

## Effect of destruction factors Bistoon inscription (Kermanshah –province)

**A. Maleki**

Received: April 20, 2011/ Accepted: March 11, 2012, 31-33 P

### Extended abstract

#### 1- Introduction

The engraved remains on stony parapets of cultural heritage of this country show rich civilization of Iran that protection and reparation of them is a duty of scientific teams, with cooperation of related specialist. Geomorphology, geology and geophysics are including of this science.

Bistoon inscription is located on long wall (famous broken part) of broken zagros on rough part which is called same name. Broken part, fissure, and thick lime of previous region (Paleoclimate) pave way for destruction of engrave figure, which leads to solving process and to make solving holes. This study has been done with the following tools: GPS, topography maps and satellite images. In order to

obtain a good quality data and radar images as well as maximum penetration of radar waves, GPR has been used three times on summer 1387 (dry season) with 500 MHz shielded antenna on five profiles from which three of them are parallel to the longitudinal part of the inscription while two of them are perpendicular to the first ones. The Ramac GPR system of a Swedish company, Mala has been used for data acquisition. GPR is a geophysics method which uses electromagnetic high frequency waves (at MHz range) to get a precise image from underground anomalies which are situated at shallow depths. The principles of data processing and data acquisition are very similar to reflection seismic. The propagation velocity of radar waves depends on electric conductivity and magnetic permeability of the medium while reflection and refraction of radar waves depend on the contrast between dielectric constants of the mediums at

---

#### Author(s)

**A. Maleki** (✉)  
Associate Professor of Geomorphology, Razi University,  
Kermanshah, Iran  
e-mail: [amjad\\_maleki@yahoo.com](mailto:amjad_maleki@yahoo.com)

both sides of the contact between them. As conductivity increases, the depth of investigation decreases which is an obstacle for radar application for high depth investigation. Therefore a good environmental condition from point view of conductivity and a proper central frequency must be provided for radar work. The dry season for the former one and 500 MHZ for the latter one were the best for the field work. The common offset method has been used for radar data acquisition. The radar grams are processed with REFLEX 2W software. The radar images after filtering such noise reduction, diffraction removal and gain show a hole at 3 m depth that is a path for rain water passage and karstification of the surrounding area. This defect is on those profiles which intersects the anomaly and is on the right side of the profiles (north end). The GPR results confirm the other findings which are based on other methods than geophysics such as geomorphology, geology field observations and archeology prospect ion. This study shows that there are effects of fissure, broken parts, solved hole and karset process at the right side of the inscription in three meters depth. Regarding to destructive agents, it is better to save, and to repair the inscription by appropriate ways.

**Key words:** Biston inscription, destruction, Geomorphology, soluble limestone, GPR method, archeology

## References

Afrasyabian, A, (1993), studies of Karst hydrology of limestone basin

of Maharlu, second scientific conference of water resources, collection of articles.

Agassi, A, Afrasyabian A, (1998), karst hydrology, first Printing, Tehran, the researches capital of karst.

Amursou, jj, F ,(1991), erosion of stone and protect it, translated by Rasoul Vatan doost, Tehran, Organization of Cultural Heritage Publications.

Christian sen, A, (1996), Iran in time of Sasanian, translated by Rashid Yasmine, Tehran, Donyaye ketab Publications.

Coke, R, (1989), Structural and dynamics geomorphology, translation of Farajollah Mahmoudi, Tehran, Tehran University Publications,.

Eyuboglu, H. And Mahdi, H. Al-Shukri, H., 2004, detection of water leaks using Ground Penetrating Radar: Department of Applied Science University of Arkansas at Little Rock Little Rock, AR, 72204, USA.

Geological map of 1:100000 scale Geological organization.

Hadian Dehkordi, M, (2007), Laboratory research Use in protected and reconstruction historical building, Tehran, Tehran University Publications.

Klays, K, Valfram and Peter, (2006), Bisotoon, Researches and Excavations (1963-1967), translated by Faramarz Najd samii, Tehran, Organization of Cultural Heritage Publications.

- Koch, H, (1997), of Dariush, translated by Parviz Rajabi, Tehran , samt Publications
- Liberty, L.M., Hemphill- Haley, M.A., Madin, I.P., (2003). The Portland Hills Fault: uncovering a hidden fault in Portland. Oregon using high-resolution geophysical methods. Tectonophysics pp: 368, 89-103.
- Mehdiabadi, M, (1997), reconstruction of historical signs, reviw of Dariush Katibe harms in Bistoon, thesis ,Faculty of Pardis Esfahan art University .
- Moradi, Y , 1382 Kermanshah Cultural face, Tehran, Cultural Heritage Publications.
- Rossetti, D.F., (2003). Delineating shallow Neogene deformation structures in northeastern Para State using ground penetrating radar. An. Acad. Bras. Cienc. 75,235-248.
- Satellite Images ETM, (rgb) IRS (bw). Sheet 54 584 topographic maps of the armed forces of the Islamic Republic of Iran
- Shohani, D, (2006) ,Zonation of karst elevation in Kermanshah, (MS Thesis) Department of Geography Faculty of literature and humanities, Razi University, Kermanshah .
- Slater, L., Niemi, T.M., (2003). Ground- penetrating radar investigation of active faults along the Dead Sea Transform and implications for seismic hazards within the city of Aqaba, Jordan. Tectonophysics 368, 33-50.
- van Dam, R.L., (2001). Causes of ground-penetrating radar reflections in sediment. Unpubl. PhD Thesis, Univ. Amsterdam.

Archive