

Archaeometrical study of the ceramics coming from the archaeological site of Termez in Uzbekistan.

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Introduction

In Uzbekistan a number of archaeometrical studies were done during the 1980's and early 90's using chemical and mineralogical analysis, notably by S. V. Vivdenko and A. Abdurazakov. The first analysed sherds from a number of sites mostly dated to the Iron Age but also from the Kushan period at Jalangtush Tepe [Vivdenko 1987, 1987a, 1990, 1992, 1993, 1994 and 1996]. Abdurazakov also analysed a few sherds, mainly dated to the Bronze Age but including some from the Kushan period at sites such as Mirzakul' Tepe and Talashkan Tepe [Abdurazakov, Bezborodov *et al.* 1963, Abdurazakov 1988, Abdurazakov 1996, Abdurazakov, Dzhalalova 1986, Abdurazakov 1987]. None of this work had the necessary continuation neither was based on the definition of Reference Groups (RG) of Paste Compositional Reference Units (PCRU) which is a fundamental process in the mark of provenience studies in order to attempt to locate the *origin* or the *production site* where the pottery was made [Picon, 1984; Buxeda *et al.*, 1995].

The present work is centred on the archaeometrical study of 144 individuals sampled at different locations at the archaeological site of Termez (Uzbekistan). At Table 1 we listed the location origin and the typology of the analysed ceramics. The analysed material includes painted wares covered with a red, brown or almost black slip (CER) non painted common wares (CC) some jars, plates and few cooking wares.

The selection of the material for analysis was based on the already obtained results from the archaeometrical and archaeological study of the pottery recovered at the Kiln N° 2 of *Kara Tepe*. Taking in consideration these first results, on one hand, to crosscheck the already obtained results from Kiln N°2, pottery from *Kara Tepe's* Kiln N°1 was sampled. This last kiln was excavated by the Uzbek-Japanese mission in the past and it is located only 200m from Kiln N°2. Additionally, material recovered from the archaeological record of the *Monasteries*, located in the close proximities of both Kilns, was sampled to be able to establish the relation between the workshop and the surrounding habitation at this area. As well, important number of samples were taken from the surrounded by wall archaeological site of *Tchinguiz Tepe*, aiming to establish the relationship between the two archaeological sites (*Kara Tepe* and *Tchinguiz Tepe*). Some of this pottery recovered during the superficial prospecting of *Tchinguiz Tepe* throughout which a lot of over fired pottery was located, without being able to define if they might be related to another workshop or not, as the findings correspond to very few living spaces according to the results of the magnetic prospecting of 2006. Another part of the material from *Tchinguiz Tepe* was sampled from decisive stratigraphical units according to the archaeological record during the excavations of 2007. Finally, the last sampling was carried out in the *Citadel*, which seems to be the chronologically eldest between the excavated sites. It was recovered by the Uzbek archaeological mission in the past. According the archaeological information the pottery found at this site might be Hellenistic thus of Mediterranean tradition. The archaeometrical study in this specific case aims not only to identify the possible different productions at the archaeological area of *Termez*, leading to conclusions on the production and diffusion of the pottery at this area, but also, to distinguish the differences between the geochemical and technological character of the typical Kushan ceramic and the pottery of a Mediterranean tradition, being able to make inferences on the possibilities of a longer distance trade or a deeper cultural interactions.

The archaeometrical study upon these 144 individuals has been carried out by applying chemical and mineralogical techniques. The chemical composition has been determined by X-Ray Fluorescence (XRF), and the mineralogy has been investigated using X-Ray Diffraction (XRD). Additionally, a com-

plete microstructural study has been carried out by Scanning Electron Microscopy equipped with Energy Dispersive X-rays Detector and, finally, the mechanical resistance of some of the individuals also has been calculated.

The analytical programme and methodology

XRF was performed using a Phillips PW 2400 spectrometer with a Rh excitation source. A portion of specimens were dried at 100°C for 24 h. Major and minor elements were determined by preparing duplicate of glassy pills using 0.3 g of powdered specimen in an alkaline fusion with lithium tetraborate at 1/20 dilution. Trace elements and Na₂O were determined by powdered pills made from 5 g of specimen mixed with Elvacite agglutinating placed over boric acid in an aluminium capsule and pressed for 60 s at 200 kN. The quantification of the concentrations was obtained by using a calibration line performed with 60 International Geological Standards (Hein *et al.*, 2003). The elements identified comprised Fe₂O₃ (as total Fe), Al₂O₃, MnO, P₂O₅, TiO₂, MgO, CaO, Na₂O, K₂O, SiO₂, Ba, Rb, Mo, Th, Nb, Pb, Zr, Y, Sr, Sn, Ce, Co, Ga, V, Zn, W, Cu, Ni and Cr. The loss on ignition (LOI) was determined by firing 0.3 g of dried specimen at 950°C for 3 h.

XRD analyses were carried out by using the same specimens prepared for XRF analysis. Measurements were performed using a Siemens D-500 diffractometer working with the Cu K α radiation ($\lambda=1.5406$ Å), and graphite monochromator in the diffracted beam, at 1.2 kW (40 kV, 30 mA). Spectra were taken from 4 to 70°2 θ , at 1°2 θ /min (step size=0.05°2 θ ; time=3 s). The evaluation of crystalline phases was carried out using the DIFFRACT/AT program by Siemens, which includes the Joint Committee of Powder Diffraction Standards (JCPDS) data bank.

JEOL JSM-840study Scanning Electron Microscope (SEM) equipped with Secondary Electron (SE) detector and Energy Dispersive X-ray Micro Analyser (EDXA) was used for the study of the microstructure and the sinterisation state of the ceramics. The observations were performed under vacuum at the external surface of the fresh fractures and the secondary electron image was taken at 2000x magnification. At some cases also X-ray microanalysis was performed. The acceleration voltage was equal to 20kV and the intensity to 3x10⁻⁹ A. The preparation of the samples has been done by fixing the fresh fractures upon a standard metallic base of 1cm diameter with silicon and in order to insure the continuous conductivity between the sample and its base and to avoid the overloading of the surface, the fresh fractures were covered with silver and then the whole sample was covered with carbon.

Four individuals (TRZ103, TRZ115, TRZ124 and TRZ140), three of which were jars and one plate, have been tested for traversal stress resistance (TRS). For the TRS tests the ceramic fragments have been cut down into small briquettes with the following dimensions: 5-7 cm length, 1cm width and at least 0.5 cm thickness. All the surfaces of the briquettes were polished (60 mm and 320 μ m) until becoming absolutely parallels. Two briquettes were prepared for each individual and the TRS-s were tested with a motorised INSTRON 1195 instrument exerting three point pressure (1N/sec) (Figure 1). In this way there is a compression applied at the upper part of the briquette and at the same time tension (by stretching) at the lower part of the briquette (both indicated by the red arrows, Figure 1). When the pressure is high enough the fracture starts to propagate from the lower surface of the briquette to the upper surface (force propagation indicated by the blue arrow in Figure 1) until the briquette totally collapses. The detector detects the maximum force at the exact moment before the fracture takes place. After the experiment the TRS can be calculated according to the following equation:

$$TRS = [3Pf \times (S_1 - S_2)] / 2bd^2$$

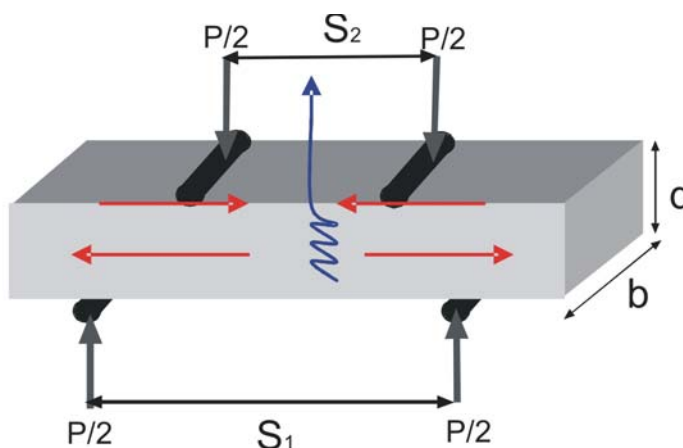


Figure 1: TRS testing

Table 1 List of analysed samples

Number of individual for analysis	Number of individual in Archaeological inventory	KARA TEPE Kiln 2	Number of individual for analysis	Number of individual in Archaeological inventory	KARA TEPE - Prospection
TRZ001	TZ06-UE 11-4	Open rim, painted common ware	TRZ044	TZ06P-6E-1	Open rim, common ware
TRZ002	TZ06-UE 12-9	Closed rim, painted common ware	TRZ045	TZ06P-7D-1	Open rim, painted common ware
TRZ003	TZ06-UE 12-7	Closed rim, painted common ware	TRZ046	TZ06P-8D-1	Open rim, painted common ware
TRZ004	TZ06-UE 11-2	Base of a painted common ware	TRZ047	TZ06P-4E-1	Open rim, painted common ware
TRZ005	TZ06-UE 9-2	Open rim, common ware	TRZ048	TZ06P-9F-1	Open rim, painted common ware
TRZ006	TZ06-UE 12-4	base	TRZ049	TZ06P-12A-1	Open rim, painted common ware
TRZ007	TZ06-UE 1-2	Closed rim, painted common ware	TRZ050	TZ06P-3E-1	Open rim, common ware
TRZ008	TZ06-UE 9-16	Open rim, common ware			
TRZ009	TZ06-UE 9-1	Open rim, common ware			
TRZ010	TZ06-UE 9-9	Open rim, common ware			
TRZ011	TZ06-UE 1-7	Open rim, painted common ware			
TRZ012	TZ06-UE 1-3	Open rim, painted common ware			
TRZ013	TZ06-UE 1-5	Open rim, painted common ware			
TRZ014	TZ06-UE 11-3	Open rim, painted common ware			
TRZ015	TZ06-UE 9-17	Closed rim, painted common ware			
TRZ016	TZ06-UE 12-8	Open rim, common ware			
TRZ017	TZ06-UE 9-8	Open rim, common ware			
TRZ018	TZ06-UE 12-10	Top of painted common ware			
TRZ019	TZ06-UE 9-10	Open rim, common ware			
TRZ020	TZ06-UE 12-5	Open rim, common ware			
TRZ021	TZ06-UE 9-15	Open rim, common ware			
TRZ022	TZ06-UE 11-5	Base of a painted common ware			
TRZ023	TZ06-UE 9-19	?			
TRZ024	TZ06-UE 9-3	Closed rim, painted common ware			
TRZ025	TZ06-UE 11-1	Base			
TRZ026	TZ06-UE 9-18	Open rim, painted common ware			
TRZ027	TZ06-UE 9-4	Closed rim, painted common ware			
TRZ028	TZ06-UE 9-7	Open rim, common ware			
TRZ029	TZ06-UE 9-5	Open rim, painted common ware			
TRZ030	TZ06-UE 12-3	Open rim, common ware			
TRZ031	TZ06-UE 9-11	Open rim, painted common ware			
TRZ032	TZ06-UE 9-20	Closed rim, common ware			
TRZ033	TZ06-UE 9-13	Open rim, common ware			
TRZ034	TZ06-UE 1-6	Open rim, common ware			
TRZ035	TZ06-UE 11-6	Base			
TRZ036	TZ06-UE 9-12	Closed rim, painted common ware			
TRZ037	TZ06-UE 12-2	Open rim, common ware			
TRZ038	TZ06-UE 1-1	Open rim, common ware			
TRZ039	TZ06-UE 12-6	Open rim, common ware			
TRZ040	TZ06-UE 1-4	Open rim, common ware			
TRZ041	TZ06-UE 12-1	Open rim, common ware			
TRZ042	TZ06-UE 9-14	Open rim, common ware			
TRZ043	TZ06-UE 9-6	Closed rim, common ware			
Number of individual for analysis	Number of individual in Archaeological inventory	TCHINGUIZ TEPE Excavation	Number of individual for analysis	Number of individual in Archaeological inventory	TCHINGUIZ TEPE - Prospection
TRZ051	TZ07-RC-10-1	Open rim, painted common ware	TRZ067	TZ07-5D-17	Walls of common ware
TRZ052	TZ07-RC-10-2	Open rim, painted common ware	TRZ068	TZ07-5D-18	Open rim, common ware
TRZ053	TZ07-RC-10-3	Open rim, common ware	TRZ069	TZ07-5D-19	Open rim, common ware
TRZ054	TZ07-RC-10-4	Closed rim, painted common ware	TRZ070	TZ07-5D-20	Walls of common ware
TRZ055	TZ07-RC-10-5	Open rim, painted common ware	TRZ071	TZ07-5D-21	Walls of common ware
TRZ056	TZ07-RC-10-6	Open rim, painted common ware	TRZ072	TZ07-5D-22	Open rim, common ware
TRZ057	TZ07-RC-10-7	Open rim, painted common ware			
TRZ058	TZ07-RC-10-8	Open rim, painted common ware			
TRZ059	TZ07-RC-10-9	Base			
TRZ060	TZ07-RC-10-10	Base			
TRZ061	TZ07-RC-10-11	Close rim, cooking ware			
TRZ062	TZ07-RC-10-12	Open rim, painted common ware			
TRZ063	TZ07-RC-10-13	Walls of painted common ware			
TRZ064	TZ07-RC-10-14	Open rim, painted common ware			
TRZ065	TZ07-RC-10-15	Open rim, painted common ware			
TRZ066	TZ07-RC-10-16	Open rim, painted common ware			
Number of individual for analysis	Number of individual in Archaeological inventory	TCHINGUIZ TEPE - Prospection	Number of individual for analysis	Number of individual in Archaeological inventory	TCHINGUIZ TEPE - Prospection
TRZ067	TZ07-5D-17	Walls of common ware			
TRZ068	TZ07-5D-18	Open rim, common ware			
TRZ069	TZ07-5D-19	Open rim, common ware			
TRZ070	TZ07-5D-20	Walls of common ware			
TRZ071	TZ07-5D-21	Walls of common ware			
TRZ072	TZ07-5D-22	Open rim, common ware			

Table 1 List of analysed samples

Number of individual for analysis	Number of individual in Archaeological inventory	TCHINGIZ TEPE - Excavation
TRZ073	TZ07-RC-6-23	Walls of common ware
TRZ074	TZ07-RC-5-24	Base
TRZ075	TZ07-RC-5-25	Open rim, painted common ware
TRZ076	TZ07-RC-5-26	Open rim, painted common ware
TRZ077	TZ07-RC-5-27	Walls of common ware
TRZ078	TZ07-RC-5-28	Walls of painted common ware
TRZ079	TZ07-RC-5-29	Walls of common ware
TRZ080	TZ07-RC-5-30	Open rim, painted common ware
TRZ081	TZ07-RC-5-31	Open rim, painted common ware
TRZ082	TZ07-RC-5-32	Walls of common ware
TRZ083	TZ07-RC-5-33	Open rim, common ware
TRZ084	TZ07-RC-5-34	Walls of painted common ware
TRZ085	TZ07-RC-5-35	Top of cooking ware
TRZ086	TZ07-RC-5-36	Walls of painted common ware
TRZ087	TZ07-RC-5-37	Open rim, common ware
TRZ088	TZ07-RB-5-38	Walls of painted common ware
TRZ089	TZ07-RB-5-39	Base
TRZ090	TZ07-RB-5-40	Open rim, common ware
TRZ091	TZ07-RB-5-41	Closed rim, common ware
TRZ092	TZ07-RB-5-42	Open rim, common ware

Number of individual for analysis	Number of individual in Archaeological inventory	CITADEL
TRZ110	TZ07-4-60	Open rim, common ware
TRZ111	TZ07-4-61	Open rim, common ware
TRZ112	TZ07-4-62	Open rim, common ware
TRZ113	TZ07-4-63	Open rim, common ware
TRZ114	TZ07-5-64	Open rim, common ware
TRZ115	TZ07-65	Open rim, common ware
TRZ116	TZ07-66	Closed rim, common ware
TRZ117	TZ07-67	Open rim, common ware
TRZ118	TZ07-68	Base
TRZ119	TZ07-69	Open rim, common ware
TRZ120	TZ07-70	Open rim, common ware
TRZ121	TZ07-4-71	Open rim, common ware
TRZ122	TZ07-72	Closed rim, common ware

Number of individual for analysis	Number of individual in Archaeological inventory	KARA TEPE Kiln 1
TRZ123	TZ07-73	Open rim, painted common ware
TRZ124	TZ07-74	Base
TRZ125	TZ07-75	Open rim, painted common ware
TRZ126	TZ07-76	Closed rim, common ware
TRZ127	TZ07-77	Kiln material

Number of individual for analysis	Number of individual in Archaeological inventory	CITADEL
TRZ093	TZ07-4-43	Open rim, common ware
TRZ094	TZ07-4-44	Open rim, common ware
TRZ095	TZ07-4-45	Open rim, common ware
TRZ096	TZ07-4-46	Open rim, painted common ware
TRZ097	TZ07-4-47	Open rim, painted common ware
TRZ088	TZ07-4-48	Open rim, painted common ware
TRZ099	TZ07-4-49	Open rim, common ware
TRZ100	TZ07-4-50	Base of painted common ware
TRZ101	TZ07-4-51	Open rim, painted common ware
TRZ102	TZ07-4-52	Open rim, painted common ware
TRZ103	TZ07-4-53	Closed rim, common ware
TRZ104	TZ07-4-54	Walls of painted common ware
TRZ105	TZ07-4-55	Base of painted common ware
TRZ106	TZ07-4-56	Open rim, painted common ware
TRZ107	TZ07-4-57	Base of painted common ware
TRZ108	TZ07-4-58	Open rim, common ware
TRZ109	TZ07-4-59	Open rim, common ware

Number of individual for analysis	Number of individual in Archaeological inventory	KARE TEPE Monastery
TRZ128	TZ07-78	Closed rim, painted common ware
TRZ129	TZ07-79	Open rim, painted common ware
TRZ130	TZ07-80	Open rim, painted common ware
TRZ131	TZ07-81	Lantern
TRZ132	TZ07-82	Closed rim, common ware
TRZ133	TZ07-83	Walls of painted common ware
TRZ134	TZ07-84	Open rim, painted common ware
TRZ135	TZ07-85	Closed rim, painted common ware
TRZ136	TZ07-86	Open rim, common ware
TRZ137	TZ07-87	Open rim, common ware
TRZ138	TZ07-88	Open rim, painted common ware
TRZ139	TZ07-89	Closed rim, common ware
TRZ140	TZ07-90	Closed rim, painted common ware
TRZ141	TZ07-91	Open rim, painted common ware
TRZ142	TZ07-92	Open rim, painted common ware
TRZ143	TZ07-93	Open rim, painted common ware
TRZ144	TZ07-94	Open rim, painted common ware

Chemical results

The raw chemical composition of the analysed ceramic material can be seen in Table 2. At first site, two general observations can be made on the data set. The Na₂O concentrations are clearly high in all the individuals and their MgO content is also moderately high. One of the most important steps in a chemical analysis, as it aims to compare the composition of the individuals analysed, is to calculate somehow the variability in the data set. One of the common ways to do that is to calculate the Compositional Variation Matrix (CVM) (Buxeda and Kilikoglou, 2003). This matrix includes all the necessary information to identify the variability in the data set, like the total variation and the variability that each element is introducing in the data set. Beside the above mentioned, it also indicates the relation between all the pair of elements. The CVM calculated for our data set can be seen in Table 3. It has been calculated without considering the following elements: Mo, Sn, Co, W, P₂O₅ and Pb. The first two elements have been left out due to analytical imprecisions, as both of them are under their regression limits in ceramics. The second two elements have been left out from the calculation, because they can be contaminated due to the sample preparation process and, the last two because they are elements which are very susceptible to suffer postdepositional contaminations, therefore they can introduce a false high variability in the data set.

The total variation (vt) in this data set according to the CVM is relatively low (0.2188), which generally indicates an homogeneous composition. At the first site the variability introduced by all the elements is relatively low. The main variability (much more than 50%; around the 70%) is introduced by the following three elements: Na₂O₃, Sr, Ce and Ba, followed by CaO, K₂O, Rb, MgO, Cu and Ni.

The variability of some of the above mentioned elements can be explained easily by looking at the chemical data of the Table 1. The high variability introduced by Ba for example is due to the extremely high concentration of this element in five individuals: TRZ050, TRZ049, TRZ044, TRZ012 and TRZ127. Therefore, a great part of the variability introduced by this element in the data set is owed to these five individuals and it is probably a result of some kind of postdepositional contamination and/or alteration.

Some of the variability introduced by Na₂O, K₂O can be explained by the existence of a characteristic postdepositional alteration or /and contamination, we already located in previous articles upon this subject (Tsantini, *et al.*, 2007), related to the formation of a secondary mineral called analcyme. By looking at the chemical data we can see that TRZ020, TRZ028, TRZ056, TRZ059, TRZ063, TRZ071, TRZ077, TRZ079, TRZ083, TRZ119 and TRZ141 have lower concentrations in K₂O and Rb and higher concentrations in Na₂O than the rest of the individuals. This is a chemical indication which normally is related to a postdepositional alteration or/and contamination, normally present in a high fired calcareous pottery. Previous studies (Picon, 1976; Segebade and Lutz, 1980; Lemoin *et al.*, 1981; Scmitt, 1989; Buxeda and Cau, 1997; Buxeda and Gurt, 1998; Buxeda, 1999b; Buxeda *et al.*, 2001; Buxeda *et al.*, 2002; Schwedt *et al.*, 2006) seems to point out that this phenomenon could be the result of leaching of K²⁺ and Rb²⁺ from the amorphous glassy face of the ceramic and the accumulation of Na²⁺ which leads to the formation of a zeolithe called analcyme (Na₂AlSi₂O₆ × H₂O) in the pores.

Finally, the variability introduced by Sr, CaO and MgO can be linked to the calcareous character of the material and to the fact that in calcareous material the variations in the concentrations of the above mentioned elements can be relatively high.

Table 2 Normalised Chemical Data

id	Fe2O3	Al2O3	TiO2	MgO	CaO	Na2O	K2O	SiO2	Ba	Rb	Th
TRZ001	5,67	15,20	0,62	4,25	10,97	2,15	3,39	57,59	0,0520	0,0128	0,0017
TRZ002	6,41	16,48	0,64	3,97	9,69	1,67	3,40	57,57	0,0586	0,0134	0,0015
TRZ003	5,91	15,65	0,65	4,23	10,56	1,69	3,53	57,60	0,0485	0,0129	0,0015
TRZ004	6,36	16,44	0,69	4,04	8,74	1,87	3,92	57,76	0,0539	0,0140	0,0017
TRZ005	6,30	16,20	0,70	4,03	10,66	1,54	3,61	56,80	0,0420	0,0128	0,0015
TRZ006	6,16	15,78	0,67	4,76	10,89	1,56	3,50	56,52	0,0474	0,0128	0,0016
TRZ008	6,11	16,08	0,69	3,43	8,16	1,78	3,89	59,71	0,0485	0,0126	0,0014
TRZ009	5,84	15,06	0,63	3,83	11,50	1,71	3,18	58,08	0,0528	0,0125	0,0017
TRZ010	5,89	15,83	0,62	4,04	10,67	1,48	3,42	57,89	0,0495	0,0130	0,0017
TRZ011	5,76	15,27	0,64	4,65	13,30	1,26	3,47	55,48	0,0483	0,0095	0,0015
TRZ012	6,29	16,03	0,65	3,85	11,21	1,33	3,37	57,06	0,0827	0,0128	0,0015
TRZ013	6,11	15,67	0,66	4,31	11,72	1,31	3,39	56,64	0,0607	0,0131	0,0015
TRZ014	5,82	15,48	0,62	3,95	13,26	1,38	3,45	55,88	0,0470	0,0128	0,0016
TRZ015	5,71	14,85	0,66	4,63	10,77	2,04	3,34	57,84	0,0510	0,0118	0,0015
TRZ016	6,10	15,49	0,67	4,29	11,96	2,10	3,46	55,75	0,0506	0,0106	0,0014
TRZ017	6,63	17,13	0,68	4,42	11,21	1,31	3,54	54,90	0,0536	0,0144	0,0018
TRZ018	5,92	15,83	0,67	3,57	8,40	1,98	3,54	59,92	0,0527	0,0128	0,0017
TRZ019	5,97	15,60	0,64	4,22	12,09	1,88	3,56	55,87	0,0497	0,0130	0,0016
TRZ020	6,08	15,66	0,70	3,85	10,63	2,07	2,71	58,12	0,0531	0,0106	0,0016
TRZ021	5,98	15,75	0,64	4,16	10,89	1,88	3,22	57,30	0,0503	0,0126	0,0014
TRZ022	6,01	15,82	0,64	4,03	11,95	1,55	3,57	56,26	0,0483	0,0130	0,0016
TRZ023	6,08	15,80	0,66	4,39	10,75	1,54	3,52	57,08	0,0502	0,0132	0,0017
TRZ024	5,92	15,59	0,64	4,20	12,14	1,52	3,44	56,39	0,0473	0,0127	0,0014
TRZ025	5,92	15,40	0,66	4,13	11,23	2,41	3,81	56,27	0,0495	0,0126	0,0016
TRZ026	6,07	15,81	0,65	4,30	12,48	1,55	3,23	55,75	0,0487	0,0120	0,0017
TRZ027	6,40	16,71	0,67	4,17	9,64	1,53	4,02	56,69	0,0504	0,0135	0,0015
TRZ028	6,29	15,82	0,70	4,01	11,06	2,29	2,33	57,35	0,0451	0,0086	0,0013
TRZ029	5,84	15,33	0,63	4,23	13,00	1,22	3,40	56,18	0,0477	0,0126	0,0014
TRZ030	5,97	15,40	0,67	4,36	12,66	1,66	2,98	56,14	0,0474	0,0115	0,0017
TRZ031	6,09	15,95	0,66	4,24	11,29	1,54	3,47	56,58	0,0480	0,0130	0,0016
TRZ032	5,90	15,76	0,62	4,12	11,79	1,60	3,38	56,66	0,0478	0,0130	0,0018
TRZ033	5,78	15,17	0,66	3,69	11,72	1,77	3,03	58,01	0,0492	0,0106	0,0015
TRZ034	6,23	16,03	0,69	3,94	11,36	1,44	3,45	56,67	0,0597	0,0124	0,0016
TRZ035	6,01	15,57	0,66	3,95	11,05	2,00	3,65	56,94	0,0552	0,0130	0,0016
TRZ036	6,20	16,24	0,67	3,92	9,33	1,60	3,96	57,92	0,0482	0,0135	0,0016
TRZ037	5,88	15,50	0,64	4,27	12,32	1,66	3,07	56,48	0,0517	0,0116	0,0015
TRZ038	5,83	15,17	0,69	3,64	11,93	1,39	3,22	57,95	0,0583	0,0118	0,0015
TRZ039	5,91	15,47	0,64	3,39	10,59	1,73	3,84	58,24	0,0566	0,0125	0,0015
TRZ040	5,95	15,55	0,65	4,47	11,52	1,40	3,10	57,18	0,0552	0,0115	0,0016
TRZ041	6,16	16,11	0,66	4,46	10,75	1,34	3,33	57,03	0,0488	0,0129	0,0015
TRZ042	5,49	14,71	0,61	3,43	11,29	1,82	3,44	59,05	0,0489	0,0118	0,0014
TRZ043	6,14	16,03	0,65	4,65	11,57	1,36	3,55	55,87	0,0472	0,0131	0,0016
TRZ044	5,65	15,41	0,63	3,60	10,10	1,39	3,24	59,80	0,0710	0,0124	0,0015
TRZ045	5,69	15,14	0,66	3,90	10,85	1,33	3,18	59,08	0,0610	0,0116	0,0015
TRZ046	5,75	14,99	0,66	4,27	11,32	1,47	3,04	58,33	0,0610	0,0110	0,0015
TRZ047	6,34	16,27	0,67	4,17	12,01	1,30	3,16	55,89	0,0698	0,0133	0,0017
TRZ048	6,10	15,86	0,67	3,66	10,16	1,26	3,41	58,71	0,0515	0,0124	0,0017
TRZ049	6,10	15,71	0,66	3,43	11,68	1,13	3,27	57,83	0,0791	0,0127	0,0016
TRZ050	5,51	14,71	0,65	3,57	9,88	1,12	3,24	61,10	0,0929	0,0111	0,0014

Table 2 Normalised Chemical Data

id	Nb	Zr	Y	Sr	Ce	Ga	V	Zn	Cu	Ni	Cr
TRZ001	0,0016	0,0152	0,0028	0,0398	0,0063	0,0022	0,0095	0,0107	0,0036	0,0049	0,0081
TRZ002	0,0016	0,0153	0,0028	0,0320	0,0063	0,0024	0,0105	0,0115	0,0037	0,0051	0,0079
TRZ003	0,0017	0,0151	0,0029	0,0387	0,0055	0,0023	0,0105	0,0114	0,0035	0,0050	0,0081
TRZ004	0,0017	0,0157	0,0030	0,0389	0,0072	0,0024	0,0111	0,0099	0,0037	0,0056	0,0084
TRZ005	0,0016	0,0152	0,0030	0,0337	0,0062	0,0022	0,0103	0,0107	0,0031	0,0048	0,0083
TRZ006	0,0016	0,0160	0,0029	0,0395	0,0059	0,0022	0,0103	0,0107	0,0035	0,0050	0,0082
TRZ008	0,0015	0,0147	0,0029	0,0276	0,0051	0,0021	0,0108	0,0081	0,0030	0,0049	0,0083
TRZ009	0,0016	0,0161	0,0028	0,0384	0,0052	0,0021	0,0093	0,0108	0,0037	0,0047	0,0078
TRZ010	0,0016	0,0145	0,0027	0,0326	0,0061	0,0022	0,0104	0,0107	0,0031	0,0050	0,0080
TRZ011	0,0015	0,0140	0,0028	0,0487	0,0042	0,0021	0,0100	0,0107	0,0035	0,0042	0,0072
TRZ012	0,0017	0,0151	0,0029	0,0445	0,0065	0,0024	0,0106	0,0108	0,0044	0,0056	0,0079
TRZ013	0,0016	0,0161	0,0029	0,0397	0,0072	0,0023	0,0103	0,0118	0,0038	0,0051	0,0079
TRZ014	0,0016	0,0152	0,0028	0,0383	0,0071	0,0022	0,0098	0,0111	0,0033	0,0052	0,0079
TRZ015	0,0016	0,0168	0,0030	0,0416	0,0070	0,0022	0,0109	0,0108	0,0032	0,0048	0,0080
TRZ016	0,0016	0,0160	0,0030	0,0412	0,0058	0,0022	0,0102	0,0102	0,0038	0,0055	0,0079
TRZ017	0,0016	0,0150	0,0030	0,0360	0,0071	0,0025	0,0113	0,0120	0,0042	0,0055	0,0081
TRZ018	0,0017	0,0168	0,0030	0,0338	0,0073	0,0022	0,0101	0,0100	0,0032	0,0049	0,0077
TRZ019	0,0016	0,0146	0,0029	0,0379	0,0044	0,0022	0,0107	0,0111	0,0033	0,0052	0,0078
TRZ020	0,0017	0,0171	0,0032	0,0330	0,0066	0,0023	0,0104	0,0113	0,0042	0,0049	0,0081
TRZ021	0,0016	0,0155	0,0029	0,0353	0,0053	0,0022	0,0102	0,0107	0,0040	0,0050	0,0078
TRZ022	0,0016	0,0152	0,0029	0,0379	0,0058	0,0021	0,0099	0,0109	0,0034	0,0051	0,0078
TRZ023	0,0016	0,0151	0,0029	0,0448	0,0066	0,0022	0,0107	0,0109	0,0034	0,0053	0,0083
TRZ024	0,0016	0,0145	0,0028	0,0390	0,0065	0,0021	0,0107	0,0111	0,0031	0,0054	0,0082
TRZ025	0,0016	0,0150	0,0030	0,0414	0,0073	0,0022	0,0098	0,0108	0,0031	0,0049	0,0078
TRZ026	0,0016	0,0150	0,0029	0,0396	0,0059	0,0022	0,0104	0,0113	0,0034	0,0053	0,0082
TRZ027	0,0015	0,0144	0,0030	0,0434	0,0044	0,0023	0,0122	0,0094	0,0028	0,0056	0,0086
TRZ028	0,0016	0,0165	0,0030	0,0339	0,0058	0,0023	0,0098	0,0099	0,0038	0,0051	0,0081
TRZ029	0,0016	0,0147	0,0029	0,0465	0,0049	0,0021	0,0099	0,0108	0,0036	0,0050	0,0078
TRZ030	0,0016	0,0159	0,0030	0,0367	0,0062	0,0022	0,0101	0,0107	0,0037	0,0052	0,0079
TRZ031	0,0017	0,0153	0,0029	0,0370	0,0073	0,0023	0,0107	0,0123	0,0034	0,0049	0,0080
TRZ032	0,0016	0,0146	0,0027	0,0342	0,0057	0,0022	0,0103	0,0114	0,0032	0,0051	0,0082
TRZ033	0,0016	0,0158	0,0029	0,0360	0,0065	0,0021	0,0097	0,0106	0,0033	0,0046	0,0081
TRZ034	0,0017	0,0162	0,0031	0,0414	0,0070	0,0023	0,0096	0,0114	0,0034	0,0051	0,0083
TRZ035	0,0016	0,0150	0,0029	0,0408	0,0066	0,0022	0,0108	0,0106	0,0030	0,0052	0,0079
TRZ036	0,0016	0,0155	0,0029	0,0392	0,0066	0,0022	0,0106	0,0106	0,0033	0,0053	0,0084
TRZ037	0,0017	0,0151	0,0028	0,0395	0,0074	0,0022	0,0103	0,0110	0,0036	0,0052	0,0086
TRZ038	0,0016	0,0167	0,0031	0,0418	0,0061	0,0021	0,0098	0,0107	0,0045	0,0048	0,0080
TRZ039	0,0016	0,0160	0,0030	0,0343	0,0076	0,0022	0,0104	0,0108	0,0032	0,0047	0,0079
TRZ040	0,0017	0,0157	0,0029	0,0419	0,0067	0,0022	0,0106	0,0111	0,0039	0,0051	0,0079
TRZ041	0,0016	0,0154	0,0027	0,0321	0,0041	0,0022	0,0097	0,0109	0,0034	0,0053	0,0088
TRZ042	0,0015	0,0152	0,0027	0,0363	0,0070	0,0021	0,0095	0,0095	0,0029	0,0044	0,0074
TRZ043	0,0017	0,0146	0,0029	0,0399	0,0069	0,0023	0,0097	0,0109	0,0037	0,0054	0,0088
TRZ044	0,0016	0,0153	0,0027	0,0393	0,0054	0,0022	0,0096	0,0101	0,0036	0,0045	0,0081
TRZ045	0,0016	0,0162	0,0028	0,0415	0,0056	0,0021	0,0100	0,0100	0,0041	0,0045	0,0080
TRZ046	0,0016	0,0168	0,0029	0,0428	0,0072	0,0021	0,0103	0,0104	0,0041	0,0049	0,0080
TRZ047	0,0017	0,0153	0,0028	0,0390	0,0057	0,0023	0,0111	0,0119	0,0043	0,0053	0,0079
TRZ048	0,0016	0,0152	0,0028	0,0361	0,0057	0,0022	0,0103	0,0097	0,0030	0,0050	0,0079
TRZ049	0,0016	0,0154	0,0029	0,0398	0,0042	0,0022	0,0108	0,0100	0,0041	0,0053	0,0074
TRZ050	0,0016	0,0166	0,0029	0,0490	0,0064	0,0020	0,0099	0,0097	0,0031	0,0044	0,0074

Table 2 Normalised Chemical Data

id	Fe2O3	Al2O3	TiO2	MgO	CaO	Na2O	K2O	SiO2	Ba	Rb	Th
TRZ051	6,57	16,20	0,67	3,89	9,94	1,43	3,31	57,81	0,0671	0,0132	0,0013
TRZ052	6,27	16,18	0,66	4,04	10,03	1,34	3,33	57,98	0,0585	0,0121	0,0013
TRZ053	6,60	16,36	0,72	3,65	9,89	1,48	3,42	57,72	0,0595	0,0124	0,0014
TRZ054	5,81	15,59	0,67	4,42	9,37	1,27	3,21	59,51	0,0502	0,0110	0,0012
TRZ055	6,80	16,51	0,69	3,81	10,91	1,35	3,36	56,39	0,0660	0,0124	0,0017
TRZ056	6,32	15,89	0,69	3,47	10,46	1,57	3,16	58,27	0,0626	0,0115	0,0015
TRZ057	6,66	16,41	0,72	3,65	9,76	1,41	3,46	57,77	0,0543	0,0130	0,0012
TRZ058	6,92	16,69	0,71	3,99	10,34	1,62	3,51	56,05	0,0610	0,0132	0,0014
TRZ059	6,84	16,48	0,70	3,74	11,63	1,60	3,78	55,06	0,0548	0,0132	0,0015
TRZ060	6,20	16,00	0,66	3,99	10,78	1,18	3,36	57,70	0,0437	0,0110	0,0011
TRZ063	6,76	16,35	0,70	3,92	11,57	2,30	1,93	56,31	0,0525	0,0073	0,0016
TRZ064	6,87	16,80	0,73	4,07	9,47	1,40	3,58	56,91	0,0578	0,0139	0,0014
TRZ065	6,61	16,15	0,72	3,77	10,15	1,45	3,41	57,56	0,0579	0,0132	0,0016
TRZ066	6,59	16,48	0,71	3,69	9,30	1,53	3,47	58,04	0,0598	0,0135	0,0016
TRZ067	6,07	15,55	0,66	3,46	11,91	1,30	3,19	57,69	0,0579	0,0136	0,0016
TRZ068	6,54	16,32	0,68	4,23	10,27	1,48	3,03	57,25	0,0767	0,0113	0,0015
TRZ069	5,91	15,05	0,65	4,15	13,29	1,50	2,90	56,36	0,0659	0,0118	0,0014
TRZ070	5,93	15,90	0,66	4,16	9,22	1,27	3,47	59,23	0,0661	0,0135	0,0013
TRZ071	5,70	14,76	0,63	3,86	11,97	1,21	3,13	58,54	0,0619	0,0123	0,0014
TRZ072	6,23	16,25	0,67	3,62	11,21	1,69	3,15	56,99	0,0693	0,0132	0,0015
TRZ073	6,26	15,86	0,67	3,46	11,33	1,44	3,42	57,38	0,0549	0,0130	0,0013
TRZ074	6,98	17,48	0,72	3,80	10,26	1,31	3,59	55,68	0,0614	0,0148	0,0015
TRZ075	6,65	16,78	0,69	4,46	10,49	1,32	3,51	55,95	0,0475	0,0135	0,0015
TRZ076	6,82	16,80	0,71	4,08	9,61	1,38	3,64	56,78	0,0575	0,0138	0,0016
TRZ077	6,49	16,11	0,66	3,95	11,64	2,33	2,40	56,26	0,0509	0,0081	0,0014
TRZ078	6,29	15,69	0,67	3,75	9,99	1,55	3,49	58,40	0,0537	0,0124	0,0014
TRZ079	6,66	16,59	0,71	4,06	10,70	2,00	2,87	56,26	0,0602	0,0107	0,0015
TRZ080	6,59	16,36	0,66	4,03	10,15	1,51	3,47	57,07	0,0547	0,0129	0,0014
TRZ081	6,49	16,49	0,66	3,91	11,02	1,37	3,28	56,60	0,0582	0,0144	0,0017
TRZ082	6,57	16,56	0,68	4,32	9,92	1,30	3,45	57,02	0,0582	0,0142	0,0016
TRZ083	6,35	15,86	0,66	4,01	11,74	1,77	2,84	56,60	0,0535	0,0116	0,0013
TRZ084	6,08	16,46	0,70	3,14	6,56	1,73	4,42	60,71	0,0572	0,0133	0,0011
TRZ085	5,39	14,97	0,57	3,14	9,67	1,52	3,44	61,13	0,0599	0,0127	0,0013
TRZ086	6,45	16,31	0,68	3,97	9,86	1,34	3,51	57,71	0,0516	0,0134	0,0013
TRZ087	6,42	16,15	0,68	3,56	10,92	1,46	3,42	57,20	0,0611	0,0136	0,0014
TRZ088	6,64	16,73	0,72	3,57	8,30	1,92	3,64	58,31	0,0609	0,0132	0,0014
TRZ089	5,86	15,26	0,66	3,31	9,34	1,58	3,35	60,47	0,0565	0,0120	0,0014
TRZ090	6,59	16,47	0,69	3,50	8,94	1,52	3,54	58,57	0,0692	0,0136	0,0015
TRZ091	6,21	16,04	0,64	3,86	10,51	1,46	3,09	58,03	0,0651	0,0132	0,0015
TRZ092	6,15	15,46	0,68	3,62	9,73	1,96	3,42	58,80	0,0655	0,0130	0,0015
TRZ093	7,03	17,21	0,70	3,69	8,87	1,39	3,88	57,06	0,0563	0,0140	0,0017
TRZ094	6,69	16,59	0,70	3,59	10,16	1,31	3,77	57,01	0,0559	0,0133	0,0014
TRZ095	6,24	16,35	0,69	3,45	9,61	1,59	3,57	58,34	0,0515	0,0126	0,0015
TRZ097	5,60	14,91	0,67	2,72	9,83	1,21	3,46	61,42	0,0527	0,0114	0,0013
TRZ098	6,36	15,92	0,65	3,35	10,38	0,96	3,50	58,71	0,0552	0,0115	0,0012
TRZ100	6,63	16,83	0,68	3,57	8,07	1,38	3,96	58,70	0,0576	0,0129	0,0014

Table 2 Normalised Chemical Data

id	Nb	Zr	Y	Sr	Ce	Ga	V	Zn	Cu	Ni	Cr
TRZ051	0,0016	0,0147	0,0026	0,0347	0,0052	0,0019	0,0107	0,0103	0,0034	0,0051	0,0076
TRZ052	0,0015	0,0143	0,0025	0,0330	0,0075	0,0018	0,0099	0,0104	0,0035	0,0047	0,0075
TRZ053	0,0015	0,0157	0,0027	0,0316	0,0065	0,0018	0,0101	0,0102	0,0037	0,0050	0,0074
TRZ054	0,0014	0,0162	0,0025	0,0352	0,0062	0,0016	0,0107	0,0092	0,0026	0,0040	0,0070
TRZ055	0,0016	0,0146	0,0027	0,0420	0,0073	0,0019	0,0110	0,0104	0,0035	0,0052	0,0077
TRZ056	0,0015	0,0152	0,0025	0,0306	0,0065	0,0018	0,0107	0,0091	0,0031	0,0050	0,0076
TRZ057	0,0015	0,0161	0,0027	0,0322	0,0063	0,0018	0,0108	0,0097	0,0038	0,0052	0,0077
TRZ058	0,0015	0,0159	0,0027	0,0371	0,0060	0,0019	0,0105	0,0112	0,0040	0,0055	0,0078
TRZ059	0,0016	0,0155	0,0028	0,0396	0,0057	0,0019	0,0110	0,0107	0,0037	0,0052	0,0071
TRZ060	0,0013	0,0132	0,0023	0,0348	0,0053	0,0016	0,0086	0,0087	0,0027	0,0042	0,0061
TRZ063	0,0015	0,0157	0,0026	0,0314	0,0072	0,0019	0,0104	0,0110	0,0039	0,0054	0,0075
TRZ064	0,0017	0,0165	0,0028	0,0371	0,0069	0,0020	0,0109	0,0112	0,0040	0,0055	0,0078
TRZ065	0,0016	0,0163	0,0027	0,0355	0,0064	0,0019	0,0102	0,0104	0,0038	0,0052	0,0074
TRZ066	0,0016	0,0164	0,0027	0,0337	0,0063	0,0019	0,0104	0,0103	0,0037	0,0050	0,0074
TRZ067	0,0016	0,0162	0,0026	0,0274	0,0059	0,0018	0,0104	0,0098	0,0035	0,0050	0,0070
TRZ068	0,0015	0,0153	0,0026	0,0337	0,0059	0,0018	0,0106	0,0114	0,0047	0,0052	0,0076
TRZ069	0,0016	0,0160	0,0025	0,0372	0,0061	0,0018	0,0098	0,0094	0,0033	0,0050	0,0069
TRZ070	0,0015	0,0159	0,0026	0,0372	0,0057	0,0018	0,0097	0,0107	0,0040	0,0046	0,0074
TRZ071	0,0015	0,0152	0,0025	0,0408	0,0064	0,0017	0,0088	0,0105	0,0035	0,0046	0,0067
TRZ072	0,0016	0,0165	0,0026	0,0352	0,0063	0,0018	0,0105	0,0100	0,0033	0,0049	0,0070
TRZ073	0,0015	0,0152	0,0026	0,0443	0,0066	0,0018	0,0104	0,0102	0,0034	0,0048	0,0073
TRZ074	0,0016	0,0157	0,0027	0,0336	0,0079	0,0021	0,0117	0,0107	0,0040	0,0060	0,0082
TRZ075	0,0015	0,0148	0,0025	0,0347	0,0056	0,0019	0,0114	0,0106	0,0033	0,0052	0,0082
TRZ076	0,0016	0,0156	0,0027	0,0377	0,0069	0,0019	0,0106	0,0108	0,0040	0,0053	0,0079
TRZ077	0,0015	0,0153	0,0026	0,0312	0,0059	0,0019	0,0095	0,0110	0,0032	0,0053	0,0073
TRZ078	0,0015	0,0161	0,0026	0,0458	0,0052	0,0018	0,0096	0,0104	0,0037	0,0048	0,0069
TRZ079	0,0016	0,0160	0,0026	0,0349	0,0060	0,0020	0,0104	0,0105	0,0038	0,0051	0,0075
TRZ080	0,0014	0,0143	0,0024	0,0352	0,0064	0,0018	0,0101	0,0100	0,0041	0,0049	0,0073
TRZ081	0,0015	0,0151	0,0027	0,0314	0,0088	0,0020	0,0111	0,0105	0,0038	0,0051	0,0073
TRZ082	0,0015	0,0155	0,0027	0,0360	0,0061	0,0019	0,0102	0,0115	0,0039	0,0054	0,0078
TRZ083	0,0015	0,0156	0,0026	0,0312	0,0060	0,0018	0,0108	0,0098	0,0038	0,0052	0,0074
TRZ084	0,0011	0,0017	0,0165	0,0024	0,0644	0,0069	0,0018	0,0113	0,0075	0,0025	0,0046
TRZ085	0,0013	0,0014	0,0149	0,0023	0,0367	0,0064	0,0017	0,0093	0,0089	0,0029	0,0042
TRZ086	0,0013	0,0015	0,0155	0,0026	0,0393	0,0057	0,0018	0,0103	0,0104	0,0035	0,0052
TRZ087	0,0014	0,0015	0,0152	0,0026	0,0380	0,0043	0,0019	0,0106	0,0100	0,0036	0,0054
TRZ088	0,0014	0,0016	0,0156	0,0024	0,0421	0,0032	0,0018	0,0096	0,0093	0,0035	0,0052
TRZ089	0,0014	0,0015	0,0164	0,0024	0,0415	0,0050	0,0016	0,0102	0,0096	0,0026	0,0045
TRZ090	0,0015	0,0016	0,0159	0,0028	0,0455	0,0055	0,0019	0,0110	0,0095	0,0032	0,0051
TRZ091	0,0015	0,0015	0,0154	0,0025	0,0328	0,0064	0,0018	0,0100	0,0103	0,0035	0,0049
TRZ092	0,0015	0,0015	0,0157	0,0026	0,0456	0,0051	0,0017	0,0088	0,0093	0,0036	0,0049
TRZ093	0,0017	0,0015	0,0153	0,0025	0,0353	0,0054	0,0020	0,0104	0,0102	0,0037	0,0050
TRZ094	0,0014	0,0015	0,0155	0,0026	0,0456	0,0076	0,0019	0,0101	0,0103	0,0039	0,0049
TRZ095	0,0015	0,0015	0,0163	0,0024	0,0299	0,0067	0,0017	0,0102	0,0090	0,0031	0,0046
TRZ097	0,0013	0,0015	0,0157	0,0024	0,0408	0,0058	0,0016	0,0107	0,0093	0,0026	0,0034
TRZ098	0,0012	0,0014	0,0137	0,0024	0,0372	0,0044	0,0016	0,0111	0,0099	0,0029	0,0043
TRZ100	0,0014	0,0014	0,0158	0,0024	0,0376	0,0070	0,0018	0,0118	0,0104	0,0027	0,0041

Table 2 Normalised Chemical Data

id	Fe ₂ O ₃	Al ₂ O ₃	TiO ₂	MgO	CaO	Na ₂ O	K ₂ O	SiO ₂	Ba	Rb	Th
TRZ101	5,92	15,19	0,69	3,19	9,29	1,25	3,61	60,70	0,0563	0,0117	0,0013
TRZ102	6,82	16,65	0,69	3,31	9,03	1,12	3,79	58,44	0,0463	0,0114	0,0013
TRZ103	6,90	16,16	0,67	3,54	10,61	1,23	3,68	57,02	0,0571	0,0135	0,0015
TRZ104	4,36	12,75	0,63	2,12	12,17	1,64	3,38	62,82	0,0287	0,0094	0,0012
TRZ105	5,93	15,44	0,69	2,99	9,87	1,36	3,47	60,08	0,0532	0,0119	0,0013
TRZ108	6,24	16,10	0,71	3,21	8,77	1,41	3,60	59,79	0,0575	0,0134	0,0015
TRZ109	6,01	15,30	0,63	3,79	12,65	1,87	2,58	56,99	0,0518	0,0093	0,0013
TRZ110	6,31	16,19	0,66	3,57	11,13	1,40	3,80	56,74	0,0559	0,0132	0,0014
TRZ112	5,94	15,57	0,62	3,57	11,97	1,36	3,70	57,08	0,0546	0,0128	0,0014
TRZ114	5,96	15,02	0,61	3,77	12,93	2,66	3,72	55,16	0,0487	0,0116	0,0014
TRZ115	6,64	16,61	0,70	3,49	11,90	1,40	3,83	55,24	0,0622	0,0138	0,0014
TRZ116	6,47	16,34	0,69	3,46	10,83	1,47	3,70	56,86	0,0584	0,0130	0,0015
TRZ117	6,37	16,52	0,68	3,30	8,39	1,45	3,62	59,51	0,0566	0,0130	0,0015
TRZ118	6,30	15,75	0,64	3,53	10,44	1,28	3,54	58,33	0,0527	0,0129	0,0013
TRZ119	6,74	16,82	0,69	3,70	11,18	1,48	3,29	55,92	0,0594	0,0123	0,0014
TRZ120	6,47	16,66	0,74	3,49	8,92	1,59	3,69	58,26	0,0591	0,0143	0,0017
TRZ121	6,75	16,77	0,67	3,83	9,45	1,24	3,47	57,65	0,0566	0,0141	0,0016
TRZ123	5,89	15,18	0,63	3,90	12,01	1,15	3,24	57,82	0,0531	0,0131	0,0012
TRZ124	6,18	15,83	0,67	4,01	10,71	1,46	3,40	57,56	0,0574	0,0140	0,0016
TRZ126	6,67	16,78	0,68	3,79	10,58	1,60	3,75	55,97	0,0549	0,0133	0,0014
TRZ127	7,02	16,21	0,66	3,68	12,96	1,29	3,10	54,84	0,1250	0,0137	0,0015
TRZ128	6,60	17,22	0,68	4,19	11,03	1,37	3,50	55,22	0,0567	0,0148	0,0017
TRZ129	6,18	15,95	0,67	3,96	10,80	1,58	3,34	57,34	0,0552	0,0138	0,0015
TRZ130	6,26	15,81	0,67	3,48	11,03	1,48	3,21	57,88	0,0665	0,0140	0,0015
TRZ131	5,69	15,04	0,63	3,56	11,05	1,66	3,13	59,08	0,0531	0,0113	0,0013
TRZ132	6,34	15,95	0,70	3,69	10,65	1,44	3,21	57,83	0,0585	0,0124	0,0015
TRZ133	6,05	16,22	0,69	3,70	8,18	1,70	3,58	59,71	0,0545	0,0121	0,0015
TRZ134	5,63	15,35	0,61	3,17	9,54	1,84	3,19	60,51	0,0588	0,0118	0,0014
TRZ135	5,94	15,25	0,63	3,87	11,15	1,07	3,06	58,85	0,0525	0,0122	0,0014
TRZ136	6,28	16,25	0,65	4,47	10,63	1,32	3,28	56,93	0,0620	0,0130	0,0014
TRZ137	6,39	16,32	0,66	3,96	9,68	1,29	3,18	58,33	0,0545	0,0125	0,0014
TRZ138	6,40	16,48	0,70	3,71	9,97	1,60	3,66	57,29	0,0607	0,0142	0,0015
TRZ139	6,15	15,80	0,67	3,76	11,43	1,56	3,11	57,35	0,0549	0,0125	0,0014
TRZ140	6,21	15,50	0,67	3,67	11,84	1,99	2,90	57,04	0,0549	0,0119	0,0012
TRZ141	6,48	16,46	0,73	3,89	10,44	1,79	2,82	57,20	0,0562	0,0129	0,0014
TRZ142	5,69	14,56	0,63	3,88	12,07	2,76	2,68	57,57	0,0495	0,0117	0,0013
TRZ143	6,73	17,05	0,73	3,91	11,06	1,48	3,55	55,30	0,0554	0,0143	0,0014
TRZ144	6,82	16,62	0,69	3,89	10,18	1,78	3,38	56,46	0,0582	0,0133	0,0015

Table 2 Normalised Chemical Data

id	Nb	Zr	Y	Sr	Ce	Ga	V	Zn	Cu	Ni	Cr
TRZ101	0,0013	0,0016	0,0168	0,0025	0,0325	0,0058	0,0017	0,0102	0,0100	0,0030	0,0042
TRZ102	0,0013	0,0013	0,0136	0,0023	0,0308	0,0050	0,0017	0,0114	0,0092	0,0030	0,0040
TRZ103	0,0015	0,0015	0,0151	0,0026	0,0492	0,0062	0,0018	0,0093	0,0101	0,0036	0,0048
TRZ104	0,0012	0,0014	0,0208	0,0027	0,0291	0,0059	0,0012	0,0118	0,0091	0,0020	0,0019
TRZ105	0,0013	0,0015	0,0164	0,0026	0,0433	0,0051	0,0017	0,0105	0,0101	0,0030	0,0042
TRZ108	0,0015	0,0016	0,0177	0,0027	0,0375	0,0084	0,0018	0,0100	0,0090	0,0033	0,0047
TRZ109	0,0013	0,0014	0,0146	0,0025	0,0484	0,0062	0,0018	0,0096	0,0105	0,0028	0,0047
TRZ110	0,0014	0,0015	0,0147	0,0025	0,0556	0,0063	0,0018	0,0106	0,0110	0,0031	0,0046
TRZ112	0,0014	0,0015	0,0152	0,0024	0,0630	0,0054	0,0018	0,0102	0,0134	0,0027	0,0046
TRZ114	0,0014	0,0013	0,0132	0,0022	0,0588	0,0050	0,0015	0,0092	0,0100	0,0030	0,0042
TRZ115	0,0014	0,0016	0,0162	0,0027	0,0538	0,0075	0,0020	0,0099	0,0106	0,0035	0,0049
TRZ116	0,0015	0,0016	0,0169	0,0025	0,0576	0,0077	0,0019	0,0088	0,0103	0,0035	0,0048
TRZ117	0,0015	0,0015	0,0167	0,0025	0,0324	0,0075	0,0018	0,0101	0,0099	0,0032	0,0049
TRZ118	0,0013	0,0014	0,0146	0,0025	0,0458	0,0071	0,0017	0,0103	0,0100	0,0025	0,0045
TRZ119	0,0014	0,0015	0,0158	0,0026	0,0437	0,0064	0,0020	0,0111	0,0109	0,0036	0,0052
TRZ120	0,0017	0,0018	0,0179	0,0027	0,0273	0,0055	0,0019	0,0098	0,0094	0,0036	0,0055
TRZ121	0,0016	0,0015	0,0156	0,0026	0,0340	0,0072	0,0021	0,0103	0,0113	0,0037	0,0051
TRZ123	0,0012	0,0016	0,0158	0,0026	0,0470	0,0051	0,0018	0,0102	0,0108	0,0031	0,0050
TRZ124	0,0016	0,0017	0,0162	0,0027	0,0313	0,0058	0,0020	0,0108	0,0116	0,0038	0,0055
TRZ126	0,0014	0,0015	0,0150	0,0026	0,0350	0,0057	0,0018	0,0111	0,0107	0,0043	0,0049
TRZ127	0,0015	0,0015	0,0144	0,0026	0,0393	0,0073	0,0019	0,0113	0,0112	0,0044	0,0059
TRZ128	0,0017	0,0017	0,0163	0,0028	0,0417	0,0074	0,0020	0,0121	0,0119	0,0038	0,0056
TRZ129	0,0015	0,0016	0,0164	0,0027	0,0415	0,0072	0,0019	0,0103	0,0118	0,0034	0,0051
TRZ130	0,0015	0,0016	0,0168	0,0028	0,0378	0,0069	0,0020	0,0103	0,0118	0,0039	0,0056
TRZ131	0,0013	0,0015	0,0160	0,0026	0,0380	0,0083	0,0016	0,0092	0,0098	0,0031	0,0044
TRZ132	0,0016	0,0157	0,0025	0,0362	0,0072	0,0018	0,0103	0,0102	0,0035	0,0048	0,0074
TRZ133	0,0016	0,0162	0,0027	0,0402	0,0059	0,0017	0,0107	0,0100	0,0024	0,0045	0,0076
TRZ134	0,0015	0,0151	0,0025	0,0404	0,0072	0,0018	0,0086	0,0090	0,0037	0,0044	0,0067
TRZ135	0,0015	0,0148	0,0024	0,0457	0,0060	0,0016	0,0107	0,0104	0,0036	0,0048	0,0071
TRZ136	0,0016	0,0153	0,0026	0,0428	0,0078	0,0018	0,0107	0,0112	0,0038	0,0051	0,0075
TRZ137	0,0016	0,0150	0,0025	0,0527	0,0073	0,0018	0,0113	0,0117	0,0036	0,0052	0,0080
TRZ138	0,0016	0,0169	0,0027	0,0378	0,0066	0,0019	0,0114	0,0109	0,0034	0,0054	0,0098
TRZ139	0,0015	0,0158	0,0027	0,0359	0,0065	0,0017	0,0101	0,0102	0,0033	0,0050	0,0070
TRZ140	0,0015	0,0159	0,0027	0,0389	0,0049	0,0017	0,0106	0,0094	0,0045	0,0049	0,0073
TRZ141	0,0017	0,0179	0,0029	0,0389	0,0055	0,0020	0,0099	0,0112	0,0038	0,0052	0,0073
TRZ142	0,0014	0,0150	0,0025	0,0421	0,0054	0,0016	0,0089	0,0094	0,0034	0,0045	0,0067
TRZ143	0,0016	0,0165	0,0028	0,0390	0,0081	0,0019	0,0120	0,0109	0,0033	0,0053	0,0080
TRZ144	0,0015	0,0151	0,0026	0,0346	0,0074	0,0020	0,0108	0,0103	0,0037	0,0054	0,0076

Table 3: Compositional Variation Matrix without considering: Mo, Sn, Co, W, P₂O₅ and Pb

el	Fe2O3	Al2O3	TiO2	MgO	CaO	Na2O	K2O	SiO2	Ba	Rb	Th	Nb	Zr
Fe2O3	0,0000	0,0011	0,0025	0,0131	0,0222	0,0415	0,0142	0,0068	0,0211	0,0112	0,0107	0,0064	0,0096
Al2O3	0,0011	0,0000	0,0014	0,0115	0,0197	0,0382	0,0108	0,0034	0,0222	0,0094	0,0086	0,0036	0,0062
TiO2	0,0025	0,0014	0,0000	0,0147	0,0206	0,0365	0,0122	0,0030	0,0237	0,0122	0,0105	0,0034	0,0035
MgO	0,0131	0,0115	0,0147	0,0000	0,0179	0,0429	0,0275	0,0164	0,0369	0,0224	0,0132	0,0117	0,0202
CaO	0,0222	0,0197	0,0206	0,0179	0,0000	0,0449	0,0364	0,0179	0,0415	0,0330	0,0198	0,0167	0,0202
Na2O	0,0415	0,0382	0,0365	0,0429	0,0449	0,0000	0,0566	0,0354	0,0720	0,0592	0,0392	0,0347	0,0345
K2O	0,0142	0,0108	0,0122	0,0275	0,0364	0,0566	0,0000	0,0117	0,0373	0,0075	0,0201	0,0140	0,0161
SiO2	0,0068	0,0034	0,0030	0,0164	0,0179	0,0354	0,0117	0,0000	0,0248	0,0136	0,0115	0,0038	0,0031
Ba	0,0211	0,0222	0,0237	0,0369	0,0415	0,0720	0,0373	0,0248	0,0000	0,0265	0,0289	0,0231	0,0274
Rb	0,0112	0,0094	0,0122	0,0224	0,0330	0,0592	0,0075	0,0136	0,0265	0,0000	0,0148	0,0113	0,0158
Th	0,0107	0,0086	0,0105	0,0132	0,0198	0,0392	0,0201	0,0115	0,0289	0,0148	0,0000	0,0068	0,0129
Nb	0,0064	0,0036	0,0034	0,0117	0,0167	0,0347	0,0140	0,0038	0,0231	0,0113	0,0068	0,0000	0,0039
Zr	0,0096	0,0062	0,0035	0,0202	0,0202	0,0345	0,0161	0,0031	0,0274	0,0158	0,0129	0,0039	0,0000
Y	0,0112	0,0077	0,0069	0,0113	0,0155	0,0344	0,0174	0,0071	0,0313	0,0167	0,0078	0,0030	0,0066
Sr	0,0313	0,0285	0,0300	0,0361	0,0340	0,0627	0,0291	0,0265	0,0423	0,0347	0,0399	0,0284	0,0314
Ce	0,0291	0,0267	0,0278	0,0383	0,0416	0,0604	0,0388	0,0281	0,0452	0,0346	0,0305	0,0263	0,0262
Ga	0,0167	0,0138	0,0164	0,0106	0,0232	0,0426	0,0248	0,0176	0,0363	0,0218	0,0091	0,0092	0,0196
V	0,0061	0,0040	0,0044	0,0164	0,0210	0,0437	0,0126	0,0057	0,0276	0,0128	0,0124	0,0061	0,0074
Zn	0,0091	0,0074	0,0095	0,0094	0,0119	0,0434	0,0207	0,0099	0,0289	0,0159	0,0091	0,0067	0,0110
Cu	0,0162	0,0177	0,0192	0,0182	0,0267	0,0542	0,0394	0,0241	0,0251	0,0263	0,0192	0,0168	0,0239
Ni	0,0085	0,0097	0,0133	0,0101	0,0268	0,0457	0,0273	0,0189	0,0236	0,0163	0,0121	0,0106	0,0212
Cr	0,0076	0,0047	0,0054	0,0105	0,0210	0,0371	0,0137	0,0066	0,0298	0,0131	0,0074	0,0033	0,0079
t.i	0,2961	0,2564	0,2770	0,4093	0,3035	0,9596	0,3881	0,2958	0,6757	0,4290	0,3444	0,2497	0,3288
vt/t.i	0,7389	0,8534	0,7899	0,5346	0,4198	0,2280	0,3832	0,7397	0,3238	0,5100	0,6353	0,8762	0,6655
r v,t	0,9642	0,9792	0,9675	0,9097	0,8838	0,8762	0,8238	0,9376	0,8767	0,9058	0,9647	0,9928	0,9261
vt	0,2188												

el	Y	Sr	Ce	Ga	V	Zn	Cu	Ni	Cr
Fe2O3	0,0112	0,0313	0,0291	0,0167	0,0061	0,0091	0,0162	0,0085	0,0076
Al2O3	0,0077	0,0285	0,0267	0,0138	0,0040	0,0074	0,0177	0,0097	0,0047
TiO2	0,0069	0,0300	0,0278	0,0164	0,0044	0,0095	0,0192	0,0133	0,0054
MgO	0,0113	0,0361	0,0383	0,0106	0,0164	0,0094	0,0182	0,0101	0,0105
CaO	0,0155	0,0340	0,0416	0,0232	0,0210	0,0119	0,0267	0,0268	0,0210
Na2O	0,0344	0,0627	0,0604	0,0426	0,0437	0,0434	0,0542	0,0457	0,0371
K2O	0,0174	0,0291	0,0388	0,0248	0,0126	0,0207	0,0394	0,0273	0,0137
SiO2	0,0071	0,0265	0,0281	0,0176	0,0057	0,0099	0,0241	0,0189	0,0066
Ba	0,0313	0,0423	0,0452	0,0363	0,0276	0,0289	0,0251	0,0236	0,0298
Rb	0,0167	0,0347	0,0346	0,0218	0,0128	0,0159	0,0263	0,0163	0,0131
Th	0,0078	0,0399	0,0305	0,0091	0,0124	0,0091	0,0192	0,0121	0,0074
Nb	0,0030	0,0284	0,0263	0,0092	0,0061	0,0067	0,0168	0,0106	0,0033
Zr	0,0066	0,0314	0,0262	0,0196	0,0074	0,0110	0,0239	0,0212	0,0079
Y	0,0000	0,0323	0,0295	0,0057	0,0084	0,0076	0,0188	0,0142	0,0039
Sr	0,0323	0,0000	0,0531	0,0411	0,0325	0,0291	0,0497	0,0401	0,0334
Ce	0,0295	0,0531	0,0000	0,0376	0,0292	0,0286	0,0430	0,0371	0,0301
Ga	0,0057	0,0411	0,0376	0,0000	0,0173	0,0117	0,0195	0,0113	0,0073
V	0,0084	0,0325	0,0292	0,0173	0,0000	0,0096	0,0249	0,0170	0,0055
Zn	0,0076	0,0291	0,0286	0,0117	0,0096	0,0000	0,0171	0,0132	0,0083
Cu	0,0188	0,0497	0,0430	0,0195	0,0249	0,0171	0,0000	0,0133	0,0196
Ni	0,0142	0,0401	0,0371	0,0113	0,0170	0,0132	0,0133	0,0000	0,0115
Cr	0,0039	0,0334	0,0301	0,0073	0,0055	0,0083	0,0196	0,0115	0,0000
t.i	0,2973	0,7664	0,7420	0,4133	0,3245	0,3181	0,8338	0,4019	0,2877
vt/t.i	0,7359	0,2855	0,2948	0,5294	0,6743	0,6878	0,4168	0,5443	0,7605
r v,t	0,9525	0,8722	0,9786	0,9086	0,9745	0,9634	0,8718	0,8877	0,9792

To continue the statistical treatment the chemical data were transformed into logratios following the consideration of Aitchison (1986) and Buxeda (1999) on compositional data, according to the following equation:

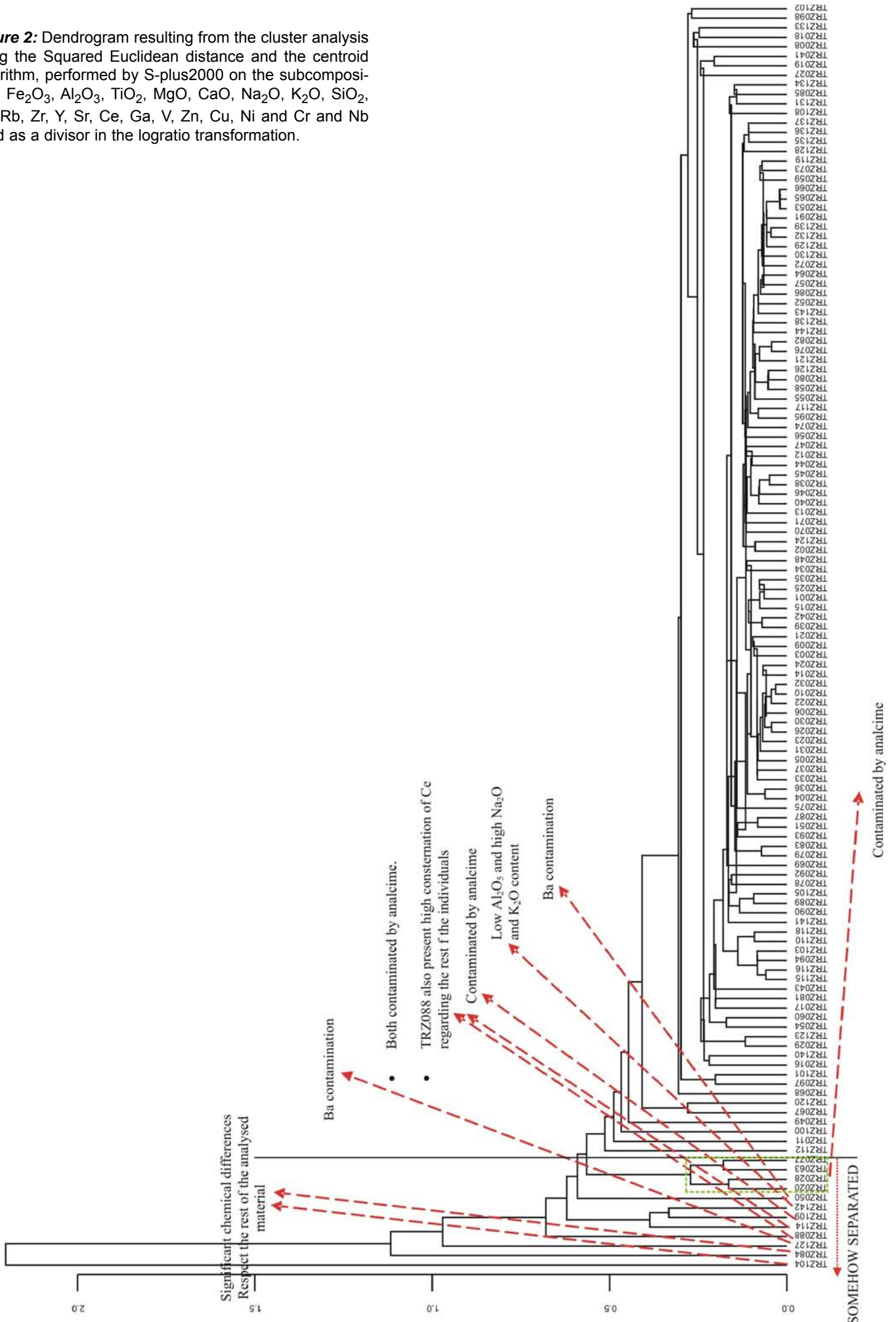
$$\mathbf{x} \in S^d \rightarrow \mathbf{y} = \log\left(\frac{\mathbf{x}_{-D}}{x_D}\right) \in R^d$$

where S^d is a d-dimensional simplex ($d=D-1$) and $\mathbf{x}_{-D}=(x_1, \dots, x_d)$. The components Mo, Sn, Co and W were not considered during this transformation due to possible analytical imprecision and possible contamination during the sample preparation process. Finally, P_2O_5 and Pb were not used during this transformation either, because of possible postdepositional contamination. The logratio transformation was performed on the subcomposition: Fe_2O_3 , Al_2O_3 , TiO_2 , MgO , CaO , Na_2O , K_2O , SiO_2 , Ba, Rb, Zr, Y, Sr, Ce, Ga, V, Zn, Cu, Ni and Cr where Nb was used as divisor, as according to the CVM (Table 3) it was the element less contributing to the chemical variability (Buxeda and Kilikoglou 2003). The chemical results are summarized in the dendrogram of Figure 2, resulting from the cluster analysis performed on the previous subcomposition, using the Squared Euclidean distance and the centroid algorithm, performed by S-plus2000 (MathSoft, 1999).

The individuals located at the left site of the dendrogram (separated by a line from the rest) according to this agglomerative analysis seem to separate from the rest of the analysed ceramics. This indicates that these individuals must present significant chemical differences from the rest. By looking at the chemical data some of the differences in some individuals can be explained by the presence of post-depositional alteration and/or contamination. Consequently, TRZ127 and TRZ142 are located in an extreme position because of their unusually high Ba content which possibly indicates some kind of post-depositional contamination and/or alteration. On the other hand, TRZ114, TRZ109, TRZ050, TRZ020, TRZ028, TRZ063 and TRZ077 have lower concentrations in K_2O and Rb and higher concentrations in Na_2O than the rest of the individuals. This is a chemical indication normally related to a postdepositional alteration or/and contamination present in a high fired calcareous pottery. This phenomenon normally evidenced by the leaching of K^{2+} and Rb^{2+} from the amorphous glassy face and the accumulation of Na^{2+} coming from the surrounding burial area. The accumulation of Na^{2+} in the ceramic body finally leads to the formation of a zeolithe called analcyme ($Na_2AlSi_2O_6 \times H_2O$) into the pores and it can be easily detected by X ray Diffraction. Finally, the only individuals that can be chemically distinguished by the rest of the studied ceramics owed to significant chemical differences, which can not be related to any kind of alteration and/or contamination, are the following ones: TRZ104, TRZ084, TRZ088 and TRZ142. Based upon their chemical composition (Table 2) these individuals can be considered as chemical loners, although they still preserve some kind of chemical similarities regarding to the rest of the analysed material, thus the raw materials used for their manufacture could be related to the same geochemical or geological background, in another words the source of their raw materials can be located at areas with similar geological characteristics.

Repeating the same statistical routine without considering Na_2O , K_2O , Ba and Rb beside the elements that already have been taken out in previous steps from the multivariate analysis (like Mo, Sn, Co, W, P_2O_5 and Pb) and leaving out also the individuals TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 (chemical loners) from this treatment, one can observe that vt of the new CVM is much more lower, in fact is equal to: 0.12. A total variation of that range indicates a very homogeneous data set. In chemical terms it would correspond to a monogenic data set (Buxeda and Kilikoglou 2003) representing probably one single production. However, this range of vt, in geochemical terms can point towards the same or very similar geochemical origin of the raw materials used for the production of all the analysed individuals, without this necessarily meaning that all of them belong into the same production.

Figure 2: Dendrogram resulting from the cluster analysis using the Squared Euclidean distance and the centroid algorithm, performed by S-plus2000 on the subcomposition: Fe₂O₃, Al₂O₃, TiO₂, MgO, CaO, Na₂O, K₂O, SiO₂, Ba, Rb, Zr, Y, Sr, Ce, Ga, V, Zn, Cu, Ni and Cr and Nb used as a divisor in the logratio transformation.



To visualize the results of the last statistical treatment we present a new dendrogram in Figure 3 resulting from the cluster analysis performed on the new subcomposition, using the Squared Euclidean distance and the centroid algorithm, done by S-plus2000 (MathSoft, 1999). Keeping in mind the very low total variation though in this dendrogram one group can be distinguished in which the individuals linked together in a very small ultra-metrical distance regarding to the rest of the individuals situated to the right and to the left from this same group. This means that there might be some chemical differences even though not very significant between the grouped and ungrouped individuals. To crosscheck the above hypothesis, due to the large number of the individuals located inside the group we calculated the Mahalanobis distances regarding to the centroid of this group, without considering the chemical elements which are contaminated or altered (Mo, Sn, Co, W, P₂O₅, Pb Na₂O, K₂O, Ba and Rb) (Buxeda i Cau, 1997) according to the following equation:

$$D^2 = (\mathbf{y} - \boldsymbol{\mu}) \boldsymbol{\Sigma}^{-1} (\mathbf{y} - \boldsymbol{\mu})$$

where \mathbf{y} vector defined on the logratio transformed data (with all the individuals), $\boldsymbol{\mu}$ is the vector of the means of the logratios of the group (only individuals belong to the group) and $\boldsymbol{\Sigma}^{-1}$ is the reverse of the variance-covariance matrix calculated on the logratio transformed data. The significance of these distances can be calculated via the equation of Hotelling (Davis 1986):

$$T^2 = \frac{n_a n_b}{n_a + n_b} D^2$$

where n_a corresponds to the number of the individuals in \mathbf{y} and n_b to number of individuals considered as a part of the group. T^2 then can be transformed to F by the equation:

$$F = \left(\frac{n_a + n_b - s - 1}{(n_a + n_b - 2)s} \right) T^2$$

from where the probabilities of the different individuals belonging or not to the group can be calculated. In Table 4, Mahalanobis distances and probabilities have been calculated without considering the individuals: TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 and the following elements: Mo, Sn, Co, W, P₂O₅, Pb Na₂O, K₂O, Ba and Rb.

Observing both results of the Squared Euclidean distances and the centroid algorithm and the Mahalanobis distances one can observe some differences considering the individuals which do not belong to the group marked with a red rectangle in Figure 3. According to the Squared Euclidean distances there are more individuals which somehow differ chemically from the individuals of the group than based on the Mahalanobis distances. Crosschecking the chemical data (Table 2) with cautiousness, one can observe that the individuals pointed out by both statistical treatments are the ones having some chemical differences, for insignificant they might be, regarding to chemical composition of the individuals belong to the group. TRZ120 has a slightly higher concentration in Nb and lower in Sr. TRZ011 presents a little bit less Zr and TRZ008 slightly lower Cu content. TRZ027 has apparently higher Ga concentration and together with TRZ100 present less Cu content in their composition. TRZ112 presents small differences in its Zn, Cu and Cr content than the individuals located inside the red rectangle in Figure 3. The only difference of TRZ115, TRZ116 TRZ110 and TRZ118 regarding the individuals within the red rectangle is slightly higher Sr concentrations. TRZ109 present a smaller quantity of Cr.

Figure 3: Dendrogram resulting from the cluster analysis using the Squared Euclidean distance and the centroid algorithm, performed by S-plus2000 on the subcomposition: Fe₂O₃, Al₂O₃, TiO₂, MgO, CaO, SiO₂, Zr, Y, Sr, Ce, Ga, V, Zn, Cu, Ni and Cr and Nb used as a divisor in the logratio transformation and without including the individuals TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 in the analysis.

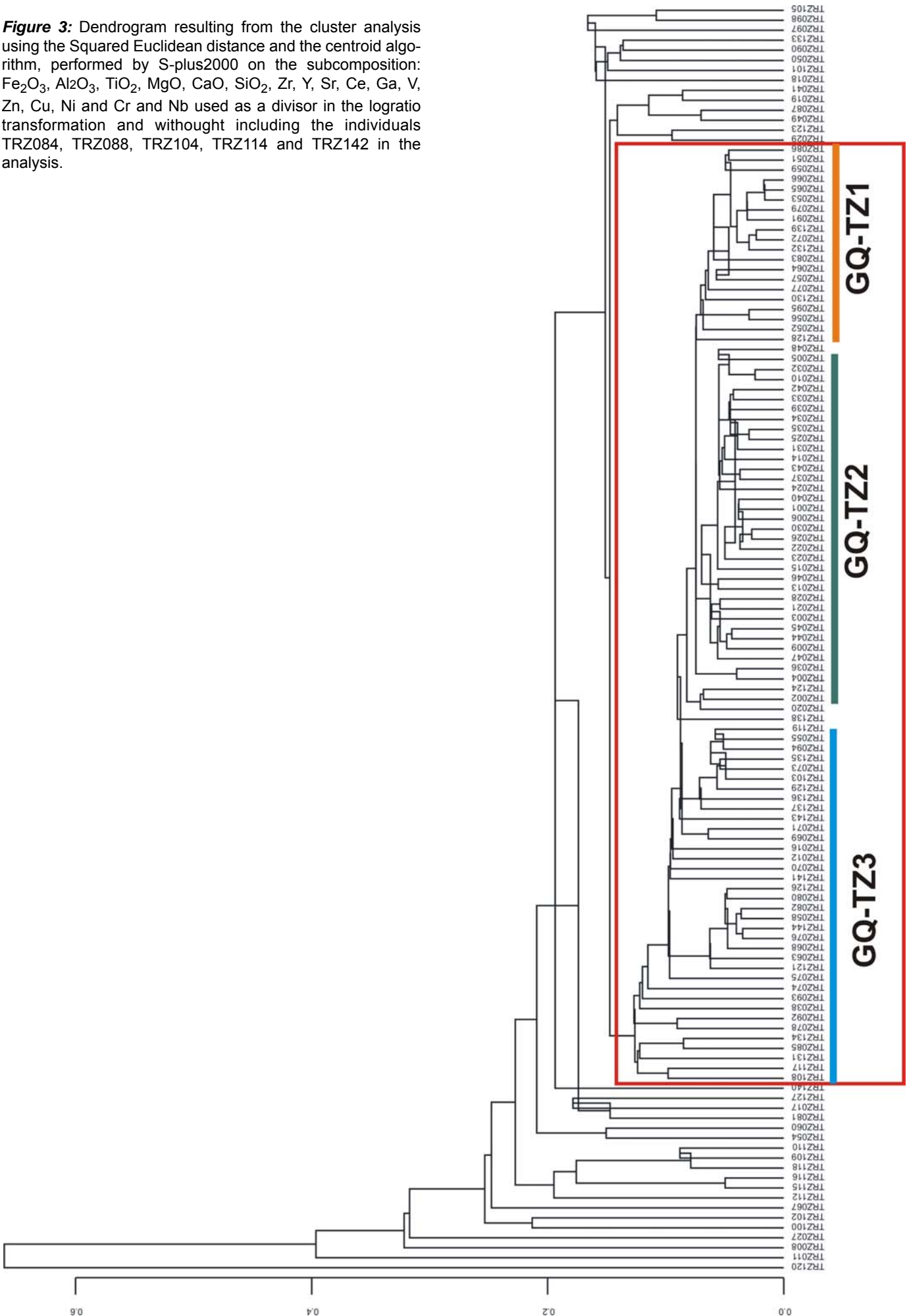


Table 4: Mahalanobis distances and probabilities calculated without considering the individuals: TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 and the following elements: Mo, Sn, Co, W, P₂O₅, Pb Na₂O, K₂O, Ba and Rb.

individus	Dist.Maha.	Prob.
TRZ040	7,2099	0,9915
TRZ022	7,2687	0,9911
TRZ065	7,4944	0,9894
TRZ058	7,7068	0,9877
TRZ091	7,9019	0,9859
TRZ066	8,0286	0,9847
TRZ139	8,2318	0,9825
TRZ144	8,3110	0,9816
TRZ001	8,5112	0,9792
TRZ053	9,0409	0,9718
TRZ076	9,2414	0,9685
TRZ086	9,2433	0,9685
TRZ036	9,3844	0,9661
TRZ079	9,6727	0,9607
TRZ010	10,1609	0,9505
TRZ073	10,4985	0,9426
TRZ026	10,5698	0,9408
TRZ033	10,8773	0,9327
TRZ035	11,1862	0,9241
TRZ003	11,2468	0,9223
TRZ132	11,3048	0,9206
TRZ082	11,7183	0,9076
TRZ023	11,7346	0,9071
TRZ025	12,1293	0,8937
TRZ030	12,6453	0,8747
TRZ042	12,9226	0,8639
TRZ021	12,9844	0,8614
TRZ014	13,0311	0,8595
TRZ048	13,1697	0,8539
TRZ037	13,3912	0,8446
TRZ064	13,4178	0,8435
TRZ032	13,4218	0,8433
TRZ129	13,4858	0,8406
TRZ013	13,4974	0,8401
TRZ057	13,9394	0,8206
TRZ031	13,9522	0,8200
TRZ034	14,1443	0,8113
TRZ006	14,2570	0,8061
TRZ072	14,9290	0,7739
TRZ063	14,9938	0,7707
TRZ045	15,4089	0,7500
TRZ044	15,5064	0,7450
TRZ051	15,7403	0,7330
TRZ024	16,0565	0,7166
TRZ080	16,0579	0,7165
TRZ075	16,1061	0,7140
TRZ009	16,2892	0,7044
TRZ136	16,3384	0,7018
TRZ068	16,4278	0,6971
TRZ095	16,4524	0,6958
TRZ047	16,5028	0,6931
TRZ078	16,6020	0,6878
TRZ005	16,9299	0,6703
TRZ119	17,1734	0,6572
TRZ059	17,2281	0,6543
TRZ028	17,2768	0,6517
TRZ029	17,5673	0,6360
TRZ143	17,8185	0,6224
TRZ094	17,8488	0,6208
TRZ071	18,2549	0,5988
TRZ052	18,3750	0,5923

individus	Dist.Maha.	Prob.
TRZ052	18,3750	0,5923
TRZ039	18,5039	0,5854
TRZ124	18,6530	0,5774
TRZ093	18,6719	0,5763
TRZ077	18,8375	0,5675
TRZ074	18,9371	0,5621
TRZ055	19,0020	0,5587
TRZ083	19,1207	0,5523
TRZ046	19,4000	0,5375
TRZ016	19,4788	0,5333
TRZ002	19,8412	0,5143
TRZ019	20,2062	0,4954
TRZ070	20,3235	0,4894
TRZ108	20,6428	0,4732
TRZ135	20,7000	0,4703
TRZ117	21,3549	0,4379
TRZ056	21,5919	0,4264
TRZ121	21,7695	0,4179
TRZ131	22,0233	0,4060
TRZ141	22,7093	0,3746
TRZ012	22,8315	0,3692
TRZ126	23,3195	0,3481
TRZ020	23,9380	0,3224
TRZ137	24,2012	0,3118
TRZ092	24,2138	0,3113
TRZ043	24,4040	0,3039
TRZ038	24,4189	0,3033
TRZ004	24,9550	0,2830
TRZ018	25,0468	0,2797
TRZ130	25,0876	0,2782
TRZ087	25,1002	0,2777
TRZ069	25,8691	0,2507
TRZ085	27,2742	0,2067
TRZ050	27,4462	0,2017
TRZ128	27,4974	0,2003
TRZ015	29,6587	0,1464
TRZ123	29,8565	0,1421
TRZ134	29,9660	0,1398
TRZ067	30,5036	0,1289
TRZ081	31,6591	0,1080
TRZ017	32,1006	0,1009
TRZ140	33,0351	0,0871
TRZ041	34,4335	0,0697
TRZ103	36,2566	0,0517
TRZ110	39,7448	0,0288
TRZ118	40,0296	0,0274
TRZ115	43,9176	0,0140
TRZ049	44,1406	0,0135
TRZ101	44,2456	0,0132
TRZ090	44,2960	0,0131
TRZ138	44,2968	0,0131
TRZ109	45,7308	0,0102
TRZ127	49,1947	0,0055
TRZ105	51,7974	0,0035
TRZ133	58,5592	0,0010
TRZ098	59,3977	0,0009
TRZ008	59,7934	0,0008
TRZ116	61,3238	0,0006
TRZ011	68,8793	0,0002
TRZ120	68,9712	0,0002
TRZ054	72,1619	0,0001
TRZ027	73,2842	0,0001
TRZ102	77,4833	0,0000
TRZ100	80,2182	0,0000
TRZ060	84,5985	0,0000
TRZ112	113,6811	0,0000
TRZ097	114,9484	0,0000

TRZ054 has little bit less Cu content and TRZ060 presents very small differences in Th, Cu and Cr. TRZ127 a part having contaminated Ba also has a slightly lower Zr content TRZ029, TRZ123, TRZ087, TRZ019 and TRZ040 are separated from the group due to slightly lower Ce concentrations. TRZ101 TRZ105 and TRZ 090 present a vaguely lower Ni content. Finally TRZ133 and TRZ097 almost indistinctly lower Cu and Ni consternations. All these chemical differences, observing the absolute chemical values (Table 2), still can not be considered so important or significant than one could clearly state that these individuals do not belong to the same chemical group than the rest of the analysed material.

Finally, the chemical results point towards the same or very similar geochemical origin of the raw materials used for the production of all the analysed individuals except five: TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 that present significant chemical differences regarding the rest of the analysed material. This might probably mean the existence of one single production. Nonetheless, further archaeometrical work is needed to confirm this hypothesis. First of all, we consider important to include a complete petrographical analysis in the study in the near future. The petrographical study can generate important information on the origin of the raw material used for the fabrication of the analysed ceramics and on significant technological aspects, which might let us know if there is a possibility to have different productions on the site and if it is possible, then to differentiate these productions. On the other hand, if the petrographical study confirms the chemical results, then we are facing the case of the existence of one single production on the site. In archaeological terms this would mean the persistence of the same ceramic tradition at Termez during several centuries and the imposition of the local technological tradition, even though there are cultural and political changes in the site during these centuries.

Mineralogical results

The technological aspects of the analysed material have been studied by XRD analysis. From the beginning, it is important to point out that, the analysed ceramic material has a calcareous character ($\text{CaO} > 5-6\%$). This CaO proportions owed basically to the presence of calcium carbonates facilitate the formation of calco- and aluminosilicates during the firing process and the formation of a characteristic cellular microstructure proportioning specific physical properties to the material (Maniatis *et al.*, 1981; Tite *et al.*, 1982).

According to the mineralogical analysis, the analysed material can be separate into four basic mineralogical fabrics. The first fabric F_1 (Figure 4) is characterised basically by the presence of primary minerals (present in the ceramics before firing) and the absence of clear firing phases. Therefore the Equivalent Firing Temperature (EFT) estimated for this group is around the $800/850^\circ\text{C}$, so it corresponds to a low fired material. The minerals present in this fabric are: calcite, quartz, illite-muscovite, microcline and plagioclase and it contains nine individuals: TRZ050, TRZ039, TRZ042, TRZ80, TRZ089, TRZ102, TRZ104, TRZ137 and TRZ088.

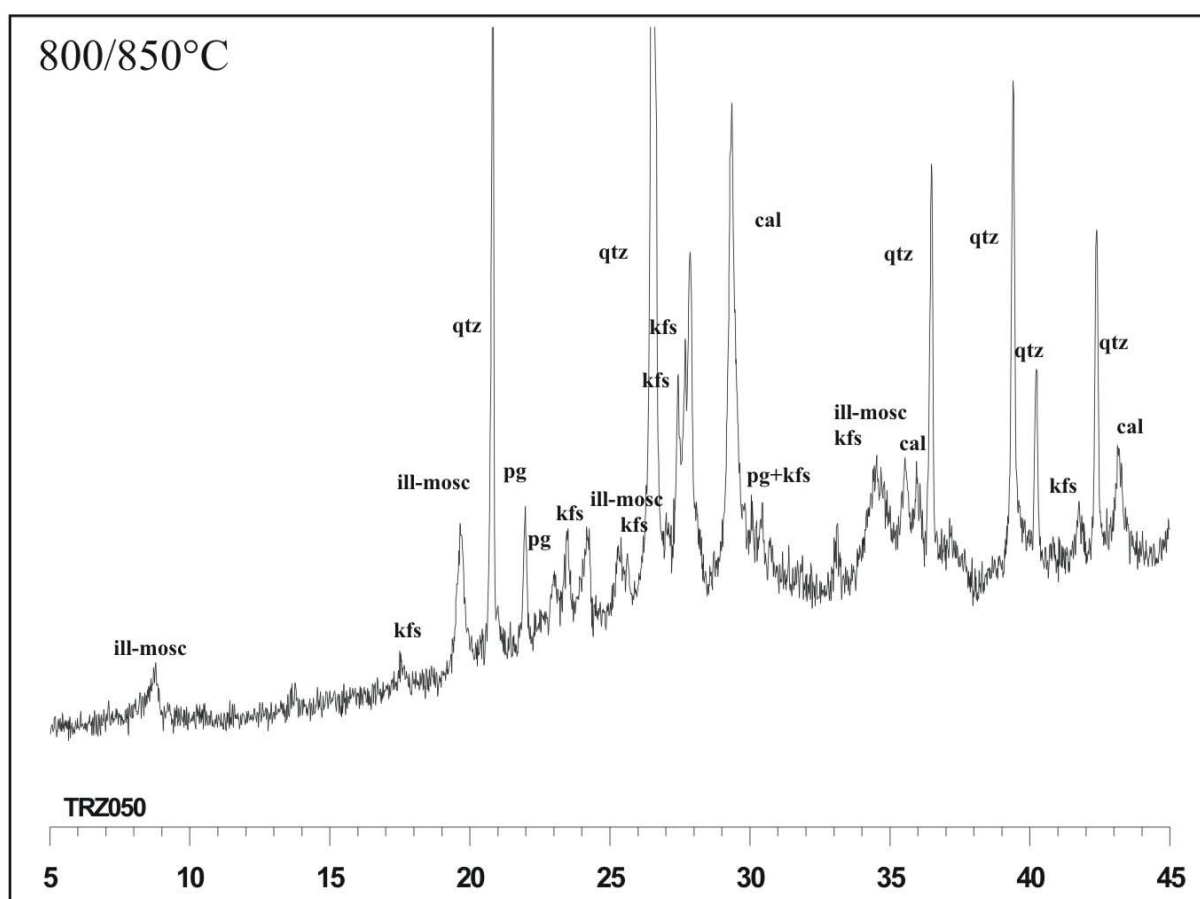


Figure 4: Diffractogram of the individual TRZ050, representing F_1

The second mineralogical fabric: F_2 (Figure 5) is configured by the following individuals: TRZ049, TRZ054, TRZ055, TRZ064, TRZ084, TRZ085, TRZ086, TRZ103, TRZ105, TRZ108, TRZ110, TRZ112, TRZ114, TRZ118, TRZ135, TRZ138 and TRZ144. In the diffractogram of this individual it can be observed that, beside the above mentioned mineral phases there is also a gehlenite in its initial phase of formation. Gehlenite is a clear firing phase, that is why the EFT of this fabric is slightly higher that of the previous one. It can be estimated around $850/900^\circ\text{C}$.

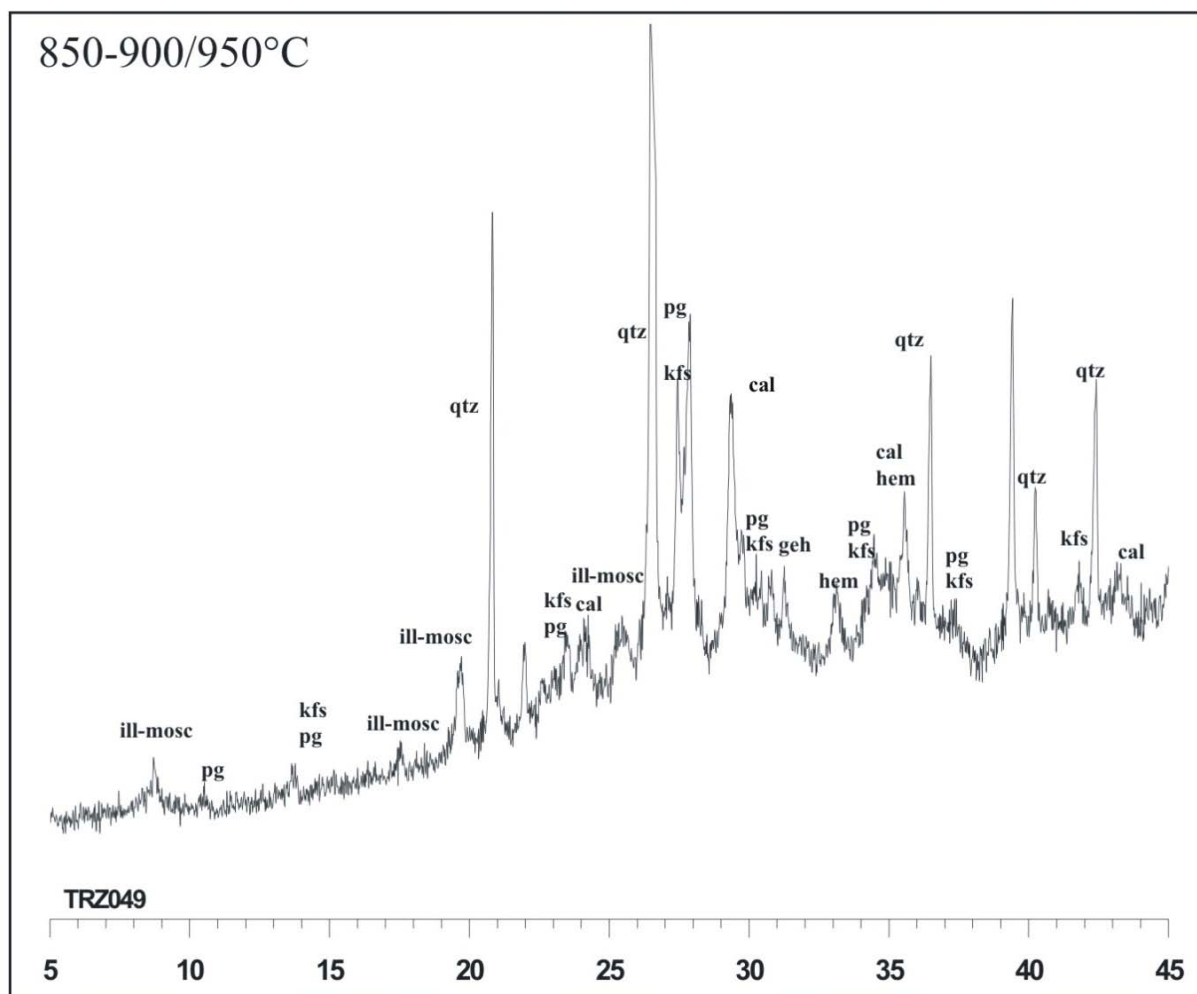


Figure 5: Diffractogram of the individual TRZ049, representing F₂

In the third fabric, F₃ (Figure 6), primary phases, like illite-muscovite and potassium feldspars, and clear firing phases, like gehlenite and pyroxenes appears together in the diffractogram of the individuals belong to this fabric (TRZ003, TRZ005, TRZ006, TRZ007, TRZ013, TRZ019, TRZ022, TRZ023, TRZ024, TRZ028, TRZ031, TRZ053, TRZ065, TRZ066, TRZ070, TRZ078, TRZ092, TRZ115, TRZ126, TRZ129, TRZ133, TRZ142 and TRZ143). Therefore, the EFT estimated for this fabric is between 900/950°C and 1000°C.

Finally, the last fabric F₄, is characterised by the partial decomposition of illite-muscovite, calcite and gehlenite and the clear increment of the pyroxenes as a firing phases of a high temperature (Figure 7). Consequently, this fabric represents over fired ceramics, as the ETF can be estimated over 1000/1050°C and it includes the rest of the individuals (TRZ001, TRZ002, TRZ003, TRZ004, TRZ008, TRZ010, TRZ011, TRZ012, TRZ015, TRZ016, TRZ017, TRZ018, TRZ021, TRZ026, TRZ027, TRZ029, TRZ032, TRZ033, TRZ034, TRZ035, TRZ036, TRZ038, TRZ040, TRZ041, TRZ043, TRZ044, TRZ045, TRZ047, TRZ048, TRZ059, TRZ060, TRZ067, TRZ072, TRZ073, TRZ074, TRZ075, TRZ076, TRZ081, TRZ082, TRZ087, TRZ90, TRZ091, TRZ093, TRZ094, TRZ095, TRZ116, TRZ120, TRZ121, TRZ124, TRZ127, TRZ128, TRZ030, TRZ131, TRZ032, TRZ134, TRZ136, TRZ139). Some of them (TRZ020, TRZ028, TRZ030, TRZ037, TRZ056, TRZ063, TRZ068, TRZ071, TRZ077, TRZ079, TRZ083, TRZ109, TRZ119, TRZ140 and TRZ142) present also analcyme in their diffractogram (Figure 8). Analcyme, as it has been described before, is a zeolith which forms as a result of a postdepositional alteration and/or contamination in the pores of a normally high fired calcareous ceramics. The presence of analcyme justifies the lower concentrations of K₂O and Rb and higher concentrations of Na₂O in these two individuals.

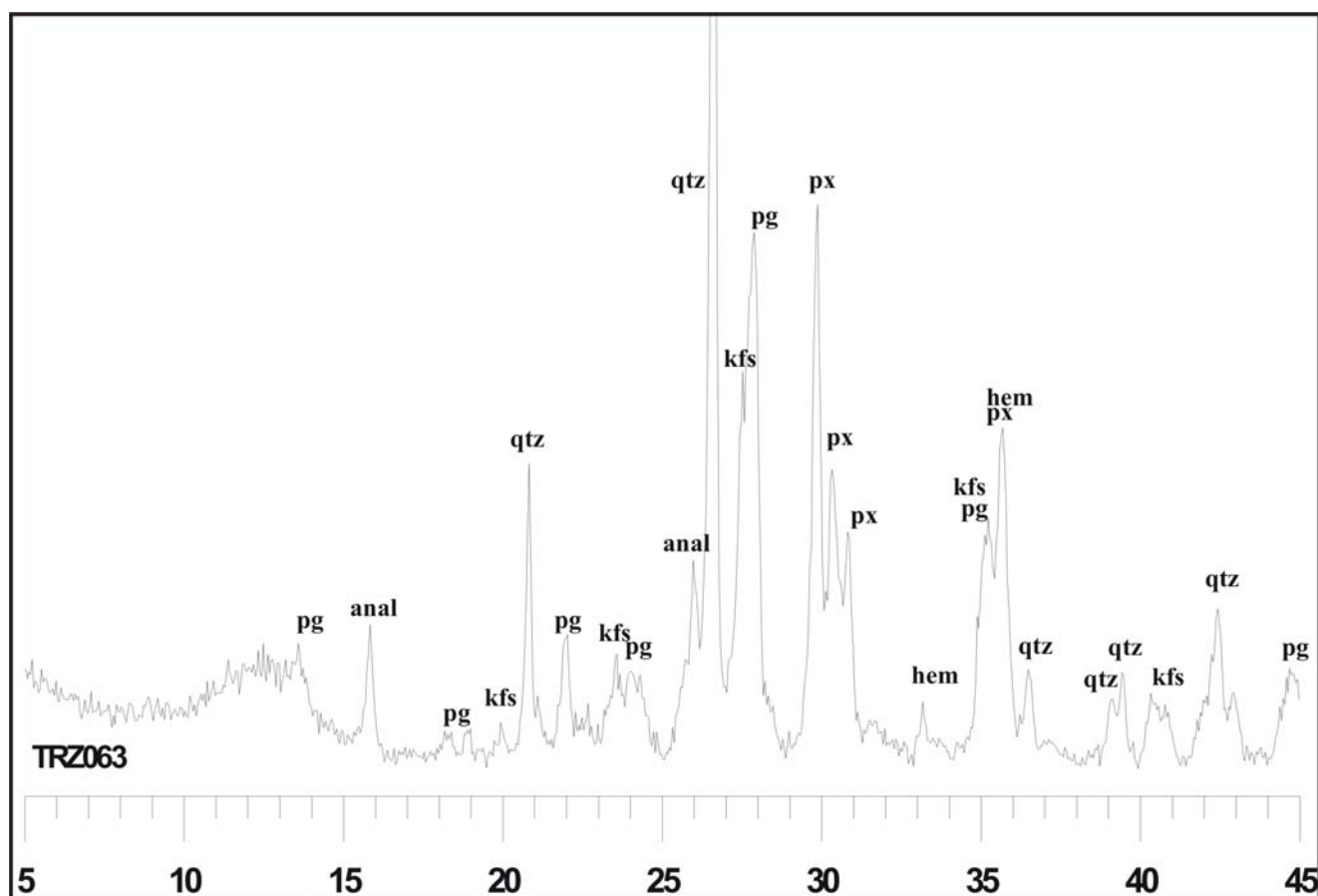


Figure 8: Diffractogram of the individual TRZ063, representing F₄ with analcyme

It is important to mention that in all the mineralogical fabrics the presence of hematite is obvious. Hematite is an iron oxide which develops under preferably oxidising atmospheres. Another observation can be made is that during firing in ancient kilns the firing temperature in the laboratory can vary $\pm 150^{\circ}\text{C}$ depending on the position of the ceramic. Specifically, the temperature is always higher in the central part of the kiln. Thus, an ETC estimated in between approximately 850°C and 1000°C , can represent the same firing procedure. That is why, in the case of the Kushan ceramic analysed, sampled at the kiln site of *Kara Tepe*, we can say that even though, there are four different mineralogical fabrics determined according to the mineral phases identified, the process of manufacture of this ceramics is very constant and generally they represent a well/high fired ceramic material.

Results of the study by Scanning Electron Microscopy and EDAX

Firing process (firing temperature and atmosphere) introduces important changes to the microstructure of the ceramic matrix (Maniatis *et al.*, 1981; Tite *et al.*, 1982). With the increment of the temperature the sinterisation process starts (the clay particles start to “fuse” together). This progressively leads to the vitrification of the matrix. On the other hand, the microstructure which develops in calcareous ceramics is different than in the border or low calcareous ones. Generally, in calcareous ceramics, the excess in CO_2 produced by the decomposition of the carbonates, normally leads to the development of a cellular microstructure, opposite to the low calcareous pottery where the vitrified phase is normally compact and continuous. The microstructure affects significantly the physical and mechanical properties of the fired product, thus the adequacy of a pottery to a concrete function among other aspects depends directly on its microstructure.

The results of SEM are given according to the observations of the fresh fractures of one characteristic individual selected for each mineralogical fabric, estimated by XRD. Microphotographs of a Secondary Electron (SE) image at 2000x magnification are presented in each case.

TRZ050 (TZ06KTHP3E1) is the individual representing the first mineralogical fabric studied by SEM-EDAX. According to XRD this is the lowest fired individual in the whole set of the analyzed material. The microphotograph (x2000) of the Figure 9 shows a non vitrified microstructure, which indicates a firing temperature that does not exceed the 750/800°C. The chemical microanalysis by EDAX upon some surface areas also revealed the presence of NaCl crystals. The precipitation of NaCl crystals was confirmed in the most of the samples analyzed by SEM-EDAX, as we will see following. The high Na concentration in the whole data set can be confirmed by observing the raw chemical data (Table 2). This high concentration of Na, though, only can be related to the presence of analcyme as a secondary mineral formed during postdeposition in two cases (TRZ020 and TRZ028). Therefore, the generally high concentrations in Na in the rest of the individuals might be explained by the presence of these NaCl crystals. The presence of these crystals, most likely, can be the result of postdepositional alteration and/or contamination due to the high concentrations of NaCl in the specific geographical area where the ceramics were discovered. In the deserts the high salt concentrations are ordinary and that can be the reason for this specific alteration and/or contamination process. Additionally, the formation of a zeolithe called analcyme ($\text{Na}_2\text{AlSi}_2\text{O}_6 \times \text{H}_2\text{O}$) in the higher fired ceramics, then, can be a consequence of this NaCl presence, which led to the leaching of K^{2+} and Rb^{2+} from the amorphous glassy face of the ceramic and the accumulation of Na^{2+} .

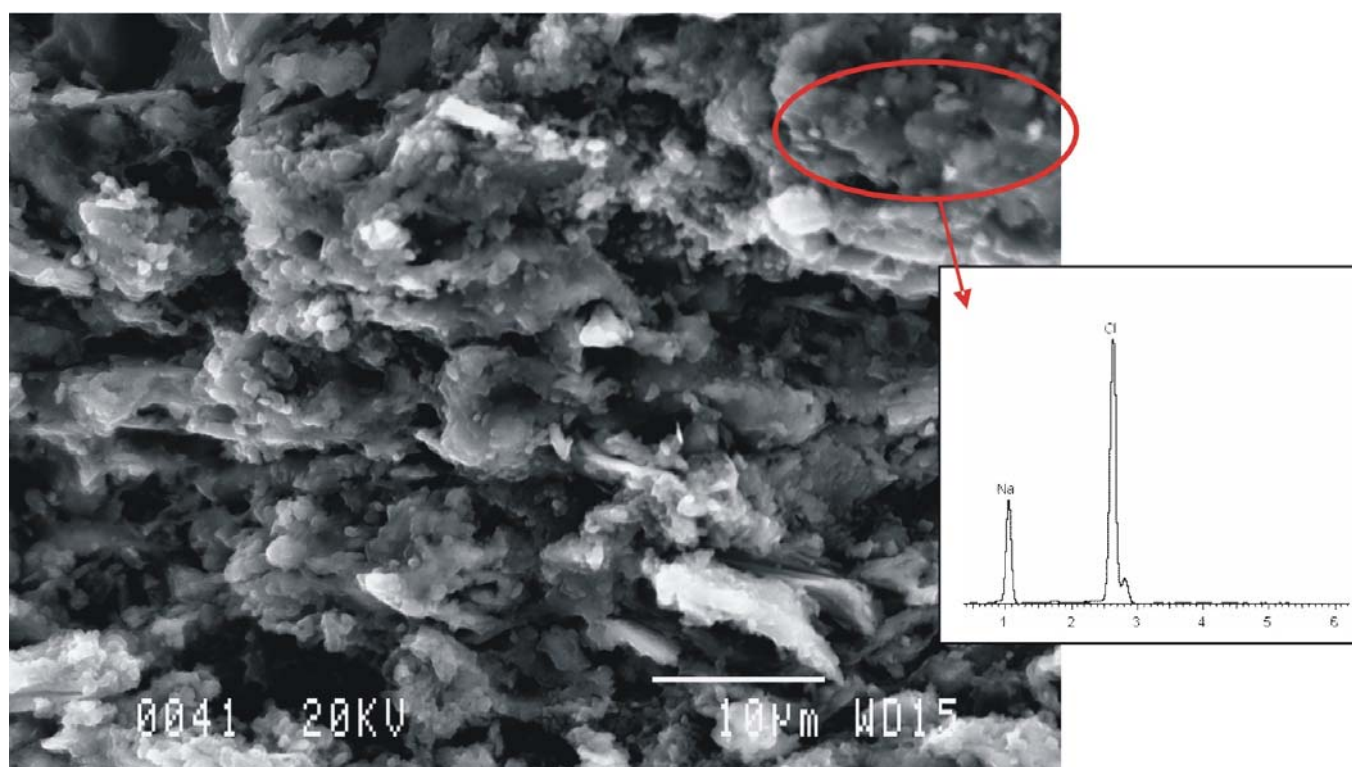


Figure 9: Microphotograph (x2000) of the SE image of the matrix of the individual TRZ050

TRZ049 represents the second mineralogical fabric. Its microstructure can be observed in the microphotograph of Figure 10. This individual unlike the first one, already clearly exposes an initial vitrification, therefore, the firing temperature in this case is obviously higher than in the case of the first individual ($\geq 900^{\circ}\text{C}$).

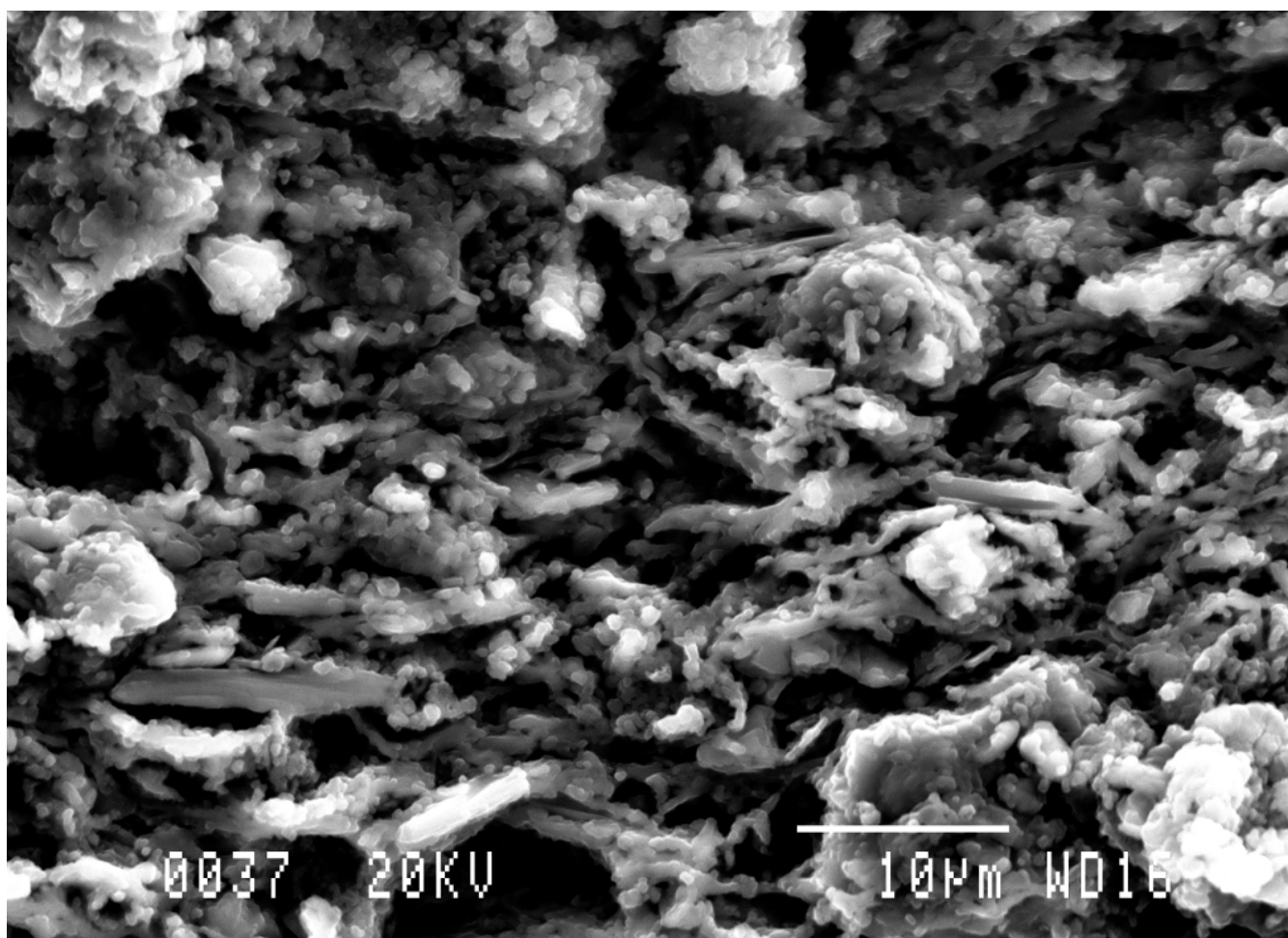


Figure 10: Microphotograph (x2000) of the SE image of the matrix of the individual TRZ049

The next mineralogical fabric F3 is represented by the individual TRZ022. In the microphotograph (Figure 11, centre) of the matrix of this individual one can observe the presence of slightly more extended glassy phase which indicates a little bit higher firing temperature ($\geq 950^{\circ}\text{C}$). By looking at the microphotograph of the individual TRZ022 under lower magnification (x1000) (Figure 12) very bright particles regarding to the ceramic matrix can be distinguished, all over the fresh fracture's surface. These bright particles that are given by the SE image, under a higher magnification (x2000), have rather rectangular or asymmetrical shape (in the right of Figure 12). The chemical microanalysis performed by EDAX in all these crystals has given high concentrations of Na and Cl, exactly the same way that in the case of TRZ050. Consequently, most likely, they correspond to well crystallised NaCl (salt) indicating once again post depositional contamination and alteration.

Finally, the last individual studied by SEM is **TRZ028**, which is representing one of the individuals altered and/or contaminated by analcyme, belonging to the mineralogical fabric **F₄** that contains all the over-fired ceramic material. At first site (Figure 13), the microstructure of this individual exposes extended vitrification, but it is also indicates some kind of alteration, as it is covered by these spherical particles (Figure 14), that after the microanalysis with EDAX seem to have a very high concentration in Ca and they might be secondary calcite. The extended vitrification indicates that this individual is high fired ($\geq 1000/1050$).

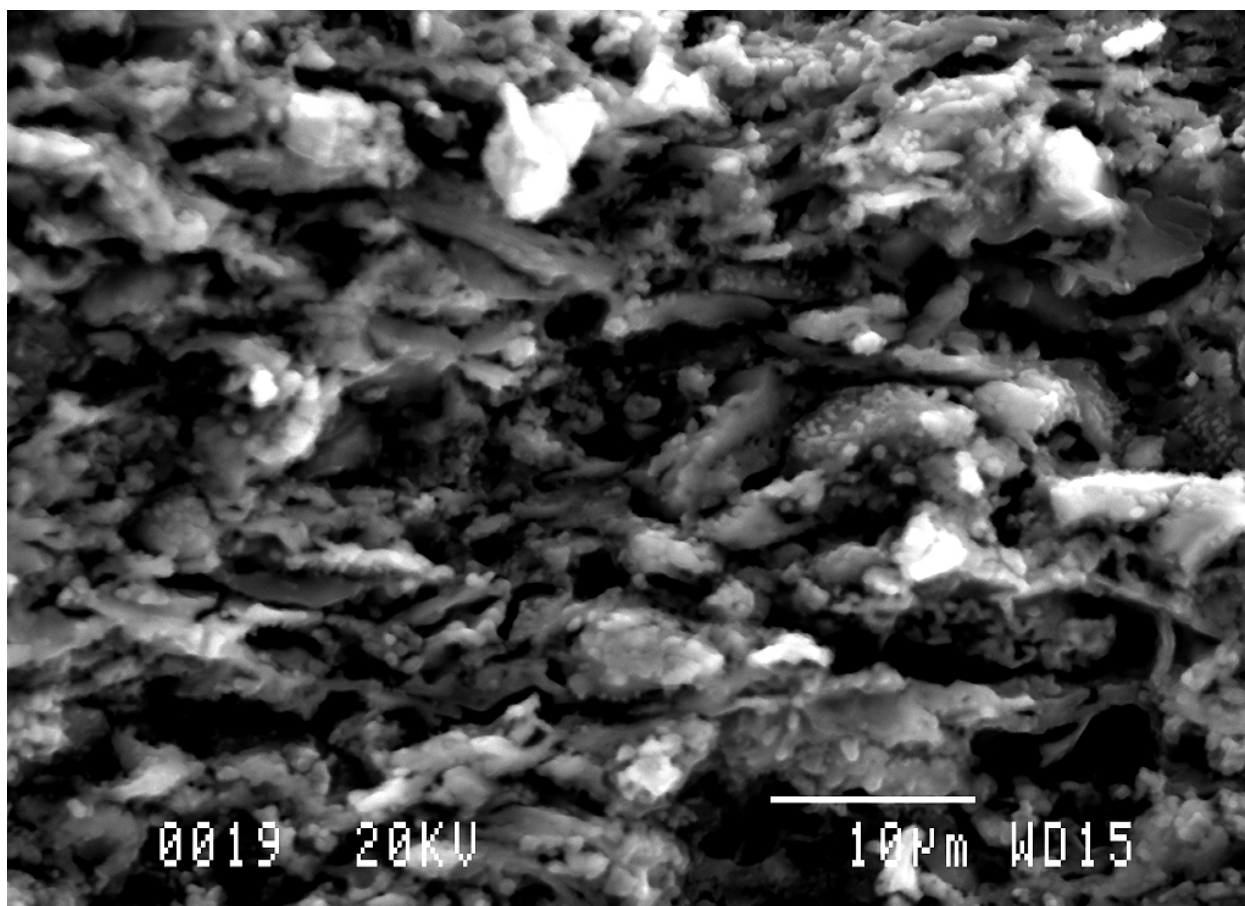
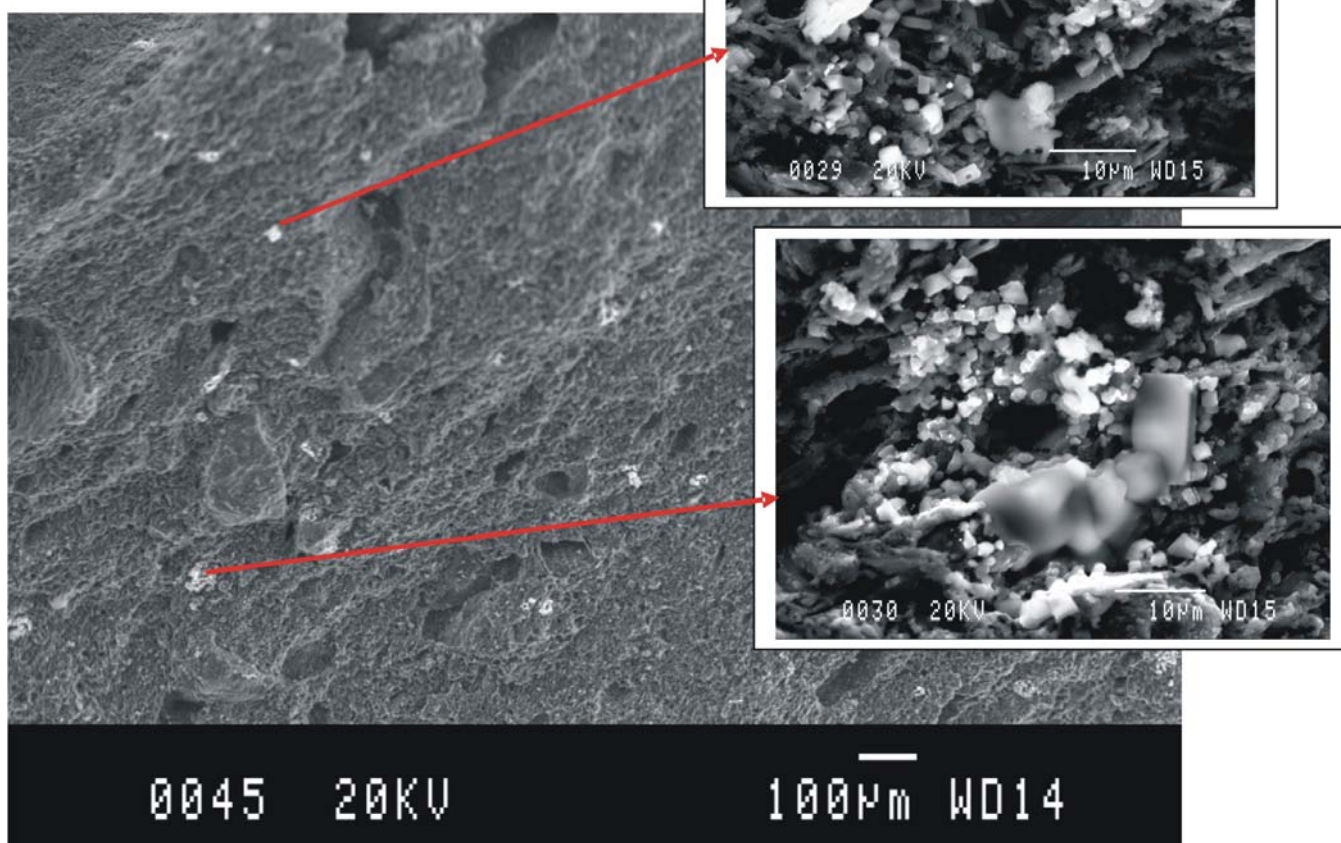


Figure 11: Microphotograph (x2000) of the SE image of the matrix of the individual TRZ022

Figure 12: Microphotograph (x1000) of the SE image of the matrix of the individual TRZ022, and microphotographs (x2000) of the NaCl crystals



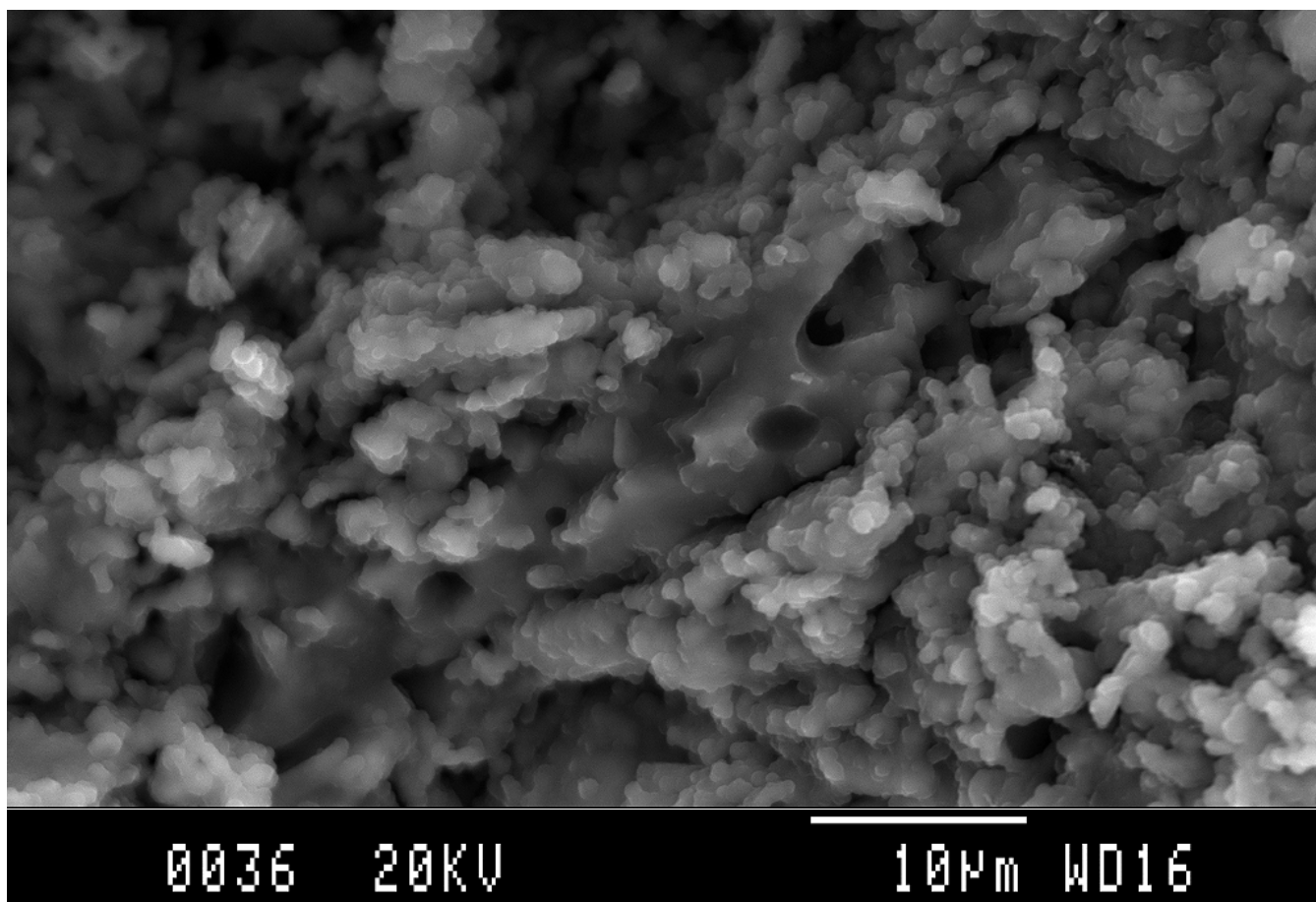


Figure 13: Microphotograph (x2000) of the SE image of the matrix of the individual TRZ028

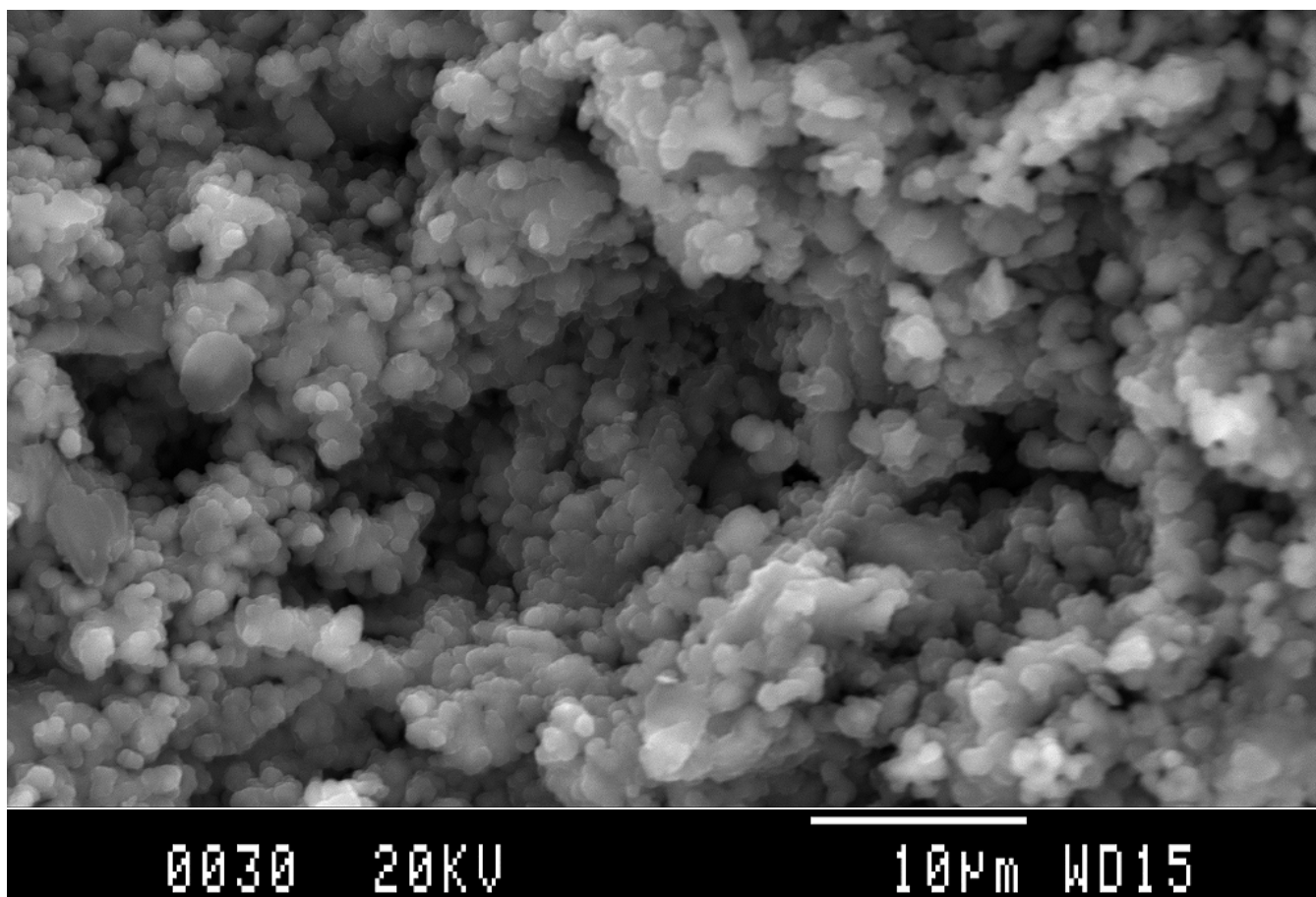


Figure 14: Microphotograph (x2000) of the SE image of secondary calcite in the pores of the individual TRZ028

By XRD we have been able to identify the presence of analcyme in this individual. However, analcyme is cryptocrystalline, thus we can not identify it by SEM. On the other hand it is important to mention that from all the individual studied by SEM this is the only one without the presence of NaCl crystals in its matrix, therefore it is possible to assume that the formation of this zeolithe ($\text{Na}_2\text{AlSi}_2\text{O}_6 \times \text{H}_2\text{O}$) can be a consequence of the decomposition of the accumulated NaCl and its transformation to analcyme by the interaction with the amorphous glassy face only in high or over fired ceramic individuals due to the specific characteristics of the microstructure of their glassy face.

Study of the red slip

The study of the red-orange slip that covers some of the common wares was carried out by SEM-EDAX under the following working conditions: acceleration voltage = 20KV, working distance = 15, probe current = 3×10^{-9} . At Figure 15 the microphotographs of the fresh fractures (left) and of the pol-

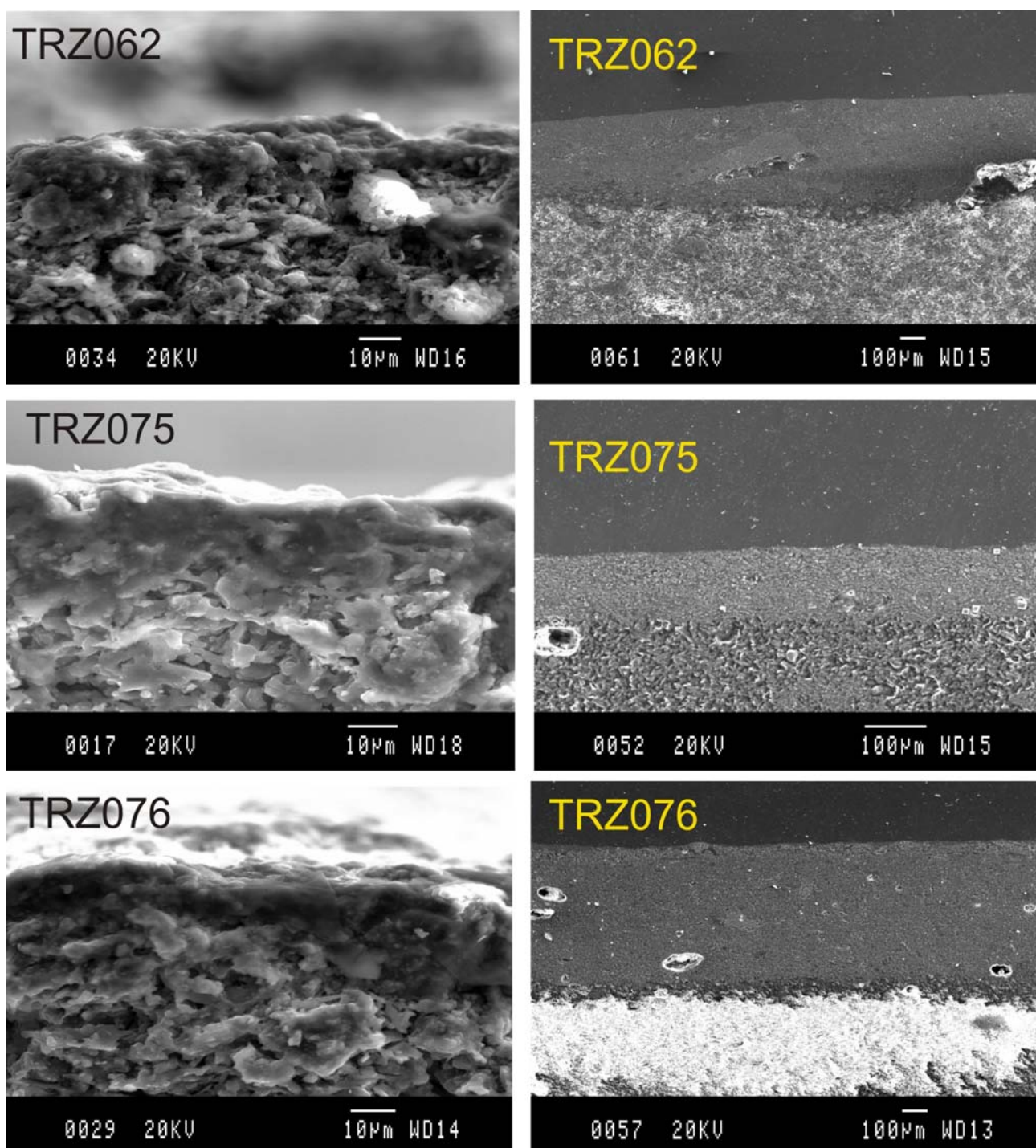


Figure 15: Microphotograph (x500) of the SE image of the fresh fracture and polished section of the red slip area observed in SEM-EDAX upon the samples: TRZ062, TRZ075 and TRZ076.

ished sections (right) of the samples extracted from the individuals: TRZ062, TRZ075 and TRZ076 are presented. Observing first the fresh fractures the limits between the red slip and the clay matrix weren't very clear, but after the observations carried out upon the polished sections, a fine and homogeneous layer of an irregular thickness could be observed on the ceramic body's surface. The minimum mean thickness can be estimated around 150 μm (represented at the microphotograph of TRZ075) and the maximum one around 450 μm (represented at the microphotograph of TRZ076).

Looking at the interface between the red slip and the clay matrix (Figure 16) no clear separation line could be observed but the existence of a 10 to 50 μm insertion zone. That clearly indicates a biscuit and no glaze firing. Biscuit firing means that the ceramic body was covered with the slip and fired at ones, thus no two separate firing have been preformed in order to fire first the body then the slip.

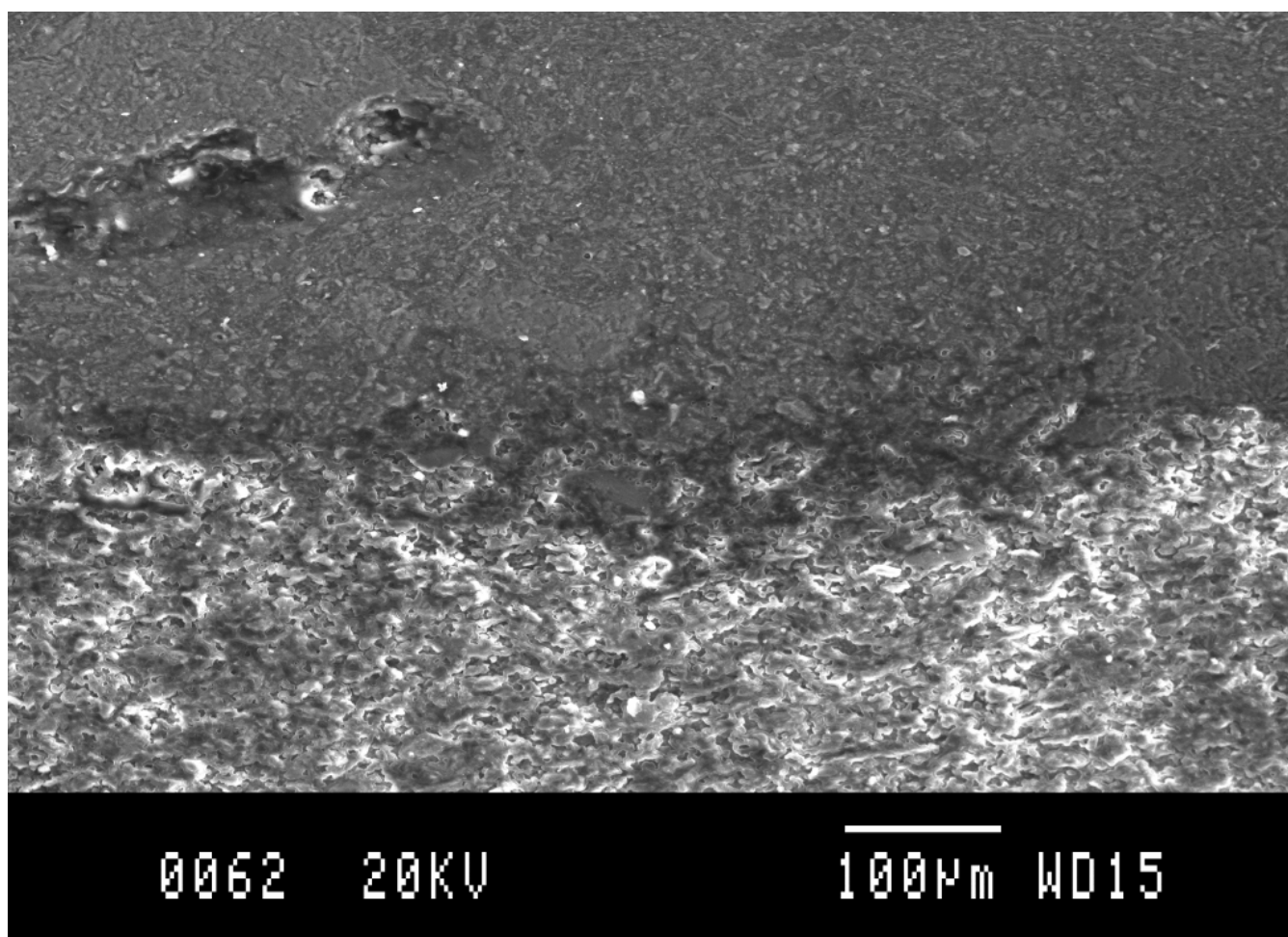


Figure 16: Microphotograph (x2000) of the SE image of the polished section of the interface between the red slip and clay matrix observed in SEM-EDAX

The quantitative micro-chemical analysis that carried out by EDAX (Energy Dispersive X Ray Analysis) in 5 different points of the slip and different areas of the body at 5 different cases (TRZ062, TRZ064, TRZ075 TRZ076 and TRZ084) pointed out that in all the cases the clay matrix and the red slip had the same composition (Figure 17 and Table 5). This probably means that a finer fracture of the clay used to fabricate the pots was applied to produce the red slip.

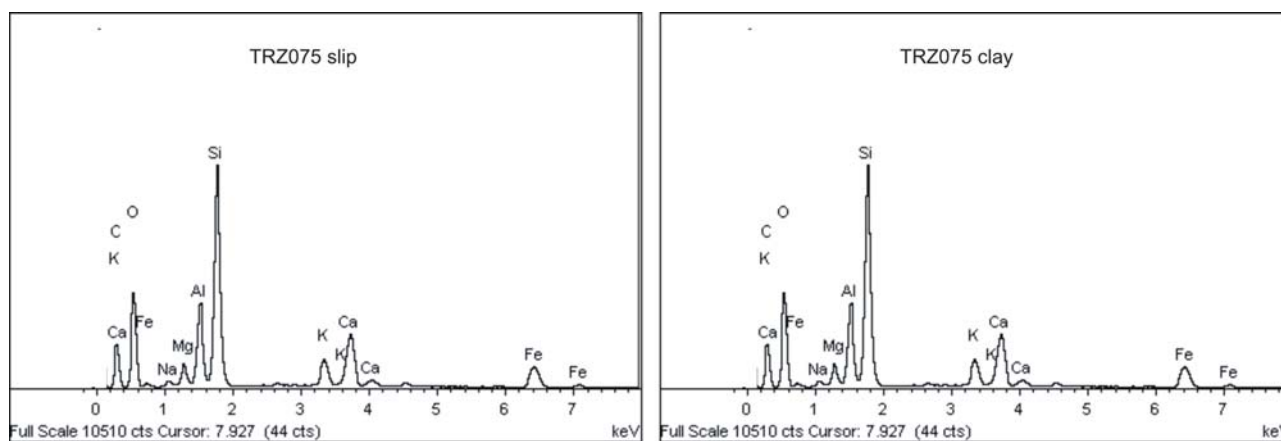


Figure 17: EDX spectres results of the microanalysis on the red slip and the clay paste of the individual TRZ075.

Quantitative EDX analysis on red slip

Element	Mean Weight%	SD
C K	25,45	1,75
O K	30,34	0,83
Na K	0,48	0,06
Mg K	1,55	0,08
Al K	5,43	0,16
Si K	15,67	0,4
K K	3,06	0,12
Ca K	7,16	0,21
Ti K	0,71	0,09
Fe K	10,15	0,35
Totals	100	

Quantitative EDX analysis on clay paste

Element	Mean Weight%	SD
C K	25,45	1,75
O K	30,34	0,83
Na K	0,48	0,06
Mg K	1,55	0,08
Al K	5,43	0,16
Si K	15,67	0,4
K K	3,06	0,12
Ca K	7,16	0,21
Ti K	0,71	0,09
Fe K	10,15	0,35
Totals	100	

Table 5: Quantitative results; mean weight percentages and standard deviation of the EDX analysis of red slip at 5 different points and clay paste at 3 different points of the individual TRZ075:

Results on mechanical properties

Four ceramic common jars (TRZ103, TRZ115, TRZ124 and TRZ140) sampled at the “Citadel” of the archaeological site have been tested for traversal stress resistance (mechanical resistance) (Table 6). Mechanical resistance can offer information on the homogeneity of the pottery and the maximum tension and compression the pottery can stand without braking. Mechanical resistance depends on various factors, the size and distribution of the inclusions in the ceramic body, on the porosity which is directly connected with the quality of the glassy phase developed in the pottery, which on the other hand, also depends on the calcareous or non calcareous composition of the pottery. In all cases except one (TRZ115), where only one briquette was tested, as there were not enough material to prepare two of them, consequently, the TRS result for this specific individual can not be 100% exact, the tested jars present very high resistance to tensions and compression. The TRS generally oscillating 40 and 56 MPa, which means that this jars can stand 400kg to 560 kg of weight per cm². Therefore these jars with so high mechanical resistance could be undoubtedly efficient as storage jars, although typologically they more seem to be simple jars used to serve liquid products on the table or to store them inside the house.

samples	3PfS/2bd2=TRS (Mpa)	Mean TRS (Mpa)	Kg/cm2
TRZ103A	54,152	53,036	530,36
TRZ103B	51,92		
TRZ124A	47,894	40,851	408,51
TRZ124B	33,808		
TRZ115A	21,695	21,695	216,95
TRZ140A	57,123	55,495	554,95
TRZ140B	53,873		

Table 6: TRS results

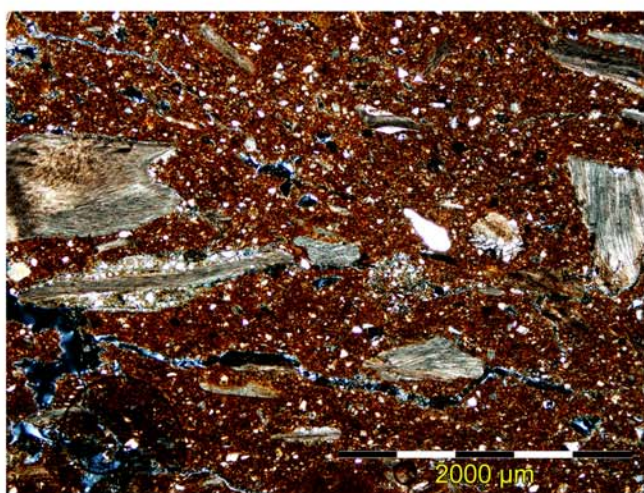
Petrographic study of the cooking wares

Petrographic study was carried out upon three thin sections corresponding to cooking wares (TRZ061, TRZ085 and TRZ104). The analysis was performed using a Olympus BX 41 polarizing microscope at magnifications of $\times 40$ to $\times 200$, equipped with a Digital Olympus Camera DP70.

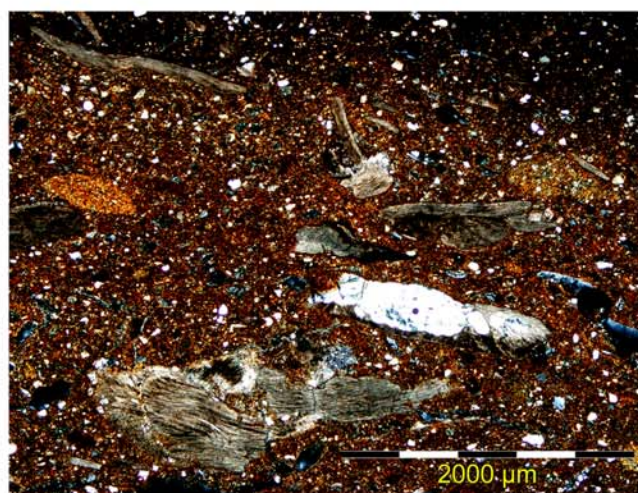
In a first classification, three samples can be divided in two petrographic fabrics. Clay components and non-plastic inclusions are different in the two petrographic fabrics identified showing, probably, different origin but a similar technological process involved in the cooking ware production.

The first fabric includes the samples TRZ061 and TRZ104. This fabric corresponds to a coarse fabric with common non-plastic inclusions in a reddish carbonated and ferric micromass. It displays small quartz and k-feldspar crystals, few muscovite mica and microfossils remains (Figure 18 a, b). The coarse fraction (> 0.2 mm) contains shell macrofossils, up to 1.5 mm, from calcareous sedimentary rock fragments (fine-grained sandstone) (Figure 18 c). Some of these rocks have become in a silicate rock (Figure 18 b, d) and several spathic calcite crystals are also present in the sedimentary rocks. These thin sections include some crystals of ferric carbonate (Figure 18 d). Finally, some volcanic-glass fragments appear as accessory minerals (Figure 18 f). The fine fraction is represented by fine calcareous and quartz grains dislodged from the sedimentary rocks. The optical activity of the matrix suggests a relatively low firing temperature.

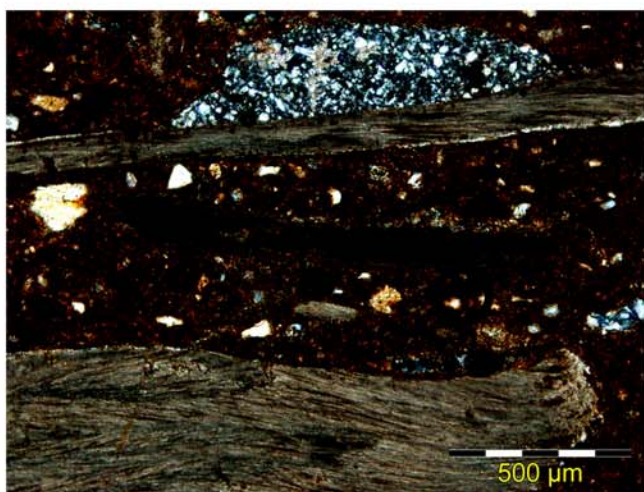
The second fabric is represented by the sample TRZ085 and can be considered medium-coarse fabric. The micromass is characterised by carbonate and ferric and it has an orange-brown colour. It includes fine quartz crystals and muscovite mica as a major component. The coarse fraction of the non



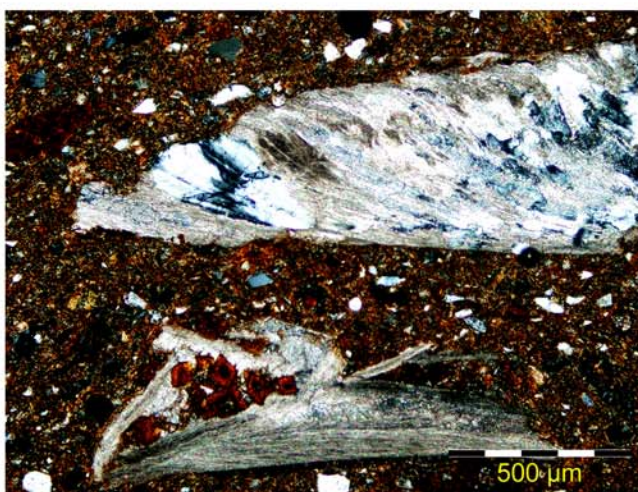
a. TRZ061 40X cp



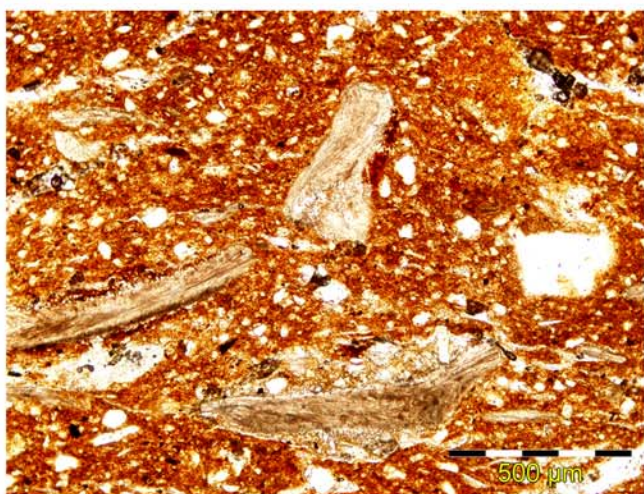
b. TRZ104 40X cp



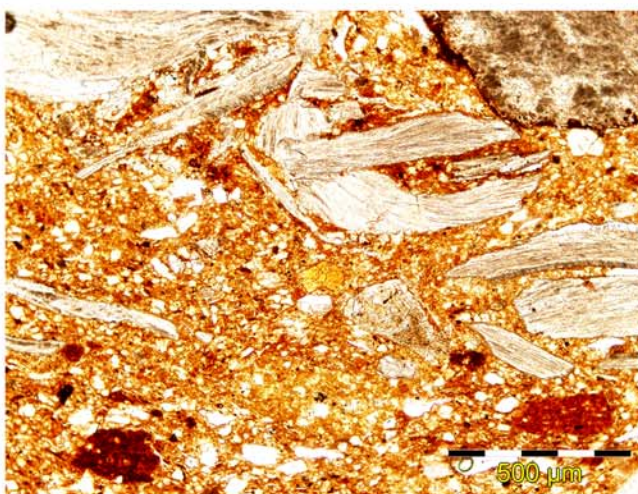
c. TRZ061 100X cp



d. TRZ104 100X cp



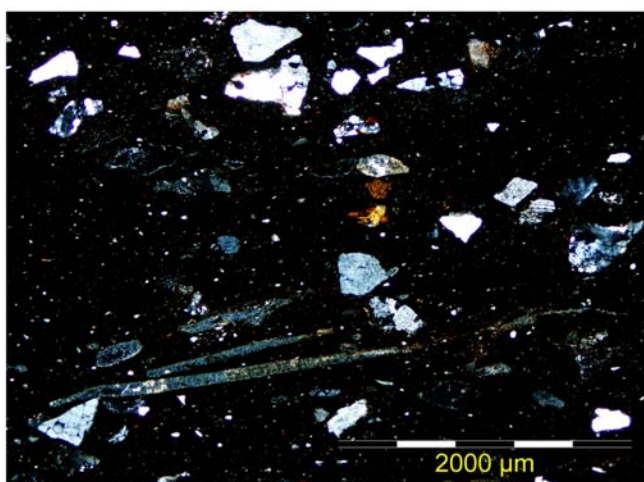
e. TRZ061 100X pp



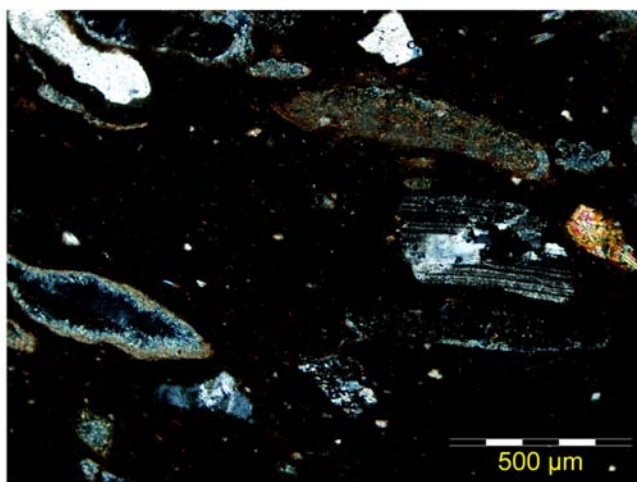
f. TRZ104 100X pp

Figure 18: Coarse sedimentary-calcareous fabric

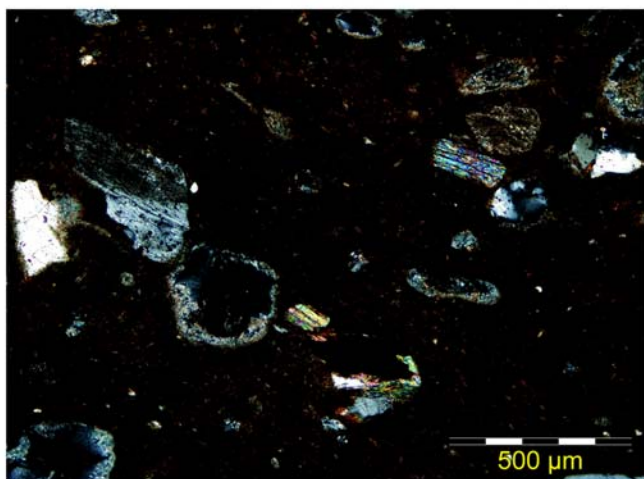
plastic inclusions is well sorted and rock fragments are generally sub-angular. It comprises different metamorphic fragments. Some crystals correspond to isolated quartz and k-feldspar coming from granite rocks or gneiss (Figure 19 a). Other metamorphic acid rocks include a range of quartz-mica-schist (Figure 19 b, c). Amphibole and epidote are also presents as accessory minerals (Figure 19 a, d). Is evident that secondary component of this fabric contains calcareous fragments coming from macrofossils remains, some of them up to 2 mm (Figure 19 a, b, c, d). Firing process has perturbed the calcareous component of microfossils, favouring calcite decomposition that become in closed pores. Finally, coarse fraction comprises other volcanic rocks, as basalt. The fine fraction includes quartz, calcite, k-feldspar, mica, amphibole and epidote. The matrix is only slightly optically active, suggesting a generally higher firing temperature for this sample.



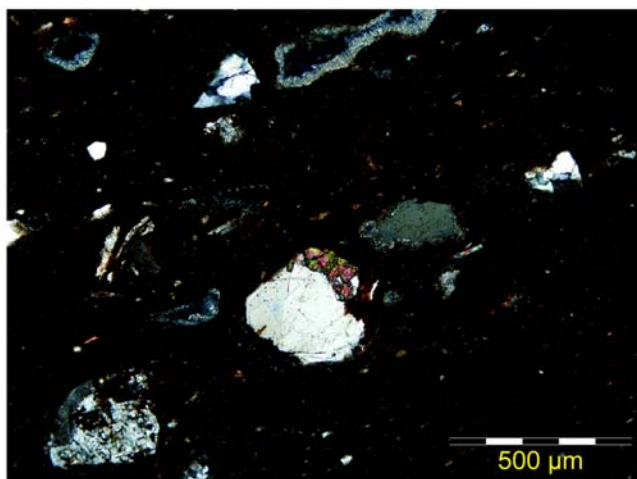
a. TRZ085 40X cp



b. TRZ085 100X cp



c. TRZ085 100X cp



d. TRZ085 100X cp

Figure 19: Medium-coarse metamorphic-calcareous fabric

The petrographic analysis shows that three cooking wares samples contains sedimentary rock with a coarse shell fragments as main temper. This technological aspect must be related to functional factors. That means, potters have manipulated paste composition in order to make some vessels more suitable for cooking tasks because coarse paste favoured for cooking wares would impart a high resist-

ance to failure from thermal stress. Thermal stress appears when there is an inhomogeneous expansion of paste constituents and temper or other mineral inclusions have significantly greater expansion rates than the clay matrix. Shells are mainly consist of the mineral aragonite which, when heated to about 500°C, alters irreversibly to calcite. Calcite from shell-temper has a thermal expansion coefficient similar to that of fired clay when heated and the amount of thermal stress would be negligible. For this reason, shell-tempered favoured the resistance to thermal stress (Rye, 1976; Steponaitis, 1984; Tite, *et al.*, 2001). Other studies have pointed out that limestone have a similar thermal expansion coefficient as the shell particles and these materials help to reduce stresses and crack initiation during thermal shock (Hoard *et al.*, 1995).

Furthermore, shell particles tend to be coarse in order to maximize the resistance to thermal-shock that is another kind of temperature-related stress. Thermal-shock occurs when a body is suddenly heated or cooled from one temperature to another because ceramics are relatively slow conductors of heat. When a cooking pot is placed over a fire, the exterior surface heats up more rapidly than the interior and stress began because of the difference of thermal expansion between wall surfaces. The same process occurs at the inverse, when a heat pot is suddenly cooled. The ability of a ceramic body to withstand thermal shock depends mainly on the size, shape, frequency and distribution of the pores and nonplastic inclusions within the paste. Past studies showed as thermal-shock resistance is increased by making the temper as coarse as possible (Steponaitis, 1984). In our case, the shell-temper of these three samples is coarse and oriented parallel to the vessel's surface. In that way, when failure appears, temper particles stop the crack propagation, leading a great value of toughness.

Conclusions based on the archaeometrical study

The chemical results point towards the same or very similar geochemical origin of the raw materials used for the production of all the analysed individuals except four: TRZ084, TRZ088, TRZ104, TRZ114 and TRZ142 which present significant chemical differences regarding the rest of them. This might probably mean the existence of one single production in the site of Termez which would be also the Reference Group (RG) of the kiln of *Kara Tepe*, which composition already have been given in a previous article (Tsantini, *et. al* 2007) Nonetheless, further archeometrical work is needed to confirm this hypothesis. It is important to include a complete petrographical analysis in the study in the near future that can generate important information on the origin of the raw material used for the fabrication of the analysed ceramics and on significant technological aspects, which might let us know if there is a possibility to have different productions on the site and if it is possible, then to differentiate between these productions. On the other hand, if the petrographical study confirms the chemical results, then we would be facing the case of persistence of the same ceramic tradition at Termez during several centuries and the imposition of the local technological tradition, even though there are cultural and political changes in the site during these centuries would be obvious.

During the chemical study we could identify two different alteration and/or contamination processes, which have been affected specific individuals. The first process is related to the increment of Ba in the ceramic composition and the second is related to the decrease of K₂O and Rb and the increment of Na₂O. The last alteration and/or contamination process is related to growth of crystals of analcyme.

The conclusions related to the technological aspects which can be made after the mineralogical study is that the pottery for *Termez*, generally, represent well to high fired ceramic material, fired between 850°C and 1050°C with a clear tendency to be high or overfired, as the 81% of the individuals present a firing temperatures that overcome 1000°C. The firing conditions are preferably oxidising. There are only 10 individuals out of 144 fired at a low temperature. However, according to the mineralogical composition, we could distinguish between four different mineralogical fabrics, each related to a specific range of Equivalent Firing Temperature.

The generally high fired and calcareous character of the analysed material could be confirmed by the study with SEM. The presence of NaCl crystals as a result of a possible postdepositional contamination and/or alteration in most of the individuals studied by this technique could be also confirmed. In fact, the only individual studied by SEM which did not present NaCl crystals in its matrix was the one which had analcyme in its mineralogical composition according to XRD (TRZ028). Therefore it is possible to assume that the formation of this zeolithe can be a consequence of decomposition of the accumulated NaCl and its transformation to analcyme by the interaction with the amorphous glassy face of the high or over fired ceramic individuals.

Under SEM we could observe the existence of a fine and homogeneous slip of irregular thickness upon the ceramic body's surface. Its minimum thickness is around 150 μm and the maximum one is around 450 μm . The interface between the red slip and the clay matrix is not a clear line but a 10 to 50 μm insertion zone where the two phases meet, which clearly indicates a biscuit and no glaze firing. The quantitative micro-chemical analysis that carried out by EDAX (Energy Dispersive X ray Analysis) points evidences o that the clay matrix and the red slip had the exact same composition, thus a finer granulometric fracture of the clay used for the fabrication of the pots were applied to produce the red-orange slip.

The TRS of all the tested individuals is oscillating 40 and 56 MPa, which means that this jars can stand 400kg to 560 kg of weight per cm^2 . Consequently this jars with has very high mechanical resistance and they could be certainly efficient as a storage jars.

The petrographic analysis shows that three all cooking wares samples contain sedimentary rock with a coarse shell fragments as main temper. This technological aspect must be related to functional factors. That means, potters have manipulated paste composition in order to make some vessels more suitable for cooking tasks because coarse paste favoured for cooking wares would impart a high resistance to failure from thermal stress. Several aspects influence in thermal and mechanical properties of cooking wares, as the effects of paste composition, the shape and wall thickness. Fabric 2 presents some quartz minerals and metamorphic rocks as main nonplastic inclusions. However, quartz has a much higher rate of thermal expansion than fired clay (Rye, 1976; Steponaitis, 1984). To avoid this source of thermal stress, the potters used a sand temper finer because avoid failures from thermal shock became greater. The wall of these cooking pots is thick and that provides a more rapid conduction of heat from the exterior to the interior. That results in an improved heating effectiveness and, at the same time, the temperature gradients through the vessel wall and, therefore, the stresses driving crack initiation during thermal shock are reduced (Tite *et al.*, 2001).

Confrontation of the Archaeological results with the Archaeometrical results

The archaeometrical results on the archaeological ceramics sampled at the production areas of the Kiln 1 and 2 of *Kara Tepe* and from the surrounding consumption areas like the *Ciutedelle*, the *Monasteries* and the main archaeological site of *Kara Tepe* are permitted to arrive to some important conclusions on the production and distribution of the different ceramic types to *Tchinguiz Tepe*.

According to the dendrogram of Figure 3 there are three basic chemical division (GQ's) within the analysed material which can be observed clearly into the red rectangle of this figure, although it does not mean that they correspond clearly to three different productions as the chemical differences are too small to be able to confirm this hypothesis. Nevertheless, there are some differences in chemical tendencies which are separating these three categories. On the other hand, some important differentiation can be made based on the archaeological and typological information within these three categories.

- GQ-TZ1

Formed by 20 individuals in the right side of the red rectangle, none of which can be related to both the studied kilns. All this individuals have been sampled at a consumption area. 15 coming from the recently excavated site of *Tchinguiz Tepe*, 4 from the monasteries' areas and 1 from the old excavation of the *Ciutedelle* (Figure 20).

Within the pottery sampled at *Tchinguiz Tepe* the most representative typology is a type of non decorated "tagine" (TRZ051, TRZ079, TRZ083) with 26-27 cm diameter rim. The only painted one out of the three above mentioned is the individual TRZ051. Other cooking pots of the type of "tagine" with a smaller diameter (TRZ053, TRZ065, and TRZ077) can be also mentioned within **GQ-TZ1**. TRZ056 with an 18 cm diameter presents an inside and outside painted decoration. TRZ053 is a cooking pot with a rim around 20cm and it presents painted decoration on its outside surface and incised decoration on its inside walls. TRZ077 is very similar to TRZ053 but without the painted decoration and some other typological differences. Other typologies also can be mentioned within this pottery. There are some exemplars of cooking pots of a thinner diameter of rims, approximately 16.5cm and more horizontal walls. Some of them without any decoration (TRZ072) others have even closer rims of 14 cm diameter (TRZ052). Beside the cooking casseroles mentioned above there are a number of bolls of different dimensions belong to this group some of them have their outside walls painted (TRZ064 and TRZ066), others present an inside and outside incised decoration (TRZ057). An open rimed jar (TRZ091) is also associated to this group and three bases of an unknown typology (TRZ056, TRZ059 and TRZ086) sampled at *Tchinguiz Tepe*. The individuals TRZ059 and TRZ086 seem to correspond to a small dimension forms with a painted decoration on the surface of their walls, in contrary TRZ056 is a big dimension undecorated individual.

The four pottery samples coming from the monasteries represent, on one hand, two decorated outside and inside thin walled jars (TRZ128 i TRZ132) and, on the other, there is a jar decorated with lines in the outside surface (TRZ139) and there is a painted in the inside casserole of "tagine" type of big diameter (33cm) (TRZ130).

The last individual sampled at the *Citadel* (TRZ095) is a 17 cm diameter boll with thin unde-corated walls.

Due to the grate variety of the forms belong to this group and the fact that it cannot be clearly associated either to Kiln 1 neither to Kiln 2 the most plausible hypothesis is that it represent probably the production of another Kiln located in the surroundings of *Tchinguiz Tepe*. However, this hypothesis has to be crosschecked in the future. This production centre seems to have been fabricated a multiplicity of frames, nevertheless casseroles of the type "tagine" and big bolls seem to be the typologically representative material of this centre. The abundance of the pottery coming from the consumption centre of *Tchinguiz Tepe* in this group might indicate that this was the main area of their diffusion during this specific period (Vth century). Nonetheless, it seems that these ceramic materials also have been diffused to the monasteries and in lower frequency to the *Ciutedelle*. In fact even though from these last to reception centres there is no information on the archaeological context. Regarding *Tchinguiz Tepe* there are various considerations can be made, as from the 15 individuals coming from this archaeological site 13 have been recovered within the stratigraphy of the sector RC of *Tchinguiz Tepe*. 9 correspond to the UE10 were a great variety of forms can be identified but where also predominate the bolls (TRZ052, 057, 064 and 066) and casseroles (TRZ051, 053 and 065), and, finally the bases of a big diameter (10 cm), although there is one base of a considerably minor diameter (4cm). UE 10 is a level of anivellation used as a floor for one habitat and it has given a great quantity of pottery represented by fine common wares, some of which are decorated, other are varnished and cooking wares. A more modern level is UE 5. It corresponds to an abandonment level from which three casseroles (TRZ077, 079, 083) and one possible top (TRZ086) have been recovered. Finally, there is one jar (TRZ091) belongs to this group coming from the UE 4 of the RB sector of *Tchinguiz Tepe*.

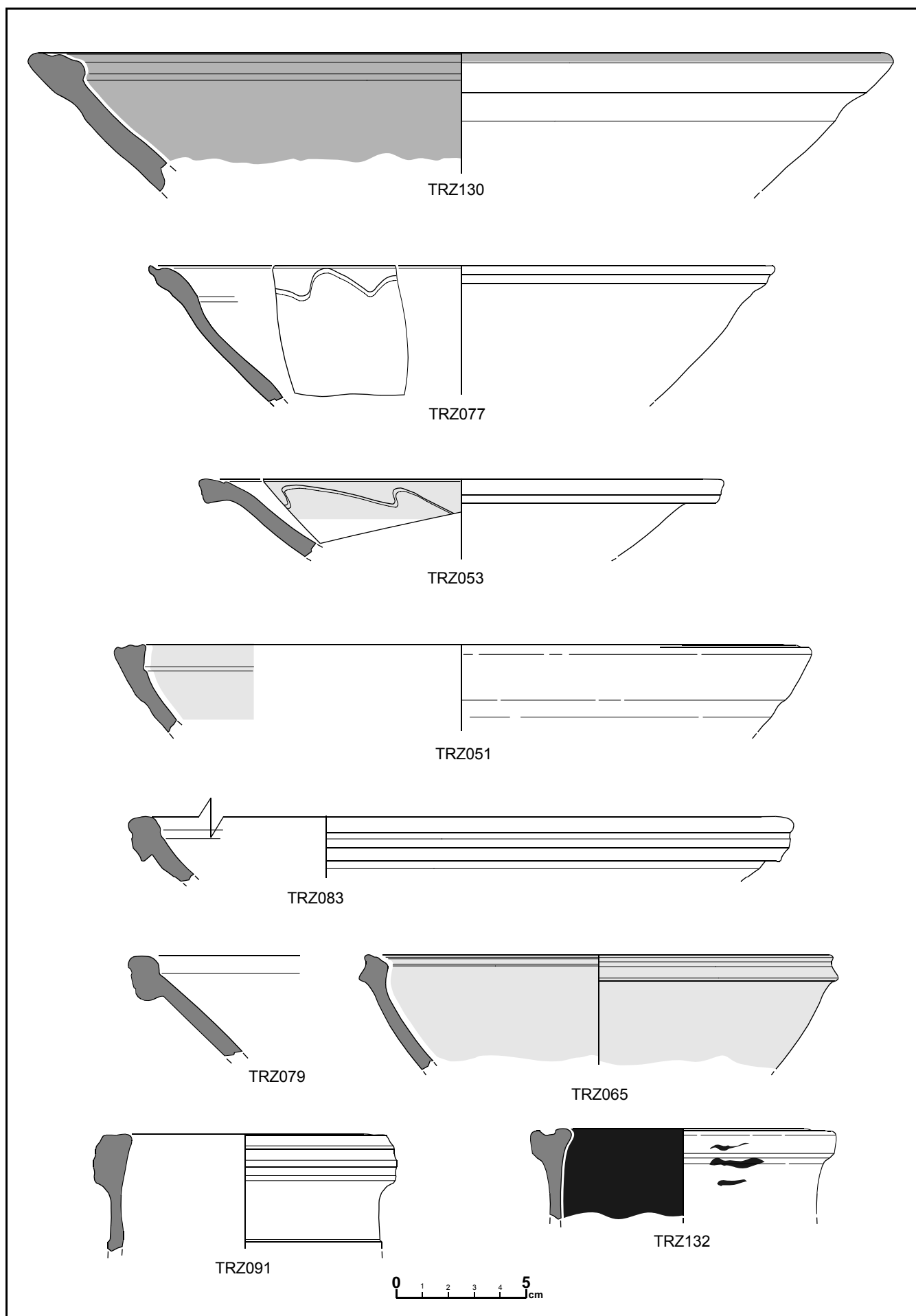


Figure 20a: Pottery from the chemical group TZ1

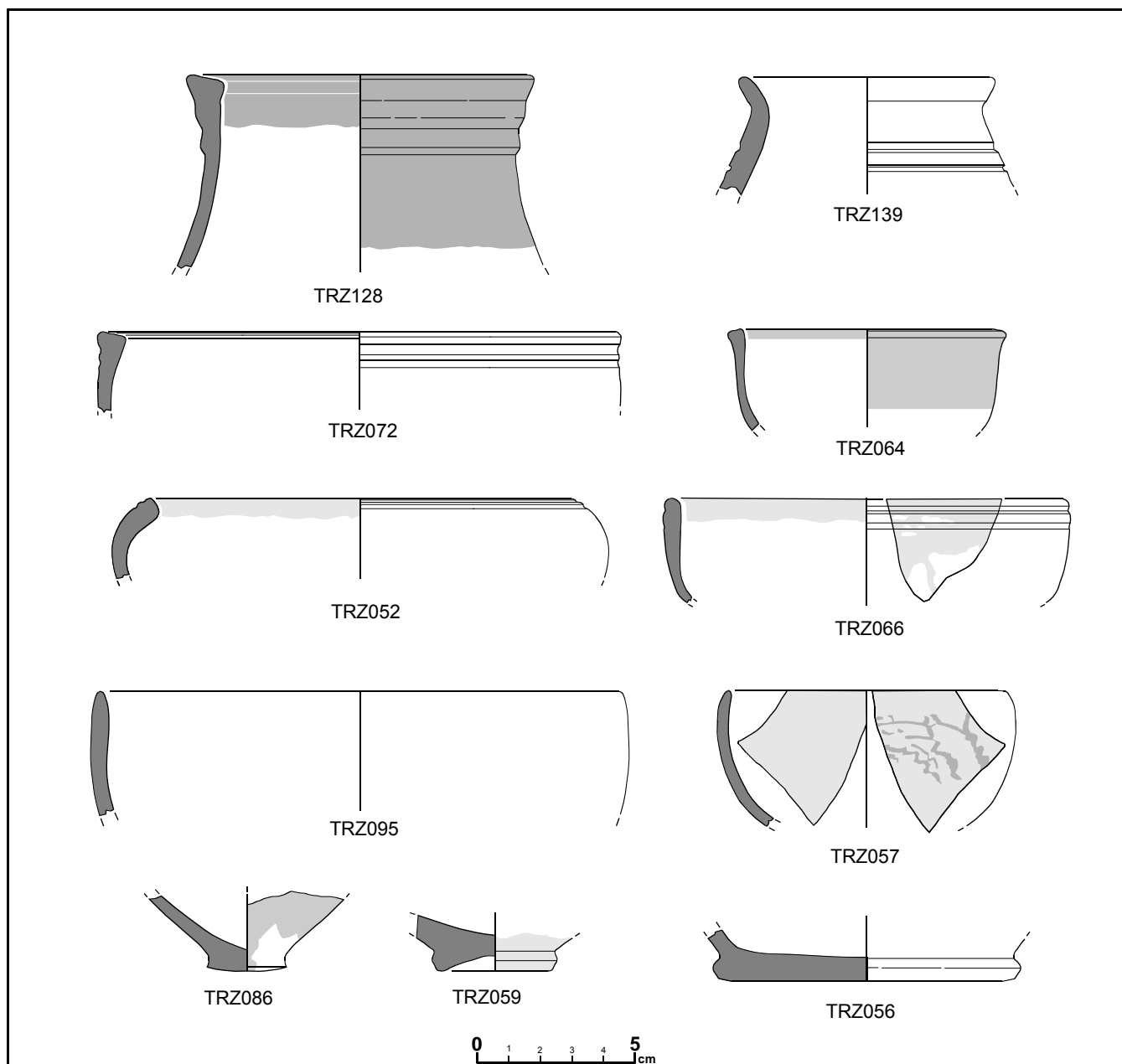


Figure 20b: Pottery from the chemical group TZ1

- GQ-TZ2

Contains 37 individuals all sampled at the Kiln 2 of *Kara Tepe*, beside one single individual (TRZ124) recovered at the area of Kiln 1 (Figure 21). The ceramic material belong to this group is coming from the destruction layer of the kiln. This indicates that the kiln was functioning during earlier times and that the ceramic material recovered from this stratum is not necessarily belong to the production of this kiln. On the other hand, almost all the pottery recovered from this layer belongs to GQ-TZ2. This group has been already defined in earlier studies as the reference group of this workshop.

There are three casseroles of the type “tagine” (TRZ044, 045 i 046); one boll (TRZ048) and one base of 6cm of diameter (TRZ047) belong into the ceramic material recovered at the superficial layer of this kiln during prospect ions. Two casseroles (TRZ034, 040) and one boll (TRZ013) coming from the sector UE1 of this superficial stratum. Finally, stratigraphically, all these ceramics can considered the most “modern” forms within all the material recovered in this kiln.

The rest of the material comes from a destruction layer located inside the firing room. The latest layer is UE11 and it has given abundant fine common wares, some of which are varnished and there are lots of lanterns between the recovered ceramic materials. On the other hand, the cooking wares are rarely represented within this layer. 7 of the analysed individuals belong to this group, three casseroles (TRZ001, 014, 037), 4 bases and one of small dimensions (TRZ022) and three of larger dimensions (TRZ004, 025 i 035).

However, the mayor part of the pottery belong to this group was recovered in UE9, that is a lower layer to UE11. UE9 represent a domestic vaster (dump) located at the entrance of the firing chamber. This stratum represented by abundant fine common wares some of which are varnished and plentiful cooking wares. 12 of the ceramics of this layer can be associated to GQ-TZ2. The most representative types are jars (TRZ010, 015, 024, 032, 036, 043), casseroles (TRZ033, 042) some of them of the type "tagine" (TRZ009, 021, 026). There is also one boll (TRZ031) and one plane base of a 4.3 cm diameter with an external varnishing (TRZ005).

Finally, 6 individuals coming from the layer UE12, which is one of the eldest layers, are associated to GR-TZ2. UE12 is located to the end of the firing champers; it is one of the first destruction levels dated around the Vth century A.D. The ceramics are over fired due to the direct contact with the flames and this kind of material is very characteristic for this stratum. The types of ceramics recovered from UE12 are mostly common wares, some of which are varnished, and less cooking wares. There are only 2 casseroles (TRZ020 and 039), 2 casseroles of the type "tagine" (TRZ006 and 030) and 2 jars (TRZ002 and 003).

Even though the great diversity of the forms this material seem to correspond to one single production, the origin of which might be situated in the area where the Kiln 2 is located. The chemical similarity and the typological similarities all these individuals present indicate that they correspond to the same ceramic production. At the same time, there are some observations can be made about the stratigraphic position of the different ceramic types. The presence of casseroles of the type "tagine" is characteristic for all the layers. Individuals of big dimensions only appear in UE11, while casseroles and jars only have been found in the stratums UE9 and UE12. Finally, bolls appear in all the archaeological record beside the stratums UE12 and UE11.

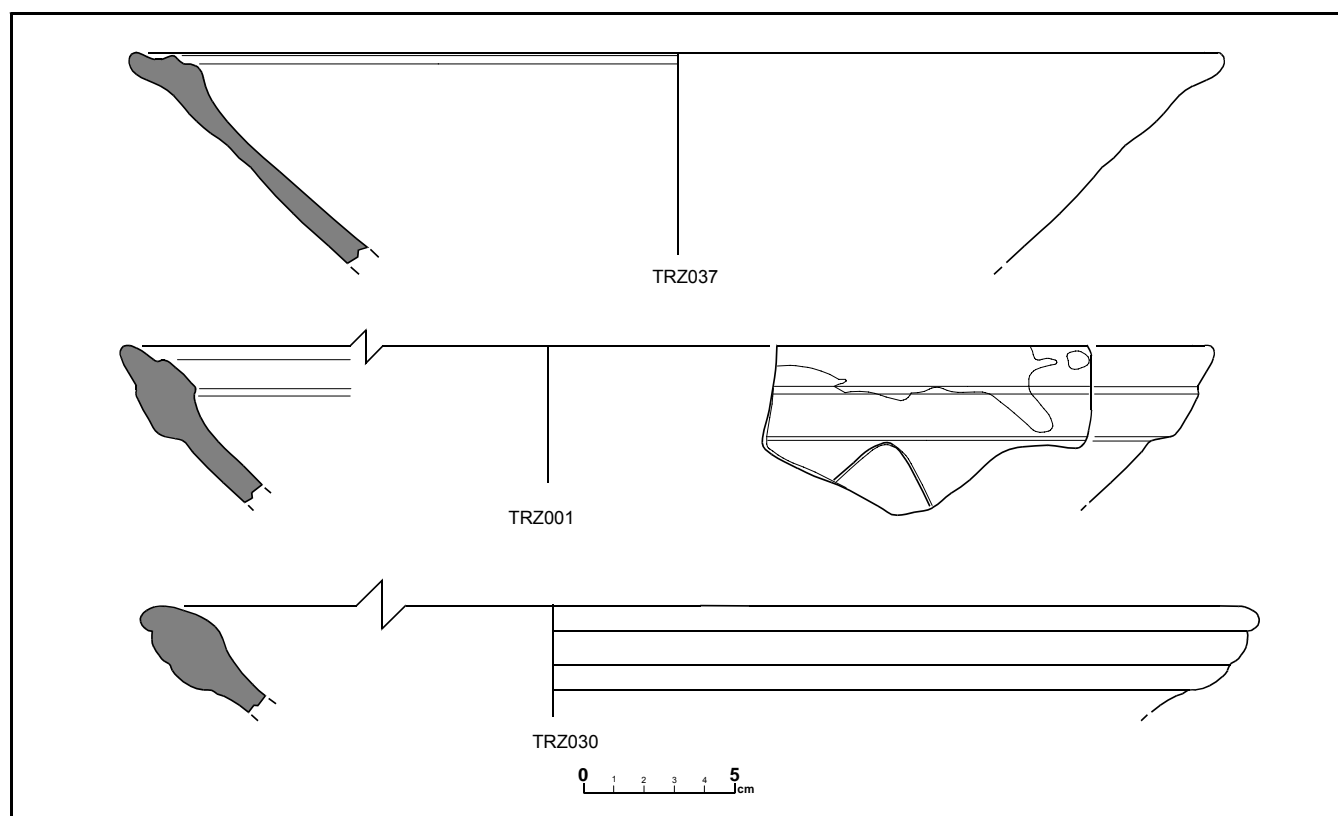


Figure 21a: Pottery from the chemical group TZ2

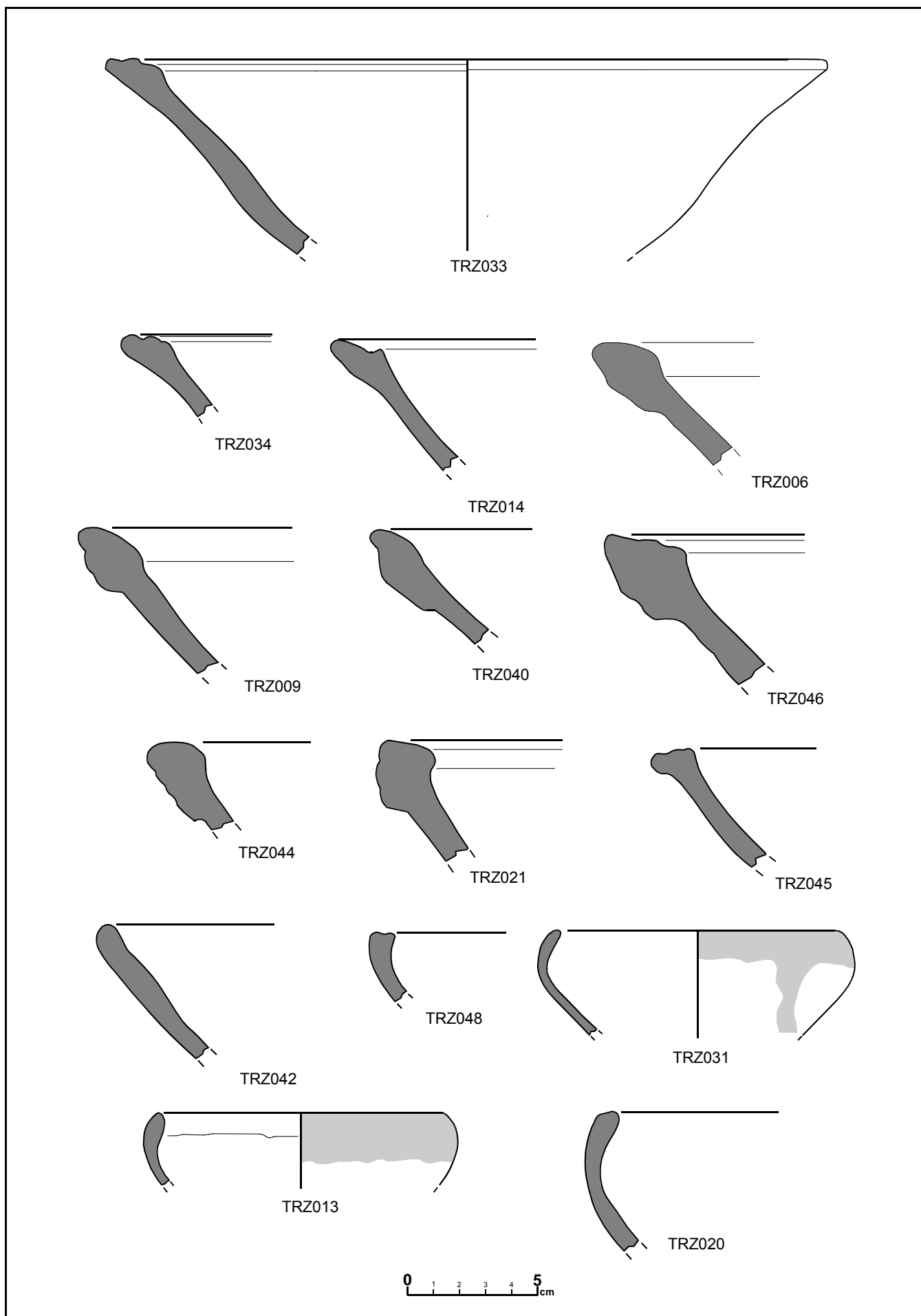


Figure 21b: Pottery from the chemical group TZ2

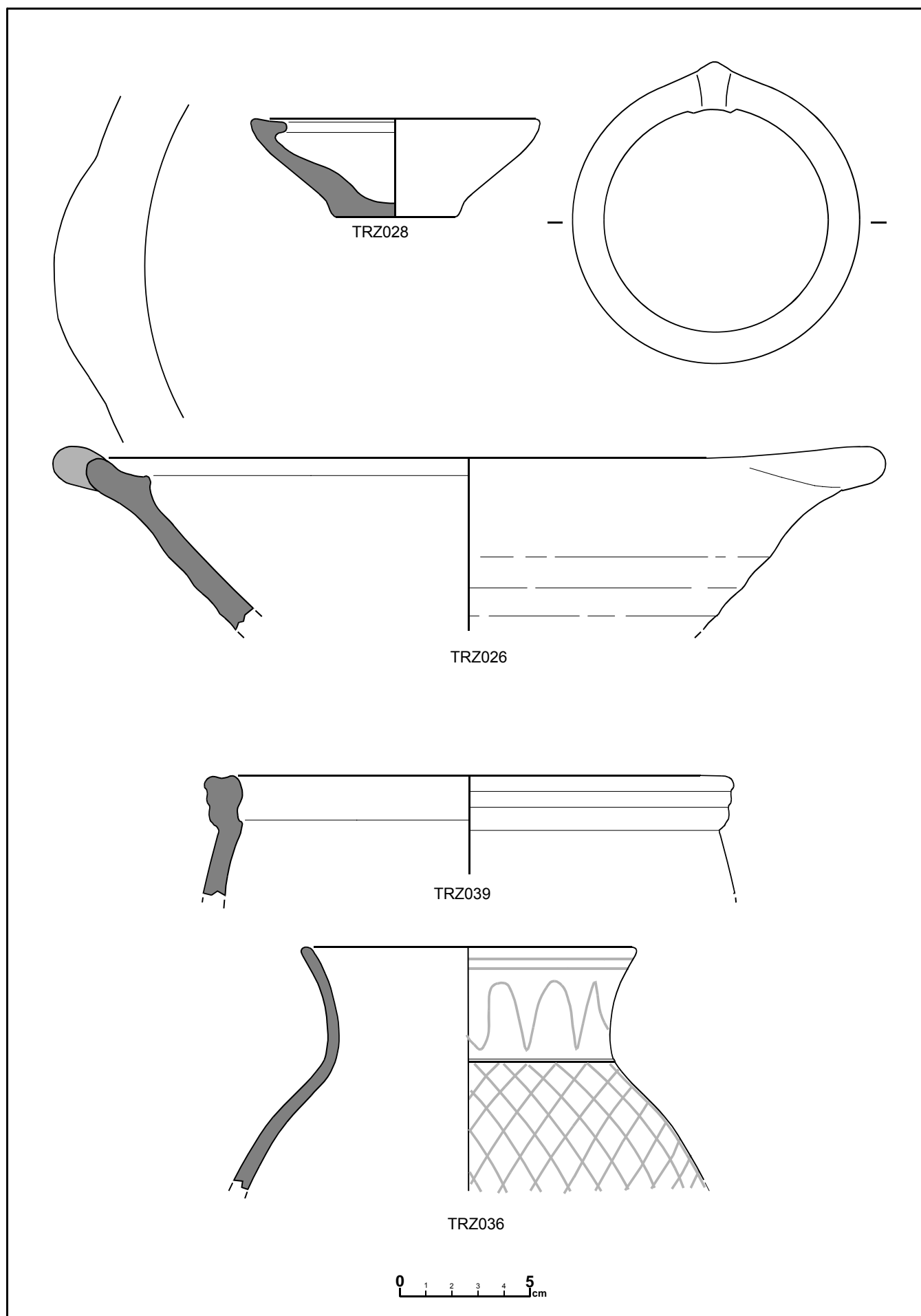


Figure 21c: Pottery from the chemical group TZ2

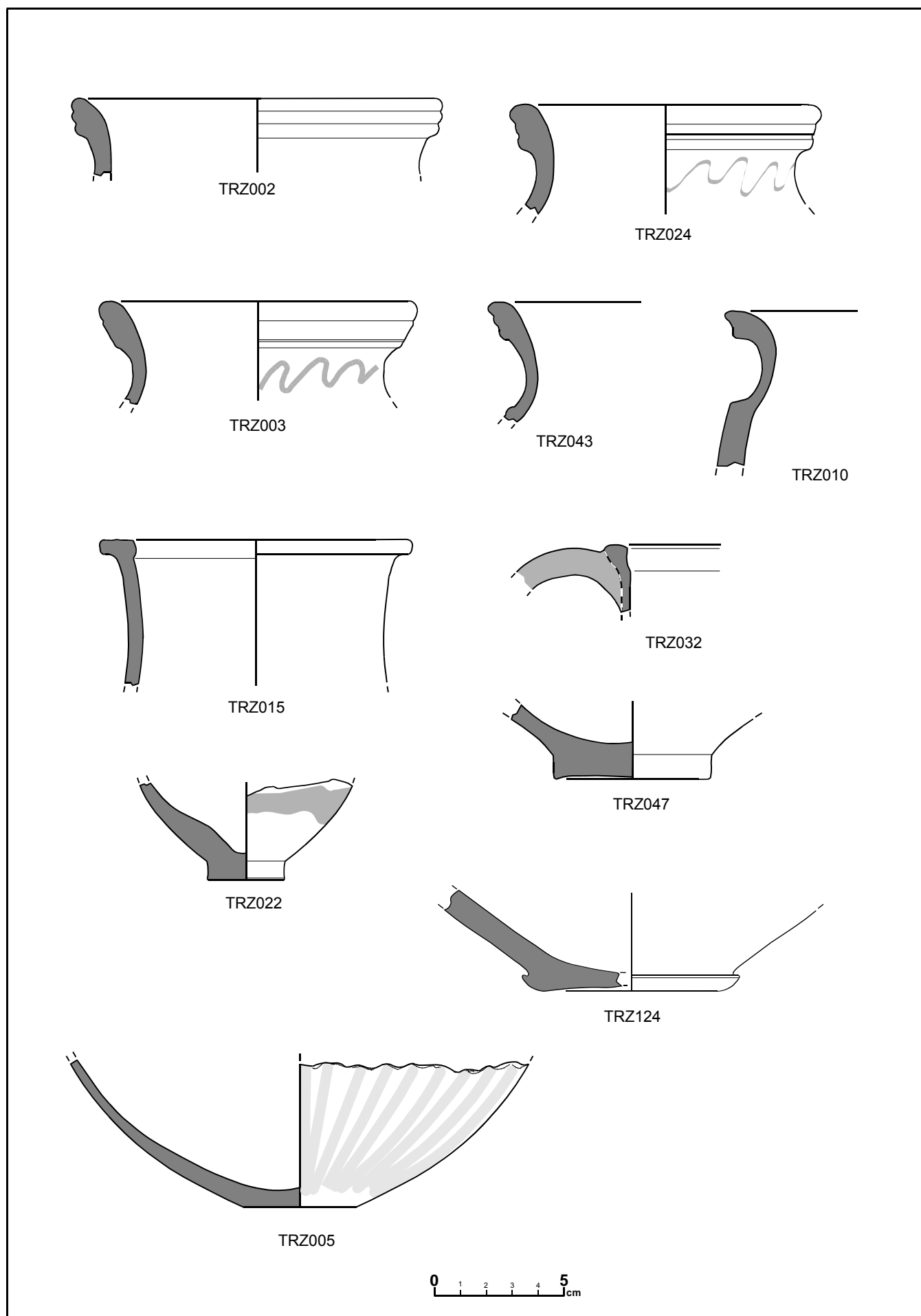


Figure 21d: Pottery from the chemical group TZ2

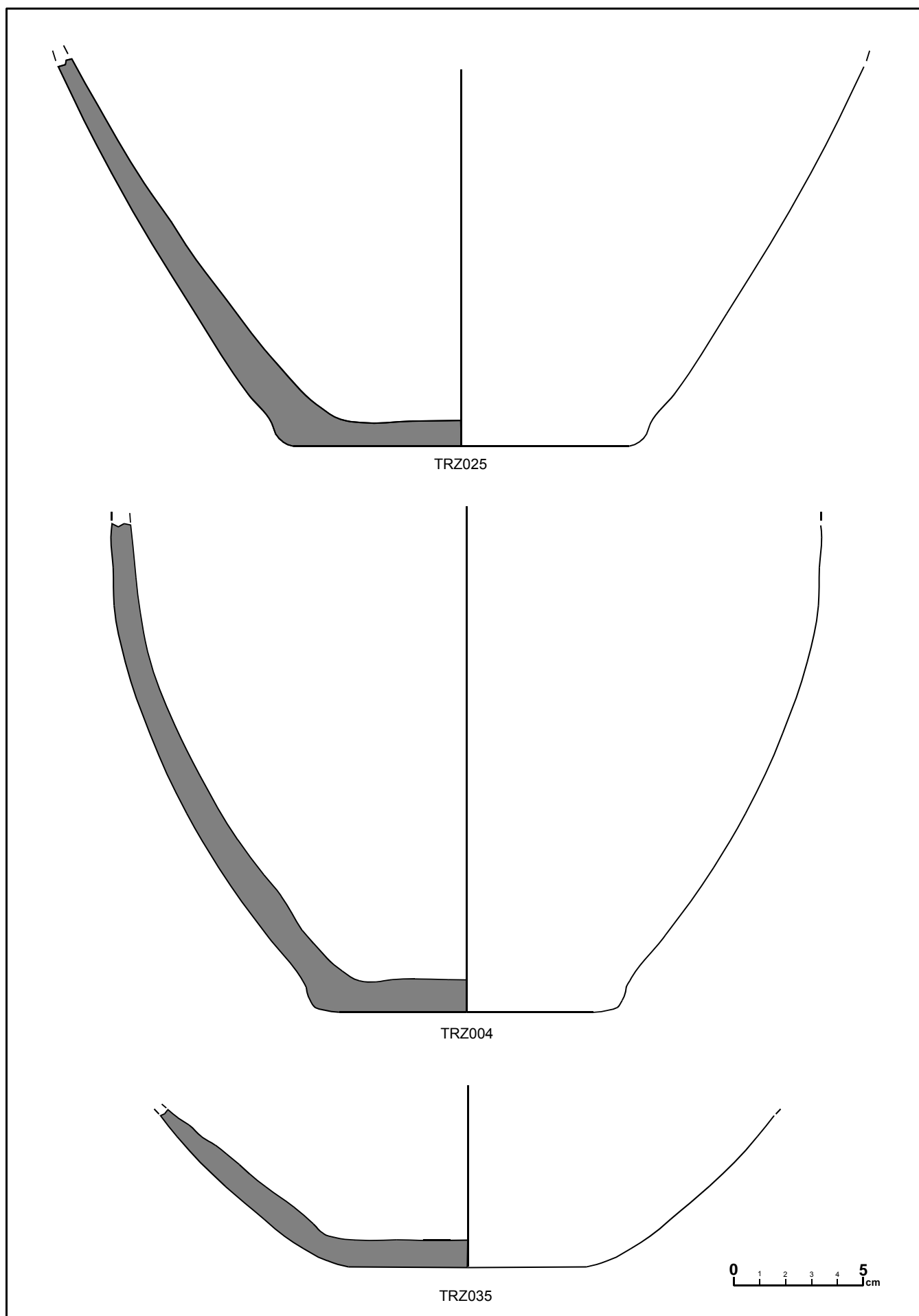


Figure 21e: Pottery from the chemical group TZ2

- GQ-TZ3

Formed by the 37 ceramic individuals located at the left side of the red rectangle of Figure 3. This group basically formed by individuals recovered in the recent excavations of *Tchinguiz Tepe* (n=16), some individuals coming from the area where the monasteries are located at *Kara Tepe* (n=10) and finally seven of the individuals have been recovered at the area of the *Citadel*. It is important to point out the presence of the individual TRZ126 which is a narrow rim jar (7cm) recovered at the kiln site of the Kiln 1 of *Kara Tepe* and three individuals coming from kiln site of the Kiln 2 of *Kara Tepe* (Figure 22). The presence of individuals recovered at Kiln 1 and 2 at the same time within this group is an evidence of a very high chemical similarity between the two workshops.

Within the pottery sampled at *Tchinguiz Tepe* associated to this group there are 4 different types of casseroles of the type "tagine" recovered during the systematic prospections in this sector (TRZ068, 069, 070 i 071). All of them recovered in stratum UE5 of the sector RC. This layer corresponds to an abandonment level with a great quantity of pottery recovered in it. There are mainly painted common wares but also some cooking wares. All kind of pottery is represented in this stratum. There are casseroles type "tagine" of 25 cm diameter of rim (TRZ082), bolls with inside and outside decoration (TRZ076), a boll or a casserole with decorated rim (TRZ080), a decorated and varnished ceramic fragment (TRZ075), a cover (TRZ085), a pottery base of 3 cm diameter (TRZ074) and a cover of a casserole of the type "tagine" (TRZ078).

From the UE 6 located below UE 5 there is a casserole of the type "tagine" with a 44 cm rim (TRZ073) a jar (TRZ055) and a boll (TRZ058). A possible base of a casserole type "tagine" (TRZ063) recovered in the UE 10 also belongs to this group.

Within the pottery recovered at the area of the monasteries of *Kara Tepe* that belong to this group one can find a casserole with a superficial decoration (TRZ134) two decorated and varnished casseroles type "tagine" (TRZ141 and TRZ136) a plate (TRZ137), a possible cover (TRZ137), a painted and inside decorated with an incised decoration boll (TRZ143) and another boll without any decoration (TRZ144). There are also two jars and a possible lantern (TRZ135, TRZ138 and TRZ131).

The individuals of this group recovered at the *Citadelle* correspond to two bolls without any decoration (TRZ117 and TRZ119), one undecorated jar (TRZ103), and some pieces which probably correspond to a plates or covers (TRZ093, 094, 108, 121).

Finally, the pottery sampled at *Kara Tepe* associated to this group represent two casseroles of the type "tagine", one with 37 cm diameter of rim the other 25 cm (TRZ012 and TRZ038) and an undecorated jar (TRZ016).

The rest of the analysed material (Figure 23) cannot be associated to any of the above mentioned chemical categories due to major chemical differences. On the other hand it is very important to mention that all the individuals associated to the three above mentioned groups present significant chemical similarities which indicated high geochemical similarity between the raw materials applied for the fabrication of all these individuals.

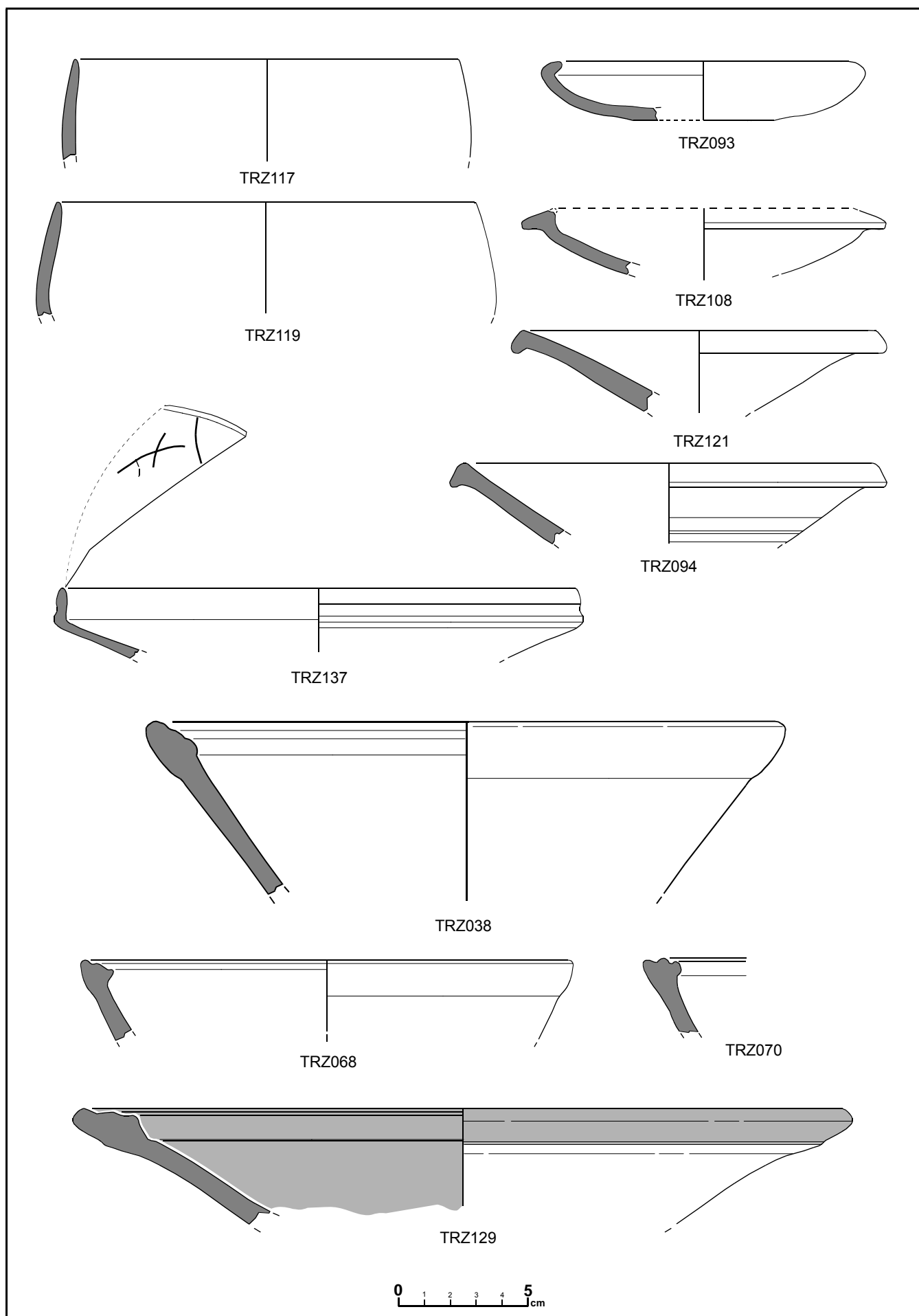


Figure 22 b: Pottery from the chemical group TZ3

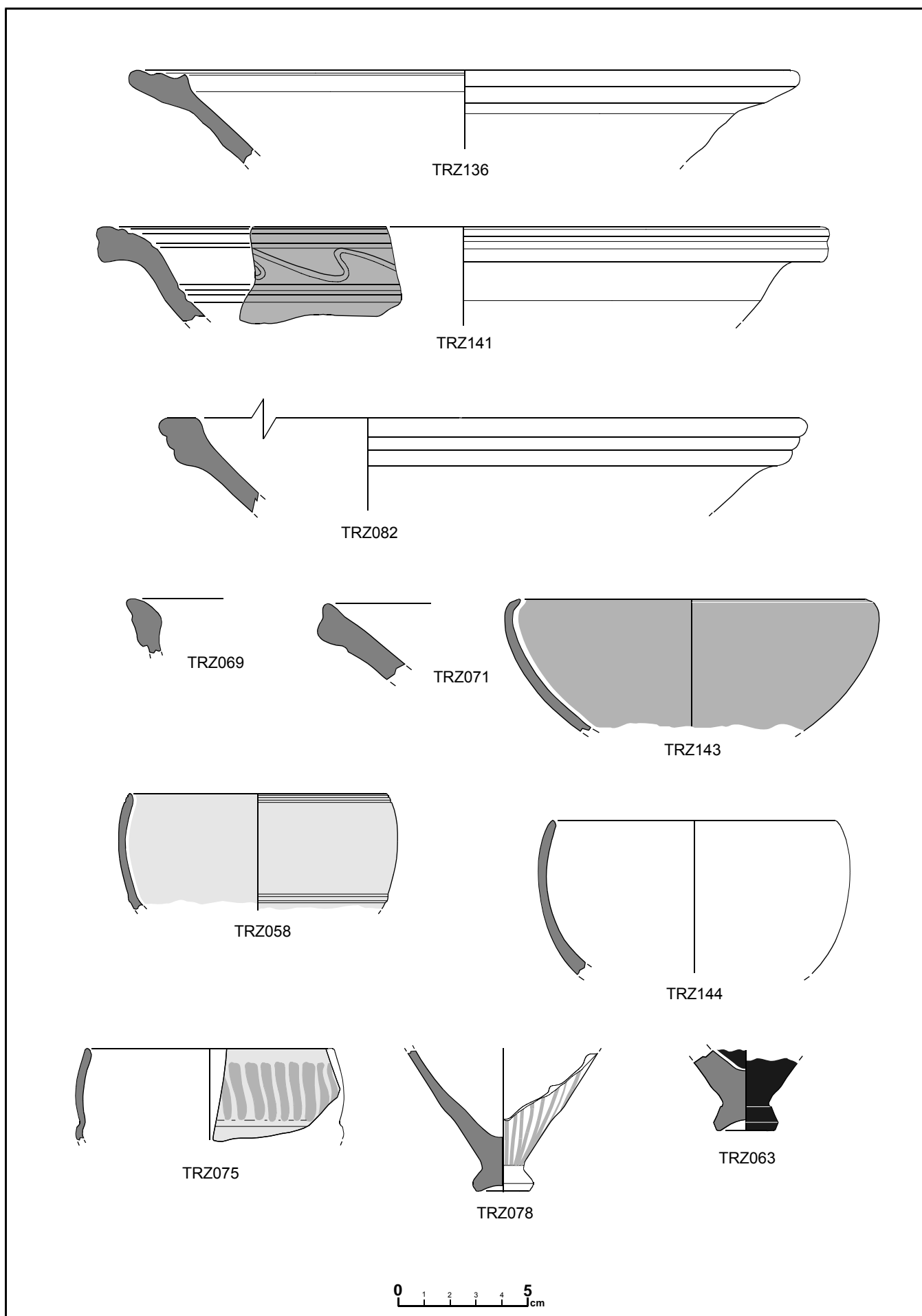


Figure 22 c: Pottery from the chemical group TZ3

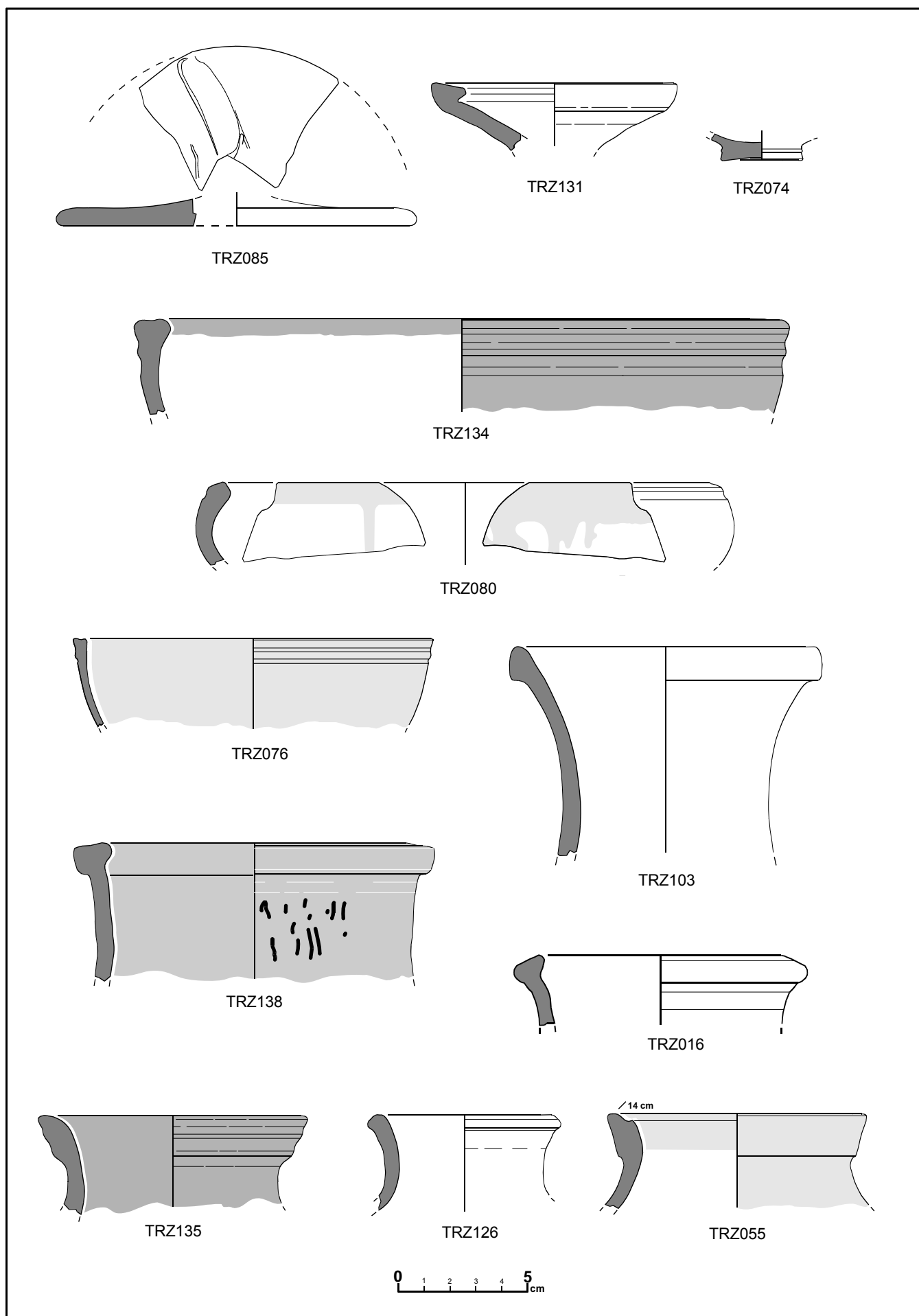


Figure 22 d: Pottery from the chemical group TZ3

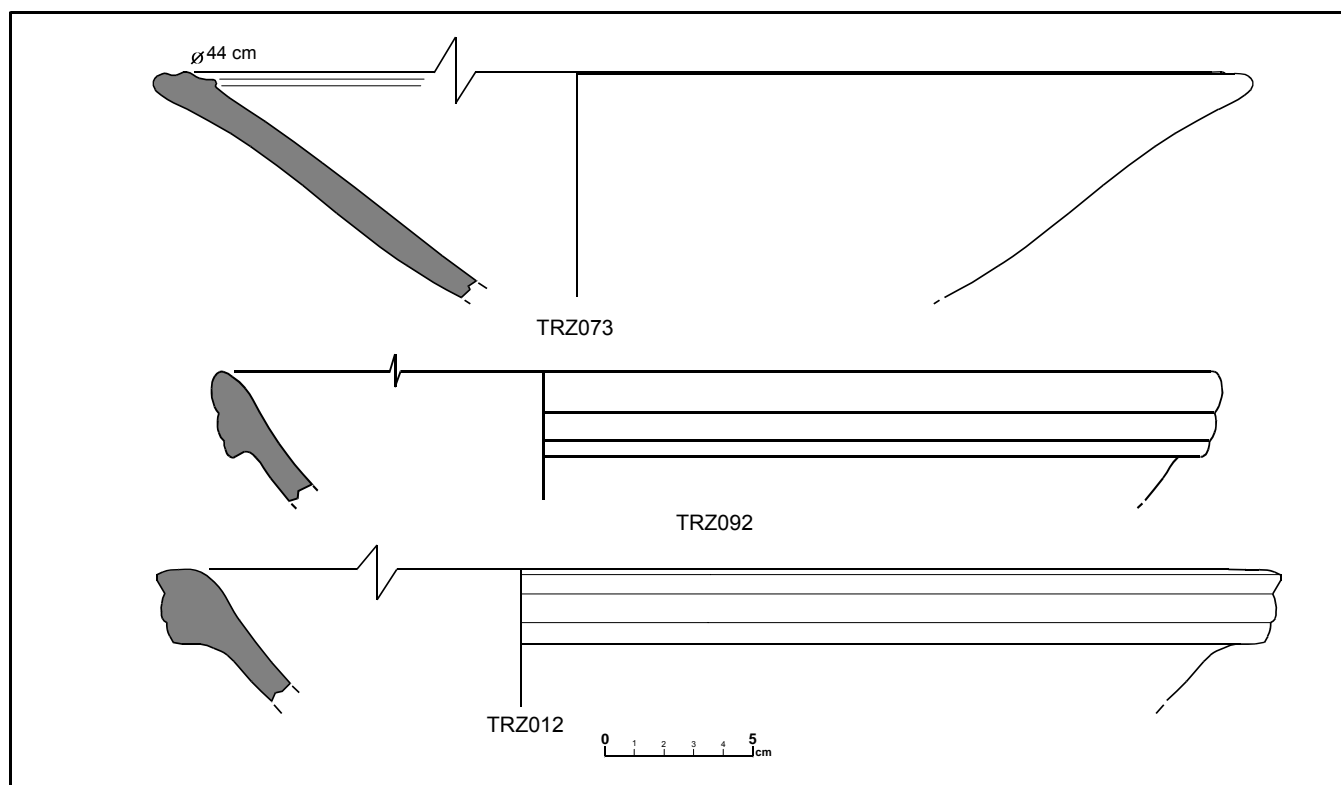


Figure 22 a: Pottery from the chemical group TZ3

REST OF MATERIAL

Within the non classified individuals there are some jars (TRZ011, 007, 028), one casserole of the type “tagine” (TRZ017) recovered from the stratum of the Kiln 2 of Kara Tepe corresponding to the period when this kiln was still functioning. The mayor number of the individuals located at the left side of the red rectangle (Figure 3), nevertheless, corresponds to pottery recovered at the *Ciutedelle* including two jars (TRZ116, 119), three plate-bolls (TRZ102, 112 and 110), and one plate or cover (TRZ120). Between these ungrouped individuals there is also one recovered at the area of the monasteries of *Kara Tepe* and another three at *Tchinguiz Tepe* (TRZ054, 060 and 081). There is also a clay sample (TRZ127) coming from the firing structure of the Kiln 1.

On the right side of the red rectangle of Figure 3 most of the unclassified individuals were recovered at the area of the Kiln 2. Within this material there are various casseroles of the type “tagine” (TRZ029, 019, 041), two jars (TRZ049, 050) and one cover (TRZ018). There is also one casserole (TRZ123) recovered in the area of the Kiln 1, two plates coming from a layers of habitat of *Tchinguiz Tepe* (TRZ087, 090) and several individuals sampled at the *Citadel* (TRZ101, 097, 098 and 105).

Beside all the above mentioned individuals five are clearly represent *chemical loners* two of which were sampled at *Tchinguiz Tepe*, one at the *Citadel* and one at the area of the monasteries of *Kara Tepe*. These individuals seem to have a clearly different geochemical origin regarding to the rest of the analysed individuals. Within this material there are one boll and one jar (TRZ104 and 114) recovered at the *Citadel*, one jar sampled at the area of the monasteries (TRZ142) one jar with a handle (TRZ084) recovered at UE 5 of the sector RC of *Tchinguiz Tepe* and one painted base coming from the UE 5 of the sector RB of the same site. Due to the clearly important chemical differences of these five individuals regarding to the rest of the analysed material it is possible to arrive to the hypothesis that pottery fabricated in other geographical areas, of which the origin is still unknown, had been diffused to the analysed production and consumption areas.

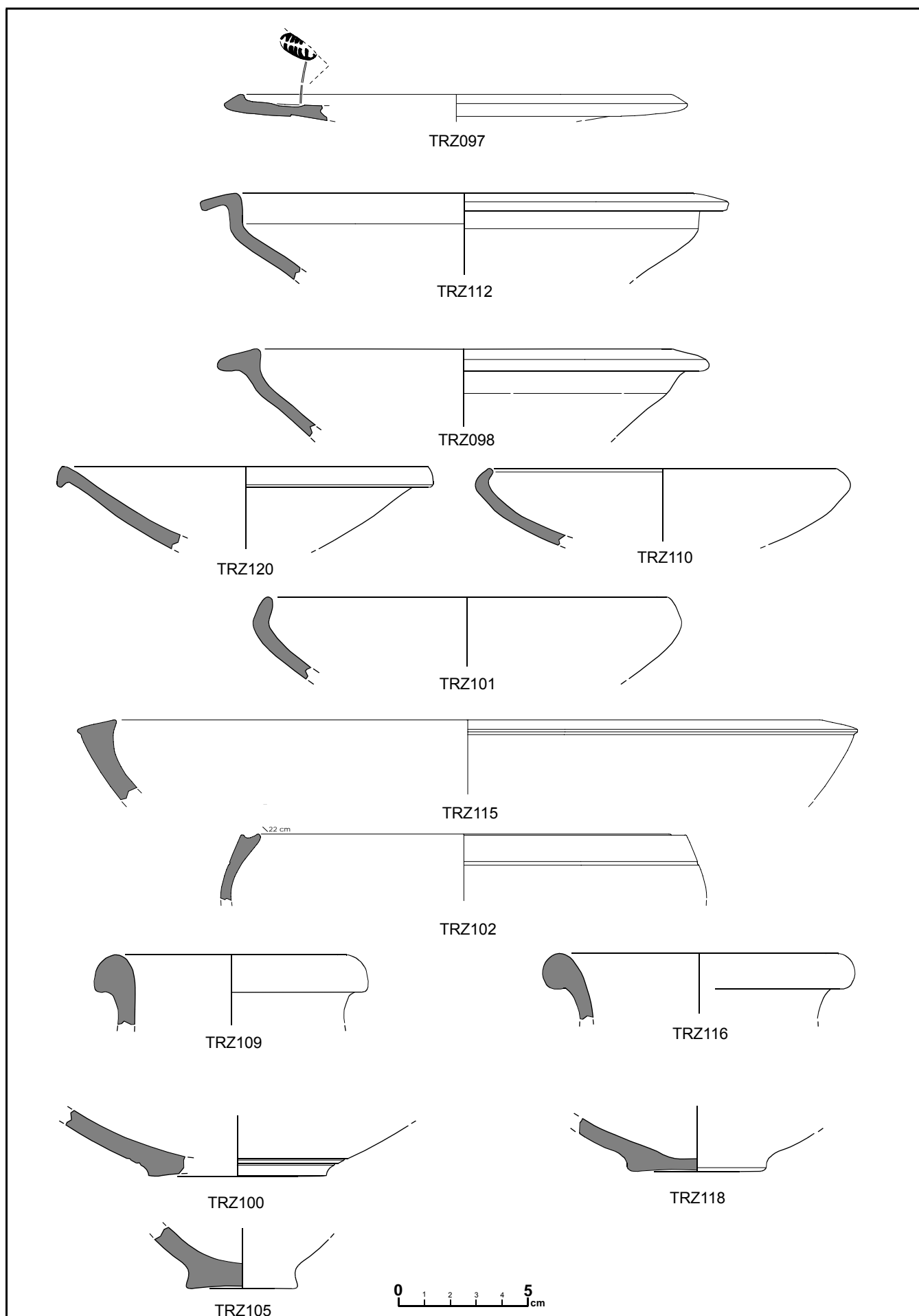


Figure 23a: Chemical outliers from the Citadel

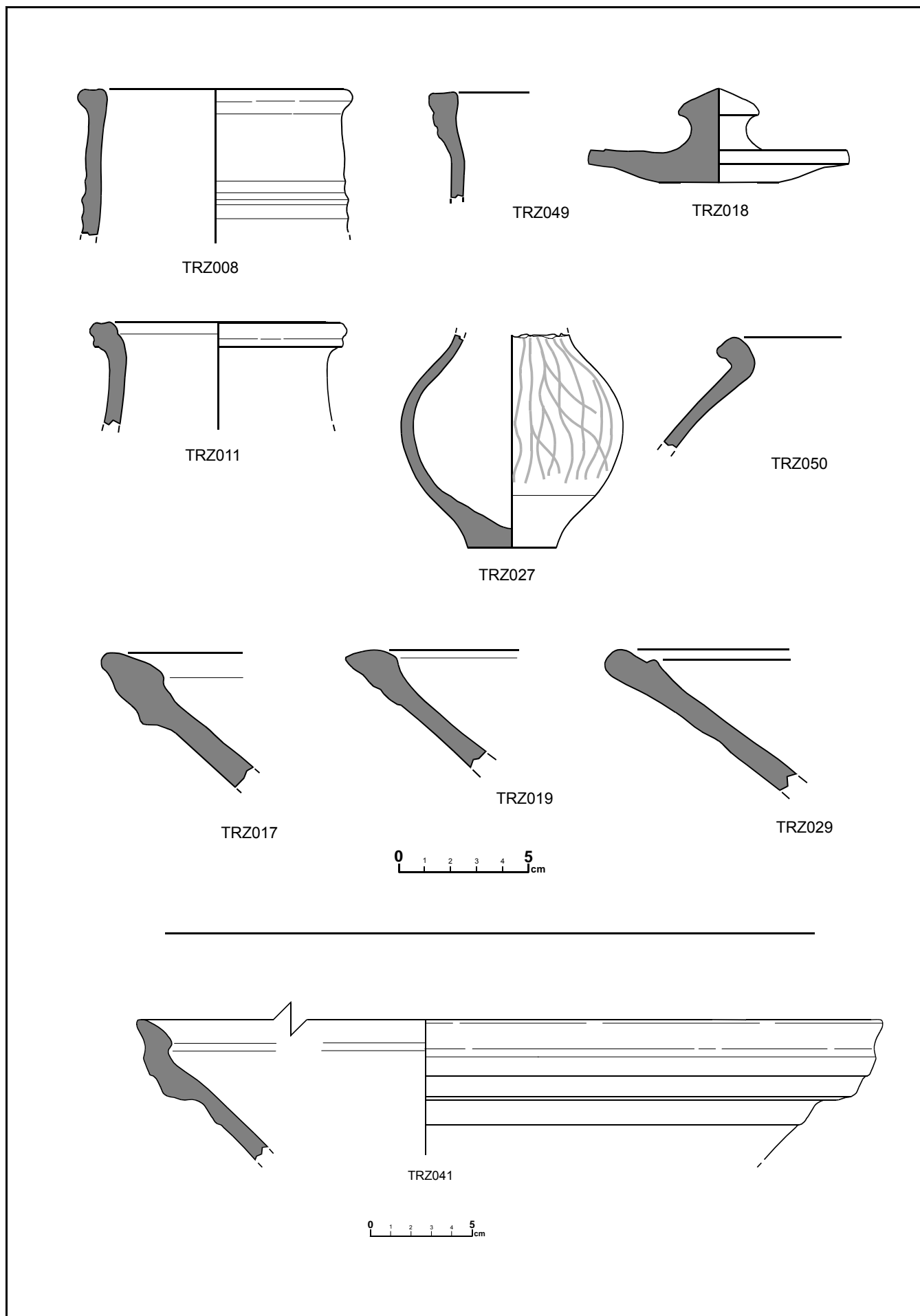


Figure 23 b: Chemical outliers from the Kiln 2

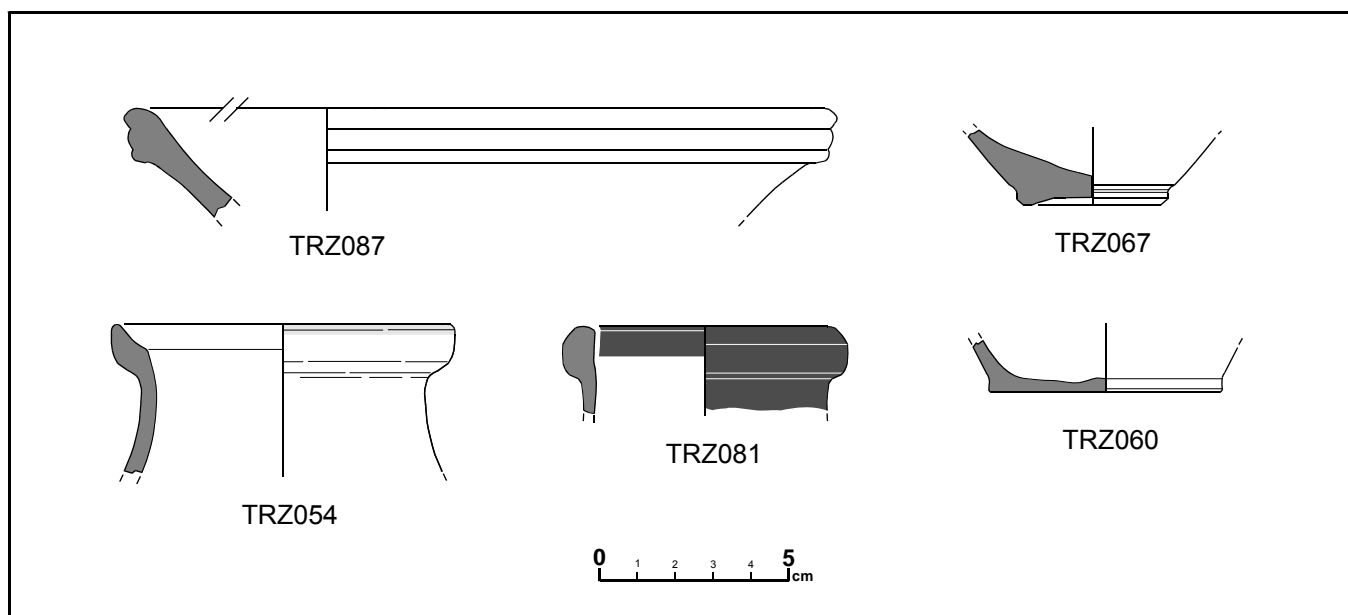


Figure 23 c: Chemical outliers from the Tchinguiz Tepe

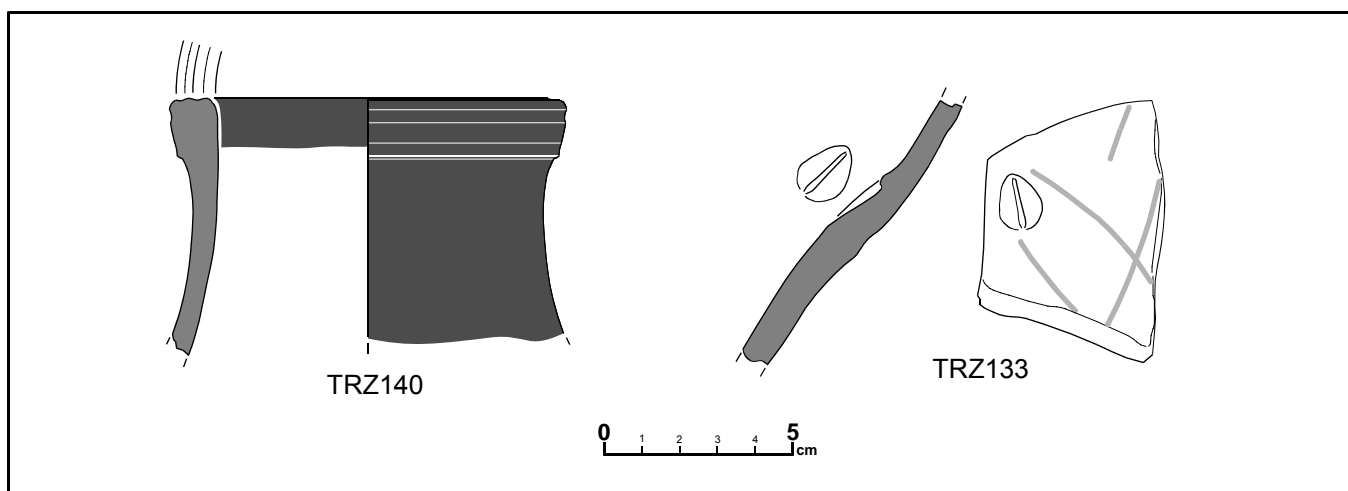


Figure 23 d: Chemical outliers from the Monestirs

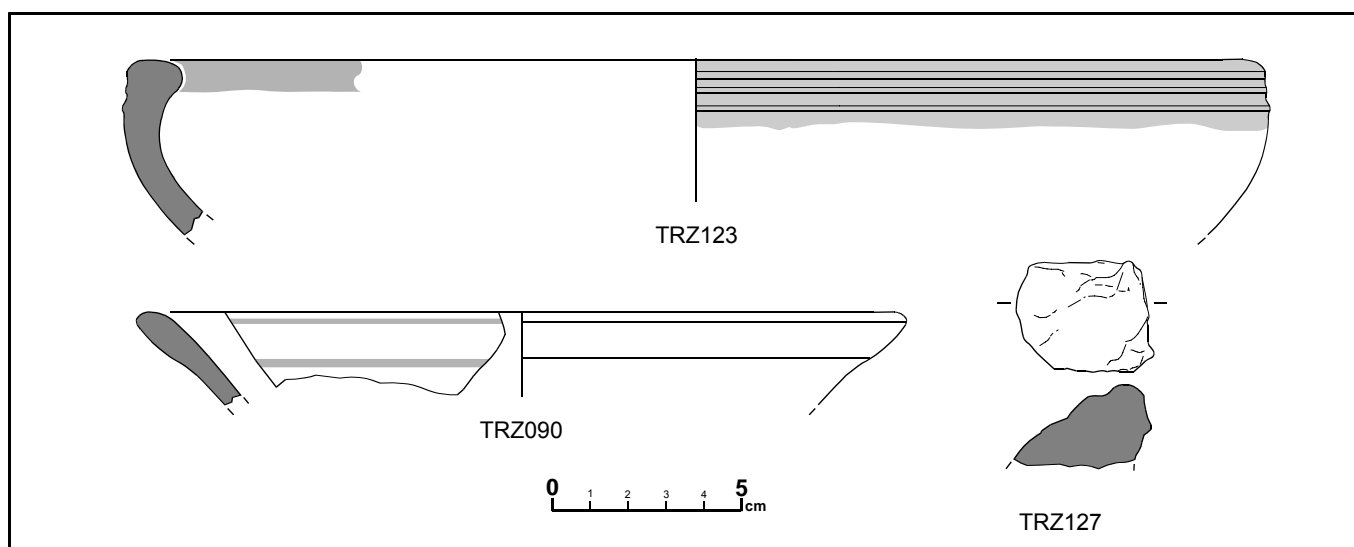


Figure 23 e: Chemical outliers from the Kiln 1 and the Tchinguiz Tepe

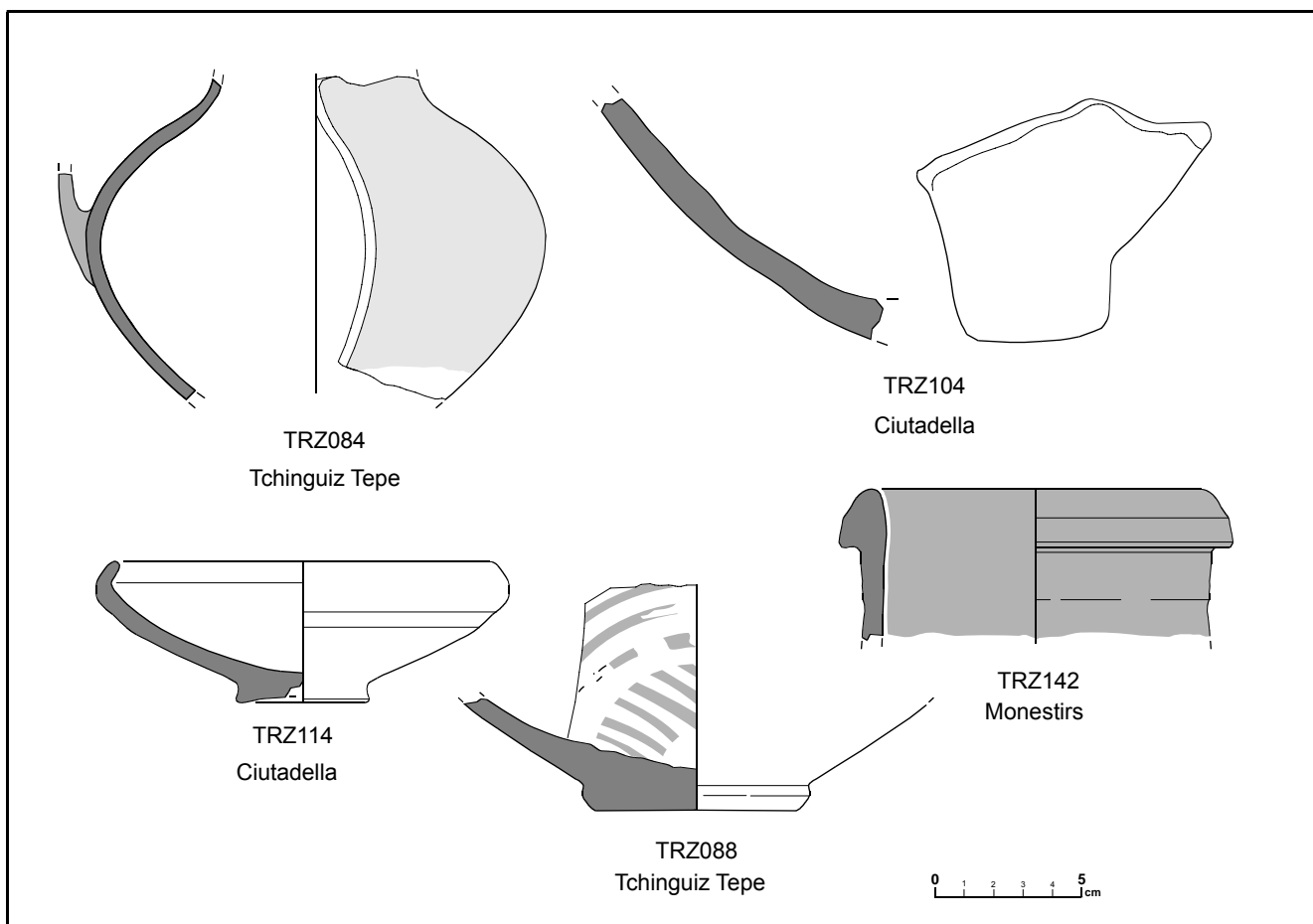


Figure 23f: Chemical outliers

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Résultats des tests polliniques octobre 2007

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PREAMBULE

Ce rapport d'activité présente simplement les résultats de tests palynologiques prévus à l'origine par la direction du programme de recherche pour envisager à terme la mise en place d'un programme de recherches paléoécologiques.

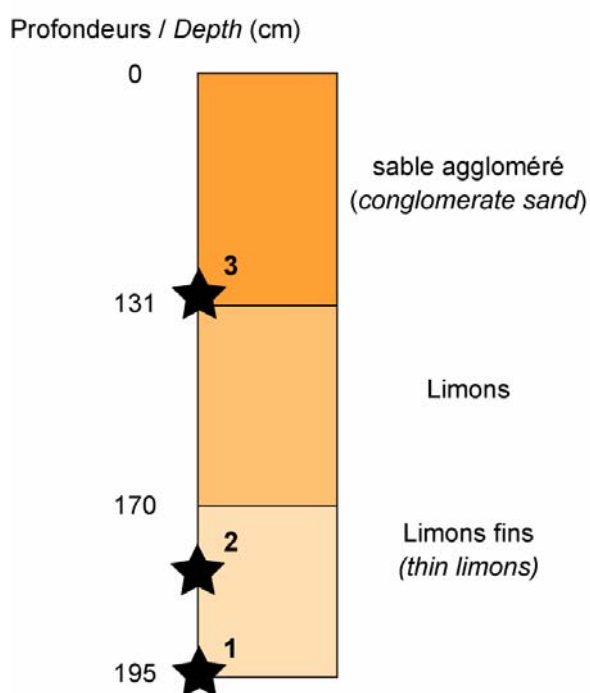
Ce document est une simple évaluation de la potentialité des études paléoécologiques et plus particulièrement palynologiques dans deux provinces d'Ouzbékistan. Si cette démarche initiale s'avère indispensable, les éléments présentés ne revêtent qu'une valeur de tests préliminaires. Ils ne peuvent donc pas être considérés comme de véritables résultats conclusifs qui pourraient donner lieu à une publication (écrite ou électronique).

1. Echantillonnage de la zone de Termez

1.1. La terrasse alluviale

Trois échantillons provenant d'une **terrasse alluviale**, en bordure du fleuve Amur Darya, ont été analysés. Le site est appelé Amur-I;

Stratigraphie (*Stratigraphy*) site : AMUR-I



Echantillons / samples :

- 1 : 190-195 cm
- 2 : 175-180 cm
- 3 : 125-130 cm



Fig. 1: . Stratigraphie et photographie de la coupe AMUR-I.

Résultats: Les sédiments alluviaux-fluviaux se sont avérés totalement stériles et donc impropres à toute analyse pollinique

1.2. Echantillonnage du site archéologique de Termez

En raison de l'emploi du temps, l'échantillonnage palynologique n'a pu être réalisé que sur la partie du site *Tchingiz Tepe* fouillée par l'équipe française dirigée par P. Leriche (AOROC UMR CNRS/ENS 8546).

En vue de tester les propriétés de conservation sporo-pollinique des sédiments du site archéologique, l'échantillonnage s'est déroulé ainsi :

3 échantillons d'une fosse comblée postérieurement à la période kouchane. Le site est appelé FOSSE-KOUCHAN-I. La stratigraphie est continue : sables limoneux.

Les échantillons ont été prélevés aux profondeurs suivantes :

- 16-26 cm,
- 170-174 cm,
- 324-334 cm.

Résultats: Les sédiments se sont avérés totalement stériles et donc impropres à toute analyse pollinique.

- 3 échantillons dans les murailles, au site dit de la Nécropole ;

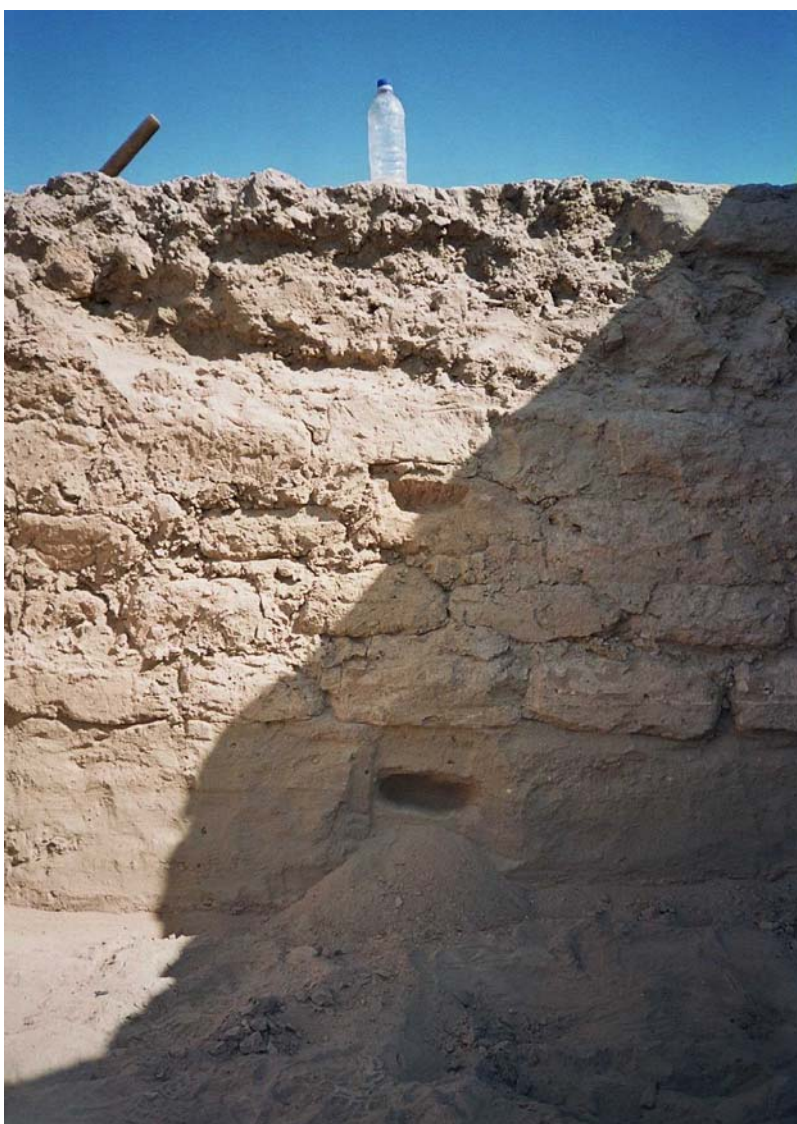


Fig. 2: . Photographie des prélèvements palynologiques au site dit de " la Nécropole " .

Résultats:

Les sédiments s'avèrent pauvres en matériel sporo-pollinique. Après lecture totale de la lame, seule une centaine de grains de pollen ont pu être comptés. En outre, la conservation est globalement médiocre jetant le doute sur de nombreuses identifications taxonomiques (exemple de l'échantillon 2 : chêne vert/*Quercus ilex* ? ; *Thalictrum* ? etc.). Enfin, les sporomorphes pourraient être en position secondaire, provenant notamment de la dégradation de la brique crue. En conséquence, les assemblages polliniques fossiles enregistrés ne peuvent étayer de façon fiable et solide des reconstructions paléoenvironnementales à plus large échelle.

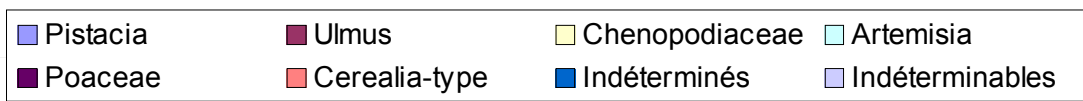
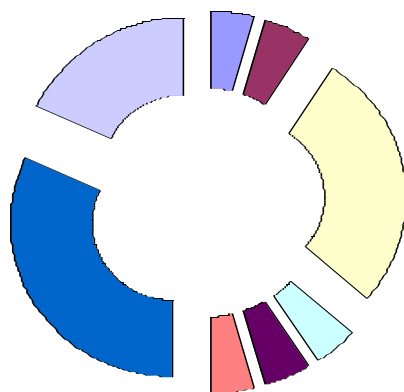
Néanmoins, une grande diversité taxonomique est observée puisque plus d'une vingtaine de types polliniques a parfois pu être identifiée. Parmi eux, la présence de manière tout à fait significative de nombreux indicateurs polliniques d'anthropisation mérite d'être soulignée. C'est particulièrement le cas des céréales et du sarrasin (*Fagopyrum esculentum*). Menée de manière plus systématique dans des niveaux ou structures bien en place, contextualisés et datés, une analyse pollinique pourrait éventuellement apporter quelques informations d'ordre qualitatif sur les espèces végétales présentes et les modes d'occupation et d'activités développées.

Nécropole-I : échantillon 1

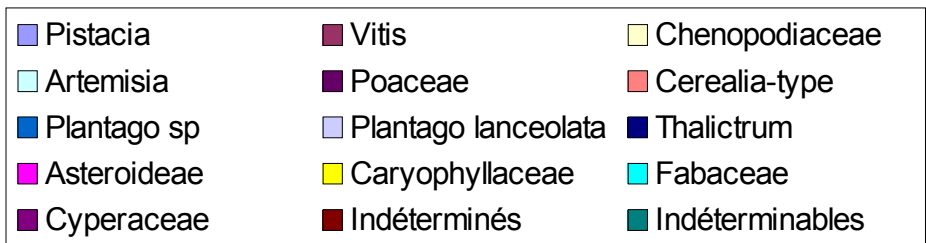


■ Ephedra	■ <i>Quercus ilex</i> ?
■ Juglans	■ Salix
■ Juniperus	■ Artemisia
■ Chenopodiaceae	■ Poaceae
■ Cerealia-type	■ <i>Fagopyrum esculentum</i>
■ <i>Papaver rhoeas</i>	■ Rumex
■ <i>Plantago</i> sp	■ <i>Plantago lanceolata</i>
■ Cyperaceae	■ Xanthium-type
■ Asteroideae	■ Cichorioideae

Nécropole 1 : échantillon 2



Nécropole 2



1 échantillon dans une tranchée du bâtiment B. Cet échantillon isolé n'a pas été testé.

2. Prospection et échantillonnage de la zone de Montagne

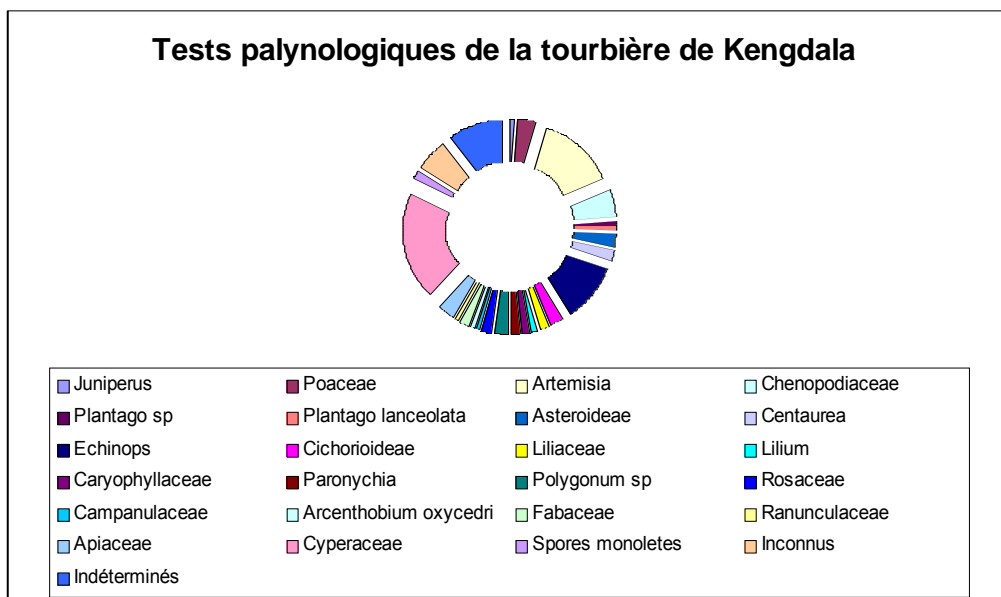
Sondage au moyen d'une sonde à avalanche et prélèvement d'1 échantillon de la tourbière de Kengdala (109 cm de prof ; 2974 m d'altitude). Stratigraphie : tourbe fibreuse ;



Fig. 3: . Photographie de la tourbière de Kengdala.

Résultats:

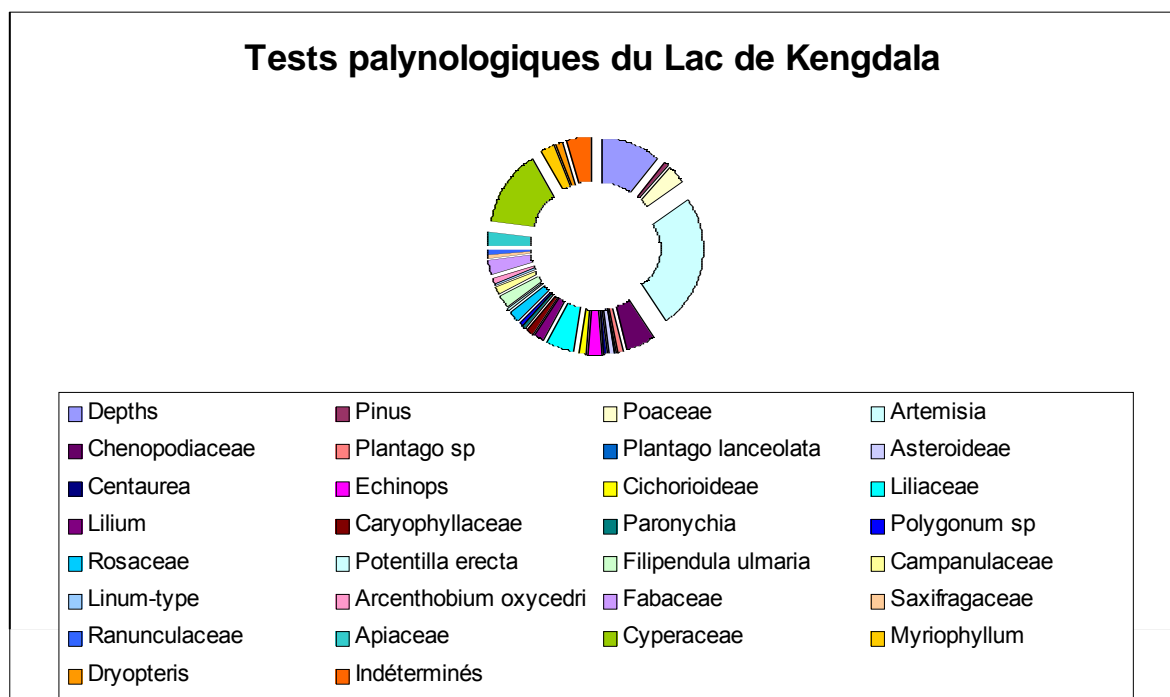
Le test palynologique réalisé dans les niveaux superficiels atteste la richesse et l'excellente qualité du matériel sporo-pollinique enregistré : bon état de conservation des spores et des grains de pollen, diversité suffisante. La tourbière topogénique de Kengdala pourrait donner lieu à une étude paléoécologique. Il faudrait toutefois tester si le processus d'édaphisation n'aurait pas altéré les cortèges sporo-polliniques situés dans des niveaux plus profonds.



Sondage et prélèvement d'1 échantillon du lac de Kengdala (au moins 1,20 m de prof, 3020 m d'altitude). Stratigraphie : tourbe évoluée



Fig. 3: Photographie du lac de Kengdala.



Résultats:

Le test palynologique réalisé dans des niveaux superficiels atteste la richesse l'excellente qualité du matériel sporo-pollinique enregistré : un très état de conservation des spores et des grains de pollen, diversité suffisante. Le lac de Kengdala peut parfaitement donner lieu à une étude paléoécologique.

Remarque:

Le contexte socio-environnemental de ces montagnes n'ont rien de commun avec la zone de Termez. Si des recherches paléoenvironnementales devaient être engagées dans ce secteur, elles doivent impérativement s'inscrire dans un programme de recherche particulier. Si ce dernier est tout à fait possible à construire, il est nécessaire de rappeler que les infrastructures nécessaires au déploiement d'une campagne de sondage paléocologiques sont relativement lourdes. Par ailleurs, le palynologue qui sera en charge de réaliser les analyses devra obligatoirement se former à la flore pollinique de ce secteur (utilisation de clé de détermination spécialisées et surtout de banques polliniques appropriées).

3. Mise en place d'un référentiel pollinique actuel

Lors de la campagne de terrain d'octobre 2006, 4 échantillons avaient été prélevés suivant un gradient altitudinal. L'objectif était de tester les propriétés de conservation sporo-polliniques de différents enregistreurs potentiels en vue d'élaborer un référentiel pollinique actuel.

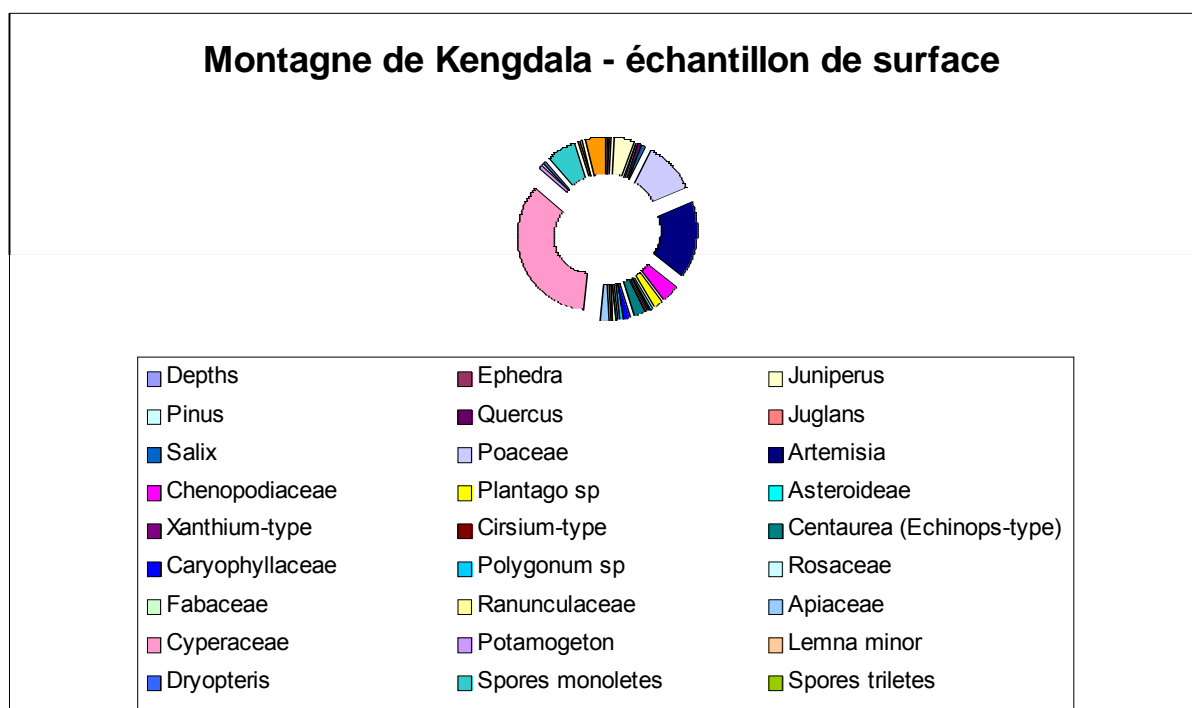
Généralement, les objectifs d'un tel référentiel sont double :

- pour une *calibration du signal pollinique*: types d'indicateurs polliniques d'anthropisation, caractérisation pollinique des différentes formations végétales, définition de l'aire de captation pollinique etc.

- pour une *quantification climatique des données polliniques*: travail en partenariat avec le Laboratoire de Chrono-écologie (O. Peyron, UMR 6565/CNRS, Université de Franche-Comté, France).

Résultats:

Les échantillons de sols se sont avérés pseudo-stériles et dans tous les cas impropres à l'analyse pollinique. Les échantillons d'excréments n'ont pas faits l'objet d'analyse. Leur étude ne sera utile notamment en terme d'identification des marqueurs pastoraux et agricoles que si une recherche palé-écologique pleine et entière se met en place dans le futur. En revanche, l'échantillon de mousse prélevé près du Lac de Kengdala a livré un contenu sporo-pollinique tout à fait satisfaisant. Les résultats ont été envoyés à la banque de données polliniques de l'Université de Franche-Comté.



4. Éléments de conclusions à prendre en compte si des études polliniques se mettent en place dans le futur :

Dans la région de Termez, les tests palynologiques réalisés ont démontré la pauvreté voire la stérilité de la grande majorité des sédiments : fluvio-alluviaux, archéologiques. Seules quelques strates ont révélé, de façon ponctuelle, la présence de grains de pollen manifestant notamment des activités agricoles. Toutefois, si dans le futur, il est décidé la mise en place d'un échantillonnage archéobotanique systématique du site archéologique, celui-ci devra être impérativement être mené en étroite collaboration avec les archéologues de façon à ne travailler que dans des zones aux chronologies et aux contextes les plus reconstruits et précis possible. Cette approche apparaît l'unique démarche envisageable de façon à obtenir quelques résultats archéobotaniques exploitables.

Les sédiments de la montagne apparaissent propices à la réalisation d'études paléoécologiques larges et précises. Mais l'étude de ce secteur doit faire l'objet d'un programme spécifique de recherches scientifiques pluridisciplinaires et diachroniques.

*The Archaeological sites
of the territory of Termez*

S. Stride

ANCIENT TERMEZ

Note : The bibliography of the sites situated within the limits of the outer walls of Ancient Termez is included in the general bibliography of Ancient Termez (site 131). Detailed data, including accessibility, state of conservation, etc. is included separately for each site.

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

The reference point is situated on the citadel.

DESCRIPTION

The site of Ancient Termez (or Pre-Mongol Termez) covers an area of about 500 hectares and includes areas and monuments, which have been occupied at different periods from the middle of the 1st Millennium BCE up until nowadays. The site is divided into six different sectors, each of which is in turn subdivided as follows :

- 131a Citadel
- 131b Shahristan
- 131b1 Dunjo Tepe
- 131c Rabat
- 131c1 Chor Sutun
- 131c2 Kurgan
- 131c3 Zone to the North of the Rabat
- 131d Sari Dikat
- 131d1 Palace
- 131d2 X
- 131e Military Camp
- 131e1 Hakim al-Termizi
- 131e2 Underground structures next to al-Hakim al-Termizi
- 131e3 Mala Chingiz (Chingiz 2)
- 131f Chingiz Tepe

Other sites linked to Ancient Termez but not included within these sectors (i.e. with a separate number) include :

- Kara Tepe
- Fayaz Tepe
- X (Fayaz Tepe)
- Zurmala
- X (South of Rabat 1)
- X (South of Rabat 2)

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

Very approximate estimation of the area in which ruins of different periods have been found.

2a, 2c. The size and importance of the site has varied over time. During phases P2 (Achaemenid), G, G/K and probably a large part of phase H, the site should be considered to be of type 2a or even 2c.

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

See bibliography

Achaemenid period levels have only been found on the citadel. Their dating remains uncertain.

IMPORTANCE OF SITE

Esthetical Value

Historical Value

Social Value

Economical Value

STATE OF PRESERVATION

Current Use

Human Pressure

Conservation Work

Accessibility

State of Preservation

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Main publications

TAKÈ I (final publication of the TAKÈ) ; TAKÈ II (final publication of the TAKÈ) ; *La Bactriane au carrefour des routes et des civilisations de l'Asie centrale* (preliminary results of the MAFOuz b)

Historical sources

*Tomaschek 1877 (p.27) ; *Bartol'd 30 ; Masson, M. 41 (pp.8-12) ; Shishkin 41 ; Bartol'd 65b (major article) ; *Bartol'd 68 (especially pp.72-76) ; Belenitsky, Bolshakov et al. 73 ; **Staviskij 86 (pp.105-107) ; Borovkova 89 (Chinese sources) ; Pugachenkova, Rtveladze 90 (pp.66-67, 126, 140, 167) ; Mukhammadzhanov 95a' ; Uvatov 95' ; Kamaliddinov 96 (pp.99-114, important article) ; *Leriche, Pidaev 99 (pp.45-46) ; *Leriche 2001a (pp. 79-83)

General overview of the site

Kastal'skij 30a (pp.5-9) ; Masson, M. 41 (especially pp.37, 53-56, 86-102) ; Shishkin 41 (citadel, fortification wall pp.126-133, zone 1 (inner rabat, fortification wall) p.133-137, zone 2 (shahristan 1, isolated buildings) p.138-147, suburbs (p.147-149)) ; Masson, M. 45 (results of the TAKÈ) ; Al'baum 85', Al'baum 90a', Al'baum 90b' - Termez during one period in particular : Okladnikov 45 (pp.10-13, Stone Age, flint tools especially from DunjoT) ; Nil'sen 66 (pp.20-22, V-VIIIth c.) ; Rempel' 78 (p.49, XI-XIIth c.) ; Masson, V. 85 (p. 258, antiquity) ; Pugachenkova Rtveladze 90 (p.140 V-VIIIth c., p.175 VIII-beg. XIIIth c.) ; Pidaev 95' (Kushan period) ; Pidaev 95b' (VIII-beg. XIIIth c.) ; Pidaev, Rakhmanov, U. 95' (historical topography, X-XIIth c.) ; Pidaev 98 (Graeco-Bactrian period) ; Pidaev 2000a (Alexander the Great pp.55-56) ; Pidaev 2000a (Achaemenid) ; *Pidaev 2001 (Achaemenid, Graeco-Bactrian)

Descriptions and brief references

- Description : Masson, M. 56a ; **Staviskij 86 (pp.276-278) ; **KIDU 91 (pp.95-96 antiquity [T.K. Mkrtychev], p.108 MA [T.K. Mkrtychev]) ; Khmel'nitskij 92 (pp.33-35, IX-Xth c.) ; Khmel'nitskij 96 (pp.34-36, XI-beg. XIIIth c.) ; Kamaliddinov 96 (pp.103-112) ; *Leriche, Pidaev 99
- Brief reference : Denike 27 ; Trever 40 (p.12) ; Masson, M. 45 (pp. 5-6) ; Masson, V. 74a ; **Ajni 80 (pl.103 bronze mortar, IX-XIIth c.) ; Annaev 84a (p.176)
- Generalities : Pidaev 89b ; Pidaev 90c' (Graeco-Bactrian) ; Pidaev 92a' ; Pidaev 94' ; Druzhinina 95' (Graeco-Bactrian) ; Mkrtychev 95a' (different religions) ; Shirinov, Pidaev 95' ; Shirinov, Shajdullaev 95'
- History of exploration : Masson, M. 41 (pp.13-37) ; *Leriche 2001a (pp. 75-79) ; *Pugachenkova 2001a

Main excavated areas

Citadel

- Various : Denike 27a ; Denike 28a ; Kastal'skij 30a (pp.5-7, description) ; Zhukov 45a (cross section of the North fortification wall, close to the NE angle) ; Pidaev 85' (SE and centre E) ; Kozlovskij, Nekrasova 76 (West part of the citadel, 3 pl. ceramics, 1 pl. statuettes), Pidaev 87 (test trench at the summit of the site, periodisation) ; Rakhmanov 95 (fortifications) ; Leriche, Annaev et al. 95' ; *Leriche, Annaev 96 (pp.281-294) ; *Leriche, Pidaev 99 (pp.47-49) ; *Pidaev 2001 (cross section n°2, test trench n°2) ; *Leriche 2001a (pp.83-97, general overview) ; *Stride 2001 (West part of the citadel, "chantier D")
- Riverine fortification wall (often interpreted as a quay) : Kastal'skij 30a (pp.6-7) ; Grazhdankina 65 ; Grazhdankina 89 (pp.57-63, building materials and methods, tabl.5 chemical analysis) ; *Leriche, Annaev 96 (p.282, ill. 3-4) ; *Gelin 2000 (baked bricks, mortar) ; *Gelin, Tonnel 2001 (excavation report) ; Pidaev, Leriche et al. 2001 (excavation report)

Lower Town

- Domestic architecture
- Living block XI-beg. XIIIth c. : Pidaev 86d
- XIIth c. room : Sukharev 41
- 2 medieval buildings : Annaev 81
- Excavation in the shahristan : Pidaev, Leriche et al. 2001 (p.110)
- Funerary architecture

- Medieval cemetery (IX-XIVth c.) : Pidaev, Mustafakulov 95' ; *Mustafakulov 2001
- Civil and industrial architecture
 - Civil works : Anarbaev 95' (MA)
 - Caravanserai (XIIth c., rabat) : Pidaev, Rakhmanov, U. 88' ; Rakhmanov, U., Pidaev 90 (excavation report, ceramic)
 - Ceramists Quarter : Pidaev, Rakhmanov, U. 95a' (XII-XIIIth c., adjacent to the walls of the city, ceramic kilns) ; Rakhmanov, U., Pidaev 95' (sphero-conical ceramic)
 - Metallurgists Quarter : Knjazev 45 (beg. of CE and especially XI-XIIIth c., 8 ha ; description, kilns, techniques of production, ton of iron lumps ; p.36, X-XIIth c., metallurgists quarter, 5 ha) ; Pruger 80 (p.32, iron, copper and lead slag) ; Papakhristu 95' ; *Papakhristou, Rehen 2001 (excavation report and analysis) ; Pidaev, Leriche et al. 2001 (pp.110-112)
 - Well : Valiev 79 (X-XIth c., cross section)
 - Quay : See Fortification along the Amu Darya
- Various
 - Underground rooms next to Al-Hakim al-Termizi : Leriche, Annaev et al. 95' ; Annaev 98
- Military architecture (fortifications)
 - Chingiz 2 : Al'baum 90b' (fortification wall, arrowheads, etc.) ; Pugachenkova, Rtveldze 90 (pp.44-45, dating ?)
 - along the Amu Darya (also interpreted as a quay) : see citadel
 - Shakhristan : Rakhmanov, Sh. 97 (major article, ceramic 2 pl., cross sections) ; Rakhmanov, Sh. 84' ; Rakhmanov, Sh. 90a ; Rakhmanov, Sh. 92' ; Rakhmanov, Sh. 94a' (kushan) ; Rakhmanov, Sh. 95a' ; Rakhmanov, Sh. 98 ; *Rakhmanov 2001
 - North of KaraT (also interpreted as a canal) : Kastal'skij 30a (p.19, canal) ; Masson, M. 41 (pp.89-91, 93) ; Shishkin 41 (pp.127, 150) ; Nikolaev 72 ; Al'baum 74 (p.57) ; Al'baum 76 (p.45) ; Al'baum 85' ; Al'baum 90a' ; *Mkrtychov 94 (p.119) ; Staviskij 98 (pp.44-45)
- Religious architecture
 - Church (???, X-XIIIth c.) : Al'baum 94
 - Local mosque (end X-beg. XIIIth c.) : *Pidaev 99a (excavation report, stucco decor)

Thematic Bibliography

- Anthropology : Khodzhaev 80 (citadel ???, pp.137-147) ; *Mustafakulov 2001 (IX-XIVe) ; Mustafakulov 2002 (pp.304-306)
- Asks (forgery) : Pugachenkova 51 ; Pugachenkova, Rempel' 60 (pl.104-107) ; *Bernard 87 (forgery)
- Ceramics : Masson, M. 41 (pp.70-71) ; Knjazev 45 (production, pp.165, 168, 170) ; Merezhin 60 (XII-XIIIth c.) ; Gens 69 (sphero-conic) ; **DJU 91 (n°235 with additions [Dzh.Ja. Il'jasov]) ; **KIDU 91 (n°538 X-XIIth c. [T.K. Mkrtychev]) ; Mirzaahmedov, Pidaev 93' (XVII-beg.XVIIIth c.) ; Pidaev 93' (socio-economic implications) ; Zhalalova 93' (chemical analysis) ; Zhurav 93' (sphero-conic) ; Pidaev 95a' (XII-beg. XIIIth c., decorated, non glazed) ; Rakhmanov, U., Pidaev 95' (XII-XIIIth c., sphero-conic) ; Pidaev 97 (XII-beg.XIIIth c., cooking ware, detailed article) ; Khalikov 2000 (glazed, XVI-first half XVIIth c.) ; Pidaev 2000 (XII-beg.XIIIth c., estampée) ; Pidaev 2002 (fin XII-beg. XIIIth c., embossed)
- Ceramics from the citadel : Abdullaev.K. 84 (zoomorphic handle), Pidaev 87 (periodisation), Pidaev 91a (Graeco-Bactrian) ; *Houal 2001 (all periods)
- Construction (methods and materials) : Masson, M. 41 (pp.71-74, bricks, stones) ; Zhukov 41a (bricks) ; Pugachenkova 79 (merlons p.43) ; Grazhdankina 89 (pp.38-70) ; *Gelin 2000 (baked bricks, pp.63-69)
- Ethnic [Composition] : Mustafakulov 93' ; Mustafakulov 95'
- Fauna : Batyrov 93' (Antiquity and MA)
- Flora (XVIth c.) : Kudrjashev 45 (especially fruit trees)
- Architectural fragments (in stone)
 - Capitals : Denike 39 (ill. p.111) ; Pugachenkova 60a (acanthi, ill.42-43) Staviskij 72b ; Pugachenkova 79 (p.36, ill.35, griffon p.41, ill.41) ; Staviskij, Kozlovskij 85 (Chapiteau à lion) ; *Staviskij 89 ; Pidaev 96 (2 capitals)
 - Elephant : **KIDU 91 (n°96 [T.K. Mkrtychev])
 - Griffon : Pugachenkova 59 ; Pugachenkova, Rempel' 60 (pl.7) ; Pugachenkova 65c' ; **KIDU 91 (n°95 [T.K. Mkrtychev])
 - Buddhist relief with two levels : Staviskij 74 (p.98, ill.73) ; Pugachenkova 76a (ill.2) ; **KIDU 91 (n°94 [K.A. Abdullaev]) ; Pidaev 96 (pp.331-334) ; Staviskij 98 (pp.135-136)
- Inscriptions :
 - Arab : Pugachenkova, Rtveldze 90 (p.137)
 - Unknown (South of KaraT) : Rtveldze 98 (p.23)
 - Kharoshti (Dun'joT) : Masson 41 (pp.81-84, ill.60) ; Vorob'eva-Desjatovskaja 64 (pp.210-212, ill.39) ; Kharmatta 69 (p.37)
- Irrigation : Bukinich 41 ; Masson, M. 41 (p.68) ; Al'baum 65 (p.88) ; Annaev 84a (with site list) ; **Staviskij 86 (pp.63-64) ; Kamaliddinov 96 (p.112)
- Legends : Masson, M. 41 (pp.7-8) ; Rtveldze 87d (p.52) ; Zhukova 90
- Nephrite : Pidaev 90a (citadel, importation from India)
- Metallurgy : Gendel'man 92 (Bz objects, probably 1220 CE)

See : Metallurgists [Quarter]

- Numismatics : Masson, M. 29 (treasure XIVth c.) ; Masson, M. 30 (37 gold coins, Kaftar-Khona, treasure XIVth c.) ; Masson, M. 51 (1 Byzantine coin XI-XIIth c., p.103) ; Davidovich 53 (treasure -78 coins, 1220 CE) ; Masson, V. 54 (1 Sogdian coin) ; Davidovich 55 (treasure of 78 coins, 1220 CE and treasure of 354 coins in modern Termez) ; Masson, M. 60a (Qarakhanide treasure, first half XIIth c.) ; Pugachenkova 67b (n°61-63, kushan) ; Rtveladze 69 (5 km NE of Termez, Timur and Khalid Sultan) ; Vajnberg 72 (IV-Vth c., Hephtalites, treasure of 7 coins pp.140-141, silver coins, area of Termez) ; Rtveladze, Pidaev 81 (Euthydemus p.45, imitation Heliocles n°31 p.51, Soter Megas p.59, Kadphises II p.65) ; Rtveladze 87c (p.129, treasure, Arab coins, beg. VIIIth c.) ; Kochnev 89 (post-qarakhanide treasure, 28 coins) ; Davidovich 93'

(p.16, 1 coin of Constantin)

- Odontology : Khodzhajova 93'

- Wall paintings : Akhadova 95' (restoration, fragments on ganch, XII-beg.XIIIth c.)

- Small finds : Pugachenkova, Rempel' 60 (pl.194 fantastic beasts on mirror) ; Pidaev 90 (citadel, in stone) ; **KIDU 91 (n°93 pyxis in ivory [T.K. Mkrtychev], n°540 Bz needle [K.A. Abdullaev]) ; Pidaev 2001 (MA, in stone)

- Stone (limestone, provenance) : Ageeva, Belogerova 82

- Plaque in jade and nephrite : **KIDU 91 (n°91 [K.A. Abdullaev])

- Arrowheads : Kozlovskij, Avanesova 83 (XII-Xth c. BCE)

- Imports :

- India : see nephrite

- Rome : see statuette, askos (forgery)

- Seals (intaglio) : Pugachenkova 90a (p.31, Sassanide type, found at the beg. of the XXth c. but of uncertain provenance) ; **KIDU 91 (n°97 agate, n°98 cornelian, n°99 white quartz, n°370-371 -non ill.- [V. Minosijants])

- Sculpture

- Buddhist relief : Pugachenkova, Rempel' 60 (pl.1) ; Staviskij 64b (p.173, ill.22) ; Pugachenkova, Rempel' 60 (p.74, ill.70) ; Pugachenkova, Rempel' 65 (pp.74-76, ill.70) ; Litvinskij, Zejmal' 71 (ill. 81) ; Pugachenkova 71 (p.145) ; Pugachenkova 79 (p.176, ill.214) ; *Nehru 89 (ill. 52) ; **KIDU 91 (n°92 [T.K. Mkrtychev]) ; Staviskij 98 (p.135)

- Statuettes : Masson, M. 41 (pp.74-77) ; Staviskij 64b (p.179, Roman warrior, KP 640 Termez museum) ; Pugachenkova, Rempel' 60 (pl.63) ; Pugachenkova 79 (pp.176-177, Buddhist) ; Rakhmanov, Sh. 83 (statuettes-whistles XII-début XIIIth c.) ; Vyzgo, Meshkeris 83 (musicians) ; Abdullaev.K., Shejko 85 ; Abdullaev.K. 90 ; Mkrtychev 90' (costume) ; **KIDU 91 (n°90 [K.A. Abdullaev], n°539 [T.K. Mkrtychev]) ; *Abdullaev, K. 95a (p.179, warrior)

- Statuette in ivory : Pidaev 86b ; Pidaev 87 (see aussi c. r. P. Bernard) ; **KIDU 91 (n°89 [K.A. Abdullaev])

- Stucco : *Pidaev 99a (mosquées de quartier, fin X-beg. XIIIth c., ill.2-5, 8)

- Urbanism : Lavrov 50 (pp.59, 74, ill.103, 131, 137, 138/4, 147, 152-154) ; Belenitskij, Bentovich et al. 73 (pp.177-179)

- Glass : Knjazev 45 (production, pp.165, 168, 170) ; Abdurazakov, Bezborodov et al. 63 (tabl.3, p.64, slag : p.82 beg. CE (?), p.100 XI-XIIth c.) ; Pidaev 86a (VIII-XIIIth c., 2 pl., citadel) ; **KIDU 91 (n°541 [T.K. Mkrtychev]) ; Abdullaev, K. 95b' (end IX-Xth c., citadel) ; Abdullaev, K. 98 (4 pl., citadel) ; Abdurazakov 95' (III-IIth c. BCE - V-VIIth c., citadel)

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The Citadel is built on a rocky outcrop next to the Amu Darya. It is surrounded by a powerful fortification wall reinforced by towers at regular intervals and probably by a moat. The two highest areas probably correspond to the central fortress and a major building, otherwise the top is relatively even.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

The dating of the lowest levels on the citadel to the Achaemenid period remain doubtful.

IMPORTANCE OF SITE

Esthetical Value High. The citadel overlooks the Amu Darya and its floodplain to the south. It is possible to make out the remains of various parts of the fortification walls, including the unique riverine wall dating from the Karakhanid period and a spectacular 10 meters tall section across walls dating from various periods in the south-east corner.

Historical Value Very High. The 14 meters of archaeological deposits on the citadel of Termez range from the early hellenistic till the contemporary period and provide a unique stratigraphical cross section. The citadel is also, presumably, the location of some of the most important buildings dating from the pre-Mongol period.

Social Value The citadel is currently used by the Uzbek army both as a lookout point over the Amu Darya river (with a mirador situated on the summit of the site), and as a training ground for soldiers.

Economical Value Limited (asides from its military function).

Spiritual Value Limited

STATE OF PRESERVATION

Current Use The citadel is currently under use by the Uzbek army as a lookout point over the Amu Darya. It has also been regularly excavated since 1993 by the MAFOuz de Bactriane archaeological team.

Human Pressure Medium-Low. No fields or domestic houses are situated in the immediate vicinity. Furthermore the transfer of military training to another military camp means that, hopefully, no further trenches will be dug.

Conservation Work Preliminary restoration work was undertaken by the MAFOuz de Bactriane in 2002-2003:
 - The surface of the baked brick fortification of the Southeast angle was protected by adding a layer of old baked bricks found on the site to the top of the fortification wall in order to prevent further erosion.
 - The fortification wall situated along the Amu Darya was reinforced, when the river was at its lowest, by building a supporting wall under the outjutting towers.

Accessibility Inaccessible. The citadel is situated in no man's land beyond the Uzbek border on the banks of the Amu Darya.

State of Preservation Authenticity: The citadel has been damaged by the activities of the army, in particular in the southeast corner, which has been largely destroyed by bulldozers. Many military trenches have been dug along the edges and none of the many archaeological trenches has yet been backfilled.
 Integrity: The citadel is crowned by a look out point of the Uzbek army. Considering it's historical role, this can however be considered to correspond to a continuity of function rather than a challenge to it's integrity. A number of small, semi-abandoned military shelters and military hardware also litter the site.

SUGGESTED IMPROVEMENTS

It is unlikely that visitors will be able to visit the citadel in the near future. Conservation is however important and should be concentrated on two major projects:

- The preservation of the massive fortification walls excavated by the MAFOuz de Bactriane in the southeast angle. This has already been started, should be fairly easy, relatively cheap and could form the future backbone to the integration of the citadel within an archaeological park.

- The fortifications situated along the Amu Darya are unique and in serious danger of being completely eroded by the river. Their preservation is likely to be very complex because the river has undercut the sandstone rock upon which they were built, however their existence warrants something being attempted.

Finally the archaeological trenches should be backfilled.

BIBLIOGRAPHY

Other Names

Other Numbers

B Number B001

Longitude 67°11'40''

Latitude 37°16'07''

Precision of the localisation

Description of the localisation

ID Problems

Approximate localisation

DESCRIPTION

The limited by fortification walls and includes a long mound (Dunjo Tepe) on the side nearest the Citadel.

Surface in ha 0,00997

Maximal height (m)

Type 4

Dimensions (m)

Remarks on the size

Remarks on the type

500x600

Approximate dimensions.

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

See bibliography

IMPORTANCE OF SITE

Esthetical Value The ruins of the fortification walls remain impressive, however the esthetical value of the rest of the site is limited.

Historical Value The inner town of Termez is fairly small compared to the outer town. According to the historical sources it included a number of important buildings such as one of the main mosques of the city and recent excavations by the MAFOUZ de Bactriane have also enabled the discovery of a Buddhist stupa.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use A road crosses the site; otherwise human use is limited to the activity of archaeologists and some shepherds.

Human Pressure Low. So far apart from the over-irrigation of the trees that line the road no major human pressure is affecting the site.

Conservation Work None

Accessibility Excellent. The road to al-Hakim at-Termizi passes through the shahrستان.

State of Preservation Authenticity: The fortification walls of the shahrستان are collapsing and some of the archaeological trenches have not been back-filled.

Integrity: The modern, tree-lined, road to al-Hakim at-Termizi passes through the centre of the shahrستان.

SUGGESTED IMPROVEMENTS

Historical sources indicate that, exceptionally for Central Asia, the main roads of the Pre-Mongol city were paved with baked bricks. In the future this may be a solution for the road that crosses the shahrستان, notably if the fortification walls can be preserved and partly restored and the buildings discovered during excavations (some of which are well published), can be either preserved or their remains reconstituted above ground.

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

B001

Longitude 67°11'37''

Latitude 37°16'01''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Mound situated in the southern part of the Shahristan, separated from the citadel by a depression about 20 meters wide.

Surface in ha 0,00997

Maximal height (m)

Type 4

Dimensions (m)

Remarks on the size

Remarks on the type

350x150

Approximate dimensions

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

See bibliography

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value High. This was likely to have been the location of important buildings during the Kushan and Pre-Mongol periods.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure Medium. The military pressure on the site continues to exist.

Conservation Work None

Accessibility Good. The site is situated to the right of the road leading to al-Hakim al-Termizi

State of Preservation Average / good. The barbed wires marking the Uzbek frontier pass over the site and various military constructions have affected its integrity.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The Rabat extends to the East of the Shahrستان and is also surrounded by a fortification wall. It seems to have been fairly densely occupied and should be considered as an integral part of the Pre-Mongol city.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value The site is flat, marked only by the outlines of the fortification walls and a few remaining mounds such as that of the "Kurgan" building.

Historical Value High as any part of Ancient Termez. The outer town was densely occupied throughout the Pre-Mongol period and also, probably, during the Kushan period.

Social Value Limited.

Economical Value Crops have recently been planted to the north of the main road within the limits of the outer town. The main highway of the region also crosses the site.

Spiritual Value Limited. A few buildings have been erected for the pilgrims heading towards the mausoleum of al-Hakim al-Termizi.

STATE OF PRESERVATION

Current Use Part of the site is currently preserved, however beyond the highway the site has been irrigated and planted with cotton, whereas buildings have been erected in the centre of the site.

Human Pressure Very High. Part of the site is now under irrigated fields, whilst the buildings situated in the heart of the rabat, next to the entrance to al-Hakim at-Termizi may well be expanded.

Conservation Work None

Accessibility Excellent. The main Tashkent to Termez highway crosses the site, as does the road to al-Hakim at-Termizi.

State of Preservation Authenticity: The fortification walls of the shahrستان and the remaining buildings, such as Kurgan, are collapsing and some of the archaeological trenches have not been back-filled.
Integrity: The highway passes through the heart of the site; in addition many modern buildings have recently been erected, in particular next to the entrance to the road leading up to al-Hakimi at-Termizi. Beyond the road, irrigated fields of cotton stretch out towards Zurmala and the Sar-i Dikat. Finally much of the rest of the rabat is waterlogged and overgrown with reeds and tamarisk.

SUGGESTED IMPROVEMENTS

No irrigated fields should be allowed in the part of the rabat situated to the northeast of the highway. Building of modern buildings must also be forbidden.

As in the case of the shahrستان, historical sources indicate that, exceptionally for Central Asia, the main roads of the Pre-Mongol city were paved with baked bricks. In the future this may be a solution for the road that crosses the shahrستان, notably if the fortification walls can be preserved and partly restored and the many buildings discovered during excavations (many of which are well published), can be either preserved or their remains reconstituted above ground.

BIBLIOGRAPHY

Other Names

Other Numbers

18 [Annaev 84a]

B Number

B001

Longitude 67°12'07''

Latitude 37°16'39''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Square plan mosque open on two sides and with a minaret dated to 1032.

Surface in ha 0,00997

Maximal height (m)

Type 3a

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

1032 : minaret

X-XIth c. (mosque)

IMPORTANCE OF SITE

Esthetical Value Limited. The photographs of the minaret and adjacent mosque prove that these were beautiful buildings, before they collapsed.

Historical Value High. These were important examples of early Islamic architecture in Central Asia.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure Medium. The water logging and salinisation, which have destroyed the building are caused by over irrigation. The area around the site is however still protected and unlikely to be either turned into agricultural land or built over.

Conservation Work None

Accessibility Difficult. Situated amongst the reeds of the rabat. However, if the water table was lowered, it would be easy to build a path up to the Chor Sutun from the road.

State of Preservation The mosque and minaret of Chor Sutun, still well preserved in the 1930's have completely disappeared nowadays.

SUGGESTED IMPROVEMENTS

Draining the area, stopping all irrigated agriculture and installing a drip feed system for the trees that provide a pleasant landscaping along the road is the first priority.

Cleaning the remains of the excavated building (as Sh. Pidaev started doing in the 1980's) and restoring them would not be excessively difficult and would provide an interesting monument. Reconstruction by using the detailed plans and photos taken by the TAKÈ should be debated in the light of the historical value of the buildings.

BIBLIOGRAPHY

Excavation report : Shishkin 45

Other publications : Denike 27a ; Zasyupkin 28b (pp.19-22, first study of the minaret) ; Kastal'skij 30a (p.9) ; Denike 39 (ill. p.19) ; Masson, M. 41 (pp.58-63) ; Zasyupkin 48 (p.65, minaret) ; Pugachenkova, Rempel' 58 (p.36) ; Pugachenkova 76a (pp.21-23, ill.5) ; Rempel' 78 (p.65) ; Pugachenkova, Rtveladze 90 (p.190, descr.) ; Khmel'nitskij 92 (pp.81-82, mosque ; pp.105-106, minaret) ; *Hillenbrand 94 (ill. h.-t. 2/228) ; Kamaliddinov 96 (pp.108-110, description, surrounding buildings historical sources ; pp.145-146, minaret) ; *Bittar 2001 (detailed analysis)

Other Names

Other Numbers 18 [Annaev 84a]

B Number B001

Longitude 67°12'06''

Latitude 37°16'38''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Square building (22x21 m) with an upper floor and vaulted rectangular rooms situated on either side of a central corridor. [Kozlovskij, Shejko 89]

Surface in ha 0,00997

Maximal height (m)

Type 3c

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

Periodisation [Kozlovskij, Shejko 89] : I-IIIth c.: Kushan building, probably fairly monumental (2 column bases) ; IV-Vth c.: tombs ; VIII-IXth c.: construction of a new building associated with Chor Sutun ; X-early XIIIth c.: main period of use of the building ; XIV-XVè s.: partial reoccupation ; XVI-XVIIth c. (partial reoccupation, some tombs)

Other datations : VI-VIIth c. construction of the building [Shishkin 45] and see the references in [Kozlovskij, Shejko 89, p.59]

IMPORTANCE OF SITE

Esthetical Value Medium-high.

Historical Value High. It is the only Pre Mongol mud brick building still standing in the ruins of the Lower Town of Termez.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure Medium. The water logging and salinisation, which have destroyed the building are caused by over irrigation. The area around the site is however still protected and unlikely to be either turned into agricultural land or built over.

Conservation Work None

Accessibility Difficult. Situated amongst the reeds of the rabat. However, if the water table was lowered, it would be easy to build a path up to Kurgan from the road.

State of Preservation The Kurgan is in danger of imminent collapse, due to water-logging and salinisation

SUGGESTED IMPROVEMENTS

Draining the area, stopping all irrigated agriculture and installing a drip feed system for the trees that provide a pleasant landscaping along the road is the first priority.

The building urgently needs consolidating if it is not to collapse.

BIBLIOGRAPHY

Excavation report : Shishkin 45 ; Kozlovskij, Shejko 89 (important article, excavation report, ceramic, numismatics)

Other publications : Zasytkin 28b (pp.18-19 first study) ; Nil'sen 1966 (p.331) ; Pugachenkova 76a (descr., pp.18-20, ill.4) ; Annaev 84a (pp.176, 177) ; Shejko 85' ; Solov'jov 87

Thematic Bibliography

- Numismatics : Kozlovskij, Shejko 89 (Kushans-Timurids)

- Textiles, end IV-Vth c. : Majtdinova 90a' ; Majtdinova 91 ; Majtdinova 93 ; Majtdinova 96 ; Elkina, Majtdinova et al. 96 ; Solov'jov 97 (p.58) ; Majtdinova 2001 (analysis and comparisons)

- Tombs : Khodzhajov 80 (pp.137-138) ; Litvinskij, Sedov 84 (p.91) ; Shejko 85' ; Rtveladze 89 (p.54) ; Solov'jov 97

TERMEZ / ANCIENT TERMEZ / RABAT NORTH

Uz-SD-131c3

Other Names

Other Numbers

B Number **B001**

Longitude **67°11'48''**

Latitude **37°16'32''**

Precision of the localisation

Description of the localisation

ID Problems

Approximate localisation

DESCRIPTION Manufacturing area situated to the North of the Rabat, just beyond the fortification wall.

Surface in ha **0,00997**

Maximal height (m)

Type **4**

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

See bibliography

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Medium. The artisanal area was probably just one of many similar installations, situated just beyond the walls of the Rabat.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure High. The area is partly used by the military, and under pressure by the expansion of agricultural fields.

Conservation Work None.

Accessibility The main highway crosses the area.

State of Preservation Much of the area has been bulldozed.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The outer suburbs of Termez stretch out to the East of the Rabat and were also surrounded by a fortification buildings such as the Palace of the Termez Shah, gardens and fields.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Low. The area is flat and largely taken over by cotton fields.

Historical Value Average. The unfortified outer town of Termez contained a number of important buildings such as the palace of the Termez Shah, however it was probably never densely occupied.

Social Value Limited

Economical Value Agricultural area, dominated by cotton fields.

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Most of the area is situated under agricultural fields.

Human Pressure Very high. The area is extensively farmed.

Conservation Work None

Accessibility Variable. The site covers a large area crisscrossed by paths and roads.

State of Preservation Very bad. The fortification walls of the Sari Dikat, which were visible 50 years ago, have been totally destroyed. Apparently the only remaining mounds within the area are those of the palace of the Termez Shah.

SUGGESTED IMPROVEMENTS

This area should be part of the Ancient Termez archaeological conservation area. Marking the ancient fortification walls of these exterior walls symbolically would give a potent illustration of the size of the city at the height of its power in the Pre-mongol period.

BIBLIOGRAPHY

Other Names

Other Numbers

B Number B001

Longitude 67°13'29''

Latitude 37°16'29''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION	The palace of the Termez Shah was built in mud bricks and richly decorated with carved stucco panels.
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Surface in ha 0,00997

Maximal height (m)

Type 3c

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

XI-XIIth c. [Masson, M. 41, p.40]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Vey high. the moulded stucco decoration is considered one of the major works of art of Pre-Mongol Central Asia.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure High. The nearest field is situated in immediate contact with what remains of the site. The water logging and salinisation, which have destroyed the building are caused by over irrigation.

Conservation Work None (but the stucco found on site has been restored)

Accessibility Average. An unpaved path leads to the site through fields of cotton from the main road.

State of Preservation Bad. The site has been badly affected by the expansion of the surrounding fields and, on site, the earth is very saline.

SUGGESTED IMPROVEMENTS

This is one of the most important buildings in Ancient Termez. The decorated stucco is now preserved in Moscow but it may be possible to mark the traces off the ancient walls on site.

BIBLIOGRAPHY

Excavation report : Zgura 27 ; Denike 28 (pp.10-14); Denike 28a ; Zasytkin 28b (pp.24-26) ; Masson, M. 41 (pp.40-53) ; Zhukov 41 ; Zhukov 45a

Descriptions and brief references

- Description : *Strelkoff 29 ; Pugachenkova 76a (pp.28-30, ill.8-13) ; Rempel' 78 (pp.53-56, ill.2) ; Pugachenkova, Rtveldze 90 (pp.187-188) ; *Hillenbrand 94 (p.412, ill. h.-t. 7/103, 106) ; Kamaliddinov 96 (pp.110-111, Historical sources)

- Brief reference : Vejrnarn 40 (ill. 17-18) ; Lavrov 50 (ill.195-196) ; Mongait 55 (ill. pp.276-277) ; Pugachenkova, Rempel' 58 (ill.17) ; Knobloch 72 (pp.188-189) ; **Ajni 80 (pl.101 médaillon, 166 stuc) ; Pugachenkova 86 (ill. pp.30-31)

Thematic Bibliography

- Stone column : Voronina 39 (p.55, ill.14)

- Glass medallion : Zhukov 40 ; Zhukov 45a (pp.151-158) ; Abdurazakov, Bezborodov et al. 63 (p.134, ill.36) ; Rempel' 78 (pp.75-76) ; Pugachenkova, Rtveldze 90 (pp.198-201) ; **KIDU 91 (n°542-544 [T.K. Mkrtychev])

- Stucco : Denike 28b ; Denike 30 (fantastic creatures) ; *Denike 30 ; Vejrnarn 34 ; Denike 39 (pp.46-69, 34 ill.) ; Denike 39a (very good ill.) ; Pugachenkova 59 (griffon) ; Zasytkin 48 (ill.36) ; Bulatov 78 (analysis of the geometrical decor, p. 283-290, ill. 174-184) ; Rempel' 78 (pp.80-82, 85, 105-106, 140, 185-186 ; analysis of the geometrical decor : pp.163-165, 166-172 ; pl.41, 77-82, 84-92, 95) ; **KIDU 91 (n°545 [L.Ju. Vishnevskaja])

- Wall Paintings : Vorodina 90

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Agricultural

Human Pressure Very high (the fields reach right up to the remaining mound)

Conservation Work None

Accessibility Average. A path leads up to the site.

State of Preservation Bad. The site has been badly affected by the expansion of the surrounding fields and, on site, the earth is very saline.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

B001

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The Military Camp is limited by the river to the Southe West, the shahristan to the East, the citadel to the South East, Chingiz Tepe to the North and the upper terrace to the North. It is situated beyond the limits of the Islamic city but was presumably densely occupied during Antiquity.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Little is known about the archaeological remains situated under the military camp ; however it seems that many of the Greek coins discovered on the site of Termez at the beginning of the century were found here.

Social Value Currently this is the location of a garrison of the Uzbek army

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Military camp.

Human Pressure Very high. The site is entirely situated beneath the military camp.

Conservation Work None

Accessibility Excellent.

State of Preservation Very bad. The site has been extensively bulldozed in order to level it out. Military barracks and other buildings are built on top of it.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude 67°11'23''

Latitude 37°15'58''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The mausoleum of al-Hakim al-Termizi is formed by various adjacent buildings / rooms built over a number of centuries. The mausoleum itself is a small square domed building. To the North of the mausoleum there is a mosque with three cupolas which leads out into a small courtyard on the opposite side of which is situated a large, domed, square plan khanaqa.

Surface in ha 0,00997

Maximal height (m)

Type 3b

Dimensions (m)

Remarks on the size

Remarks on the type

20x30

The mausoleum is associated to a mosque

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IX-XVth c. [Arshavskaja, Rtveladze et al. 82] with an inscription of the end of the XIth c. (in the name of the Qarakhanide Abu' Muzzafar Ahmad Tigah Tikin)

IMPORTANCE OF SITE

Esthetical Value High. Despite the tragic restoration carried out recently, the mausoleum of al-Hakim al-Termizi remains a beautiful example of baked brick architecture - all the more impressive since it is situated at the heart of the ruins of Old Termez, not far from the Amu Darya.

Historical Value High. The monument is the oldest, continually used, building in the Termez district.

Social Value High. As a major pilgrimage centre, al-Hakim al-Termizi also serves as a focal point for the community.

Economical Value High. The monument is run by the Board of Spiritual Affairs and, seeing the number of pilgrims, it presumably makes a handsome profit.

Spiritual Value Very high. This is the main centre of pilgrimage in the Termez region, and al-Hakim al-Termizi's status throughout the Islamic world makes it a potential centre of pilgrimage of international significance.

STATE OF PRESERVATION

Current Use Mausoleum and centre of pilgrimage.

Human Pressure Medium. The building is heavily used by pilgrims but the real danger appears to have already been done by over-enthusiastic restorers.

Conservation Work Portal rebuilt and stucco
XXX
1979-1981 : Restoration (notably of the stucco) was undertaken by the Ministry of Culture by Z. Mirzaakhmedova, under the direction of A. Khodzhaev.

Accessibility Perfect. The road leading up to the site is newly paved, a parking is situated in front of the entrance to the preserved area and a paved path leads up from there to the entrance.

State of Preservation Heavily restored.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Main publication : Masson, M. 60

Other publications : Denike 27a ; Denike 28 (tombstone) ; Denike 28a ; Zasytkin 28b (pp.22-24, first study) ; Kastal'skij 30a (pp.7-9) ; Denike 39 (ill. pp.37, 106, 111, 113) ; Vejrnar 40 (stucco, ill.10) ; Masson, M. 41 (pp.56-58) ; *Knobloch 72 (p.188) ; Pugachenkova 76 (pp.75-77) ; Pugachenkova 76a (pp.30-41, ill.15-22) ; Rempel' 78 (p.62, ill. of the stucco pp.69, 139, 179, 183, pl.35, 94) ; **Ajni 80 (pl.100) ; Arshavskaja, Rtveladze et al. 82 (pp.100-108, ill. pp.102-108) ; Pugachenkova 83 (descr. n°257-260) ; Pugachenkova 86 (ill. p.37) ; *Golombek, Wilber 88 (p.283, ill. h.-t. 54, descr.) ; Pugachenkova, Rtveladze 90 (pp.194-195) ; Khmel'nitskij 92 (descr., pp.173-174) ; Khmel'nitskij 96 (pp.103-106, khanaqa)

pp.280-282) ; Kamaliddinov 96 (pp.106-107, Historical sources) ; Rtveladze, L., Rtveladze 96 (pp.100-101, descr.) ; Annaev 98 (descr.) ; *Kervran 2001 (pp.344-346, ill.8-9)

Thematic Bibliography

- Inscriptions : Masson, M. 60 ; Fedorov 98 (datation : 1165-1166) ; *Blair 92 (new reading)
- Building materials and methods : Grazhdankina 89 (pp.63-70, detailed analysis, chemical analysis, tabl. 6-7)
- Numismatics : Fedorov 98 (2 dinars of the XIIth c.)

TERMEZ / ANCIENT TERMEZ / UNDERGROUND COMPLEX NEXT TO HAKIM AL-TERMIZI Uz-SD-131e2

Other Names

Other Numbers

B Number B001

Longitude 67°11'26''

Latitude 37°16'00''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Series of underground rooms, which may have been originally linked to Buddhism and were later used for storage purposes.

Surface in ha 0,00997

Maximal height (m)

Type 4

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

See bibliography

IMPORTANCE OF SITE

Esthetical Value Limited. Although, the fact of entering a cave in a land of loess is not unattractive.

Historical Value High. If the interpretation of T. Annaev is correct and these underground rooms are indeed linked to Buddhism then the fact that they should be immediately adjacent to the mausoleum of al-Hakim al-Termizi is particularly interesting.

Social Value Systematically explored by many of the young (and not so young).

Economical Value Limited

Spiritual Value Limited (despite them having possibly had a religious role in the past)

STATE OF PRESERVATION

Current Use Open to the public.

Human Pressure High. Constantly visited and therefore suffering rapid degradation.

Conservation Work Partly "restored", to enable access by visitors to al-Hakim al-Termizi.

Accessibility Good. Situated next to the parking of al-Hakim al-Termizi.

State of Preservation Average.

SUGGESTED IMPROVEMENTS

These caves need to be restudied in order to evaluate their original use. If public access is to be maintained, restoration is vital so as to limit further degradation. Furthermore, once further study determines their probable past use, it will be necessary to add elements, which illustrate this use to visitors (for example copies of storage jars or of buddhist figures).

BIBLIOGRAPHY

Other Names Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Small mound, situated on the banks of the Amu Darya between the citadel and Chingiz Tepe. Excavations have uncovered a very complex monumental building, which may have served a cultic function.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA

Bz Proto Ant HMA preM postM

B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Medium-high. The site is well located, alongside the Amu Darya, between the mounds of Chingiz Tepe and the citadel.

Historical Value Very high. Recent excavations have uncovered a highly comple series of cultic buildings dating from the Kushan and Pre-Kushan periods.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use The site is currently being excavated by the MAFOUZ de Bactriane directed by P. Leriche and Sh. Pidaev.

Human Pressure Very high. The current excavations where started in order to halt the complete levelling of the site by military bulldozers.

Conservation Work L.I. Al'baum, after his excavations in the 1980's, preserved some features, such as the pilasters of the main room, before reburying them.
Whilst the current excavations are underway, temporary measures have been taken to preserve the most important discoveries.

Accessibility Non accessible to outside visitors. The site is situated in the military camp, next to the military track leading towards the citadel.

State of Preservation Bad. Most of the site has been destroyed by bulldozers before the archaeologists could intervene.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Rocky by a platform upon which there presumably used to be a major building. Recent excavations have shown that the area inside the walls was densely occupied during the Kushan period.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Very high. The recently excavated fortification walls of Chingiz Tepe form an impressive sight. However, the best is the amazing view from the top of Chingiz Tepe - the highest point in the territory of Termez. From here it is possible to look out over the whole territory of Termez to the east, over the island of Aral Pajgambar with its marshes and the curve of the Amu Darya to the north and the west and to the south, beyond the river, the dunes of northern Afghanistan and, in clear weather, the great Hindu Kush mountain range.

Historical Value High. Recent excavations have shown that this was one of the most important areas of the city during the Kushan period.

Social Value Limited

Economical Value Limited

Spiritual Value Limited.

STATE OF PRESERVATION

Current Use The site is currently being excavated by the MAFOUZ de Bactriane directed by P. Leriche and Sh. Pidaev.

Human Pressure Medium. The site was extensively used by the army but now remains mostly unaffected.

Conservation Work Whilst the current excavations are underway, temporary measures have been taken to preserve the most important discoveries.

Accessibility Difficult. The site is situated within the military camp and can only be accessed with special authorisation.

State of Preservation The site has been damaged by military installations, in particular its western side where the barbed wires of the frontier cross it. The top was also leveled in order to make way for a geodesic point.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Excavation report : *Strelkoff 29 ; Masson, M. 41 (pp.38-40) ; Piotrovskij 41 (houses, column base ill.93) ; Pidaev, Leriche et al. 2001 (pp.112-113)

Thematic Bibliography

- Architectural fragments and a fragment of a Buddhist statue (found on the South side of ChingizT) : Denike 27a ; Denike 28 (p.8) ; Denike 28a ; Strelkov 28

- Numismatics : Zejmal' 96a (complete list of the finds of 1936)

- Statuette ('warrior goddess') : Pugachenkova 71 (ill.140) ; *Nikonorov, Savchuk 92 (ill. 5, pl. 14d) ; Nikonorov 2000a (pp.172-173, ill.5b) ; Nikonorov 2001

- Vault : Piotrovskij 41 (ill.90-91) ; Pugachenkova 79 (p.28)

Other Names

Other Numbers

B Number B001

Longitude 67°10'58''

Latitude 37°16'40''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Buddhist monastery, situated on a rocky outcrop, formed by a series of caves dug into the ground and adjacent buildings. The main complex, recently discovered, is built around a monumental stupa and is situated to the North-East.

Surface in ha

2

Maximal height (m)

Type

3a

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

The site was abandoned during the last quarter of the IVth c. and throughout most of reoccupied before being definitely abandoned during the first half of the VIth c.

IMPORTANCE OF SITE

Esthetical Value High. The site includes some of the best preserved mud brick architecture in the region, with doorways, arches and vaults all still standing.

Historical Value Very high. Kara Tepe is the most important Buddhist monastery in Termez and one of the main ones in Central Asia as a whole.

Social Value Limited

Economical Value Limited. This could change if and when the site is opened to the public.

Spiritual Value As one of the main Buddhist monasteries in Central Asia, Kara Tepe's spiritual value is high. This will be all the more so with the increase in Japanese (and in some cases Occidental) visitors. K. Kato, the Japanese Director of the excavations, was a professor at Soka University, a private institution with close links to Buddhist groups.

STATE OF PRESERVATION

Current Use The site is currently being excavated by the Japano-Uzbek archaeological expedition directed by K. Kato and Sh. Pidaev.

Human Pressure Low.

Conservation Work Conservation work was started on the site of Kara Tepe in 1999 by the Uzbeko-Japanese expedition. Major work was undertaken in order to roof the most interesting newly excavated areas so as to protect them from the elements. Two very different techniques have been used : in the case of the main stupa a vast roof has been built on a metallic structure, whilst the rooms to the north of the main courtyard have been roofed over using mud brick and a simple wood supported roof. In total over 150 m² have been thus restored at a total cost of just over 11 000 US\$. The restoration project has also included the chemical restoration of wall paintings in situ and that of various limestone objects at the archaeological base in Termez.

Accessibility Difficult. The site is situated within the military camp and can only be accessed with special authorisation. In addition, no paved roads lead up to it.

State of Preservation Good. But definitive consolidation of the excavated areas should be done as soon as possible, and under the supervision of a specialised restorer with western or japanese training if possible.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Excavation Reports

Kara-tepe I ; Kara-tepe I ; Kara-tepe III ; Kara-tepe IV ; Kara-tepe V ; Kara-tepe VI

Bibliography by period

Expedition of 1928 : *Strelkoff 29 (pp.233-234)

Expedition of 1934-36 : Masson, M. 41 (p.40) ; Zhukov 41 (mud bricks size)

Excavation of 1937 : Pchelina 46 ; Pchelina 64 (excavation, coins, ceramic, wall paintings, inscriptions, etc.)

Excavation of 1961-1991, 1994 : Staviskij 64 (1961-62) ; Staviskij 69 (1963-64) ; Staviskij 72 (1965-1969) ; Staviskij 72a (1970-1971) ; Staviskij, Sergeeva 75 (1972-1973) ; Sycheva 75 (1972-1973) ; Staviskij 76 (1972-1973) Berdnikov 82 (1974-1977) ; Staviskij 82 (1974-1977) ; Staviskij 82a (1978-1981) ; Staviskij 96 (1978-1989) ;

Excavation of 1998-2005 : Pidaev, Kato 99 ; Pidaev, Kato 2000

Bibliography by area of the site

- South Hill

- Complex A (+P I) : Staviskij 64 (pp.9-14, P I pp.14-22) ; Staviskij 69 (pp.8-10) ; Staviskij 72 (pp.11-16) ; Staviskij 72a (pp.68-69)

- Complex B (+P II) : Pchelina 46 ; Pchelina 64 ; Staviskij 64 (P II pp.14-22) ; Staviskij 69 (pp.10-15) ; Staviskij 72 (pp.16-30) ; Staviskij 72a (pp.69-89) ; Staviskij, Sergeeva 75 ; Staviskij 82 (pp.8-24)

- Complex V (or C +P III, stupa) : Staviskij 64 (p.22) ; Sycheva 75 ; Berdnikov 82 ; Staviskij 82 (pp.25-26) ; Kovaljova 96a (conservation of the stupa) ; Staviskij, Mazurina 96 ; Pidaev, Kato 99

- Complex P IV (?) : Staviskij 69 (pp.15-17)

- Complex G (+P V) : Staviskij 69 (P V, pp.15-17) ; Staviskij 82 (pp.26-37) ; Staviskij, Mazurina 96

- Complex D : Staviskij, Mazurina 96

- Complex E : *Mkrtychev 95 (sculpture) ; Mkrtychev 96 (complex E, stone bases) ; Mkrtychev 98 (wall paintings) ; Mkrtychev 99 (complex E, functional analysis, important article)

- Complex JU : Davidjan 96 (complex Ju, jewellery)

- Northern side of KaraT : Zejmal' 96

- Southern side of KaraT : Staviskij 72a (pp.89-90)

- Summit of KaraT : Staviskij, Sergeeva 75 (pp.22-29)

- West Hill (complex A and B)

Pidaev, Kato 99 (excavation report) ; Pidaev, Kato 2000 (excavation report) ; Pidaev, Kato 2001 (excavation report)

- North Hill and stupa

Pidaev, Kato 99 (excavation report) ; Pidaev, Kato 2000 (excavation report) ; Pidaev, Kato 2001 (excavation report)

Staviskij 96 (1978-1989)

Staviskij 82a (1978-1981) ; Uzjanov 96 (North Eastern side) ;

- Tombs (maybe linked to an epidemic) : Al'tman 72 (anthropology) ; Staviskij 72 (pp.15-18, 51-52) ; Staviskij 72a (pp.68-72,

(p.133, pl.12b) ; Litvinskij, Sedov 84 (pp.91-92) ; Rtveladze 89 (p.54) ; Zejmal', Rtveladze 99 (p.138)

Descriptions and brief references

Excavations: Staviskij 62' ; Shishkin 63a ; Staviskij 63 ; Staviskij 63a' ; Staviskij 64a' ; Staviskij 65 ; Staviskij 65a' ; Staviskij 66 ; Staviskij 66a' ; Staviskij 67 ; Staviskij 67a' ; Staviskij 68 ; Staviskij 69b ; Staviskij 71 ; Staviskij 71a ; SGÈ 72 (pp.93-94) ; Staviskij 72c ; Staviskij 72e ; Staviskij 72f ; Staviskij 72g' ; Askarov 73a ; SGÈ 73 (p.101) ; Staviskij 73 ; SGÈ 74

76 (1972-73) ; Staviskij 76b' ; Staviskij, Berdnikov et al. 76 ; SGÈ 77 (p.72) ; Staviskij, Berdnikov 77 ; SGÈ 78 (p.76) ; Staviskij, Berdnikov et al. 78 ; SGÈ 79 (p.75) ; Staviskij, Mazurina 79 ; SGÈ 80 (p.85) ; Staviskij 80 ; SGÈ 81 (p.64) ; Staviskij 81a ; Staviskij 81b' ; SGÈ 82 (p.92) ; SGÈ 83 (p.52) ; Staviskij 83 ; Staviskij 84 ; SGÈ 85 (p.61) ; Staviskij 85 ; SGÈ 86 (pp.72-73) ; Staviskij 86a ; Staviskij 86b' ; Staviskij 87a ; Staviskij 88 ; *Staviskij 88 (1978-1982)

Description : *Staviskij, Pchelina 63 ; *Frumkin 65 (pp.242-243, 251-252) ; *Humbach 70 ; Staviskij 74 (pp.101-106, 110-112, ill.77-81, 85) ; Staviskij 75 ; Staviskij 77a (pp.79-111, ill.42-59) ; Pugachenkova 79 (pp.65-66) ; *Staviskij 83 (fairly detailed) ; *Staviskij 84 (idem) ; **KIDU 91 (p.101 [T.K. Mkrtychev]) ; *Staviskij 88 ; *Staviskij 94 ; Staviskij 98 (pp.23-44, detailed)

Various: Staviskij 68b' ; Staviskij 73a' ; Staviskij 73b' ; Lelekov 81' ; Tumanova 81' (architecture) ; Staviskij 84a (new methods) ; *Fussman 87 (pp.347-349, relativises the importance of the site) ; *Staviskij 87 (interreligious links) ; Lelekov 90 ; Staviskij 90' (importance of the site) ; Staviskij 95b' (Buddhist centre) ; Staviskij 95d' (Conservation and presentation of the site)

Brief references : Voronets 37 (pp.177, 178) ; Voronets 40 (p.326) ; Masson, M. 40 (p.114) ; Masson, M. 41 (pp.77-80) ; Shishkin 41 (pp.148-149) ; Tolstov, Shishkin 42 (pp.261, 262) ; *Field, Prostov 42 (pp.144-145, ill.6-8) ; Vjaz'mitina 45 (pp.24, 25) ; Masson 45 (pp.3, 5, 9) ; Pugachenkova 45 (p.66, fragment. architectural) ; Mongait 55 (pp.274, 305, 394) ; Al'baum 60 (p.225) ; Pugachenkova, Rempel' 60 (pp.13, 14) ; *Bhatia 70 ; *Frumkin 70 (pp.111-113, ill.25-26, pl.42) ; *Knobloch 72 (p.188) ; Litvinskij 75 ; Pugachenkova 76a (pp.14-16) ; Annaev 84a (p.176) ; Pugachenkova, Rtveladze 90 (pp.94-95) ; *Staviskij 94 (p.114, ill.2-3, pl.1, 8) ; *Staviskij 96 (pp.156-157)

Conclusions and general questions : Staviskij 64 (pp.44-61) ; Staviskij 69 (pp.28-31) ; Bkhatija 72 ; Staviskij 72 (pp.48-61)

; excavations of Fajaz Tepe) ; Staviskij 82 (pp.45-49) ; *Staviskij 90 (the destruction cannot be linked to the Sassanids) ; *Mkrtychev 94 (Buddhism, complex E) ; Vertogradova 95 (pp.41-48, interpretation based on the epigraphic evidence) ; *Dani, Litvinskij 96 (kushano-sassanide, pp.111-112)

Thematic Bibliography

- Anthropology : see Tombs

- Architectural fragments (in stone) : Staviskij 64 (pp.25-26) ; Staviskij 69 (pp.20-21) ; Staviskij 69a (important article) ; Kara-tepe II (pp.170-173, list) ; Berlin, Zhelninskaja 72 (traces of paint, analysis of the pigments, pp.111-112) ; Staviskij 72 (pp.35-42)

Sycheva, Sychev 82 (semantic analysis) ; Kovaljova 96 (excavations 1981-1989, conservation)

- Fire altar : *Bernard 80 (p.326, reinterpreted as a domestic fireplace)

- Bibliography : Shchegolev 72 (1961-1970, annotated) ; Zadneprovskaja 87 (1971-1985, annotated)

- Datation : *Zejmal 99 (important article, two main periods of occupation, reinterpretation, redating)

- Capitals : Staviskij 72b ; Pugachenkova 79 (p.39, ill.39) ; Staviskij 89a ; *Staviskij 89

- Historiography : Pchelina 64 (pp.82-85) ; Podol'skij 81 ; Staviskij 81 ; Staviskij 86 ; Staviskij, Vertogradova et al. 88 ; Staviskij 89 (old investigations) ; *Staviskij 2001

- Inscriptions :

- Generalities : Staviskij 64 (pp.43-44, 52-53) ; Livshits 67 (pp.163, 166, 170) ; Staviskij 69 (pp.24-27) ; Staviskij 72 (pp.46-47) ; Livshits 74 (pp.317-318) ; *Fussman 87 (p.348, criticism) ; Staviskij 82 (p.44)

- Kharoshti : Masson, M. 41 (pp.81-84) ; Grek 62' ; Grek 64 (pp.62-74) ; Kharmatta 69 (pp.33-36) ; Grek 72 ; Vertogradova 81' ; Vertogradova 82 (pp.134-158) ; *Vertogradova 83 ; *Vertogradova 84 ; Vertogradova 87 ; *Vertogradova 87 ; Vertogradova 95 (monographie, catalogue pp.49-89, 116-120) ; Vertogradova 96 ; Vertogradova 98 (p.200)

- Brahmi : Grek 62' ; Grek 64 (pp.74-80) ; Kharmatta 69 (p.36) ; Grek 72 (pp.116-117) ; Vertogradova 75 ; *Hinüber 80 ; Vertogradova 81' ; Vertogradova 82 (pp.158-159) ; *Vertogradova 83 ; *Vertogradova 84 ; Vertogradova 87 ; *Vertogradova 87 ; Vertogradova 95 (monography, catalogue pp.89-106, 120-122) ; Vertogradova 96 ; Vertogradova 98 (p.200)

- Bilingual : Kharmatta 69 (pp.37-38 ; Grek, Livshits 72 ; Khumbakh 75 (pp.52-68) ; Vertogradova 95 (catalogue pp.106-113)

- Bactrian : Livshits 64' ; *Harmatta 65 ; *Harmatta 69 ; Kharmatta 69 ; Livshits 69 (pp.32-33, 38-39) ; *Humbach 70 (KaraT, Tochi, Surkh Kotal) ; *Harmatta 72 ; Khumbakh 72 (translation of *Humbach 70) ; *Harmatta 74 ; Khumbakh 75 ; Livshits 75 (analysis) ; *Davary 82 ; *Livshits, Shkoda 94 ; Livshits 96 ; Livshits 96a ; Livshits, Shkoda 96

- Middle Persian : Lukonin 69 (with a note by V.B. Henning) ; Pugachenkova, Rtveldadze 90 (p.60, 101, datation)

- Arab : Pevzner 75

- Unknown : Vertogradova 81' ; Vertogradova 82a ; *Vertogradova 83 ; *Vertogradova 84 ; *Vertogradova 87 ; Vertogradova 95 (catalogue, pp.113-116) ; *Vertogradova 96 ; *Vertogradova 96a ; Rtveldadze 98

- Ceramics : Staviskij 64 (pp.38-42) ; Judochkina 68' ; Staviskij 69 (pp.17-20) ; Sycheva 69 (complex A and B) ; Sycheva 69 (P II) ; Staviskij 72 (pp.42-46) ; Sycheva 75a (important article, complex A pp.89-103, B pp.104-114, V pp.114-119, summit pp.119-120, analysis pp.120-132) ; Staviskij 82 (pp.43-44) ; **KIDU 91 (n°100-103 [T.K. Mkrtychev])

- Cultic objects : Staviskij 64 (pp.35-38)

- Datation and periodisation : *Zejmal 99 (important article, two main periods of occupation, many finds were mistakenly attributed to the first period) ; Zejmal', Rtveldadze 99 (p.142, reoccupied during the VIth c.)

- Stone friese [Fragment of] : Staviskij 64 (pp.25-26, ill.27) ; Staviskij 69a (pp.146-149, ill.33-36) ; Pugachenkova 79 (p.38, ill.44)

- Metal objets : Ravich, Shemakhanskaja 82 (analysis)

- Mirrors : Ravich 96

- Numismatics : Staviskij 64 (pp.42-43) ; Staviskij 72 (p.47) ; Staviskij 72a (pp.99-100) ; Zejmal', Lukonin 72 (finds from 1961-1971) ; Fedorov, Rtveldadze 72 (Soter Megas) ; Vajnberg 72 ; Khumbakh 75 (pp.61-62) ; Staviskij, Sergeeva 75 (p.28) ; Sycheva 75 (p.37) ; Staviskij 82 (pp.44-45) ; Vajnberg, Raevskaja 82 (IV-VIth c.) ; Zejmal' 96a (complete detailed list)

- Wall paintings : Staviskij 64 (pp.27-32, graffiti pp.32-35) ; Staviskij 69 (graffiti pp.21-24) ; Berlin, Zhelninskaja 72 (analysis of the pigments, pp.112-113) ; Staviskij 72 (pp.31-35) ; Staviskij 74 (ill.80) ; Birshtejn 75 (technical analysis) ; Egorov, Ivanova et al. 75 (fieldwork) ; Ruzavin 75 (conservation) ; Birshtejn 76' (analysis of the pigments) ; Zhelninskaja 76'

Polev 81' (mythological serpent) ; Vitrenko 81' ; Zavadskaja 81' (semantic analysis) ; Zhelninskaja, Vitt et al. 81' (binder and pigments) ; Birshtejn 82 (analysis of the pigments) ; Staviskij 82 (pp.37-39) ; Sycheva, Sychev 82 (semantic analysis) ; Zhelninskaja 82 (analysis of the binders) ; Zhelninskaja, Vitt et al. 82 (analysis of the binders) ; Neglinskaja 90 ; Pugachenkova, Rtveldadze 90 (pp.105-107) ; **KIDU 91 (n°111-112 [K.A. Abdullaev]) ; Kovaljova 95' (graffiti) ; Mkrtychev 95' (comparison with FajazT) ; Mkrtychev 95b' ; Shesternev 95' (interpretation) ; Jarosh 96 (analysis of non-organic materials) ; Jarosh 96a (analysis of organic materials) ; Mkrtychev 96a (purna-ghata, Buddhist iconography) ; Mkrtychev 98 (complex E) ; **Kosolapov, Marshak 99 (p.57)

- Small finds : **KIDU 91 (n°110 reliquary [T.K. Mkrtychev])

- Foreign links (India) : Staviskij 64b (pp.171-174, ill.19-21, covers, statues, wall paintings, ...) ; Staviskij 68a (pp.190-193)

- ; *Bongard-Levin 69 (pp.8-9) ; Staviskij 87
- Sassanide [Presence] : *Harmatta 69 (pp.121-125) ; Lukonin 69a (p.44) ; Staviskij 72 (p.51) Staviskij, Vajnberg 72 (important) ; **Staviskij 86 (pp.154-155) ; Solov'jov 97 (pp.17-18) ; Pugachenkova, Rtveladze 90 (p.60)
- Seals : Staviskij 82 (? , p.45, Buddha or Bodhisattva) ; Peters 96 (with a representation of boats)
- Sculptures : Staviskij 64 (pp.22-25) ; Staviskij 72 (pp.35-42) ; Pugachenkova 79 (technology of fabrication p.71) ; *Staviskij 80 (Buddha-Mazda) ; Sycheva, Sychev 82 (semantic analysis) ; **KIDU 91 (n°104-109 [T.K. Mkrtychev]) ; *Mkrtychov 95 (complex E) ; Mkrtychev 95b' (brief reference) ; Jarosh 96 (analysis of non-organic materials) ; Jarosh 96a (analysis of organic materials) ; Reutova, Akhadova 2002 (conservation)
- Statuettes : Meshkeris 69 (anthropomorphic and zoo.)
- Stucco : Staviskij 64 (pp.22-25) ; Staviskij 82 (pp.41-42)
- Textiles : Majtdinova 91
- Glass : Abdurazakov 96 (chemical analysis, X- beg. XIIIth c.)

Other Names

Other Numbers 4 [Annaev 84a]

B Number B001

Longitude 67°13'56''

Latitude 37°15'50''

Precision of the localisation

Description of the localisation

ID Problems

Approximate localisation

DESCRIPTION Buddhist stupa built on a pahsa platform.

Surface in ha 0,07

Maximal height (m) 18

Type 3a

Dimensions (m)

Remarks on the size

Remarks on the type

Diameter: 30

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

See bibliography

IMPORTANCE OF SITE

Esthetical Value Limited. The remains of the stupa form a ruined stump in the middle of cotton fields. The esthetical value would increase greatly if the area around the site was not irrigated and partial restoration was undertaken.

Historical Value High. Zurmala is the largest known stupa in Central Asia.

Social Value Limited

Economical Value Limited

Spiritual Value Potentially high.

STATE OF PRESERVATION

Current Use None

Human Pressure Very High. The cotton fields reach right up to the site.

Conservation Work None

Accessibility Bad. The possible access routes are along unpaved paths and in one case require wading an irrigation canal.

State of Preservation Bad. The stupa is clearly crumbling and could collapse any moment.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Excavation report : Strelkov 27 ; Pugachenkova 67a (pp.257-261, mud bricks, fragments of architectural decor pp.260-261 ill.3, ceramic p.260)

Descriptions and brief references : Denike 27a ; Zgura 27 ; Denike 28a ; Strelkov 28 ; Kastal'skij 30a (p.7, sceptical) ; *Strelkoff 29 (p.220) ; Masson 41 (p.27, 28, ill.3) ; Shishkin 41 (p.148, sceptical) ; Pugachenkova, Rempel' 58 (p.8) ; Staviskij 64 (p.58, sceptical) ; Pugachenkova 73a (pp.100-102, ill.19) ; Staviskij 74 (pp.94-96, ill.72) ; Pugachenkova 76a (p.18, ill.1) ; Pugachenkova 79 (p.67, ill.74) ; Annaev 84a (p.176) ; Pugachenkova 86 (ill. p.20) ; Pugachenkova, Rtveladze 90 (p.95) ; *Staviskij 94 (p.115, ill.6/3) ; *Staviskij 96 (p.158) ; Staviskij 98 (pp.51-52)

Thematic Bibliography

- Sculpture (limestone low-relief)

- Fragment with Buddhist figure : Masson 41 (p.77) ; Pugachenkova 67a (p.261) ; Pugachenkova 76a (ill.3) ; Pugachenkova 79 (pp.175-176)

- Fragment found in the palace of the Termez-Shah : Pugachenkova, Rempel' 60 (p.22) ; Pugachenkova 67a (p.261)

X (SOUTH OF RABAT 1) (TERMEZ)**Uz-SD-369**

Other Names

Other Numbers 20 [Annaev 84a]

B Number B001

Longitude 67°13'04''

Latitude 37°15'57''

Precision of the localisation

Description of the localisation

ID Problems

It is not certain that this site is the site mentioned by [Annaev 84a, p.176], since the dates do not correspond.

DESCRIPTION Little mound situated in the middle of a cotton field.

Surface in ha 0,005

Maximal height (m) 5

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

Diameter: 5 m.

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan-Early Medieval [T. Annaev]

Pre-Mongol [Annaev 84a]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Unknown. The site was presumably part of the Kushan city.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None / agricultural

Human Pressure Very high. The site is situated in a field next to the main highway and is being progressively destroyed. It is likely to disappear completely within a few years.

Conservation Work None

Accessibility Excellent. Next to the main road.

State of Preservation Very poor. Most of the site appears to have been destroyed.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Annaev 84a (brief reference, p.176, 177)

X (SOUTH OF RABAT 1) (TERMEZ)**Uz-SD-370**

Other Names

Other Numbers 21 [Annaev 84a]

B Number B001

Longitude 67°13'08''

Latitude 37°15'53''

Precision of the localisation

Description of the localisation

ID Problems

It is not certain that this site is the site mentioned by [Annaev 84a, p.176], since the dates which he indicates do not correspond to those of the sherds lying on the surface and he himself is doubtful.

DESCRIPTION Small site (30x15 m).

Surface in ha 0,045

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

30x15

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan-Early Medieval [T. Annaev]

Pre-Mongol [Annaev 84a]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important. The site was probably part of the Kushan city.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None / agricultural

Human Pressure Very high. The site is situated in a field next to the main highway and is being progressively destroyed. It is likely to disappear completely within a few years.

Conservation Work None

Accessibility Excellent. Next to the main road.

State of Preservation Very poor. Most of the site appears to have been destroyed.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Rtveladze 74 (p.74, brief reference) ; Annaev 84a (brief reference, p.176, 177)

Other Names

Other Numbers

2 [Annaev 84a]

B Number

B001

Longitude 67°11'16''

Latitude 37°17'10''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Large, square, rectangular building, divided into three main units and with a stupa situated in front. The central part is built around a courtyard (30x20 m), surrounded by a colonnade, and a series of small rooms / sanctuaries. The two other units are also structured around a courtyard and were presumably used for domestic and administrative purposes.

Surface in ha 0,14

Maximal height (m)

Type 3a

Dimensions (m)

Remarks on the size

Remarks on the type

117x34

Size according to [Staviskij 98]

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

According to B. Ja. Staviskij the stupa and some of the rooms of the manastery may have been reused during the Ve. s. [Staviskij 98, p.50]

IMPORTANCE OF SITE

Esthetical Value High. The overall plan of the site is easily perceivable and its situation, in the midst of a semi-desertic steppe leading down towards the Amu Darya is beautiful.

Historical Value Very high. Fayaz Tepe is the most important Buddhist monastery in Termez alongside Kara Tepe.

Social Value Limited. The opening of the site to tourists and that of the onsite visitor's centre is likely to have an import impact.

Economical Value Limited. This will change with the opening of the site to tourists and that of the onsite visitor's centre. These will provide not only jobs but also an outlet for selling handicrafts.

Spiritual Value As one of the main Buddhist monasteries in Central Asia, Fayaz Tepe's spiritual value is high. This will be all the more so with the increase in Japanese (and in some cases Occidental) visitors.

STATE OF PRESERVATION

Current Use In restoration. Will soon be open to visitors.

Human Pressure Low. Various fields are situated a few hundred meters away from the site, within the preservation area.

Conservation Work At the end of the 1970's, the local administration of Termez (under Shaniyazov), undertook restoration work at Fayaz Tepe, including the construction of paths for visitors in cement and the restoration of the walls.
Current restoration is now underway by UNESCO.

Accessibility Excellent. An access road leads up to the visitor's centre and the site from the main highway.

State of Preservation The site was badly affected by erosion when it was left after excavation. It is now being fully restored.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Excavation reports

- Monastery : Al'baum 74 (excavation report, Buddha head, FajazT more important than KaraT), Al'baum 76 (excavation report, stone bassin)
- Tombs : Al'baum 79' (p.22) ; Litvinskij, Sedov 84 (p.92) ; Rtveldze 89 (p.54) ; Zejmal', Rtveldze 99 (p.138)

Descriptions and brief references

- Brief references : Al'baum 72', Guljamov 72 ; Al'baum 73', Askarov 73a, Al'baum 79', Al'baum 81' (in relation to Ancient Termez as a whole), Al'baum 86', Staviskij 87 (reconstitution by A. Avanesova) ; Al'baum 92' ; *Staviskij 94 (pp.114-115, ill.4/1, pl.2) ; *Staviskij 96 (pp.157-158)
- Description : Pugachenkova 76a (pp.16-18) ; Pugachenkova 79 (pp.66-67) ; Pugachenkova, Rtveldze 90 (p.94) ; **KIDU

91 (p.107 [L.I.Al'baum]); **Staviskij 86 (pp.210-211); Staviskij 98 (pp.44-50, detailed))

Thematic Bibliography

- Architectural fragments : **KIDU 91 (n°118, upside down capital [T.K. Mkrtychev])

- Datation : Zejmal', Rtveldze 99 (pp.141-142, rebuilding of the Stupa in the VIth c.)

- Inscriptions :

- Kharoshti : Vorob'eva-Desjatovskaja 74 (pp.123-125)

Vertogradova 95 (pp.123-128); Vertogradova 98 (pp.200-201).

- Unknown : Vertogradova 95 (pp.133-134); Rtveldze 98

- Bactrian (Aramean) : Livshits 79 (p.95, note 3)

- Bactrian (Greek) : **Staviskij 86 (brief reference, p.238); Staviskij 98a (brief reference, p.275)

- Numismatics : Ernazarova 73' (1972); Rtveldze 87c (p.129, treasure of arab coins, VIII-beg.IXe); **KIDU 91 (Abbasside 811/12 [G. Alimov])

- Wall paintings : Al'baum 90 (important article); Birshtejn 76' (analysis of the pigments); Pugachenkova 79 (technics of fabrication p.81, analysis p.124); Birshtejn 82 (analysis of the pigments); Pugachenkova 86 (ill. p.145); Rempel' 89 (p.126); Pugachenkova, Rtveldze 90 (p.107); **KIDU 91 (n°119-120 [L.I.Al'baum]); Mkrtychev 95' (comparison with KaraT); Mkrtychev 95b'; Mkrtychev 98 (pp.191-192, analysis of new fragments)

- Stone : Ageeva, Belogerova 82 (analysis of the limestone)

- Sculpture : Al'baum 78 (Griffon); Pugachenkova 79 (technics of fabrication p.71; head of a Buddha pp.167, 205, ill.201; fragment

Mkrtychev], n°121-122 [L.I.Al'baum]); Mkrtychev 95b' (brief reference); *Sérinde 95 (n°60 head of a Buddha [Cohen, M.], n°188 "the awakening" [Cohen, M.])

- Statuette : **KIDU 91 (n°113 [K.A. Abdullaev])

X (FAJAZ TEPE) (TERMEZ)**Uz-SD-372**Other Names Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Agricultural / Canal

Human Pressure Very high.

Conservation Work None

Accessibility Average

State of Preservation Entirely destroyed

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

POST MONGOL TERMEZ

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The Post Mongol city (Termez II) corresponds to the city, which was rebuilt after the Mongol conquest in 1220. The city of this period is known thanks to a few historical sources (in particular the account by Clavijo) and the three main remaining monuments: Kyrk Kyz, Kokildora and Sultan Saodat. No systematic surveys or excavations have been carried out and we therefore know nothing about the general plan of the city or its importance.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value

Historical Value

Social Value

Economical Value

Spiritual Value

STATE OF PRESERVATION

Current Use

Human Pressure

Conservation Work

Accessibility

State of Preservation

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Square mud brick building oriented towards the cardinal points. The building is almost perfectly symmetrical with four circular towers in the angles and a gateway in the centre of each facade leading to a central room via a vaulted corridor.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

VI-VIIth c. : Masson 41 (p.66)
VIII-IXth c. : Zasytkin 48 (p.30)
IX-Xth c. : Pribytkova 61 ; Arshavskaja, Rtveladze et al. 82 ; Grazhdankina 89 (p.55) ; and many other authors
IX-XIIth c. : *Hillenbrand 94
XIIIth c. : Zasytkin 28b
XIV-XVè s. : Nekrasova 95'
XIV-XVè s. (mainly XVth c.) : Nekrasova 2001

The excavations of E. Nekrasova have proven that the site of Kyrk Kyz should be dated to the XIV-XVth c. Most previous publications and in particular publications on Islamic architecture date the building to the IX-XIIth c.

IMPORTANCE OF SITE

Esthetical Value High. The building is impressive both from the outside and the inside. The arcs, vaults and ruined cupolas in mud brick are interesting and beautiful – as an architect said: “it resembles a architectural dictionary”. The many, semi-ruined rooms invite the visitor to explore them.

Historical Value High. Initial work carried out in the first part of the XXth century led this site to be dated to the IXth century. It was therefore included in many books of Islamic Architecture (for example in the classic book by Hillenbrand, R. Islamic architecture. Form, function and meaning, Edinburgh, Edinburgh University Press, 1994) as a unique example of an early, mud brick Islamic building (and usually identified as a khanaka). However, archaeological excavations undertaken by E. Nekrasova in 1979-1980 as well as a close architectural analysis and the localisation of the building have demonstrated beyond reasonable doubt that the site should be dated to the XIV-XVth century. The site is thus an archaic provincial building and can no

Social Value The site fulfils a mainly spiritual function for the local population.

Economical Value Low. Visitors cannot be expected to pay an entrance fee. If the number of visitors increases, indirect jobs may be created (souvenirs, drinks, etc.).

Spiritual Value Medium-High. One of the back rooms of the site contains an old, dead, mulberry tree to which women attach handkerchiefs or socks in the hope of obtaining a good husband.

STATE OF PRESERVATION

Current Use The site is used as a cultural monument, however it also serves as a place of pilgrimage for women (in particular those wishing to find a husband, but also those with an ill child, etc.).

Human Pressure The site is surrounded by a protective zone. The nearest house is situated at about 20 meters and the nearest irrigated field at less than 30 m from the building.

Conservation Work The site was partly restored in 2002 by the Ministry of Culture of Uzbekistan, in accordance with the presidential decree linked to the celebration of the 2500th Anniversary of Termez. The workmanship and materials used is not perfect, although efforts were made. Thus the mud brick vaults were fairly successfully restored but attempts to reinforce the walls within the building by placing baked bricks and cement at their base look very bad and seem to be likely to contribute to further erosion.

Accessibility Perfect – the road leading up to the site is newly paved, a parking is situated in front of the entrance to the preserved area and a paved path leads up from there to the entrance.

Authenticity: So far little altered.

Integrity: Seriously altered by the use of concrete bars placed under some of the walls and by cement used as a join between the baked bricks, which have been used to rebuild some of the walls.

Furthermore, although some baked bricks were used at Kyrk Kyz, these have been used systematically during the restoration and their quality is such that many are already eroding away less than three years later.

SUGGESTED IMPROVEMENTS

Restoration of Kyrk Kyz is not a priority for the near future. The building is large and would require a comparatively important investment if it were to be undertaken properly. It is however important to attempt to limit irrigation in the near vicinity since this is leading to further, rapid deterioration of the mud brick walls. And it is fundamental to try and halt any further “restoration” work being undertaken by the local authorities ; indeed, seeing what has been done so far, it is not so far fetched to imagine that they would be capable of simply bulldozing the inside of the building and building a brand new two stories, Karimov style, palace. It is very important that no further restoration should be undertaken using the previous techniques.

A future, large scale project would require careful restoration of all preserved parts of the interior and could include certain restitutions – such as those of semi collapsed vaults, cupolas or arcs. The holy tree localised within the complex should be respected.

BIBLIOGRAPHY

Excavation report

Zasytkin 28b (pp.26-33, first study) ; Pribytkova 61 (architectural analysis) ; Nekrasova 2001 (excavation report)

Descriptions and brief references

Denike 27a ; Denike 28a ; Kastal'skij 30a (pp.9-10) ; Vejrnar 40 (ill.5-7) ; Masson, M. 41 (p.60) ; Zasytkin 48 (pp.30-33, ill.16-17) ; Lavrov 50 (pp.48-50, ill.107-108) ; Pugachenkova, Rempel' 58 (p.24, ill.9-11) ; Pribytkova 73 (pp.28-35) ; Pugachenkova 76a (pp.23-28, ill.6-7) ; **Ajni 80 (pl.34-35) ; Arshavskaja, Rtveladze et al. 82 (pp.88-91, ill. pp.92-95) ; Khakimov 83 (pp.149-154., ill p.155) ; Pugachenkova 83 (n°256) ; Pugachenkova 86 (ill. pp.24-27) ; Khmel'nitskij 92 (pp.219-229) ; *Hillenbrand 94 (pp.409-411, ill. h.-t. 7/14) ; Nekrasova 95'

Thematic Bibliography

- Building materials and methods : Grazhdankina 89 (pp.55-57)

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION	Monumental building with an iwan and a domed square central room.
-------------	---

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Medium-high. Although Kokildora is a fairly typical post-Timurid building with limited decorative features, it's proportions and general aspect are pleasant. It is situated amongst the houses and gardens of a suburb of Termez.

Historical Value Medium. The khanaka (or tomb) of Kokildora is dated to the XVIth century. This building is not particularly important

Social Value The site could become a focal point for the local community if it is turned into a mosque.

Economical Value Low. Visitors cannot be expected to pay an entrance fee. If the number of visitors increases, indirect jobs may be created (souvenirs, drinks, etc.).

Spiritual Value High. One of the rooms in the building is used for saying prayers and the local community have asked for it to be turned into a mosque.

STATE OF PRESERVATION

Current Use The site is a historical monument, which can be visited. One of the rooms is also used for prayers and the local population have asked to turn the site into a mosque.

Human Pressure A buffer zone surrounds Kokildora at a distance of about 20 meters. It is protected by a wall to the south and the east, by a road to the north and west and landscaped. Both the nearest house and the nearest field are situated at about 25 m from the building.

Conservation Work The site was extensively restored in 2002 by the Ministry of Culture of Uzbekistan, in accordance with the presidential decree linked to the celebration of the 2500th Anniversary of Termez. Cement has been used as a joint between the paving bricks and in some of the walls.

Accessibility Perfect – the road leading up to the site is newly paved, a parking is situated in front of the entrance to the preserved area and a paved path leads up from there to the entrance.

State of Preservation Authenticity: The site has been fully restored, including some parts for little evidence remained. Integrity: Altered by the use of cement, mainly as a joint between the paving bricks and in the walls, which have been rebuilt.

SUGGESTED IMPROVEMENTS

As has been said above, I suggest that one of the rooms of Kokildora be turned into a small onsite museum and that toilets be built close by.

BIBLIOGRAPHY

Denike 28a ; Kastal'skij 30a (p.11) ; Pugachenkova 76a (pp.52-55, ill.30-32) ; Arshavskaja, Rtveladze et al. 82 (pp.86-88, ill. pp.86-91) ; Pugachenkova 83 (n°267)

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Group of mausoleums, built at different periods around a 70 meter long rectangular courtyard. The oldest buildings (probably dated from the XIIth century) are situated at the Western end. The mausoleums are almost all square buildings with a cupola. At the beginning of the XXth century a khanaka, situated opposite the entrance was also preserved.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

Various other mausoleums also form part of the necropolis.

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Medium-High. The main complex has been fully restored and appears fairly homogeneous, although not exceptionally beautiful. The surrounding cemetery is not particularly interesting apart from the ruins of four ancient mausoleums. Beyond, the houses and gardens of this suburb of Termez are non descript but pleasant.

Historical Value High. The series of mausoleums and tombs have been used by the local community for centuries.

Social Value Medium. The cemetery is still visited by the local population and the site is crossed by a number of paths. It seems that people sometimes meet in the shade of the main complex.

Economical Value Low, indirect. Visitors cannot be expected to pay an entrance fee. If the number of visitors increases, indirect jobs may be created (souvenirs, drinks, etc.). The mullah who blesses the pilgrims lives off their donations.

Spiritual Value High. The site is still considered to be holy and is regularly visited, mostly by local people. The cemetery is no longer used for burials but many old tombs are carefully looked after and some have recently been completely rebuilt (including one dated from 1946).

STATE OF PRESERVATION

Current Use The site is currently open to visits by tourists. However it is also considered to contain the tomb of Sultan Saodat, who is said to be a descendant of the prophet, five generations removed. It therefore receives a fairly important number of pilgrims for whom the mullah will recite a small prayer. The cemetery is no longer in everyday use although a number of old tombs have been recently restored or remade and in exceptional cases a sayyid (direct descendant of the prophet) may be buried here (the last case occurred in 1994).

Human Pressure Both the nearest house and the nearest field are situated at less than 100 m from the main complex. Sultan Saodat, the neighbouring cemetery, which completely surrounds the site, and the ruins of four mausoleums that are situated there are all included within a buffer zone marked by a well built brick wall. Apparently the buffer zone is protected towards the North, South and East, but in the West, at the entrance, alongside trees planted for landscaping purposes, a maize field has recently appeared (planted by the guard who is paid to forbid this !). This is a serious encroachment and could easily lead to further liberties being taken within the area.

Conservation Work The site was extensively restored in 2002 by the Ministry of Culture of Uzbekistan, in accordance with the presidential decree linked to the celebration of the 2500th Anniversary of Termez. The work was rushed in order for the building to be ready for the jubilee celebration. Some of the reconstruction undertaken was not properly documented (for example the main vault) or simply undertaken for beautification purposes (the tiled foreground and steps leading up to each individual mausoleum). The materials used are not always up to standard, with cement joins in some buildings (but not all).

Accessibility

the preserved area and a paved path leads up from there to the entrance.

State of Preservation

Authenticity: Seriously altered, in particular by the decorative pattern of the main vault for which no evidence existed and by the decorative pattern in glazed tiles, much of which seems to have been invented. Other elements, such as the disposition of the tombs within the main mausoleum also seem to have little relation to their original position. Finally, the stepped platform situated in front of the mausoleums may never have existed.

Integrity: Altered by the use of cement, mainly as a joint between the paving bricks and in walls which were completely rebuilt.

SUGGESTED IMPROVEMENTS

The buffer zone should be free of any intrusions and in particular of irrigated fields. This must be strictly implemented. Well-written information panels are also required.

The priority at Sultan Saodat should be to halt any further “restoration” work being undertaken by the local authorities. It appears, however, difficult to reverse the damage done so far and it is likely that Sultan Saodat will suffer further.

BIBLIOGRAPHY

Descriptions and études

Semenov 1914 (detailed study) ; Denike 27a ; Denike 28 ; Denike 28a ; Zasytkin 28b (pp.33-35) ; Kastal'skij 30a (pp.10-11) ; Denike 39 (ill. p.13) ; Masson, M. 41 (pp.63-66) ; Lavrov 50 (p.86, ill.178, 288-290) ; Pribytkova 55 (pp.97-98) ; Pugachenkova, Rempel' 58 (ill.15) ; Pugachenkova 65a (detailed study) ; Khakimov 66 ; Shvab 66 (Western mausoleums, detailed study) ; Khakimov, Shvab 69 (complete study, analysis) ; *Knobloch 72 (p.191) ; Pribytkova 73 (pp.152-157) ; Pugachenkova 76a (pp.41-51, ill.23-29) ; Rempel' 78 (pp.65, 131) ; **Ajni 80 (pl.48) ; Arshavskaja, Rtveladze et al. 82 (pp.91-97, ill. pp.96-101, detailed description) ; Pugachenkova 83 (n°261-266) ; Pugachenkova 86 (ill. pp.38, 41) ; *Golombek, Wilber 88 (pp.283-284, ill. h.-t. 55) ; Pugachenkova, Rtveladze 90 (pp.193-194) ; *Hillenbrand 94 (pp.409-411, ill. h.-t. 5/122) ; Kamaliddinov 96 (p.113) ; Khmel'nitskij 96 (pp.248-255) ; Rtveladze, L., Rtveladze 96 (p.99) - Khanaka (now destroyed) : Nekrasova, Filimonov 89 (excavation report, plans and reconstitution) : Zasytkin 1928b (p.32) ; Nekrasova 81' (archaeological data) ; Khmel'nitskij 96 (pp.278-280)

Thematic Bibliography

- Building materials and methods : Grazhdankina 89 (pp.39-55, detailed analysis, chemical analysis tabl. 4)

PRE REVOLUTIONARY TERMEZ

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Fairly high. The building is simple, square and fairly massive, but the plastered mud brick walls with small baked bricks decorative features are pleasant. The area to the front has been landscaped, and the fort is situated in central Termez.

Historical Value High. The military fort of Termez was founded in 1894 on land ceded by the emir of Bukhara. As such it is a unique testimony to Russian colonial and military history on the Afghan border during the Great Game.

Social Value High. The fort still serves as the headquarters for the Termez garrison of the Uzbek army.

Economical Value High. The fort still serves as the headquarters for the Termez garrison of the Uzbek army.

Spiritual Value Depends on your concept of the army.

STATE OF PRESERVATION

Current Use The fort is used as the headquarters of the Termez military garrison.

Human Pressure High. The army has transformed the inside. On the outside, the fortress is surrounded by the modern city but is not at risk from urban development (the original landscape has in any case been transformed beyond recognition)

Conservation Work The base of the walls has been lined with modern bricks.

Accessibility Excellent. The fort is situated at the intersection of two of the main avenues of the city. It is possible to park close to the southwest angle.

State of Preservation The basic structure of the fort is in relatively good condition, especially from the outside. However the inside is said to have been transformed by the construction of various new buildings and the pre-revolutionary ones are in a bad state of disrepair (access was alas not granted).

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

- Esthetical Value* High. Surrounded by low buildings and pine trees, the orthodox church is an attractive building, especially in its overall setting.
- Historical Value* Medium-high. The church in itself is a classic early XXth century orthodox building. However, the fact that it is in the middle of Termez, undeniably increases its value.
- Social Value* Potentially high. When the church opens again it will presumably serve as a focus for the remaining Russian community.
- Economical Value* Potentially high if the restoration goes ahead and it opens once more as a church.
- Spiritual Value* Very high.

STATE OF PRESERVATION

- Current Use* Not in use but is planned to be opened as a church once more in the future.
- Human Pressure* High. Small, fairly traditional, buildings dominate the area surrounding the church. When, and if, the economy revives it is likely to be transformed with new postmodernist villas in the Uzbek style or high-rise flats.
- Conservation Work* Work was started on the restoration of the church but it appears to have been halted by a lack of funds. The inside has been completely gutted and cement applied liberally to most surfaces.
- Accessibility* Excellent. The church is situated in central Termez.
- State of Preservation* The outside retains its original aspect ; but the inside has been emptied and restoration work undertaken so far does not bode well for the final result (use of modern materials in a modern way).

SUGGESTED IMPROVEMENTS

Work on the restoration should be continued and the building reopened as a church to serve the large orthodox congregation of Termez (which currently uses badly adapted buildings such as private houses). The outside aspect should be maintained and the yard, which surrounds the church, landscaped. The inside will need to be entirely redone, ideally in a style reminiscent of the early XXth century.

BIBLIOGRAPHY

OTHER SITES

Other Names Afgan Tepe [Arshavskaja, Rtveladze et al. 82] ; X (Infektsionaja Bol'nitsa) [T. Annaev] Other Numbers 17 [Annaev 84a] B Number

Longitude 67°17'45'' Latitude 37°13'52''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION In 2000, in the remaining part of the site it was possible to make out mud brick walls and a vaulted corridor built on a pahsa platform. [S. Stride]

Surface in ha 0,02 Maximal height (m) 11 Type 3c

Dimensions (m) 20x10 (2000) Remarks on the size Remarks on the type

DATATION

Undated MA

Bz Proto Ant HMA preM postM

B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Early Medieval, Pre-Mongol [Arshavskaja, Rtveladze et al. 82]

IMPORTANCE OF SITE

Esthetical Value Limited.

Historical Value Clearly fairly important.

Social Value Limited.

Economical Value High enough to warrant the complete destruction of the site both for brick making and in order to expand the gardens of the houses, which surround it.

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Mud brick quarry.

Human Pressure Extreme. The site is surrounded by houses and backyards on all sides. It is currently being destroyed in order to make mud bricks and enlarge the gardens of the houses.

Conservation Work None

Accessibility Excellent. The site is situated in Termez, next to the hospital.

State of Preservation Very bad. Less than one quarter of the site remains and the remaining part is being progressively destroyed (the use as a brick quarry has been verified in 2000 and 2005)

SUGGESTED IMPROVEMENTS

What remains of the site should be protected.

BIBLIOGRAPHY

Arshavskaja, Rtveladze et al. 82 (p.130) ; Annaev 84a (pp. 176, 177)

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

Impossible to determine
[Arshavskaja, Rtveladze et al. 82]

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value

Historical Value Presumably fairly important.

Social Value

Economical Value

Spiritual Value

STATE OF PRESERVATION

Current Use Unknown

Human Pressure Unknown. May have been destroyed.

Conservation Work Unknown

Accessibility Unknown

State of Preservation Unknown. Presumably poor. It may well have been entirely destroyed.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Other Names

Other Numbers

B Number

Longitude

Latitude

Precision of the localisation

Description of the localisation

ID Problems

The description of site 133 in [Arshavskaja, Rtveladze et al. 82] is not sufficient for the identification to be certain. This is all the more true considering that in their list the site is named Topitagara Tepe. However, considering that site 133 is listed with no further information this problem is secondary.

DESCRIPTION

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated

MA

Bz

Proto

Ant

HMA

preM

postM

B1

B2

P1

P2

G

GK

K

K1

K2

H1

H2

I1

I2

M1

M2

M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Medium-high. The mound is fairly impressive and the view from its summit gives a good image of the northern part of the Termez plain with the KattaKum desert, the Surkhan Darya river and the irrigated fields stretching out southwards.

Historical Value High. The site of Talitagora probably controlled the irrigation system of the plain of Termez.

Social Value Average. As it is the highest point situated in the midst of cotton fields, the local community use it regularly.

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None. Look out point in the midst of the fields.

Human Pressure High. The fields reach right up to the base of the site.

Conservation Work None

Accessibility Poor. The site is surrounded by cotton fields and no paths lead up to it.

State of Preservation The site is well preserved but, as usual in these cases, slowly being eaten away by the surrounding fields.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

B Number

B041

Longitude 67°18'24''

Latitude 37°12'45''

Precision of the localisation

Description of the localisation

ID Problems

In the year 2000, we were able to find no trace of the site and none of the local inhabitants could remember a site ever having been here.

DESCRIPTION Not described. In 2000, we were able to find not traces of the site.

Surface in ha 0,00999

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Greco-Bactrian, Kushan, Timurid [Rtveladze 74]

IMPORTANCE OF SITE

Esthetical Value

Historical Value Presumably fairly important.

Social Value

Economical Value

Spiritual Value

STATE OF PRESERVATION

Current Use Unknown

Human Pressure Unknown. May have been destroyed.

Conservation Work None

Accessibility Unknown

State of Preservation Unknown. Presumably poor.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Rtveladze 74 (p.78)

Thematic Bibliography

- Numismatics : Pugachenkova, Rtveladze 71 (n°1, 22, 25-27, 33-36, 48, 50) ; Fedorov, Rtveladze 72 (Antimaque, Kadphises II, Kanishka, Vasudeva I, Vasudeva II, Timurids) ; Rtveladze, Pidaev 81 (Antimaque p.46)

X (MIRZAKUL' TEPE)**Uz-SD-262**

Other Names

Other Numbers

8 [Annaev 84a]

B Number

B082

Longitude 67°19'36''

Latitude 37°16'53''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Completely leveled circular building situated 50 m SEE of Mirzakul' Tepe. [Sh. Pidaev]

Surface in ha 0,07

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

Diameter: 30 m (?).

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan [Rtveladze 74]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Domestic gardens and backyards.

Human Pressure Extreme. The site is currently being destroyed in order to make way for low lying gardens, which are easier to irrigate.

Conservation Work None

Accessibility Good. Situated next to the main road leading to the airport.

State of Preservation Very Bad. Most of the site has been destroyed (in the year 2000 it was being used as a quarry for making bricks)

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Rtveladze 74 (p.82) ; Annaev 84a (p.176)

Other Names Other Numbers B Number Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

The localisation of the site was established following T. Annaev's indications. It is extremely approximate. The only person who may remember the site in the field is L. Nekrasova.

Despite having searched for the site with T. Annaev, it was not possible to find it.

DESCRIPTION Surface in ha Maximal height (m) Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Unknown

Human Pressure Unknown. Presumably very high.

Conservation Work None

Accessibility Unknown

State of Preservation Unknown. May well have been totally destroyed.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Other Names

Other Numbers

9 [Annaev 84a]

B Number

Longitude 67°20'15''

Latitude 37°17'25''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The site may have marked the Eastern limit of Post-Mongol Termez. [T. Annaev]

Surface in ha 0,00999

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan, Pré-Mongol (mainly) [Annaev 84a]

Kushan (?), XV-XVIIth c.(according to T. Annaev)

It seems that the dates given in [Annaev 84a] are wrong and that the site should be dated mainly to the Post-Mongol period.

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Agricultural

Human Pressure Extreme. The site is situated under fields.

Conservation Work None

Accessibility Bad. The site is situated in the midst of fields.

State of Preservation Entirely destroyed.

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Annaev 84a (p.176)

Other Names

Other Numbers 7 [Annaev 84a]

B Number

Longitude 67°19'34''

Latitude 37°17'01''

Precision of the localisation

Description of the localisation

ID Problems

Localised using a GPS from a few hundred meters away and evaluating the distance to the site.

The site is situated inside the airport of Termez and is only accessible with a special authorisation.

DESCRIPTION

Approximately square site, oriented towards the cardinal points. Excavations have uncovered the remains of domestic rooms and a small graveyard. [Pidaev 78]

Surface in ha

1

Maximal height (m)

3

Type

2b

Dimensions (m)

Remarks on the size

Remarks on the type

100x110

Over 1 ha [Pidaev 78]

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Yuezhi, Early Kushan [Pidaev 78]

IMPORTANCE OF SITE

Esthetical Value Average

Historical Value High. The site is a good example of a medium size rural settlement of the Kushan period.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use None

Human Pressure High. The site is situated within the airport and could easily be bulldozed if the director of the airport so decides.

Conservation Work None

Accessibility Unaccessible unless with special authorisation.

State of Preservation Average

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Excavation report

Pidaev 78 (pp.29-50, ill. 2-15, ceramic (pp.36-42, pl.1-8, ill.6-10), statuettes (pp.42-49, ill. 11-15), 4 coins (p.49), small finds, pp.49-50))

Descriptions and brief references

Masson, V. 75 ; Pidaev 75 (preliminary report) ; Masson, V. 76 (p.4) ; Pidaev 76 (preliminary rapport, 2 pl. ceramic) ; Annaev 84a (p.176)

Thematic Bibliography

- Ceramics : Abdurazakov, Dzhahalova 86 (chemical analysis) ; Pidaev 91 (grey clay)
- Inscriptions (Bactrian) : Pidaev 82
- Necropolis : Pidaev 78 (pp.35-36) ; Litvinskij, Sedov 84 (p.100)
- Numismatics : Rtveladze, Pidaev 81 (imitation Heliocles n°18 p.50, Soter Megas p.59) ; Pidaev 90b (MirzakulT, imitations Heliocles, Soter Megas, Kadphises II, Kanishka)
- Statuettes : Pidaev 75b ; Abdullaev, K., Pidaev 89

Other Names

Other Numbers

6 [Annaev 84a]

B Number

Longitude 67°19'31''

Latitude 37°14'59''

Precision of the localisation

Description of the localisation

ID Problems

The site corresponds probably to the one mentioned by T. Annaev, even if he localises it on the right bank of the Surkhan Darya.

DESCRIPTION Rectangular site with a citadel in the North-Eastern angle.

Surface in ha 0,00999

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan, Early Medieval (partial occupation) (d'après T. Annaev)

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Agricultural

Human Pressure Very high.

Conservation Work None

Accessibility Average.

State of Preservation Partly destroyed by the surrounding fields.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Annaev 84a (p.176)

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION Small site discovered whilst canalisations were being laid down. The archaeological levels are situated belong the level of the alluvial plain.

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value None

Historical Value The site is important since it is the only certain Achaemenid period site in the territory of Termez.

Social Value None

Economical Value None

Spiritual Value None

STATE OF PRESERVATION

Current Use Main road

Human Pressure Extreme.

Conservation Work None

Accessibility Excellent (!)

State of Preservation The site is situated under one of the main avenues of Termez, next to the university.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION	A few sherds are visible on the tombs. [S. Stride]
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Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

IMPORTANCE OF SITE

Esthetical Value High. The presence of Orthodox, Atheist Sovietic and Muslim tombs side by side is unique. It is further enhanced by the different ethnic groups buried here, each of which has conserved certain characteristics such as that of building tombs resembling houses for the Kazakhs.

Historical Value The cemetery is situated over an archaeological site. The archaeological value is therefore high. However the cemetery is especially interesting from a historical and ethnographical point of view since it preserves the memories of the various ethnic groups of Termez from the foundation of the city up till nowadays.

Social Value High (as all cemeteries)

Economical Value High (as all cemeteries)

Spiritual Value Very high (as all cemeteries)

STATE OF PRESERVATION

Current Use Cemetery

Human Pressure Cemeteries is unlikely to be destroyed. The cemetery is surrounded by semi-derelict industrial buildings.

Conservation Work None

Accessibility Good. The road leading to the cemetery could do with being repaved.

State of Preservation The cemetery is fairly well kept and still in use. Obviously the archaeological site situated under the cemetery has presumably been partly destroyed by contemporary tombs.

SUGGESTED IMPROVEMENTS

If visitors were to come to the cemetery, it would be worth producing a small leaflet indicating the different areas in the cemetery and the different types of tomb.

BIBLIOGRAPHY**Thematic Bibliography**

- Numismatics : Vajnberg 72 (pp.141-142, 3 Hephtalite coins)

Other Names

Other Numbers

B Number

Longitude Latitude

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

No evidence of a mound of any type could be found and it is highly likely that this is not an archaeological site. The discovery of many coins is presumably linked to the fact that the earth used to make baked bricks probably comes from archaeological sites and is brought here in lorries. Coins are logically the only artefacts preserved by the employees and some of these have been transmitted to archaeologists. [S. Stride]

Surface in ha

Maximal height (m)

Type

Dimensions (m)

Remarks on the size

Remarks on the type

DATATION

Undated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

See the bibliography for a description of the coins found here.

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Limited. The archaeological artifacts discovered here are clearly out of context and come in reality from other archaeological sites whose earth is being used by the brick factory.

Social Value High.

Economical Value High. This of course is a major problem since it is directly linked with the destruction of archaeological sites.

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Brick factory

Human Pressure

Conservation Work

Accessibility

State of Preservation

SUGGESTED IMPROVEMENTS

BIBLIOGRAPHY

Thematic Bibliography

- Numismatics : Fedorov, Rtveladze 72 (imitation Heliocles) ; Pugachenkova, Rtveladze 71 (n°7) ; Rtveladze, Pidaev 81 (imitation Heliocles, n°46-47, pp.53-54)

X (TALITAGORA)**Uz-SD-364**

Other Names

Other Numbers

11 [Annaev 84a]

B Number

Longitude 67°20'59''

Latitude 37°17'43''

Precision of the localisation

Description of the localisation

ID Problems

Approximate localisation

100 meters East of Talitagora.

DESCRIPTION

Small Tepe. [Annaev 84a]

Surface in ha 0,00999

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Kushan, Pre-Mongol [Annaev 84a]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Agricultural

Human Pressure Very high

Conservation Work None

Accessibility Poor. In the middle of a field.

State of Preservation The site was entirely destroyed at the beginning of the 1960's [Annaev 84a, p.171].

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Annaev 84a (pp.171, 176)

X (RAILWAY STATION)**Uz-SD-619**

Other Names

Other Numbers

16 [Annaev 84a]

B Number

Longitude 67°18'13''

Latitude 37°15'17''

Precision of the localisation

Description of the localisation

ID Problems

DESCRIPTION

The remains of a small mound can just be made out. A depression situated South of the site and oriented NEE-SWW may mark the location of an ancient canal. [S. Stride]

Surface in ha 0,03

Maximal height (m) 3-4 [Annaev 84a]

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

Diameter: 15-20 m. [Annaev 84a]

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Early Medieval [Annaev 84a]

Early Medieval ?, XI-XIIth c., XVI-XVIIth c. [T. Annaev]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Domestic / agricultural

Human Pressure Extreme. The site is currently being destroyed to make way for gardens and fields.

Conservation Work None

Accessibility Good. Situated next to a road.

State of Preservation Most of the site has been destroyed.

SUGGESTED IMPROVEMENTS**BIBLIOGRAPHY**

Annaev 84a (brief reference, p.176)

X (RAILWAY STATION 2)**Uz-SD-620**

Other Names

Other Numbers

19 [Annaev 84a]

B Number

Longitude 67°18'27"

Latitude 37°15'19"

Precision of the localisation

Description of the localisation

ID Problems

Very approximate localisation, done according to T. Annaev's indications.

Despite having searched for the site with T. Annaev, it was not possible to find it.

DESCRIPTION Small Tepe [Annaev 84a]

Surface in ha 0,00999

Maximal height (m)

Type 2d

Dimensions (m)

Remarks on the size

Remarks on the type

DATATIONUndated MA Bz Proto Ant HMA preM postM B1 B2 P1 P2 G GK K K1 K2 H1 H2 I1 I2 M1 M2 M3

Other datations

Remarks

Pre-Mongol [Annaev 84a]

IMPORTANCE OF SITE

Esthetical Value Limited

Historical Value Presumably fairly important.

Social Value Limited

Economical Value Limited

Spiritual Value Limited

STATE OF PRESERVATION

Current Use Unknown. Probably situated beneath houses.

Human Pressure Very High

Conservation Work None

Accessibility Unknown

State of Preservation Unknown. Probably destroyed.

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