OUARKZIZ STRUCTURE (ALGERIA): TANDEM-X (TDX) IMAGES, FIELD INVISTIGATIONS AND FORMATION MECHANISM

R. Sahoui[1] and D. Belhai[1], [1]University of Sciences and Technology Houari boumedienne, Algiers, Algeria (r.sahoui@gmail.com)

The Ouarkziz crater is located 170 km north of Tindouf at 7°33'W and 29° 00' N. [1] proposed its impact origin is on the basis of observations of "planar elements" in some of the crater rocks. [2] and [3] refined the field description and presented some preliminary petrographic and geochemical studies. The Ouarkziz crater appears on satellite images in the form of two discontinuous rings of hills.The aim of this present paper is to explain the formation mechanism of this discontinuous structure using TDX images and field investigations (three expeditions have been undertaken on 2011, 2014 and 2016).

TanDEM-X (TDX) images: they are realized at the « German Aerospace Center (DLR) » and recovered from [4]. Ouarkziz crater is superimposed on a fold structure trending NW-SE (north flank of Tindouf basin). The heights are illustrated by three different colors indicating 415m, 593m and 729m. Two ridges (R1, R2) and a central area (CA) are distinguished. The outer ridge R1 is continuous on the northern part of the structure, shows a height of 729m.This ridge disappears on the eastern and western parts of the structure. On the southern part, it shows a height of 593m. The inner ridge R2 appears on the form of small hills with a height of 593 m, it disappears on the southern part of the structure. The central area (CA) is completely flat and shows the lowest heights (415 m). Outside the circular structure of Ouarkziz, an important decreasing of the heights is noted from North to South, except on the R1 where the heights remain important.

Field observations: the rocks are composed of Lower Namurian limestones (called Lower Limestones), Upper Namurian marls with gypsum and thin limestones (called Upper Limestones). The outer ridge (R1) is set in the Lower Limestones (100m), at its major part, and in the marls with gypsum (90 m) at the southwestern part. At the northern part, it is formed of two crowns: the internal crown is dipping at 60°N and the external one is dipping at 40°N. At the southeastern part, the outer ridge affects the lower limestones and is formed only by the internal crown. At the southern part, R1 disappears because it is completely emplaced on the marls with gypsum (severely eroded). About 20 m thicknesses of the Upper Limestones are affected at the western part of the ridge, where the marls thickness is reduced. Elsewhere, these limestones are dipping at 20° S which is characterizing the North flank of Tindouf basin. The outer ridge shows strongly fractured upturned limestone beds with large blocks of ejected limestones. Folds with inclined axis are noted towards the East and the West. The inner ridge (R2) is characterized by a distinct series of hills of angular to subangular fragments; it disappears at the southwestern quadrant of the crater. The central area (CA) is largely covered by alluvium, the lumachelic limestones (known at the basis of Lower Limestones) are characterized by vertical dipping beds, they are fractured at all scales and brecciated.

Formation mechanism: the projectile has affected different target rocks from North to South of Ouarkziz structure, dipping at 20°S. During excavation stage, the crater rims are upraised (the rims are formed by Lower limestones at the northern, southeastern and southwestern parts, and by marls with gypsum and Upper limestones at the southern part of the structure). According to [5], during transitory cavity formation of complex craters, detachments faults associated to folds with inclined axis are always described. During modification stage, the rims collapse induced terraces formation (R1 and R2 at the north and marls with gypsum at the south). Thus, Ouarkziz is a complex impact crater with one peripherical ring and central pick highly eroded formed by the former strata of Lower limestones (lumachelic limestones).

References: [1] Fabre J. et al. 1970. *C. R. A cad. SC. Paris, t. 2 7O,p. 1212-1215.* [2] Sahoui R. et al. 2014. *77th Annual Meteoritical Society Meeting. Abstract #5105* [3] Sahoui R. et al.2015. *78th Annual Meteoritical Society Meeting Abstract #5081.* [4] Gottwald M. et al. 2015. *78th Annual Meteoritical Society Meeting. Abstract #5004.* [5] Osinski G. R. et al 2005. *Meteoritics & Planetary Science 40:12:1887–1900.*