The Amguid crater: new structural and geophysical data

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Introduction

The Amguid crater is a circular structure which is located in the Mouydir (Central Sahara) at 105 km, as the crow flies from Fort Amguid and 260 km from In Salah. It is located on the topographic map to the 200,000th of Khanguet el Hadid. Its geographical coordinates are 26°05'00" North and 04°23'25" East. Is one of the four (4) recognized impact craters in Algeria. Access to this crater is very difficult, which explains the few studies that have been devoted to it. The easiest is via In Salah, from which it is some 260 km to the east.

This crater is well preserved in Lower Devonian terrain composed of sandstone of the extern Tassili series [1] [2] [3], between two wadis, Tafrakrak wadi to the east and Tihiet wadi to the West. It is a circular structure with the collapse of the central part. The southeastern part seems steeper than the rest of the perimeter. Its diameter is 550 meters and its depth is about 65 meters. The center of the crater is composed of a layer of compacted silt. The crater rim is studded with breccias and has folds and radial fractures. It corresponds to the impact of a meteorite which could be 100,000 years old, i.e. the Pleistocene period.

Tectonic, this crater has three main macroscopic markers which are associated with microscopic markers which argue in favor of an unmistakable meteorite structure.

Macroscopic markers are radial fractures, folds and shatter cone. The radial fractures are well highlighted and already known, while the folds are highlighted for the first time. The structural analysis of the attitudes of the stratifications allows thanks to the stereographic projection to determine the trajectories of the axes of folds. We also deduce bulging that disorients the layers that we interpret as linked to the post-impact phase corresponding to the elastic rebound that allows it to empty the crater and radial folds. The only shatter cone and pseudo-shatters cones (striated planes) that we found are in the quartzite sandstones of the southern rim of the crater.

Microscopic analysis shows shocked quartz that we have highlighted. The effects of shocks are shown from the fractures of the quartzes namely the PFs, the PDFs and the quartz grids. These shock stages are closer to those determined at Meteor Crater, but are not shocked at the same pressures ([4].

Geophysical study: a geophysical study has been started for the first time, given the access conditions and the difficulties of transporting the material, nevertheless, we have endeavored to take up the challenge and transport the material to the crater over several kilometers walk. Several electrical profiles were carried out in the crater in order to know the lithological composition and the structure of the bottom of the crater.

Discussion and conclusion: This work with the new interpretations of the data of the Amguid crater confirms its character of meteorite impact according to the bundle of elements presented (exploded cones, shocked quartz, radials). The presence of folds has never been demonstrated, but detailed observation and analysis show two differents orientations.

Recent work has been carried out on samples collected [5] around the craters and on the edges of the crater, which has revealed minerals and drop-shaped debris rich in Mg and without Al, compatible with olivine. forsterite. Some particles have been found associated with a Ni-rich metallic iron phase, and this association suggests a specific extraterrestrial origin for them.

References:

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