

KAREZ RESEARCH IN THE TURPAN DEPRESSION

Measuring and inventorizing karez irrigation systems in order to gain more insights on their age and genesis.

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1. INTRODUCTION

Objectives

Gain more insights on the age and genesis of the karez by finding the oldest karez system in the region.

Method

Investigating, inventorizing, measuring and mapping of different individual karez wells. Extraction of the exact geometry using Pleiades-1 satellite imagery (0,50 m resolution).

Application of the results

→ Composition of a database, containing each karez system in the region.

→ Gaining more insights the age and genesis of the karez

Workflow

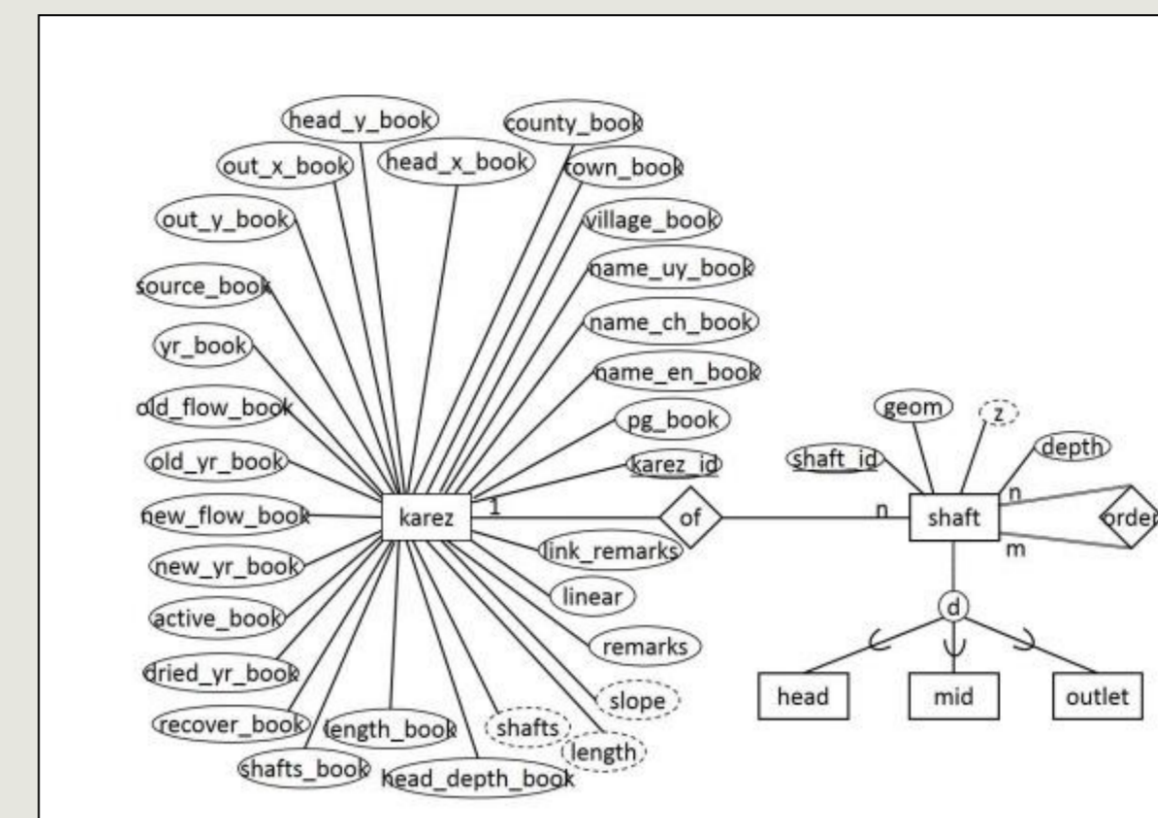
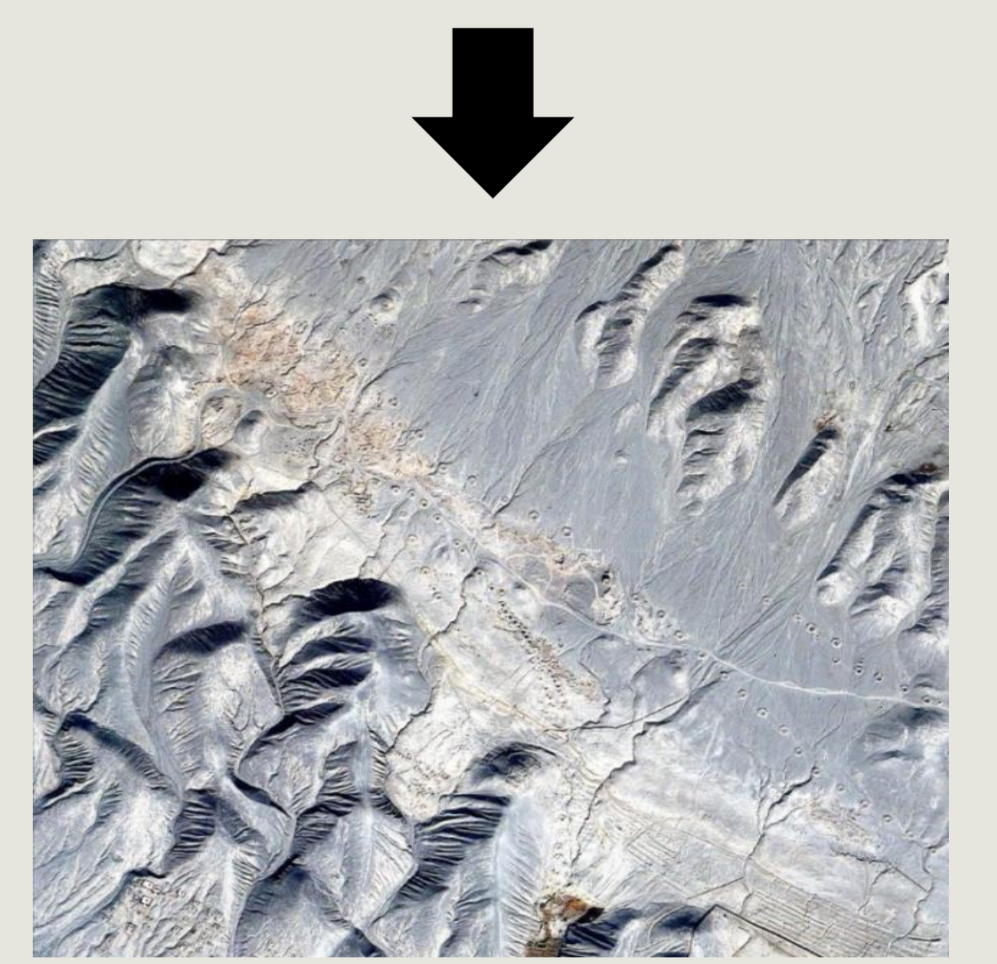
1. Data acquisition: field work
2. Data processing: mapping and creating a database
3. Interpretation of the results

4. DATA PROCESSING: MAPPING & DATABASING

Inventorized parameters per individual well

Zone	Line ID	Photo nr.	diam. N2 (m)	diam. NW (m)	h (m)	active	Opes	depth (m)	wet	φ (°)	λ (°)	elev(m)	description
Z	D	100	3033	1030	1050	110	NA	0	1400	NO			
Z	D	101	3034	900	950	105	NA	0	480	NO			
Z	D	104	3035	1000	880	40	NA	0	200	NO			
Z	E	101	3036	830	850	43	NA	NO	0	NO			
Z	E	102	3037	510	490	70	NA	NO	400	NO			
Z	E	104	3038	820	660	100	NA	NO	200	NO			
Z	D	103	3039	950	720	30	NA	NO	0	NO			
Z	D	105	3040	720	600	40	NA	0	240	NO			
Z	C	101	3041	1000	1000	90	A	HO	10000	Y			
Z	C	106	3042	1220	1240	110	A	HO	10000	Y			
Z	C	104	3043	1180	1150	110	A	HO	10000	Y			
Z	C	103	3044	1250	1150	80	A	HO	10000	Y			
Z	C	102	3045	1110	1450	80	A	HO	10000	Y			
Z	H	101	3046	710	690	70	NA	NO	0	NO			
Z	H	106	3047	1150	1250	80	NA	0	1200	NO			
Z	C	108	3048	1560	1330	120	A	HO	10000	Y			

Mapping

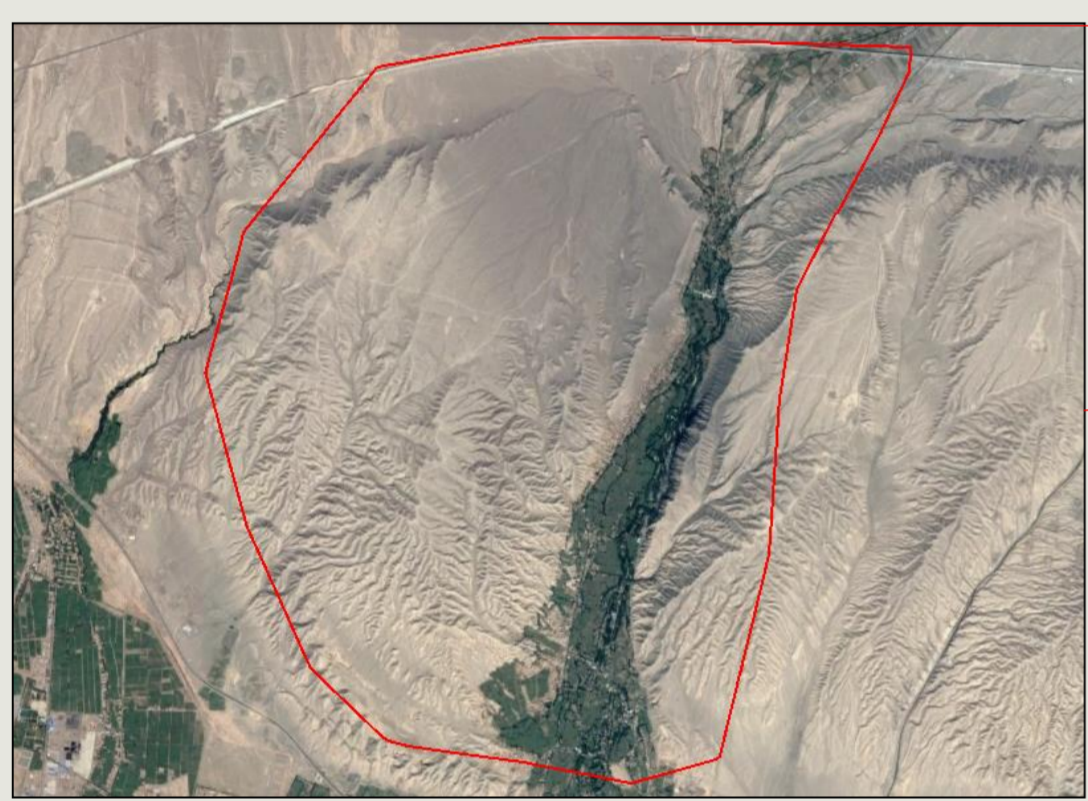


Database

Extraction of the precise geometry

2. STUDY AREA

Area of interest of ± 30km²



Valley of the Grapes, 10 kilometres Northwest of Turpan



3 line-shaped karez systems, one in the North, one in the South and one central system.

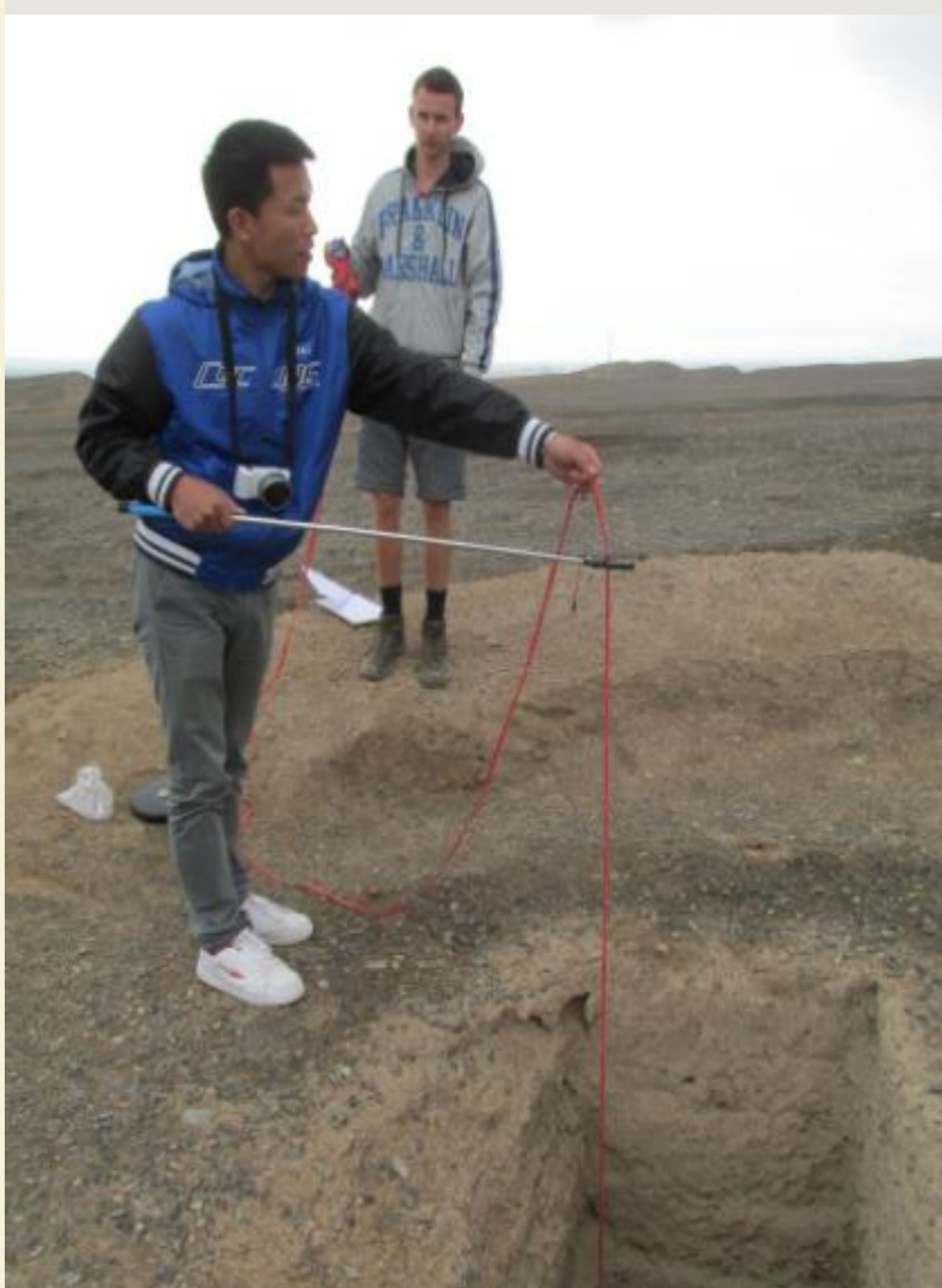
3. DATA ACQUISITION: FIELD WORK

Measuring equipment

Tape measure (100 m) with a heavy object attached
Tape measure (50 m)

Mapping equipment

Tablet with Google Earth satellite images + location based services



5. RESULTS

Only one active line in the three examined systems

→ most systems are destroyed /abandoned / have disappeared

→ depth deeper than 100 metres

The irrigation of the Valley of the Grapes is provided by water pumps and not by the use of karez.

Relative chronology can be determined within lines of one system.

One line in the Southern system is in the surrounding of a brick building of Nestorian age. This same line is in the middle of a Chinese burial place.

Recent human impact (building of a High Speed Railway) destroyed a whole series of karez in the Northern system.

One karez line of the head Northern system disappears into a gully of recent date.

6. CHALLENGES AND FUTURE RESEARCH

Data acquisition and processing

Difficulties in exact planimetric and altimetric localisation of the karez mounds.

Future research

Soil samples will be taken from both the active karez line and other lines (determined as 'older' by relative dating). Using an absolute dating, the oldest system in the region can be determined.

North of the Flaming Mountains, there's a bigger area with more karez systems. Having obtained know-how on how to examine karez efficiently, this second complex can be the subject for a future research.

7. ACKNOWLEDGEMENTS

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