KAREZ RESEARCH IN THE TURPAN DEPRESSION

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

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

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

4. DATA PROCESSING: MAPPING & DATABASING

Inventorized parameters per individual well

Mapping

Database

Extraction of the precise geometry

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 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

This research is conducted in the framework of a multilateral cooperation between Ghent University, Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences, University of Chinese Academy of Sciences and Xinjiang Turpan Bureau of Cultural Heritage (Academica Turfanica).