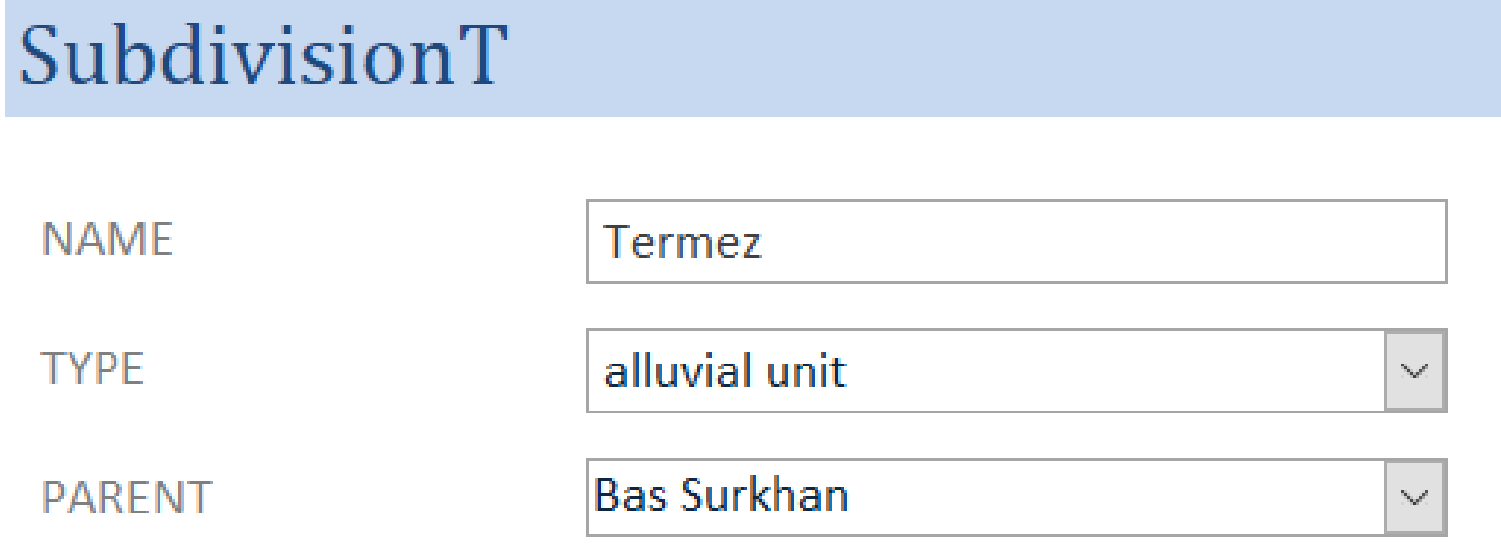


Site **name** and initials

Geographical **coordinates** and parent unit ("region")

Environmetal situation and surface area

TABLES > SUBDIVISION



Recursive structure of geographical units

e.g., Termez → Bas Surkhan → South Surkhan Darya region → Surkhan Darya region → Uzbekistan

Stride, S. (2005). Géographie archéologique de la province du Surkhan Darya (Ouzbékistan du sud / Bactriane du nord). Ph.D thesis, Université Paris I Panthéon-Sorbonne.

TABLES > CHEM

Chem_id	CODE	Reference Gr	Fe2O3	Al2O3	MnO	P2O5	TiO2	MgO	CaO	Na2O	K2O	SiO2	Ba
563	SAL028	SAL-1	6,12	16,51	0,07	0,10	0,74	1,62	3,22	0,57	2,94	64,75	0,0578
564	SAL029	SAL-IND	4,94	14,16	0,06	0,18	0,65	3,73	6,96	0,59	4,01	58,67	0,0843
565	SAL032	SAL-2	5,98	16,57	0,08	0,12	0,66	1,87	9,26	0,53	2,79	54,18	0,0735
566	SBL001	SBL-IND	5,13	15,07	0,07	0,23	0,69	1,54	11,65	1,03	2,60	58,47	0,0554
567	SBL006	SBL-1	4,97	13,62	0,06	0,14	0,71	1,25	9,76	0,55	2,75	60,16	0,0465
568	SBL011	SBL-1	5,23	14,14	0,07	0,18	0,78	1,33	9,55	0,60	2,80	59,73	0,0447
569	SBL024	SBL-1	5,87	15,15	0,07	0,18	0,77	1,71	6,82	0,63	3,05	61,27	0,0580
570	SBL028	SBL-1	5,12	13,97	0,06	0,17	0,74	1,41	8,92	0,55	3,01	60,10	0,0441
571	SBL032	SBL-1	6,12	15,74	0,07	0,13	0,80	2,01	7,98	0,76	3,01	60,32	0,0519
572	SBL038	SBL-2	5,16	14,33	0,07	0,53	0,64	1,56	14,23	0,92	2,57	56,77	0,0637
573	SBL040	SBL-2	4,75	13,36	0,06	0,33	0,59	1,41	12,42	0,50	3,13	57,64	0,0493
574	SBL042	SBL-2	4,59	13,26	0,06	0,28	0,59	1,42	13,62	0,55	3,34	55,79	0,0556
575	SBL043	SBL-2	5,23	14,90	0,06	0,28	0,65	1,82	13,47	1,24	2,27	56,76	0,0562
576	SBL045	SBL-2	5,29	14,88	0,06	0,39	0,69	1,62	10,88	0,68	3,24	59,70	0,0599
29	TRZ001	IND	5,41	14,51	0,09	0,29	0,59	4,06	10,47	2,05	3,24	54,98	0,0496
30	TRZ002	IND	6,23	16,01	0,11	0,19	0,62	3,86	9,41	1,62	3,30	55,93	0,0569
31	TRZ003	IND	5,67	15,01	0,09	0,25	0,62	4,06	10,13	1,62	3,39	55,24	0,0465
32	TRZ004	IND	6,16	15,93	0,09	0,35	0,67	3,92	8,47	1,81	3,80	55,98	0,0522
33	TRZ005	IND	5,97	15,34	0,09	0,24	0,66	3,82	10,10	1,46	3,42	53,80	0,0398
34	TRZ006	IND	5,77	14,79	0,09	0,21	0,63	4,46	10,21	1,46	3,28	52,98	0,0444
35	TRZ008	IND	5,98	15,73	0,09	0,22	0,67	3,35	7,98	1,74	3,80	58,40	0,0474
36	TRZ009	IND	5,57	14,35	0,10	0,27	0,60	3,65	10,96	1,63	3,03	55,36	0,0503
37	TRZ010	IND	5,63	15,13	0,09	0,23	0,59	3,86	10,20	1,41	3,27	55,32	0,0473
38	TRZ011	IND	5.46	14.47	0.09	0.31	0.61	4.41	12.60	1.19	3.29	52.58	0.0458

Geochemical data (XRF)

+ reference group (if determined)

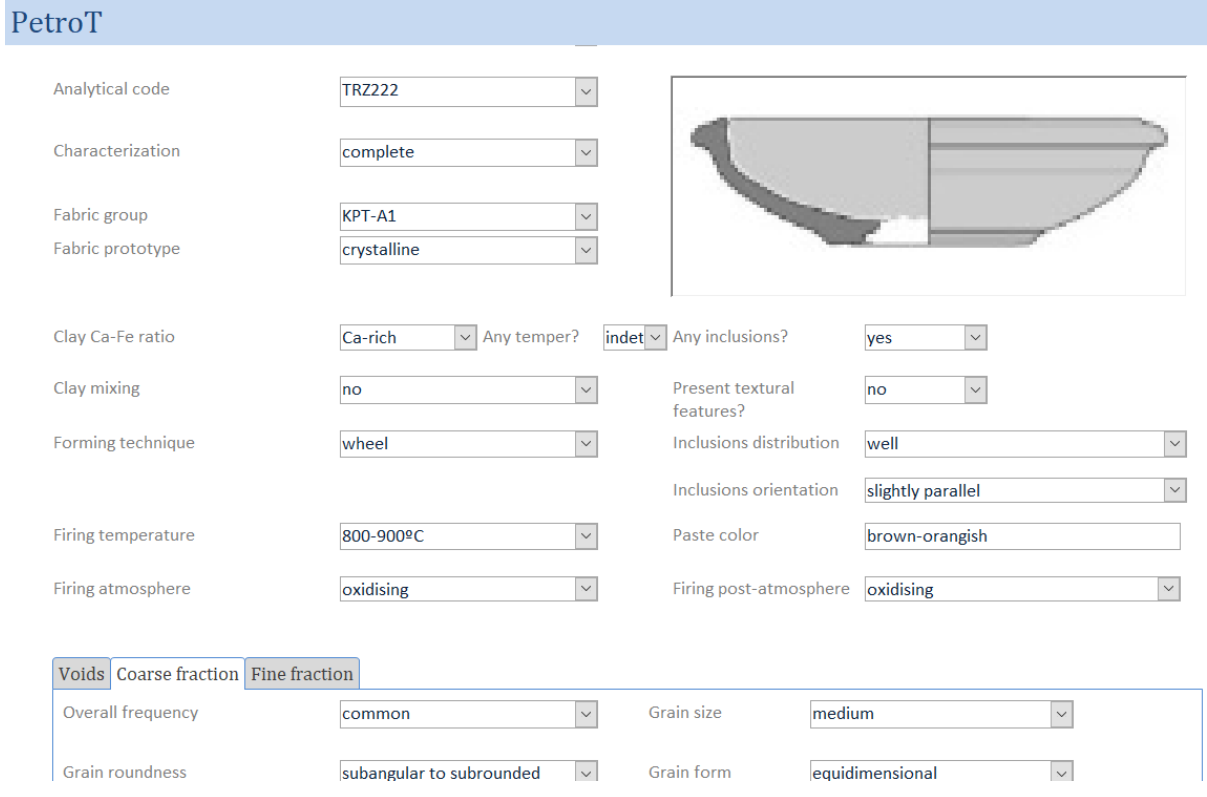
TABLES > CHEM REFERENCE GROUP

ChemReferenceGroupT

Id	ChemReferenceGroup	ChemReferenceGroup_Parent
1	BIF	BIF
2	BIF-1	BIF
3	BIF-IND	
4	AUM	AUM
5	AUM-2	AUM
6	AUM-1	AUM
7	AUM-IND	
8	ELV	ELV
9	ELV-1	ELV
10	ELV-2	ELV
11	ELV-3	ELV
12	ELV-IND	
13	SBL	SBL
14	SBL-1	SBL
15	SBL-2	SBL
16	SBL-IND	
17	FEU	FEU
18	FEU-1A	FEU
19	FEU-1B	FEU
20	FEU-2A	FEU
21	FEU-2B	FEU
22	FEU-IND	
23	SAL	SAL
24	SAL-1	SAL
25	SAL-2	SAL
26	SAL-IND	
27	PRINC	PRINC

⊞	27	PRINC	PRINC
⊞	28	PRINC-1	PRINC
⊞	29	PRINC-IND	
⊞	30	CP	CP

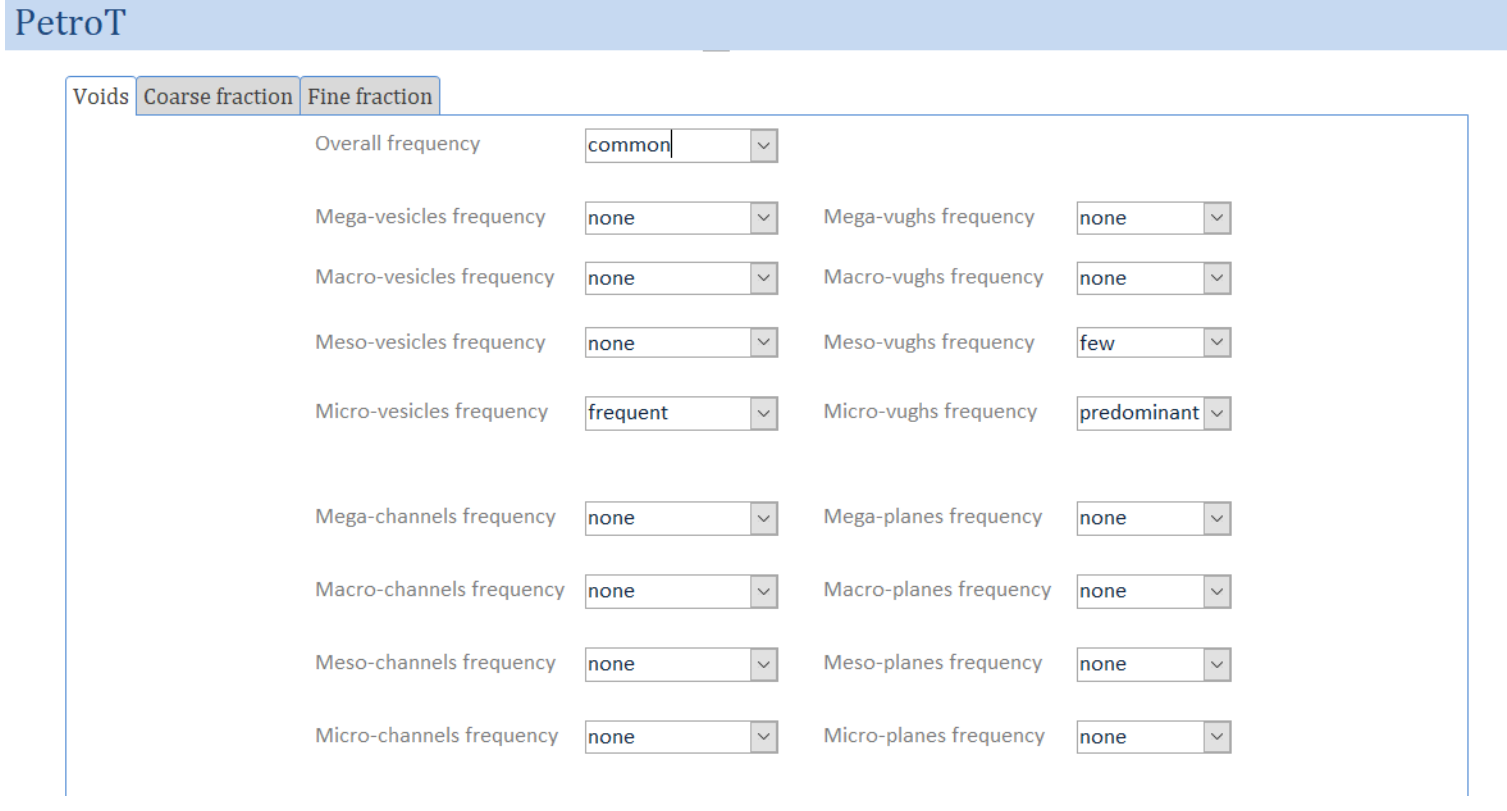
TABLES > PETRO



Petrographic *qualitative* data (thin section optical microscopy) + firing temperature (inferred from X-ray diffraction) + fabric group (if determined)

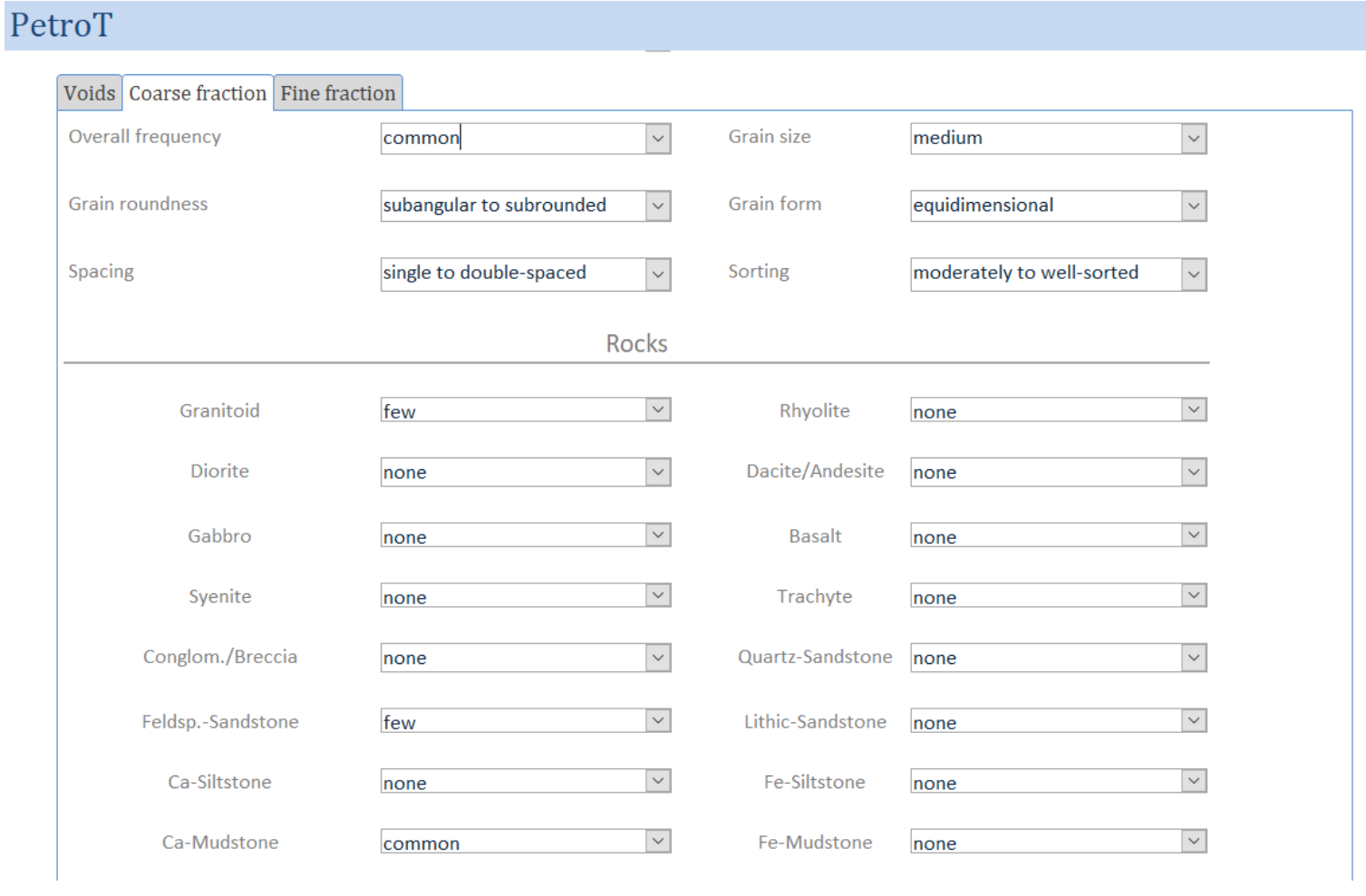
Whitbread, I.K. (1995). Greek transport amphorae: a petrological and archaeological study, British School at Athens, Fitch Laboratory Occasional Paper 4, Athens.

TABLES > PETRO > VOIDS



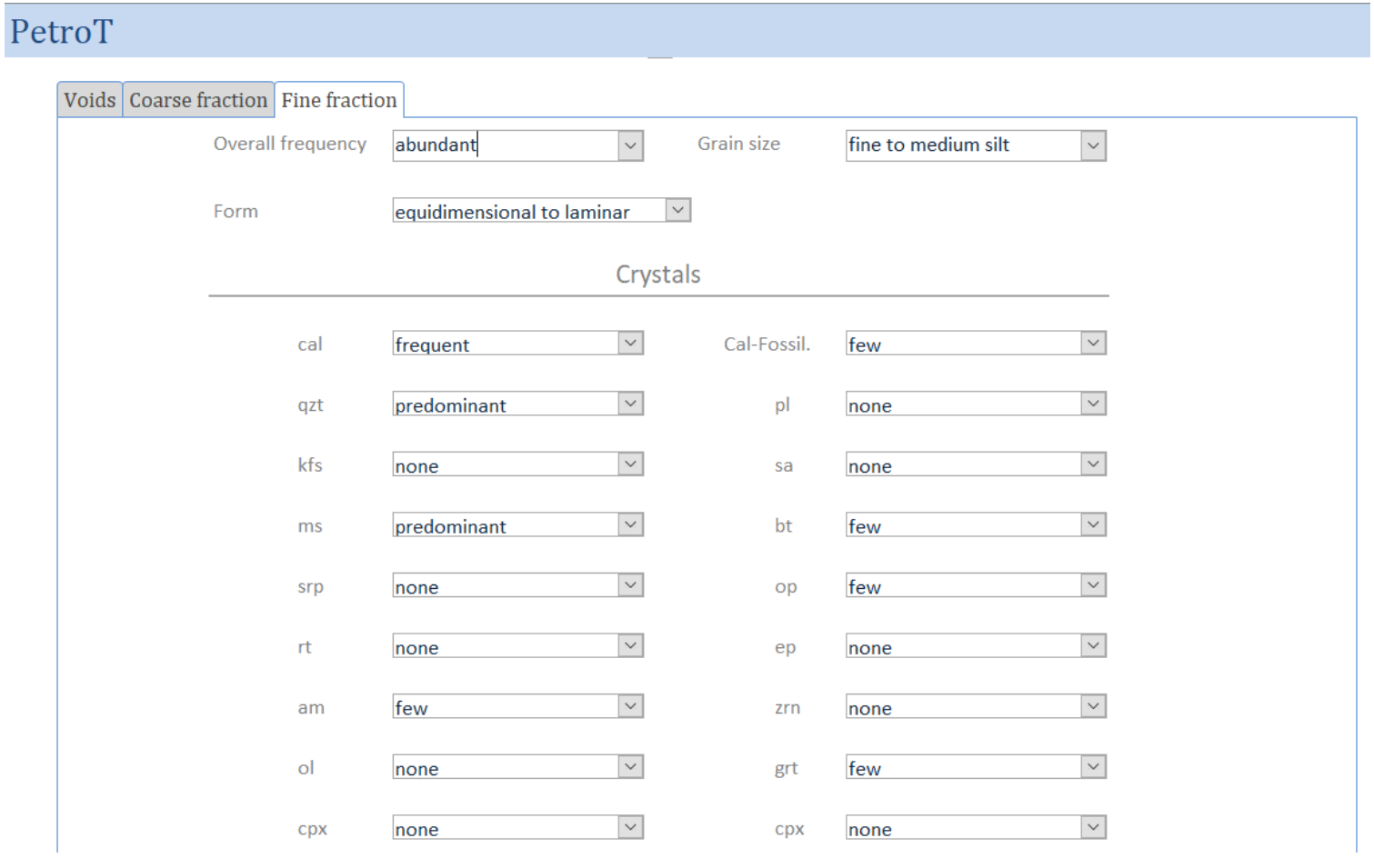
Frequency and frequency per type of
size (micro to mega) and
shape (vesicles, vughs, channels, planes)

TABLES > PETRO > COARSE FRACTION



General characteristics + Frequency per type of **rock** and **crystal**

TABLES > PETRO > FINE FRACTION



General characteristics + Frequency per type of **crystal**

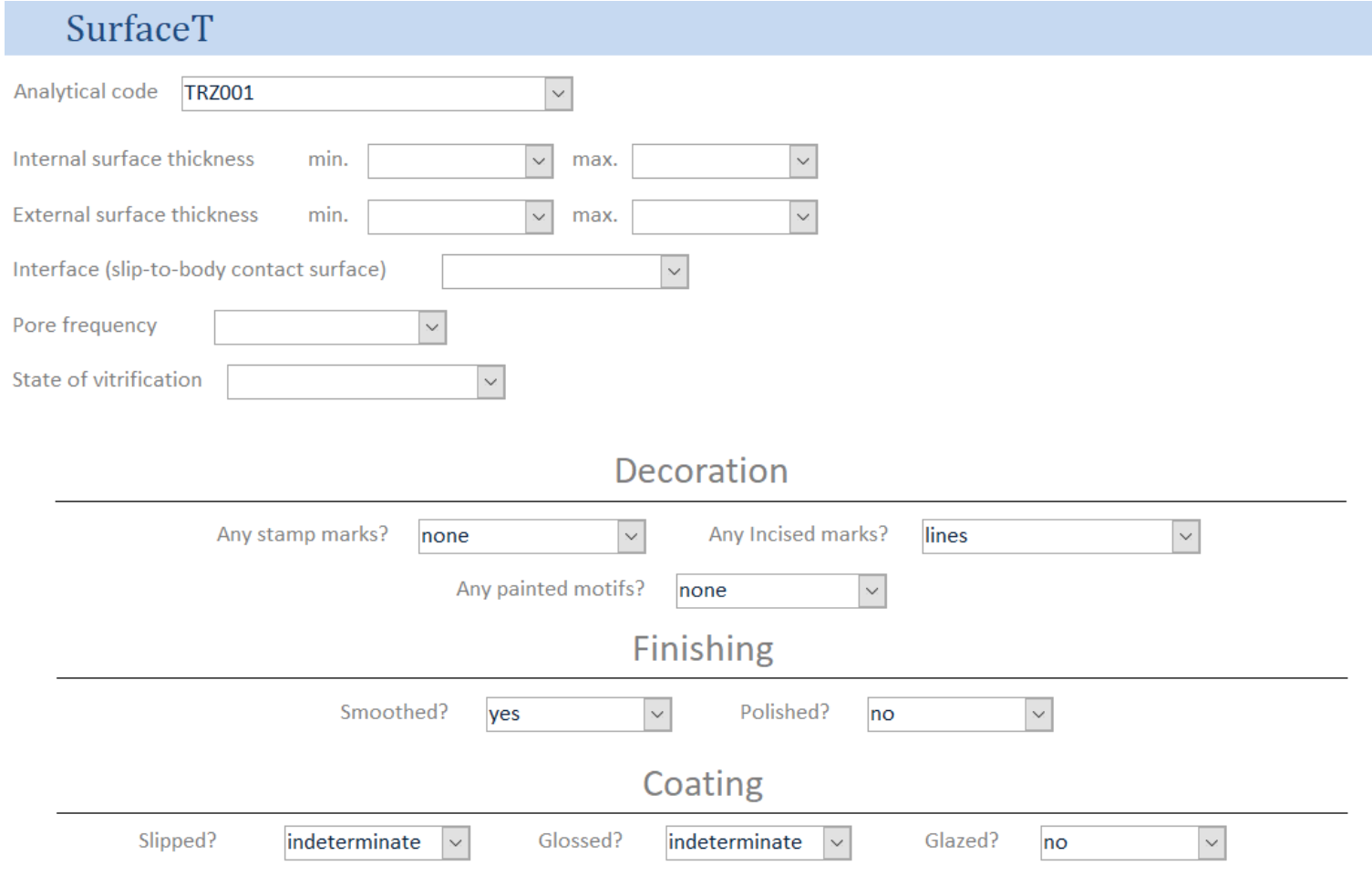
TABLES > FABRIC GROUP

FabricGroupT

Id	FabricGroup	FabricGroup_Parent
56	ISL-1	ISL
16	ISL-1A	ISL-1
17	ISL-1B	ISL-1
118	ISL-1C	ISL-1
119	ISL-1D	ISL-1
57	ISL-2	ISL
18	ISL-2A	ISL-2
19	ISL-2B	ISL-2
20	ISL-2C	ISL-2
58	ISL-3	ISL
21	ISL-3A	ISL-3
59	ISL-4	ISL
117	ISL-4A	ISL-4
60	ISL-5	ISL
35	ISL-5A	ISL-5
61	ISL-6	ISL
36	ISL-6A	ISL-6
22	ISL-Indet	ISL
23	ISL-OUTLIER	ISL
63	KPT	
62	KPT-A	KPT
1	KPT-A1	KPT-A
2	KPT-A2	KPT-A
3	KPT-A3	KPT-A
4	KPT-A4	KPT-A

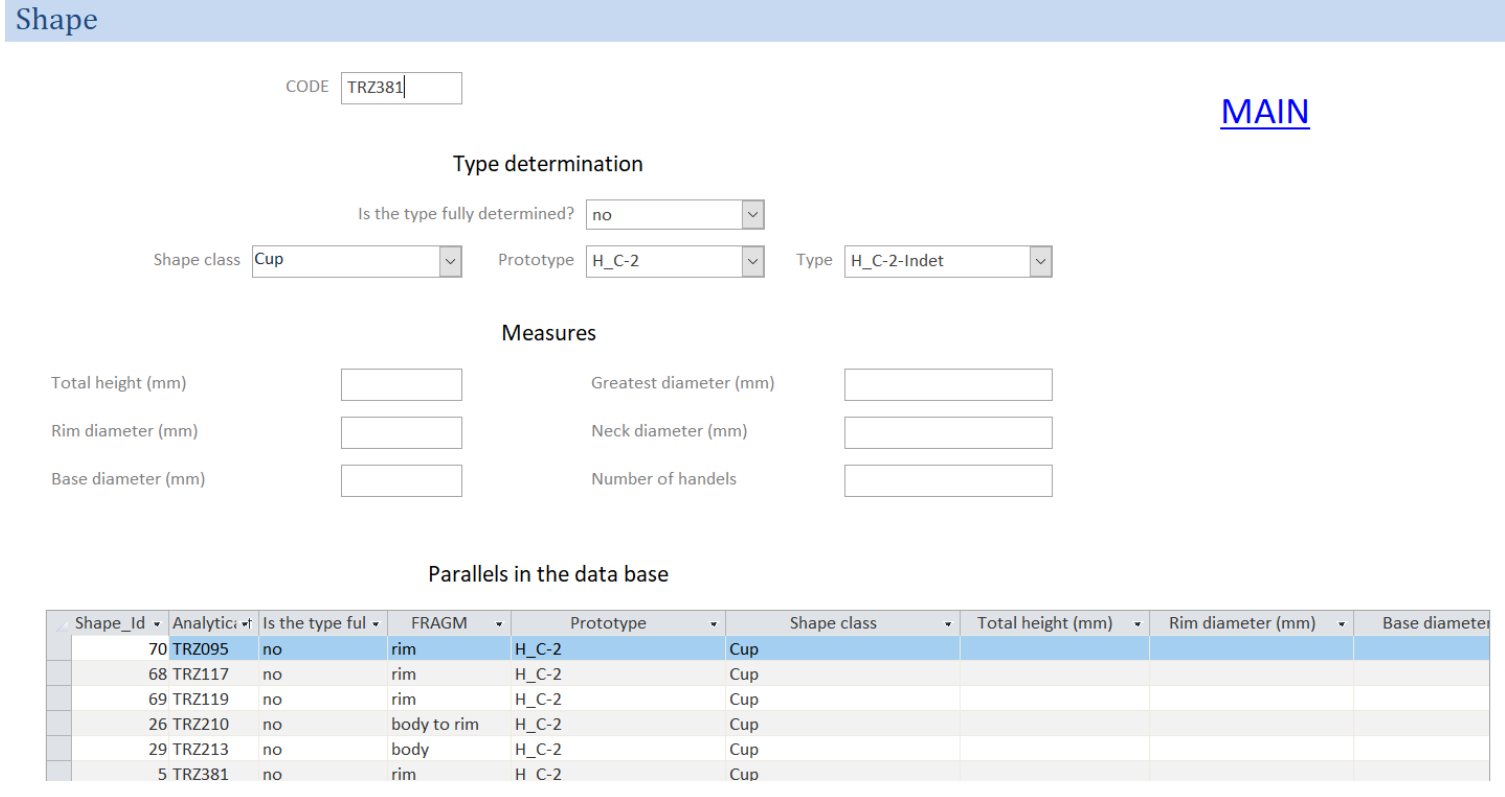
5	KPT-A5	KPT-A
6	KPT-A6	KPT-A
7	KPT-B	KPT

TABLES > SURFACE



General properties + decoration, finishing and coating

TABLES > SHAPE



Shape

CODE TRZ381

MAIN

Type determination

Is the type fully determined? no

Shape class Cup Prototype H_C-2 Type H_C-2-Indet

Measures

Total height (mm)		Greatest diameter (mm)	
Rim diameter (mm)		Neck diameter (mm)	
Base diameter (mm)		Number of handels	

Parallels in the data base

Shape_Id	Analytica	Is the type ful	FRAGM	Prototype	Shape class	Total height (mm)	Rim diameter (mm)	Base diameter
70	TRZ095	no	rim	H_C-2	Cup			
68	TRZ117	no	rim	H_C-2	Cup			
69	TRZ119	no	rim	H_C-2	Cup			
26	TRZ210	no	body to rim	H_C-2	Cup			
29	TRZ213	no	body	H_C-2	Cup			
5	TRZ381	no	rim	H_C-2	Cup			

Typology and measurements

TABLES > SHAPE CLASS

ShapeClassT

ShapeName_	ShapeName	ShapeFunction	Description
1	Amphora	transport storage vessel	Ovoid body and often the base ends in a point, to facilitate stacking
2	Stamnos	table ware	Relatively rare vessel with globular body and many variations in the
3	Krater	table ware	Large vessel that comes in many distinctive shapes. Mixing wine and
4	Psykter	table ware	Cooling wine
5	Kantharos	table ware	Wine-drinking vessel, generally two-handled, wide-mouthed, and fo
6	Kylix	table ware	Drinking-cup. Its traditional shape is broad and shallow, with two fla
7	Rhyton	table ware	Drinking cup that can take many different shapes, generally flamboy
8	Equinus	table ware	Bowl with its rim curved to the inside.
9	Olpe	table ware	A small pitcher usually with just one handle and no spout, as compar
10	Skyphos	table ware	A deep drinking vessel with two horizontal handles and it may or ma
11	Lagynos	table ware	Wine jug popular in the Hellenistic period. It is characterized by a lor
12	Oinchoe	table ware	A (wine-) pouring vessel (from the krater into a drinking-cup). Its mo
13	Ichthya	table ware	Plate used to serve fish. It commonly has a small well in the center t
14	Hydria	common ware	Three-handled vase for drawing, storage or transport water. The tw
15	Pyxis	common ware	Small box or containers, generally flat based, to hold cosmetics.
16	Lekythos	common ware	Small vessel, usually flatfooted, with one vertical handle or without
17	Aryballos	common ware	Small globular flask with a very narrow neck, almost always with jus
18	Alabastron	common ware	Elongated flask with a rounded bottom, narrow neck, and two vestig
19	Ampulla	common ware	Small vessel with handles on both sides, used to contain oils or ungu
20	Lamp	common ware	Oil lamp
21	Pithos	storage vessel	Very large storage jars for grain or liquids. It is set partially into the g

Name, functional category and description

APPLICATION

Integrative multivariate statistical analysis

We defined four protocols for analysing geochemical and petrographic data:

Angourakis, A., Martínez Ferreras, V., Torrano, A. and Gurt Esparraguera, J.M. (2018). Presenting multivariate statistical protocols in R using Romanwine amphorae productions in Catalonia, Spain. Journal of Archaeological Science, 93: 150-165. https://doi.org/10.1016/j.jas.2018.03.007

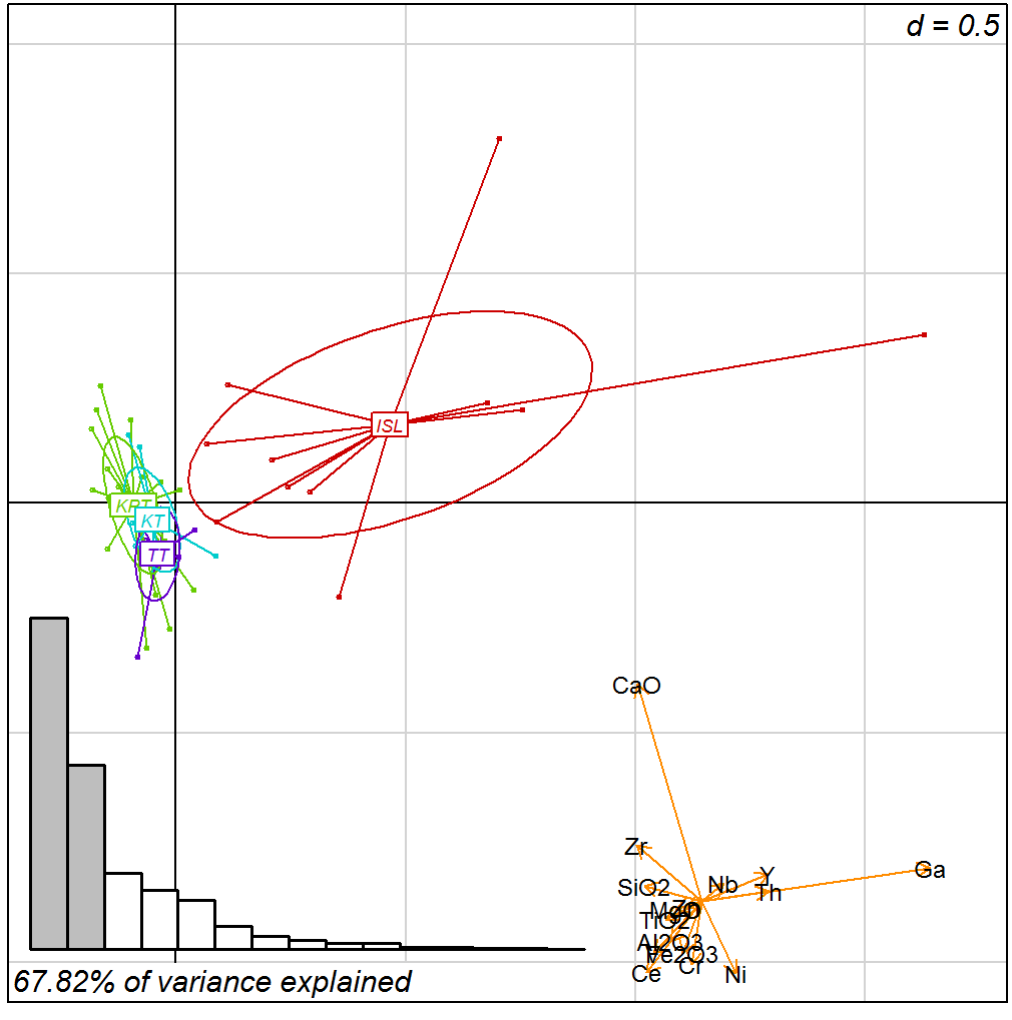
Data in Surface and Shape tables still need to be addressed.

EXAMPLE

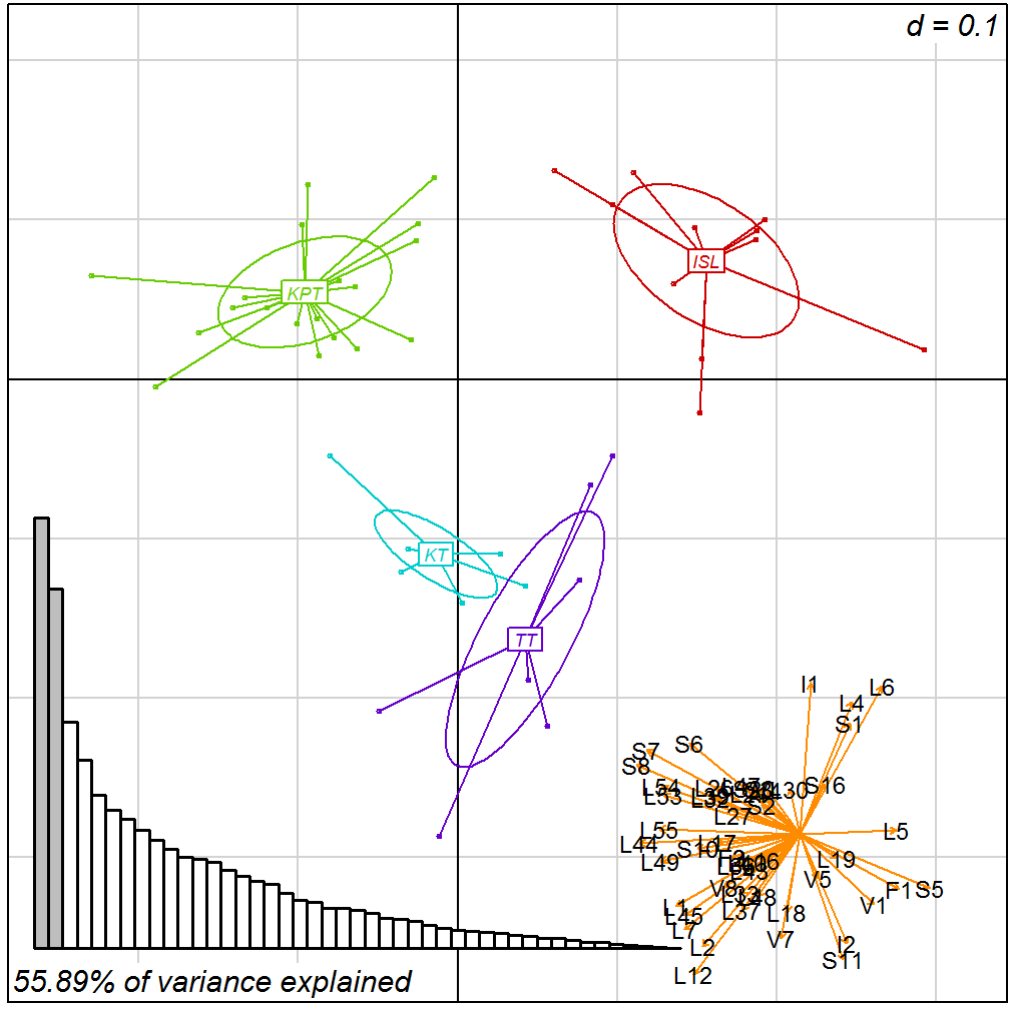
45 tableware individuals from 4 sites:

- *Kampyr Tepe*, Hellenistic period (**KPT**)
- *Termez - Tchingiz Tepe*, Yuezhi to Kushan-Sassanid period (**TT**)
- *Termez - Kara Tepe*, Kushan-Sassanid period (**KT**)
- *Termez - Ancient Quarters*, Islamic period (**ISL**)

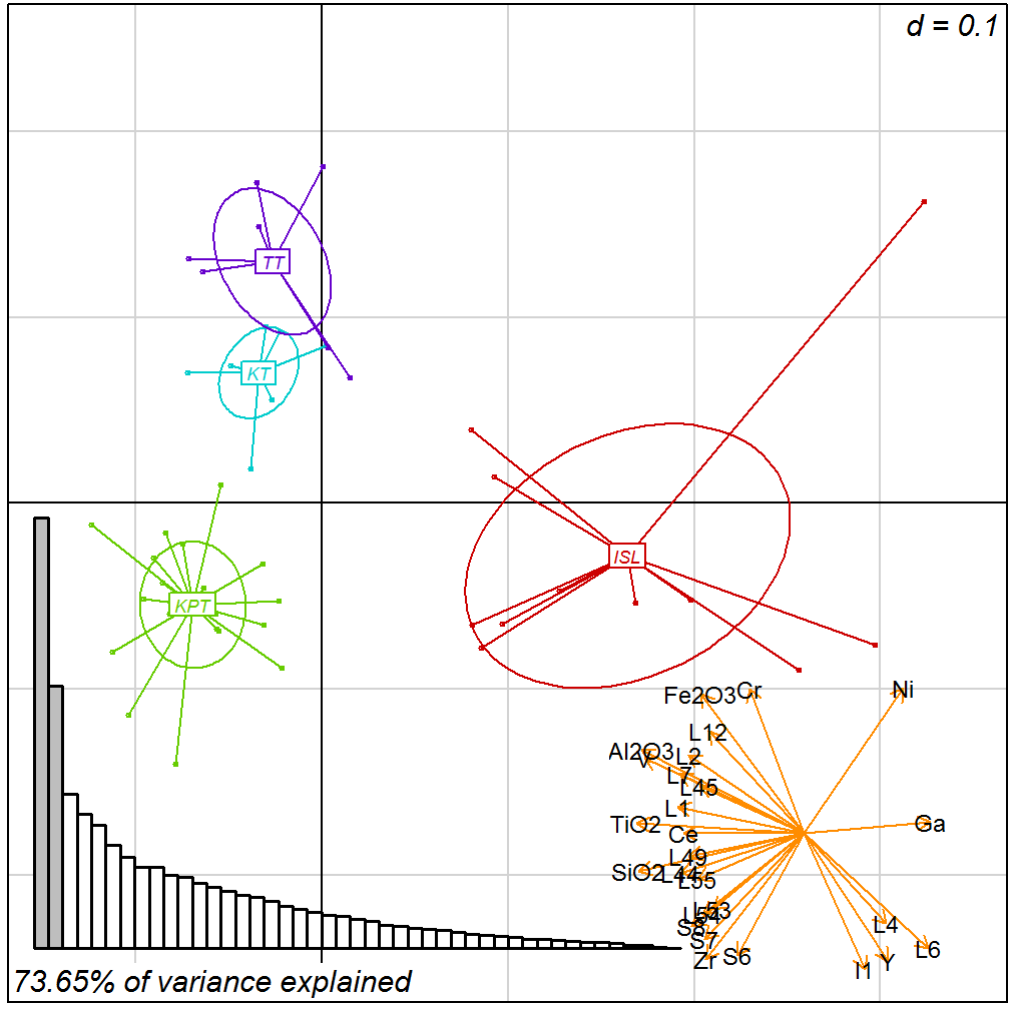
PROTOCOL 1: CHEM TABLE



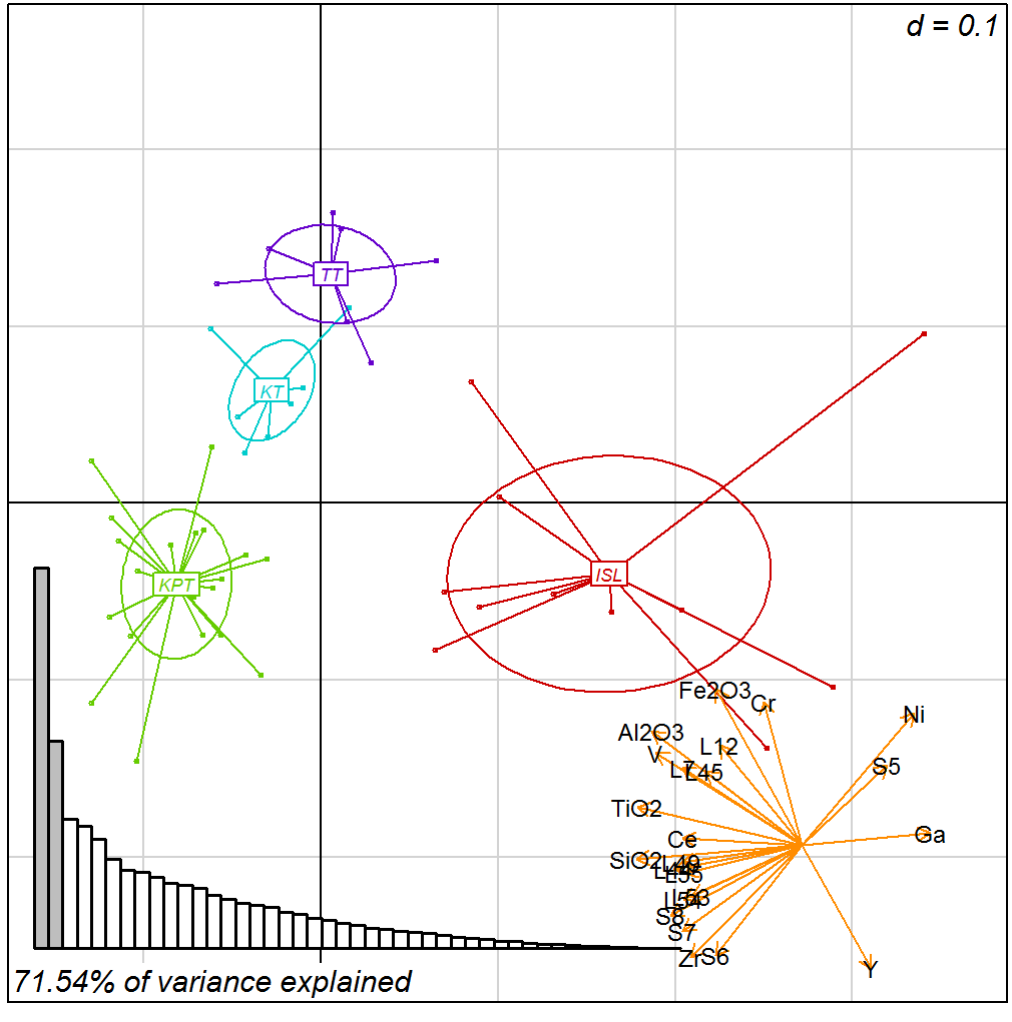
PROTOCOL 2: PETRO TABLE



PROTOCOL 3: CHEM AND PETRO TABLES



PROTOCOL 4: CHEM AND SELECTION OF PETRO VARIABLES



AT THE CROSSROADS OF DATA

Presenting the CAMOTECCER relational database of archaeological ceramics from Central Asia

Andreas **Angourakis**, Verónica **Martínez Ferreras**, Josep M. **Gurt**, Enrique **Ariño Gil**, Shakir R. **Pidaev**

THANK YOU!

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