

ASH SHUTBAH: A NEW IMPACT CRATER IN SAUDI ARABIA.

E. Gnos¹, A. Al-Wagdani², A. Mahjub², A. A. Al-Solami², S. H. Allah², A. Matter³, B. A. Hofmann⁴, M. Schmieder⁵, E. Buchner⁵
¹Natural History Museum Geneva. E-mail: edwin.gnos@ville-ge.ch. ²Saudi Geological Survey, Jeddah, Kingdom of Saudi Arabia, ³Institut für Geologie, Universität Bern, Switzerland, ⁴Natural History Museum Bern, Switzerland, ⁵Institut für Planetologie, University of Stuttgart, Germany.

Introduction: Although Saudi Arabia covers an area of more than two million square kilometers, only the three small, ~300 years old Wabar impact craters located in sand dunes of the Rub al Khali have been confirmed on the ground [1-2]. Three additional circular features, the ~5 km Jabal Rayah, the ~2.5 km Ash Shutbah, and the ~17 km Wadi Na'am have been proposed as possible impact craters [3-4].

Ash Shutbah: The Ash Shutbah impact crater is located in flat lying limestones of the Middle Jurassic Tuwayq Mountain Formation at 21°37'N/45°39'E, ~50 km S of the village of Al Haddar. It is located at the edge of the Jabal Tuwayq escarpment. A set of circular features is easily recognizable on satellite images, and two branches of the upper Wadi Ash Shutbah follow the outermost circular feature. The morphological expression as revealed by Shuttle radar data (SRTM) is very weak [4]. Nonetheless, due to lithologic contrast, a dark central area is clearly distinguishable on satellite images.

Field observations: A four day exploration in the Ash Shutbah area in May 2011 confirmed that the morphological expression of the Ash Shutbah impact crater has been strongly reduced by desert alteration and wind erosion. Only one possible shatter cone was found in massif sandstone of the central uplift. The weakly expressed central uplift consists of strongly folded, creamy calcareous sandstone of the Dhurma formation containing a 60 cm thick, black weathering, massif sandstone bed. This marker bed has been located in the escarpment outcrop at ca. 130 m below the plateau, indicating a minimal uplift of ca. 140 m, consistent with estimates obtained on complex impact craters of similar size [5]. Outward dipping radial folds occur in the external part of the central uplift. The outer parts of the crater consist of deformed Tuwayq Mountain limestone sheets forming circular rings of hills and depressions.

Conclusions: The presence of folded beds and a possible shatter cone confirm that the Ash Shutbah circular feature is a complex meteorite impact crater that is younger than the middle Jurassic limestones of the lower Tuwayq Mountain formation. The presence of an escarpment and a characteristic marker bed provide a unique situation to determine minimum uplift directly.

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