



The Faya basin (northern Chad, Africa) – a possible impact structure

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To date, more than 170 impact structures have been confirmed on Earth, 18 of them in Africa [1]. The discovery and confirmation of two large impact structures, Aorounga and Gweni Fada, has brought Chad to the public eye in Impact Geology [2,3]. Since the end of the last century, remote sensing has strongly been supporting impact-related research from far above [4]. By studying Landsat7 ETM+ and Shuttle Radar Topographic Mission (SRTM) data, examinations of desert regions in Chad have been carried out in search for “new” possible impact structures.

The Faya basin is centered on 18°11' N and 19°34' E, about 55 km NE of the city of Faya (Largeau), and has an average diameter of 2 km. The surrounding sedimentary rocks are most likely of Upper Devonian age [5]. As observed and interpreted in satellite imagery and digital elevation models, the Faya basin exhibits all structural features and the typical morphology of small, complex impact craters: a nearly circular rim, an annular basin, and a central topographic high. The rim of the Faya basin is uplifted about 5-10 m with respect to the average ground level. The outermost rim zone is characterized by a concentric fault system and, probably, an accumulation of sedimentary deposits. Large parts of the annular basin seem to be covered by coarse colluvial masses, desert sands, dust, and evaporites. The central topographic high elevates as much as 35 m above the deepest parts of the recent basin floor. In general, we constitute a wide similarity between the Faya basin and the Libyan B.P. impact structure [6], as regards their size, shape, and the climatic conditions in both areas. In our impact geological interpretation based on remote sensing, the rim of the Faya basin could be described as impact crater rim, the annular depression as crater basin, and the central topographic high as central uplift [7]. The deposits around the Faya basin might accordingly represent proximal ejecta.

A possible impact origin of the Faya basin must be discussed carefully. Structures of diverse origin may be similar in shape to impact structures. For example, deeply or partially eroded magmatic intrusions, volcanic maars and calderas, eroded sedimentary anticlines and salt diapirs, gypsum and salt dissolution holes, as well as landslides may be morphologically akin to impact craters [8-11]. Even man-made features can resemble natural impact structures, as in the case of nuclear test craters or large mining pits.

However, the formation of the Faya basin cannot be satisfactorily explained by endogenic geological processes. We therefore suppose that the Faya basin is an impact structure. Detailed field studies have to be carried out to prove final evidence for shock metamorphism and an impact origin of the Faya basin.

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