

## Structural, Geomorphological And Age-Related Analysis Of The Amguid Crater.

D.Belhai<sup>1</sup> and R. Sahoui<sup>1</sup>, <sup>1</sup>(LGGIP, FSTGAT, USTHB, BP 32 El-Alia, Algiers, Algeria)  
([dbelhai2001@yahoo.fr](mailto:dbelhai2001@yahoo.fr))

### Introduction:

The Amguid crater (26 ° 05'00"Nord and 04 ° 23'25 " East), is located in Mouydir (Central Sahara), 105 km (as the crow flies) from Fort Amguid, on the northern outskirts of the central Hoggar, north of Tamanrasset (see map Khanguet el Hadid), on the other hand, geologically, is dug in Tassilian formations of early Devonian age of the Saharan platform. It is a simple type crater, its diameter about ~ 550m, with a depth ~ 65 meters, these borders are very steep and a flat bottom.

**Geomorphology and structural analysis:** Amguid's borders are very steep and a flat bottom. Detailed mapping shows that the crater is well preserved in Lower Devonian terrains composed of sandstones of the outer Tassili series [1] [2] between two wadis, the Tafrakrak wadi at East and Tihiet wadi to the west. There are four main formations: 1) The center is composed of compacted fine silt; 2) The edge is formed of sandstone in metric quartzite beds with fine alternations of schistose clays of the external Tassili; 3) The edge of the crater is dotted with breccias of different sizes discordant on the healthy rocks.

On the tectonic plane, this crater has three macroscopic main markers that are associated with microscopic markers that argue in favor of an unmistakable meteoritic structure.

*Macroscopic markers* are radial fractures, folds and shatter cones. Radial fractures are well evidenced and already known, while the folds, we highlight them for the first time and they have radial axes. The only shatter cone we found is in the quartzite sandstones of the southern edge of the crater. The shocked quartz that we have highlighted are as follows : the focus is on shock effects namely: PFs, PDFs and toasted quartz. The PFs are open cracks with a width ranging from 4 to 7 $\mu$ , spaced around 25 $\mu$ . PDFs whose thickness does not exceed 3 $\mu$ . PDFs are recognized in class 2 sandstone (P = 5-10Gpa, T = 350 ° -950) and 3a (P = 10-20Gpa, T  $\geq$ 1000 °) . Toasted quartz (TQ) is a quartz grain with a grilled appearance. The toasted quartz is formed in rocks of class 2-4 (P = 20-30Gpa, T  $\geq$ 1000 °) . : the association of PDFs parallel to {10 1 3} and {10 1 2} alone indicates the highest shock stage established using the PDFs, it corresponds to class 3a. These shock stages are closer to those determined at Meteor Crater, but are not shocked at the same pressures.

**Relationship between the depth and age of the Amguid crater:** In the terrestrial craters the Grieve equation[3] allows to connect the apparent depth  $da$  and the diameter  $D$  as follows:  $da = 0,14D^{1,02}$ . In our case, Amguid has average diameter 550 m and apparent depth 65 m. On the other hand, the theoretical depth is:  $da = 0.14 (550)^{1,02} = 87$  m. This value is greater than the measured depth which is 65 m. Theoretical depth:  $d1 = 0.29 (550)^{0,93} = 102.5$  m.

**Discussion and conclusion:** Theoretical ly we had to have a depth after the fall of the debris of 87 m, but we only have 65 m. This difference of 22 m is a filling due to the erosion of the edges of the crater. Knowing that the rate of erosion in the desert oscillates between 0.1 mm to 1 mm per year, so, for the minimum value of 1 mm /year, the approximate age of the crater is 22000 years, whereas for the value of 0.1 mm / year, this age would be 220 000 years. Moreover, the presence of folds has never been highlighted but the detailed observation allows to see the bulges. These folds are class *1a*, according to the classification of Ramsay [4] that we interpret such as related to the post-impact phase corresponding to the elastic rebound which allows it to empty the crater and disperse breccias and dust. This interpretation is consistent with the idea we developed for Tin Bider[5] phase 2 fold deformation.

This work with the new interpretations of the Amguid crater data confirms its meteorite impact character according to the beam of elements presented (shatters cones, quartz, shocked, radial folds). Its age oscillates between 220000 years and 22000 years.

### References:

[1] Karpoff B. (1954) *C.R. Congrès Geol. Intern. Alger*, 1952. Sect, 13, Fasc.13 : 233-241. [2] Belhai D. et al.(2006) *Bul. serv. GéolAlgérie, Vol. 17, n°2 : 95-112*. [3] Grieve R.A.F (1987) *Ann. Rev. Earth Planet. Scie. 15 : 245-270*. [4] Ramsay J.G. (1967) *Mc Graw Hill, 568 p*. [5] Belhai D. et Kassab F.(2017) *80th Annual Meeting of the Meteoritical Society, Abstract #6289*.