

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/
https://andros-spica.github.io/EAA2018_ceramics/index.html?print-pdf (printable version)



UNIVERSIDAD
DE SALAMANCA
CAMPUS DE EXCELENCIA INTERNACIONAL



Academy of Sciences
of Uzbekistan
FINE ARTS INSTITUTE



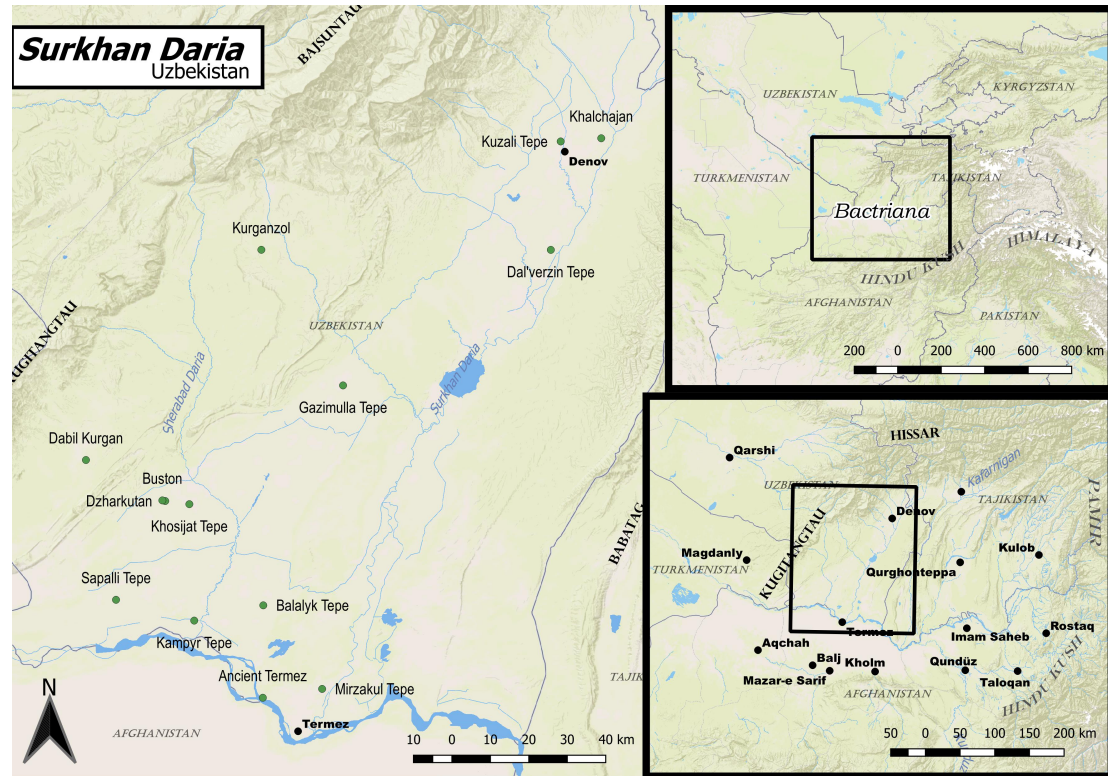
EAA 2018
BARCELONA,
5-8 SEPTEMBER
REFLECTING FUTURES



CONTEXT

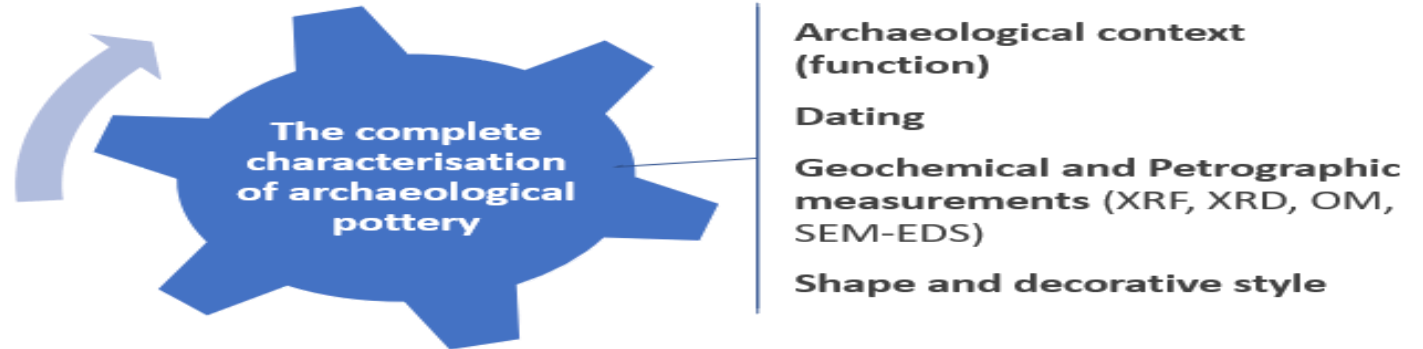
CAMOTEC project
(2013-17),
CERAC project
(2017-20)

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

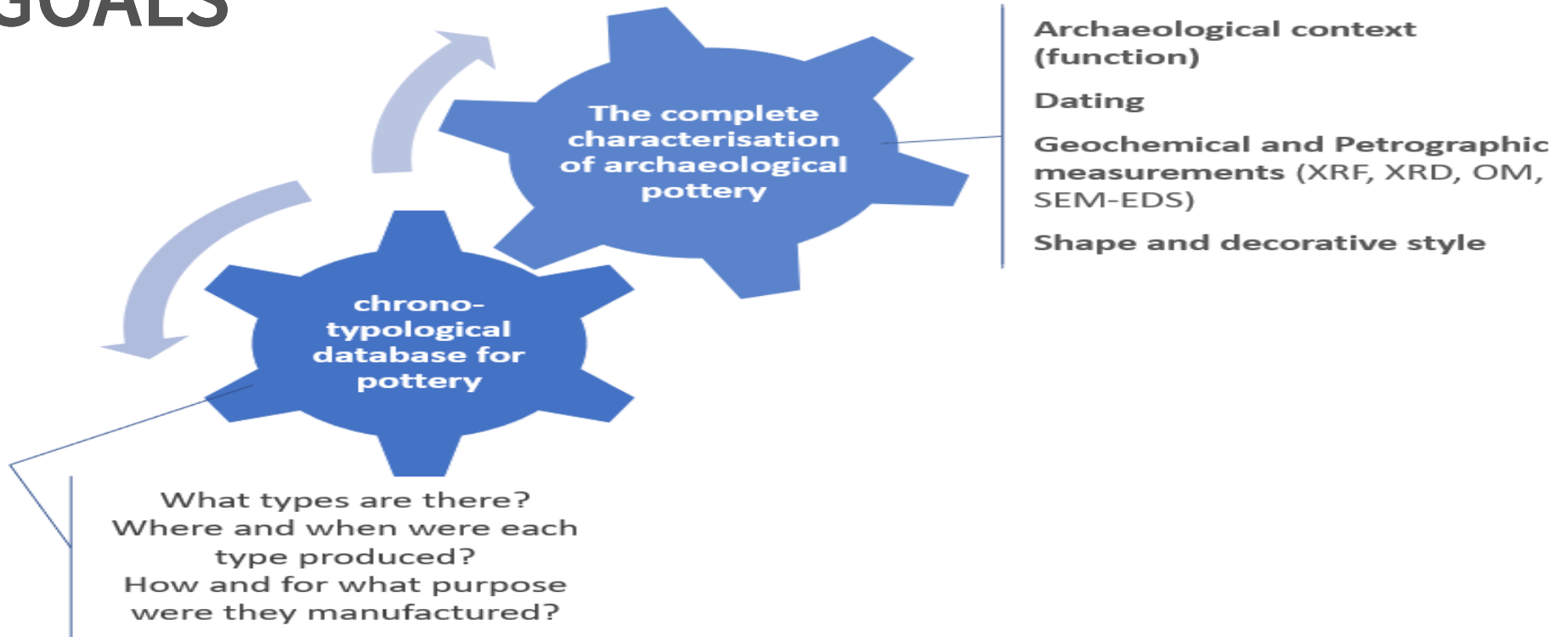


GOALS

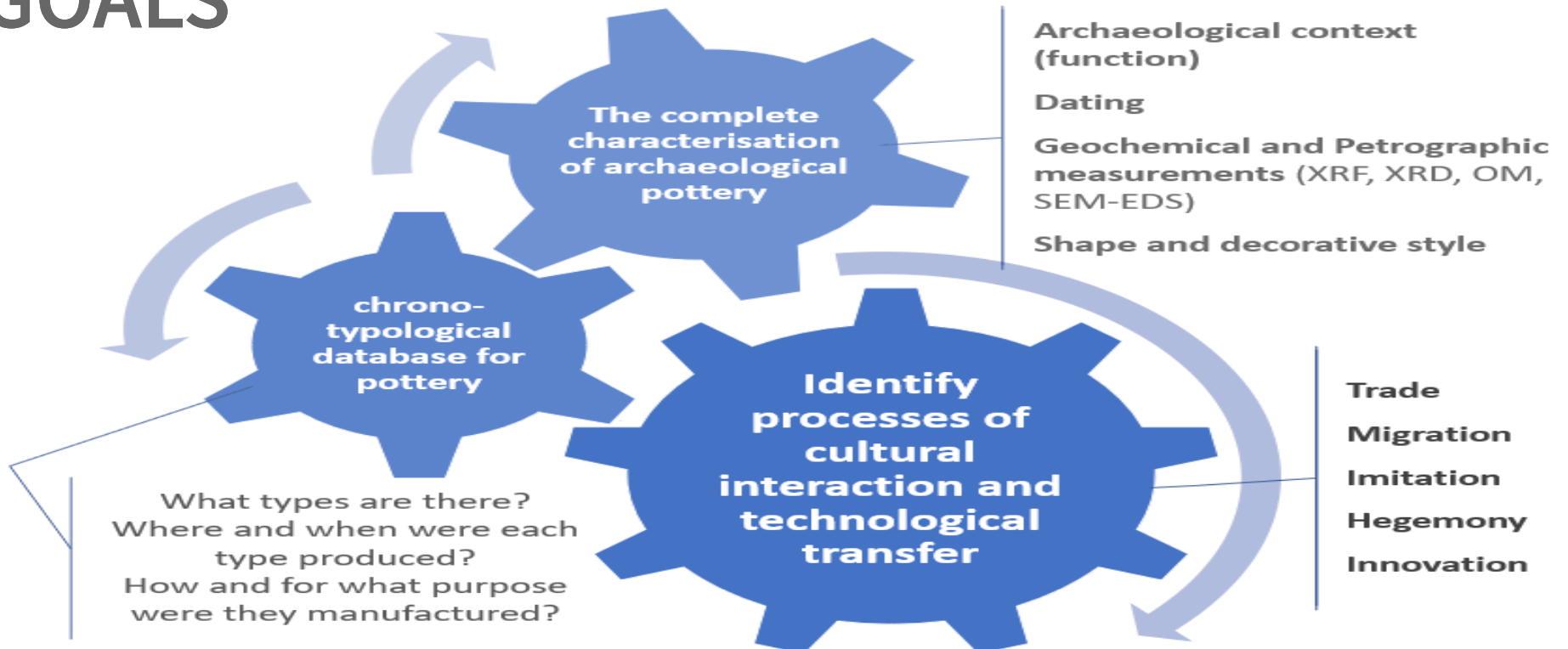
GOALS



GOALS



GOALS



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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- Archaeometric characterisation of archaeological pottery
- Geological characterisation of the region (raw materials)
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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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- 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

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- combines *archaeological* and *archaeometric* data

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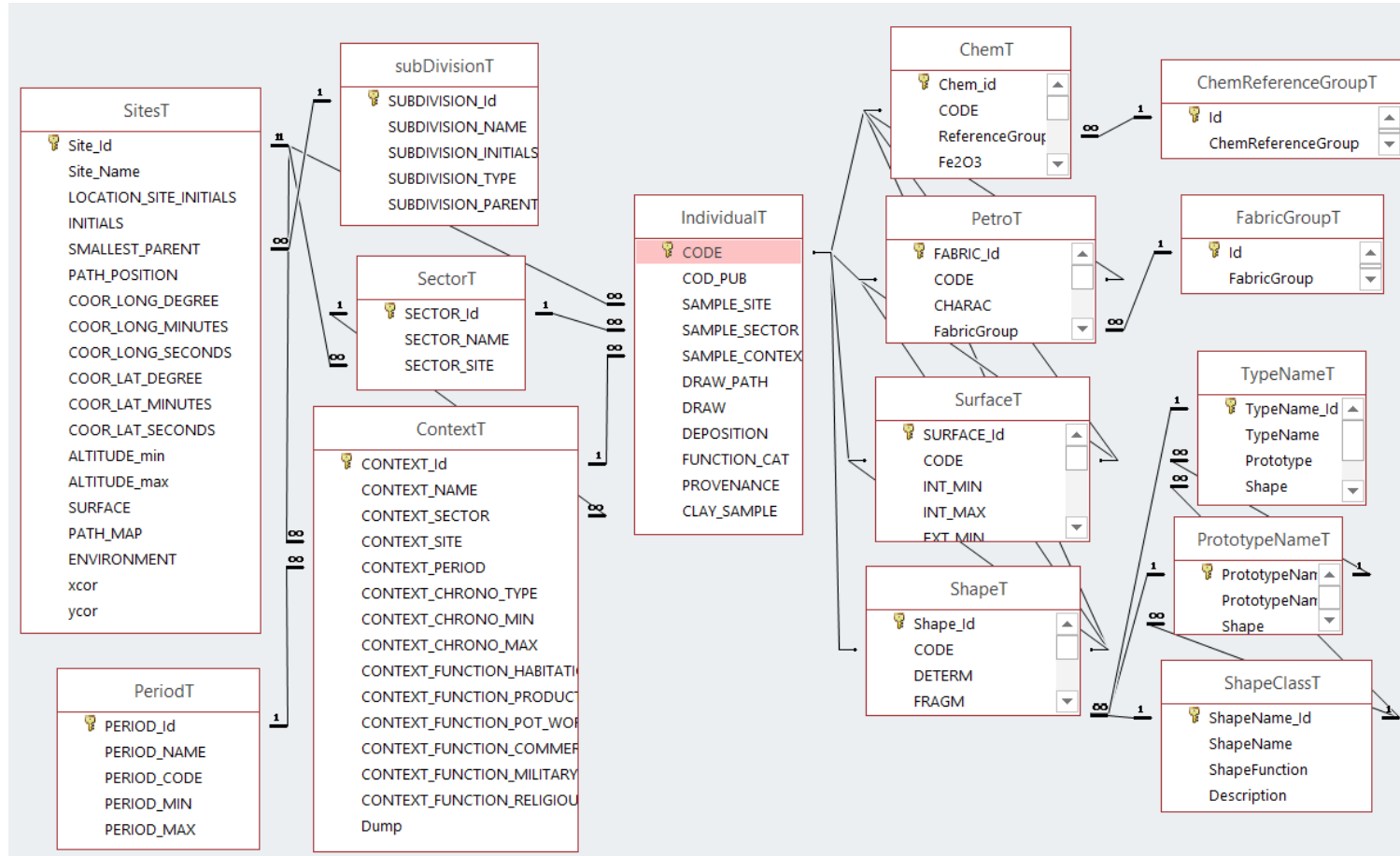
WHAT

- *relational* database
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- more than 700 ceramic individuals
- sites in the *Surkhan Darya* region, Uzbekistan
- Hellenistic to Islamic period

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- combines *archaeological* and *archaeometric* data
- more than 700 ceramic individuals
- sites in the *Surkhan Darya* region, Uzbekistan
- Hellenistic to Islamic period
- + over 200 wine Roman amphorae from Catalonia (generality test)

TABLES AND RELATIONSHIPS

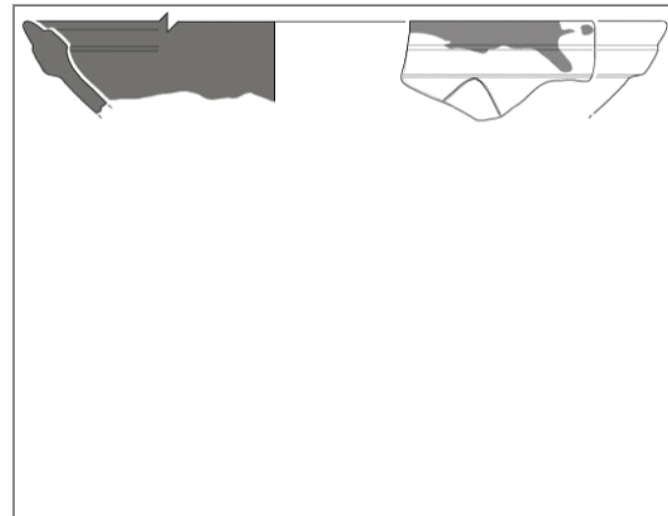


TABLES > INDIVIDUAL

IndividualT

Analytical code	<input type="text" value="TRZ001"/>
Archaeological site	<input type="text" value="Termez - Kara Tepe"/> ▼
Sector	<input type="text" value="TZ-KT-Monastery"/> ▼
Archaeological context	<input type="text" value="TZ-KT-K2-SU11"/> ▼
Chronological interval	<input type="text" value="483"/> <input type="text" value="533"/>
Period	<input type="text" value="Kushan-Sassanid Period"/>
Deposition	<input type="text" value="indeterminate"/> ▼
Functional category	<input type="text" value="table ware"/> ▼
Provenance	<input type="text"/> ▼

Drawing



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

TABLES > CONTEXT

ContextT

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

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

SiteT

Site

INITIALS

[MAIN](#)

Region

Longitude ° ' "

Environmental situation

Latitude ° ' "

Surface area ha

Sectors in this site:

SECTOR_Id	SECTOR_NAME					
11	TZ-KT-Monastery					
10	TZ-KT-Workshop-Kiln 2					
9	TZ-KT-Workshop-Kiln 1					
(Nuevo)						

Registro: 1 de 3 Sin filtro Buscar

Contexts in this site:

CC	Context name	Sector	Period	Datation	min.	max.	Has habitations	Has productive f	Is a pottery	Has commerc	Has military
15	TZ-KT-K2-SU11	TZ-KT-Workshop-Kiln 2	Kushan-Sassanid Period	14C	483	533	no	no	yes	no	no
16	TZ-KT-K2-SU12	TZ-KT-Workshop-Kiln 2	Kushan-Sassanid Period	relative			no	no	yes	no	no
17	TZ-KT-K2-SU9	TZ-KT-Workshop-Kiln 2	Kushan-Sassanid Period	14C	386	442	no	no	yes	no	no
18	TZ-KT-K2-SU1	TZ-KT-Workshop-Kiln 2	Kushan-Sassanid Period	relative			no	no	yes	no	no
19	TZ-KT-P-K2-6E	TZ-KT-Workshop-Kiln 2	Kushan-Sassanid Period	relative			no	no	yes	no	no

Registro: 1 de 13 Sin filtro Buscar

Site name and initials

Geographical coordinates and parent unit ("region")

Environmental situation and surface area

TABLES > SUBDIVISION

SubdivisionT

NAME

Termez

TYPE

alluvial unit



PARENT

Bas Surkhan



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)

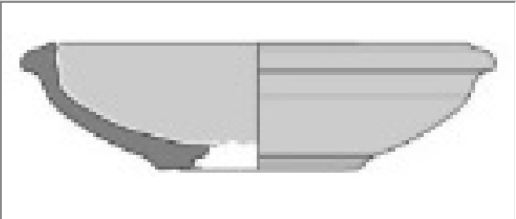
TABLES > CHEM REFERENCE GROUP

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	

	<input type="checkbox"/>	27 PRINC	PRINC
	<input type="checkbox"/>	28 PRINC-1	PRINC
	<input type="checkbox"/>	29 PRINC-IND	
	<input type="checkbox"/>	30 CP	CP

TABLES > PETRO

PetroT

Analytical code	TRZ222		
Characterization	complete		
Fabric group	KPT-A1		
Fabric prototype	crystalline		
			
Clay Ca-Fe ratio	Ca-rich	Any temper?	indet
		Any inclusions?	yes
Clay mixing	no	Present textural features?	no
Forming technique	wheel	Inclusions distribution	well
		Inclusions orientation	slightly parallel
Firing temperature	800-900°C	Paste color	brown-orangish
Firing atmosphere	oxidising	Firing post-atmosphere	oxidising
<div>Voids Coarse fraction Fine fraction</div>			
Overall frequency	common	Grain size	medium
Grain roundness	subangular to subrounded	Grain form	equidimensional

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

PetroT

Voids	Coarse fraction	Fine fraction
Overall frequency	<input type="text" value="common"/>	<input type="text"/>
Mega-vesicles frequency	<input type="text" value="none"/>	Mega-vughs frequency <input type="text" value="none"/>
Macro-vesicles frequency	<input type="text" value="none"/>	Macro-vughs frequency <input type="text" value="none"/>
Meso-vesicles frequency	<input type="text" value="none"/>	Meso-vughs frequency <input type="text" value="few"/>
Micro-vesicles frequency	<input type="text" value="frequent"/>	Micro-vughs frequency <input type="text" value="predominant"/>
Mega-channels frequency	<input type="text" value="none"/>	Mega-planes frequency <input type="text" value="none"/>
Macro-channels frequency	<input type="text" value="none"/>	Macro-planes frequency <input type="text" value="none"/>
Meso-channels frequency	<input type="text" value="none"/>	Meso-planes frequency <input type="text" value="none"/>
Micro-channels frequency	<input type="text" value="none"/>	Micro-planes frequency <input type="text" value="none"/>

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

TABLES > PETRO > COARSE FRACTION

PetroT

Voids	Coarse fraction	Fine fraction
Overall frequency	<input type="text" value="common"/>	Grain size <input type="text" value="medium"/>
Grain roundness	<input type="text" value="subangular to subrounded"/>	Grain form <input type="text" value="equidimensional"/>
Spacing	<input type="text" value="single to double-spaced"/>	Sorting <input type="text" value="moderately to well-sorted"/>
Rocks		
Granitoid	<input type="text" value="few"/>	Rhyolite <input type="text" value="none"/>
Diorite	<input type="text" value="none"/>	Dacite/Andesite <input type="text" value="none"/>
Gabbro	<input type="text" value="none"/>	Basalt <input type="text" value="none"/>
Syenite	<input type="text" value="none"/>	Trachyte <input type="text" value="none"/>
Conglom./Breccia	<input type="text" value="none"/>	Quartz-Sandstone <input type="text" value="none"/>
Feldsp.-Sandstone	<input type="text" value="few"/>	Lithic-Sandstone <input type="text" value="none"/>
Ca-Siltstone	<input type="text" value="none"/>	Fe-Siltstone <input type="text" value="none"/>
Ca-Mudstone	<input type="text" value="common"/>	Fe-Mudstone <input type="text" value="none"/>

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

TABLES > PETRO > FINE FRACTION

PetroT

Voids	Coarse fraction	Fine fraction	
Overall frequency	abundant	Grain size	fine to medium silt
Form	equidimensional to laminar		
Crystals			
cal	frequent	Cal-Fossil.	few
qzt	predominant	pl	none
kfs	none	sa	none
ms	predominant	bt	few
srp	none	op	few
rt	none	ep	none
am	few	zrn	none
ol	none	grt	few
cpx	none	cpx	none

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

		4 KPT-A4	KPT-A
	<input type="checkbox"/>	5 KPT-A5	KPT-A
	<input type="checkbox"/>	6 KPT-A6	KPT-A
	<input type="checkbox"/>	7 KPT-B	KPT

TABLES > SURFACE

SurfaceT

Analytical code

Internal surface thickness min. max.

External surface thickness min. max.

Interface (slip-to-body contact surface)

Pore frequency

State of vitrification

Decoration

Any stamp marks?

Any Incised marks?

Any painted motifs?

Finishing

Smoothed?

Polished?

Coating

Slipped?

Glossed?

Glazed?

General properties + decoration, finishing and coating

TABLES > SHAPE

Shape

CODE

[MAIN](#)

Type determination

Is the type fully determined?

Shape class Prototype Type

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	Analytic	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 for
+	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 e

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>

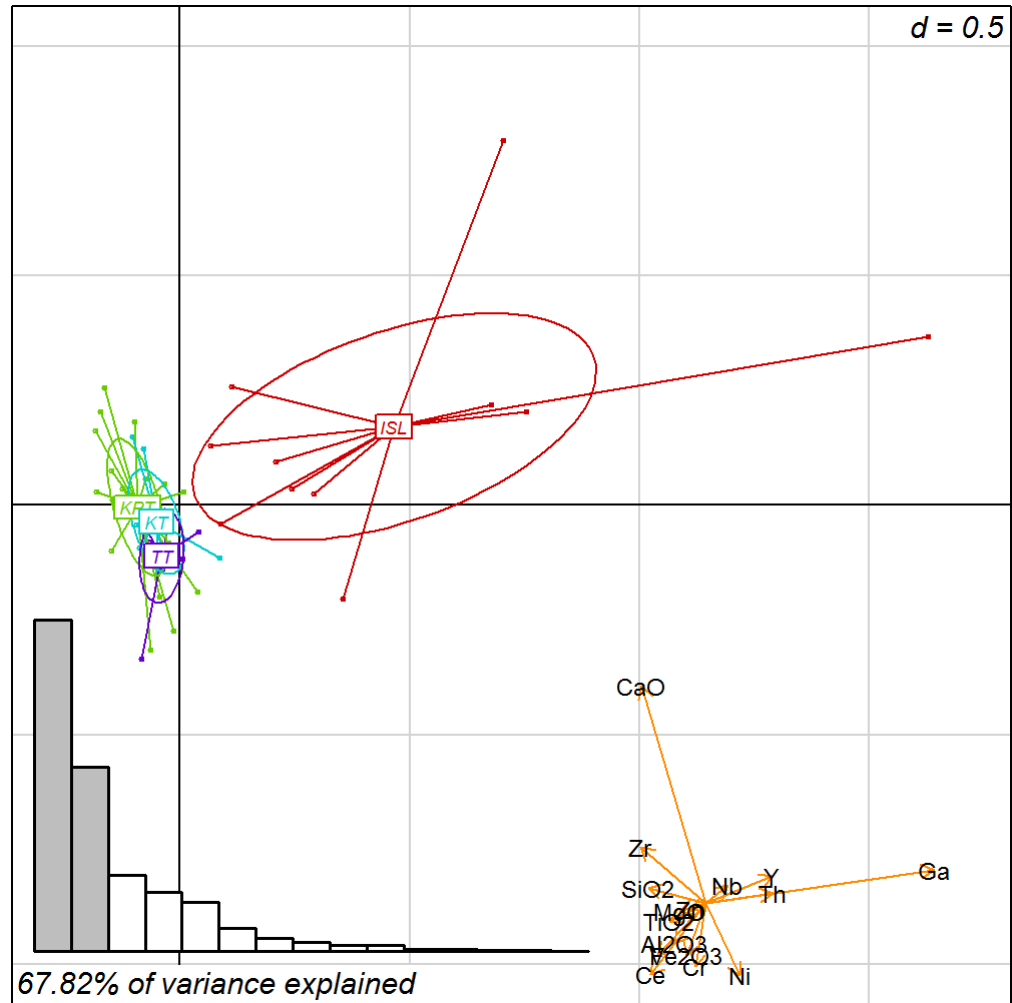
Data in Surface and Shape tables still need to be addressed.

EXAMPLE

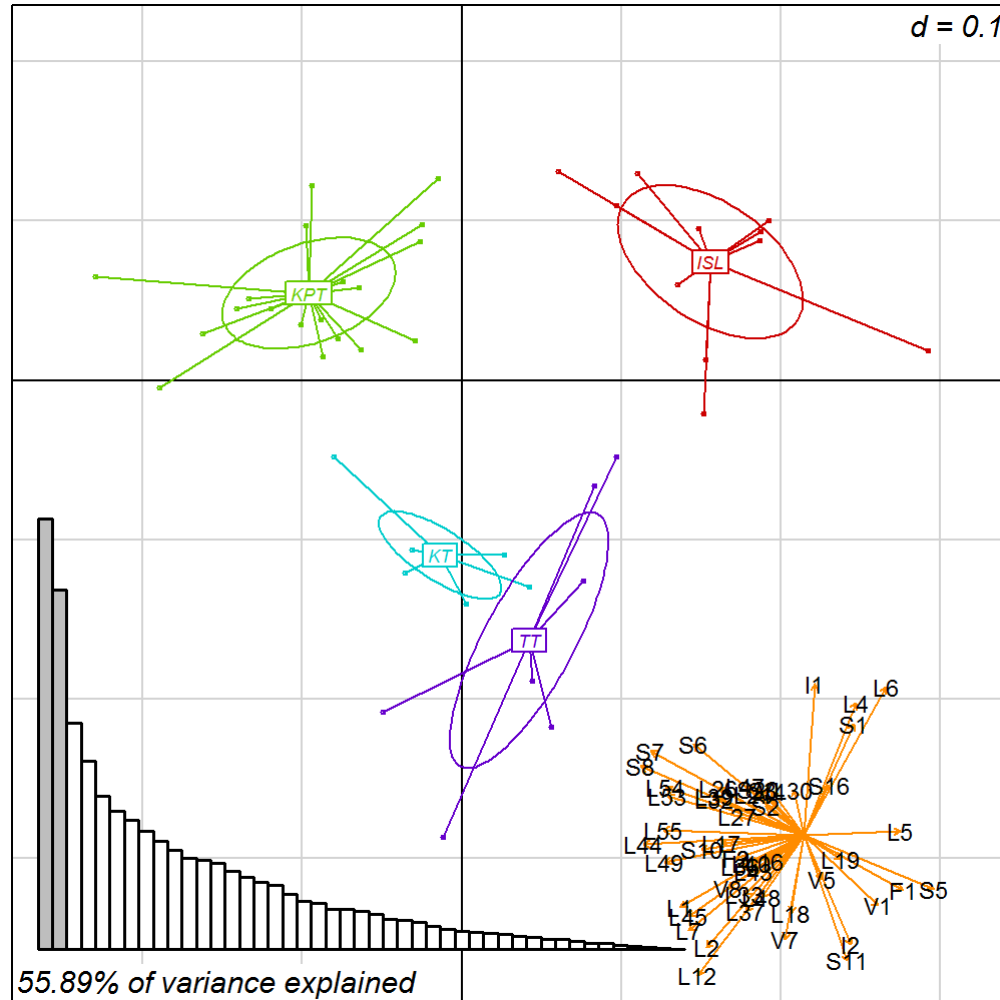
45 tableware individuals from 4 sites:

- *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**)

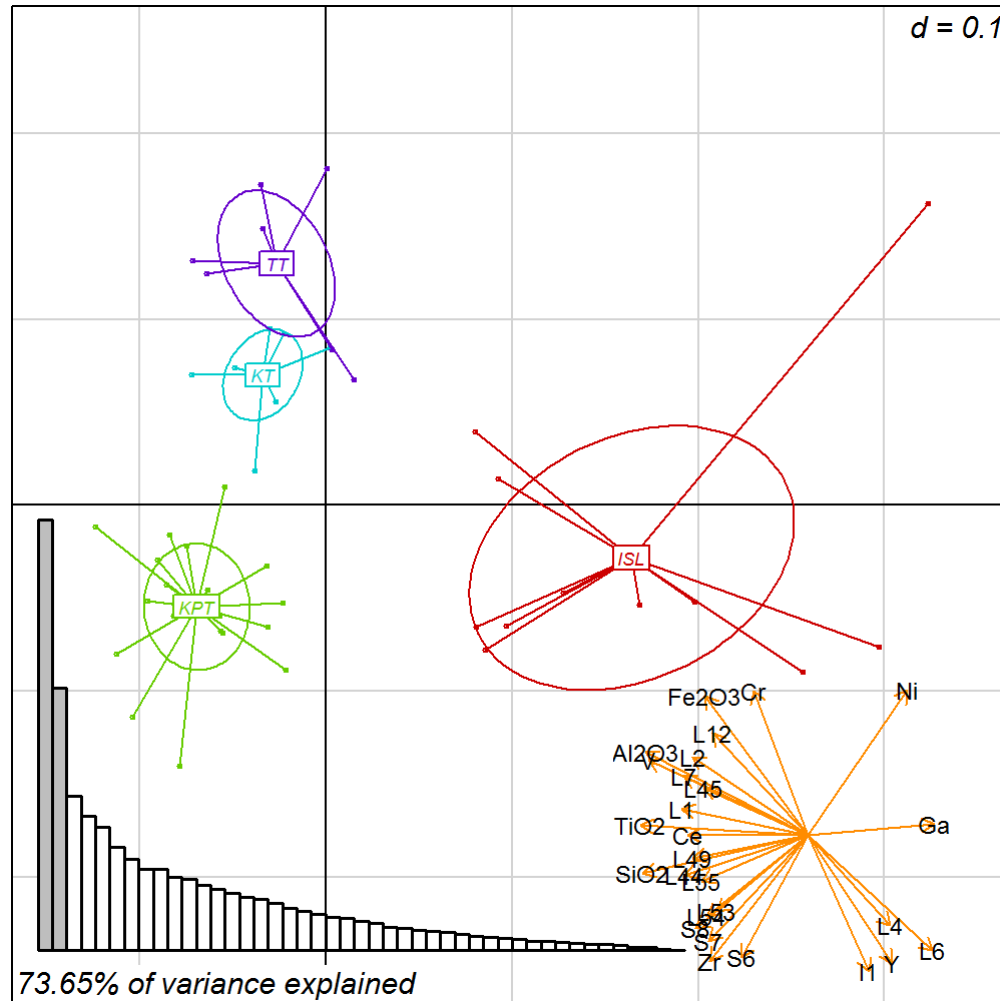
PROTOCOL 1: CHEM TABLE



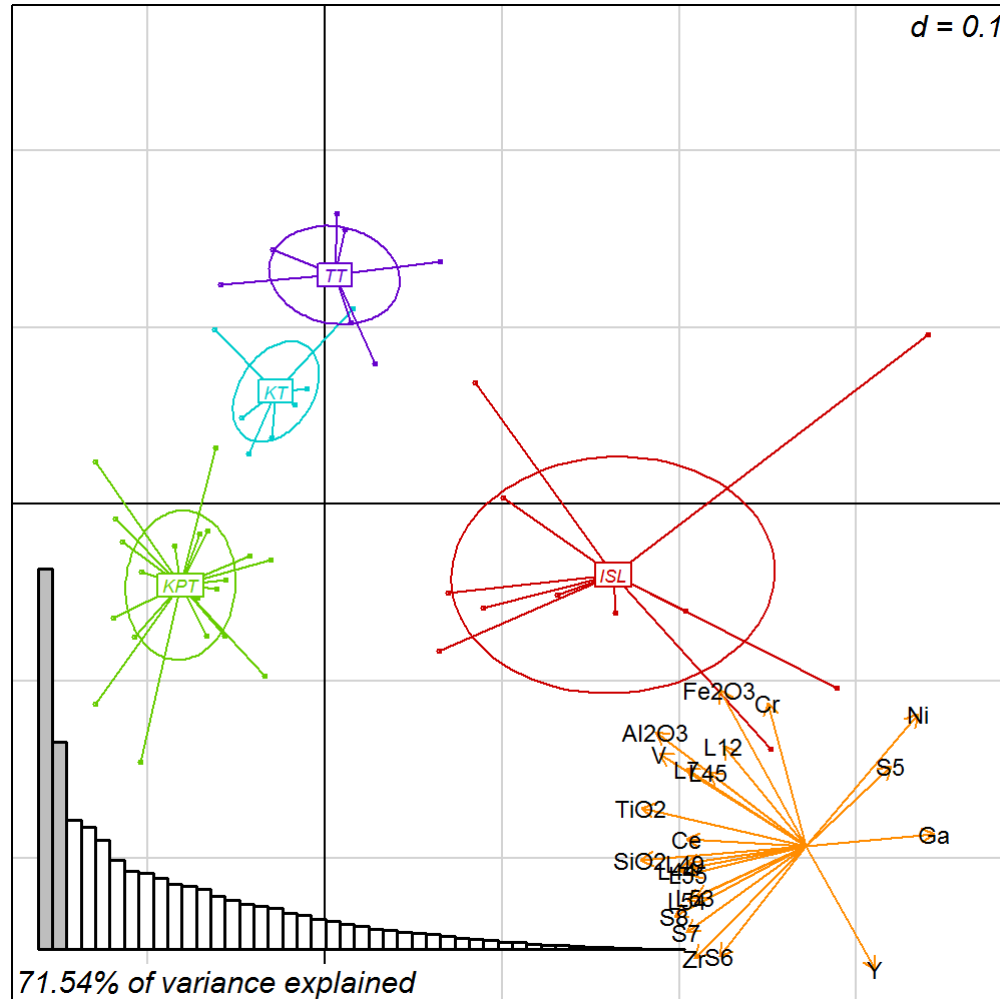
PROTOCOL 2: PETRO TABLE



PROTOCOL 3: CHEM AND PETRO TABLES



PROTOCOL 4: CHEM AND SELECTION OF PETRO VARIABLES



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Academy of Sciences
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FINE ARTS INSTITUTE

AT THE CROSSROADS OF DATA

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THANK YOU!

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