NEW EVIDENCES OF AN IMPACT ORIGIN FOR TEMIMICHAT CRATER, MAURITANIA. A. P. Rossi[1], A. Baliva[1] and E. Piluso[2], [1]International Research School of Planetary Sciences, Universita' d'Annunzio, Viale Pindaro 42, 65127 Pescara, Italy (arossi@irsps.unich.it), [2]Dipartimento di Scienze della Terra, Universita' della Calabria, Arcavacata di Rende, Cosenza, Italy.

Introduction: Temimichat crater is located in northern Mauritania (24° 15' N, 9° 39' W). The bedrock is made up of crystalline basement rocks, with no sedimentary cover. The structure has been listed together with other Mauritanian craters or crater-like features [1]. According to Pomerol [2], basaltic rocks have been found in the area.

It is currently considered a probable impact crater [3], but no definitive evidence of an impact origin has been found so far [4]. Gravity data indicate that the structure is shallower than what is expected for a simple crater of that size [5]. The crater, for its remote location, has not been deeply investigated during last decades.

Observations: Basement rocks include granitoid gneisses and gabbros. The crater appears moderately eroded, with a rim height ranging from few meters to few tens of meters. Its diameter is about 700 m (Fig. 1). The crater rim is not completely preserved: large portions are eroded and dissected, or masked by eolian deposits. The rim is mostly formed by granitoid gneisses, and its outline was described as hexagonal [2]. We interpret this polygonal shape of the crater derived from differential erosion of the rim. The low-lying portions of the rim correspond to the occurrence of gabbroic dikes, which seem to be more easily erodible, with respect to the dominant granitoid bedrock.

The crater interior is covered by recent eolian sediments. Below this surficial cover, sedimentary deposits are likely filling the crater.

Inside the granitoid gneisses of the rim, structures that strongly resemble pseudotachilite veins crop out discontinuously, and do not occur in the surrounding undisturbed basement. The term pseudotachilite is used with a descriptive meaning only, not implying any genetic process.

The pseudotachilites are dark to greenish veins of glassy material with fluidal texture at places. Inside these veins small (less than 1 mm size) fragments of the host rock are present. Pseudotachilite veins mainly appear along small-scale faults, with offsets up to few centimeters. Shear zones are also present, with a brittle to brittle-ductile style. Inside the shear zones, apparently re-melted granitic clasts (with dimension of few millimeters up to few centimeters) are visible and their shape varies from angular to highly rounded.

The granitoid gneisses have an ipidiomorphic texture with a mineral assemblage formed by quartz, K-feldspar, plagioclase, biotite and some opaque minerals. The gabbroic bodies are composed mainly of plagioclase and amphiboles.

No ejecta blanket appears to be preserved outside the crater. All around the structure only eolian and fluvial deposits are present, with sporadic large rocky blocks that are also visible farer outside the crater, in the surrounding plain.

The time of formation of the structure is still unconstrained, but the present erosional level suggests a relatively old age of formation. This is evident if we compare this crater with the 1.9 km wide, 2.5 million years old Tenoumer crater [7], which is located few hundreds of km south of Temimichat. This last crater, in fact, has still a pristine morphology, although formed on very similar target rocks.

Discussion and conclusions: Temimichat crater has been poorly studied during recent times, mostly because of its remoteness. Newly found pseudotachilite-bearing rocks at Temimichat could be related to impact rather than tectonic processes, because their occurrence is limited to the rim. Therefore, the genesis of the observed pseudotachilites is much likely related to the structure formation itself.

Despite the level of erosion, and the absence of preserved ejecta, this structure may still represent a good candidate for a simple impact crater on a crystalline basement target.

A search for shock metamorphic effects on collected samples is ongoing.

References:

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Figure 1: Panoramic view of Temimichat crater. The differentially eroded rim is clearly visible.

Figure 2: Example of faulted granitic block: pseudotachilite veins are occurring along shear planes.