SEVEN POSSIBLE NEW IMPACT STRUCTURES IN WESTERN AFRICA DETECTED ON ASTER IMAGERY. A. P. Rossi, *International Research School of Planetary Sciences, Universita' d'Annunzio, Viale Pindaro 42, 65127 Pescara, Italy, (arossi@irsps.unich.it).*

Introduction: During last decades satellite images have been used in order to detect medium and small scale impact structures in Africa, e.g. Space Shuttle SIR [1,2]. Few of them have been confirmed, other disctredited [3], but remote sensing approach is still suitable as a tool for individuating promising structures to be studied in the field.

The recent release of ASTER (*Advanced Spaceborne Thermal Emission and Reflection Radiometer*) images, with a ground resolution up to 15 *m/pixel*, offered an enormous amount of data useful to new impact structures recognition.

In this work the preliminary results of a systematic search for unknown impact structures in W Africa is presented.

At the present state seven possible new small impact structures have been found using ASTER data. Their diameters vary from few hundreds of meters up to about 3 km. Few of them include a possible secondary crater. They appear bowl-shaped in most cases, with some exceptions showing a complex geometry. The search have been performed as sistematically as possible, with the available remote sensing coverage.

The ASTER based remote sensing reconnaissance is going to be extended to Central-North Africa too in near future.

The mean age of African surfaces is very old: most of the African Continent constitutes a craton with Precambrian basements and rather undeformed Phanerozoic sedimentary covers Moreover in large parts of Africa the actual morphogenesis is not as active as in temperate regions. This makes the preservation potential of impact structures much higher than in other regions (e.g. tectonically active). Nevertheless the number of proven or proposed impact structures is only 18 [4].

The attention have been concentrated on Mauritania, for the small amount of known craters [5,6], Mali and Niger (with no suggested craters). A large part of the detected structures are located in the Neoproterozoic-Cambrian Taoudenni basin [7]; few of them are located on Quaternary deposits (erg or alluvial).

Structures description: No volcanic centres have been found in the vicinity of the observed structures. The proposed craters appear isolated and relatively small (between 0.5 and 3 km). An impact origin is likely. On the other hand the scale of the landforms is too small for being included in available geological maps [8,9]. Possibly some of them could be confused with dome structures. Only fieldwork could solve this ambiguity.

The proposed names are based on closest toponyms found on available maps.

Ouro Ndia (Mali, 15 N 4.5 W)

The crater has a diameter of about 3 km and it is occupied by a small subcircular lake (Figure 1). It is located inside Niger inland delta area, on Quaternary deposits. It appears as an isolated landform, clearly outstanding over all the other small lakes, both in size and in shape.

A drainage system is developed on the rim and possible landslide deposits could be distinguished in the NE side of the structure.

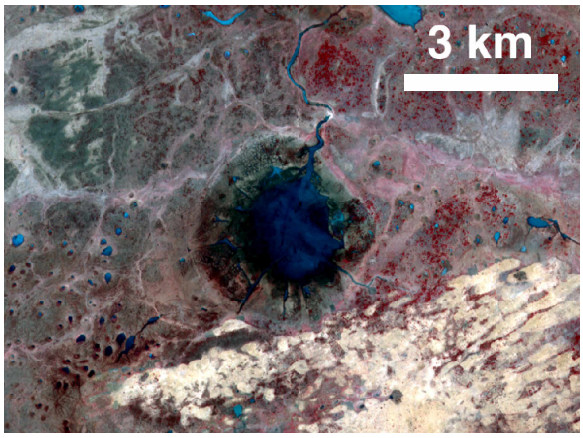

Figure 1: Ouro Ndia: the structure is located in the Niger inland delta area (Aster RGB-321).

Based on the overall morphology and the geological and geomorphological setting a recent age of formation could be hypothesized.

This crater shows a lobate-like pattern around the rim. If the impact hypothesis is correct this could be interpreted as fluidized ejecta. This observation could be consistent with the geological setting (humid or temporarly flooded area)

Gogui (Mauritania, 15.5 N 11.4 W)

The crater is about 500-600 m wide and shows a relatively pristine morphology (Figure 2). The bedrock is constituted by Paleozoic metamorphic rocks. It has a distinct circular rim and a rather flat bottom, apparently. Around the crater ejecta are possibly preserved, but the spatial resolution of the image is at the limit for this observations. The age of formation of the crater could be very recent, looking at its pristine aspect.

Anefis (Mali, 18 N 0.5 W)

This structure has a diameter of almost 3 km and its bedrock is made of Neogene sedimentary formations. It is located on a subhorizontal plateau. It appears to be cut by fluvial erosion: SW part of the rim is partially dissected, giving perhaps the possibility to investigate the internal structure of the rim itself. The general aspect and the noticeable erosion of the structure does not suggest a recent age of formation.

Azenak (Niger, 16.5 N 8 E)

Few tens of km South of Agadez there are two distinct structures, with a diameter respectively of 0.5 and 1 km. They are about 9 km far from each other and lie on a E-W direction. The bedrock is Early Cretacic in age, but Quaternary small playas and sand dunes are also present nearby. In the western

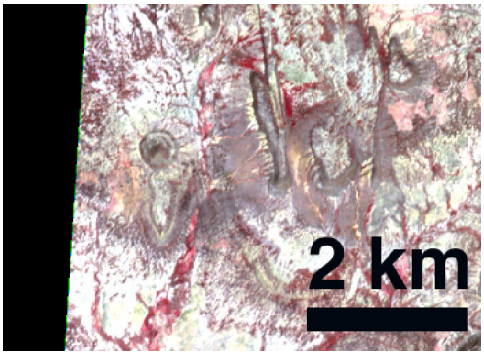

Figure 2: Gogui: The crater shows a distinct rim and an apparent flat bottom(Aster RGB-321).

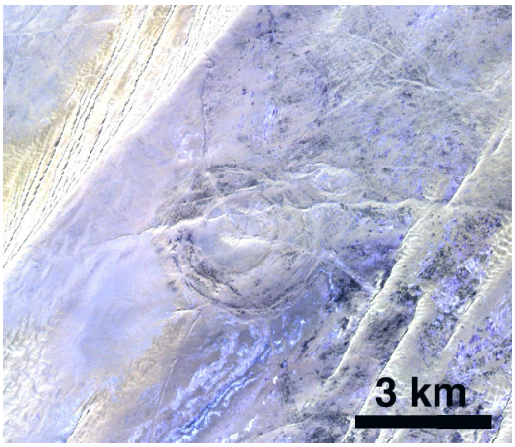

Figure 3: El Mrayer : a possible secondary crater is located close to the dunes in the upper part of the image (Aster RGB-321).

smaller structure a distinct rim can be distinguished, while the eastern one has no clear rim evidence. Both appear to be partially filled with eolian deposits.

El Mrayer (Mauritania, 22.5 N 7.2 W)

The structure (Figure 3) has a diameter of about 2 km and it is located on Cambro-Ordovician substrate. It is bordered by NE-SW elongated sand dunes. The geometry appears rather complex: a subcircular inner crater is bound by an apparently concentric deformed region. Nearby, 2 km towards N a possible secondary small crater is visible. This would suggest a young age of formation. To the contrary, the concentric pattern around the inner rim could be indicative of a complex structure. There are few sand dunes overlapped on the structures, covering it partially.

Terhazza (Mali, 23 N 6 W)

Terhazza structure has a diameter close to 1 km and it is located few hundreds kilometers East of El Mrayer structure. Its substrate is constituted by Cambro-Ordovician rocks, as well as El Mrayer. The planimetric geometry appears concentric, suggesting a complex structure. Nevertheless the small dimensions and the hihgly eroded aspect lead to interpret Terhazza as a possible remnant central peak of an old bigger structure. Similarly to El Mrayer sand dunes linearly distributed are visible around the structure.

Conclusions: The potential of medium-high resolution satellite imagery (such as ASTER) in recognizing possible small impact craters is still valuable in remote areas, where field reconnaissance is difficult. In the present work a systematical search of circular features in W Sahara has been performed and few promising structures have been found.

The identified structures show a range of sizes and apparent erosion, suggesting a wide variation in age. The aspect of the detected structures on satellite images varies from pristine to moderately eroded.

A similar approach might be effective in finding other undiscovered small impact structures.

Ground truthing is needed to investigate the nature of the presented structures.Therefore a fieldtrip is planned within 2002 for selected ones.

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