THE TIN BIDER IMPACT STRUCTURE, ALGERIA: NEW MAP WITH FIELD INPUTS ON STRUCTURAL ASPECTS.

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Introduction: Tin Bider (N27°36'E05°07') is an eroded but well exposed complex structure of 6 km diameter in Algeria.

The structure lies in the Saharan Platform and is located at 265 km to the North-East of In Salah. It is located in the North-Eastern part of Tidikelt between Aguemmour and Açfer Regs. Tin Bider is < 70MA and was firstly named as « Tadmait » by [1] and previously studied by [2] and [3]. The crater-fill deposits that cover the impact structure are composed by Cretaceous formations (sedimentary rocks) going from the Albian so called «the continental-intercalair» to the Upper Senonian [4,5]. Our research deals with new inputs on geologic and structural aspects of recent field investigation and the achievement of the geological map of Tin Bider.

Tin Bider's mapping required to use many data and also informations from previous works. Remote sensing allowed us to use different filters as band combination techniques or spatial filtering in order to extract informations which can be helpful to carry out the map of Tin Bider. Thus, the identification of structural elements, formation's boundaries and also the type of target rocks give a precision to the circular impact structure. The field investigation allowed to confirm some structures previously observed and to identify new of them which must be reported on the map. Moreover, the collected samples at different sectors of the structure and their ongoing analysis (petrography, geochemistry and also micropaleontology) will precise our study especially for the map.

Results: The Tin bider impact crater is the first complex type crater in Algeria due to his 6 km diameter. In this present work, new map is realized. All the data used additionally to the field observations has led to provide a geological map and also to identify new structures described below. Remote sensing allowed us to highlight the characteristics of a complex crater and to precise the impact structure. This last, is highly folded and defined by a central area so called central peak composed by albian sandstones additionally to three carbonated rings (Cenomano-Turonian) interbedded by cenomanian gypsum. Outward to the central peak, the median and external rings comprise carbonated formations of Upper Senonian separated by marls of lower Senonian. Among criteria which justify meteoritic impact of Tin Bider, new generated structures were observed in the field like folds and metamorphism of shock as shatter cones.

Foldings: We discover for the first time two juxtaposed folding trend F1 and F2. The first folds F1 occur in a concentric direction to the circular structure. Thus, they are relatively flat with sub-horizontal axes. In contrast, the second folds F2 have a radial direction with respect to the crater and crossed at right angle (90°) the first folds F1. They are less flattened and have generally fairly straightened axes. Radial and concentric folds occur in many other impact structures developed in sedimentary targets [6].

Moreover, the intensity of folding increase from the periphery to the center of the structure [5] using the ramsay fold classification.

Shatter Cones: Shatter cones are considered to be the only macroscopic feature to confirm the shock metamorphism [7]. Therefore, they play an important role to identify and to ascertain the impact structure. In the study area, they are present in the central peak more precisely in the Cenomano-turonian limestones. Their direction is usually oriented toward the center of impact structure.

Discussion and Conclusion: Among criteria which ascertain the impact structure of Tin Bider, we can mention PDF that were described by [4] in the albian sandstone of central peak. Tin Bider lies in the Saharan Platform which is fairly stable and no deformation known in the region could give to the structure such an intense folding except to a meteoritic impact phenomenon. The concentric folds F1 are formed the first and may correspond to a first phase of folding. In contrast, the radial F2 occur in a second phase which is posterior to the first phase but, both occur within seconds. Shatter cones observed in the carbonated formations need deeper research and investigation.

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