THE FAYA BASIN (N CHAD) REVISITED – STRUCTURAL INSIGHTS FROM CENTRAL PEAK MORPHOLOGY AND POTENTIAL MARTIAN ANALOGS. M. Schmieder[1] and E. Buchner[1,2], [1]Institut für Planetologie, Universität Stuttgart, Herdweg 51, D-70174 Stuttgart, martin.schmieder@geologie.uni-stuttgart.de. [2]HNU Neu-Ulm University, Wileystrasse 1, D-89231 Neu-Ulm, Germany.

Introduction: The ~2 km Faya basin (18°10' N, 19°34' E) is an enigmatic circular (slightly polygonal) feature in the desert of the Borkou-Ennedi-Tibesti, northern Chad. With an elevated 'crater' rim, a deep annular moat, a prominent central 'peak', some possible rim slumps/terraces, as well as a set of concentric annular faults, the Faya basin bears a striking morphological-structural resemblance to small, complex impact structures [1]. The Faya basin is hosted by flat-lying Devonian sandstones of the Borkou plateau, which constrains the maximum age of the structure. The confirmed impact structures of Aorounga (16 km), Gweni Fada (22 km) [2], and the nearby Mousso structure (3.8 km) of possible impact origin [3] are located in the same region. Due to the aftermath of the civil war in Chad and serious political instability, field studies of the Faya basin are currently impossible.

Remote Sensing: Earlier studies on the Faya basin [1] were based on Landsat-7 ETM+ satellite images (15/30 m/pixel) of rather poor ground resolution. Recent SPOT-5 satellite imagery (2.5 m/pixel) provides higher-resolution data.

New Observations and Discussion: A close-up view of the Faya basin still exhibits the characteristic morphological-structural features described earlier [1] (Fig. 1A). However, SPOT-5 data reveal some conspicuous internal features within the central peak of the Faya basin (covering an area of ~250x150 m). The peak represents a slightly triangular, complex 'ridge-shaped' topographic high, characterized by apparent ~SW-NE-trending bilateral symmetry of crests of hills and elongation (Fig. 1B-C). The divergent arrangement of (sandstone) crests of hills in the complex central peak of the Faya basin suggests that the sedimentary rocks are locally steeply inclined, in turn suggesting stratigraphic uplift within the central peak. Similar morphological features occur at the central uplifts of some impact craters on Mars (Fig. 1D-E). Our observations, together with potential Martian morphological-structural analogs, support the theory that the Faya basin could be a small, complex impact structure. Shock-metamorphic studies would be desirable in order to substantiate the impact hypothesis.

References: [1] Schmieder M. and Buchner E. (2007) *J. African Earth Sci., 47,* 62–68. [2] Koeberl C. et al. (2005) *Meteoritics & Planet. Sci., 40,* 1455-1471. [3] Buchner E. and Schmieder M. (2007) *J. African Earth Sci., 49,* 71–78.

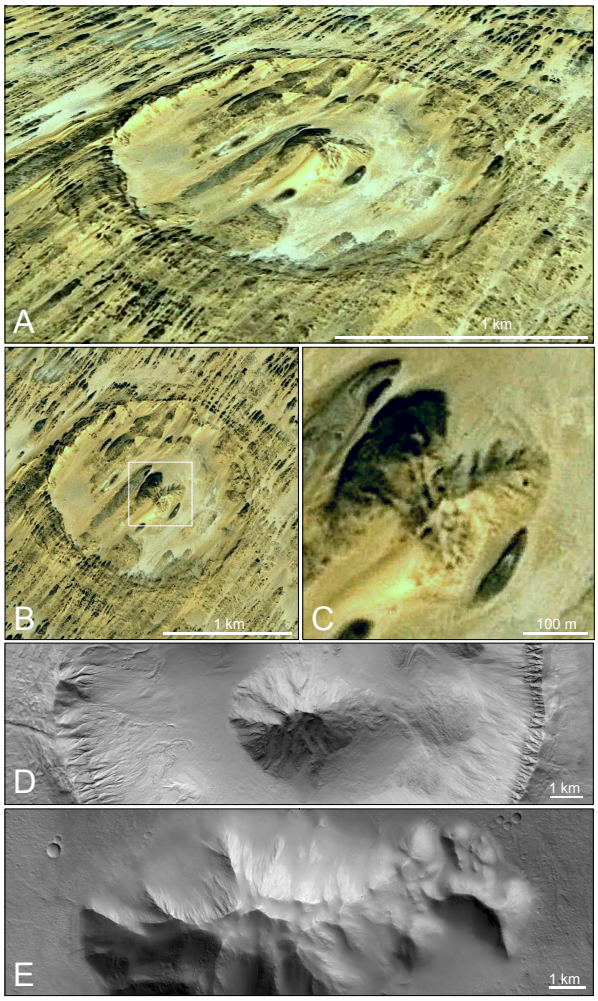

Fig. 1: The Faya basin and potential Martian analogs. **A**: Perspective view of the Faya basin; note the distinct elevated 'crater' rim, an annular moat partially covered by desert sands and salts, the prominent central peak, concentric faults, as well as NE-SW-trending yardangs (see [1] for details; 3-fold vertical exaggeration; North is top). **B**: Satellite image scene of the Faya basin (compare A). **C**: Close-up of the central peak (see white box in B for position); A-C: CNES SPOT-5 image; Google Earth. **D**: An unnamed ~19 km complex Martian impact crater (38.5°N, 99.2° E) exhibiting a complex, 'ridge-shaped' central uplift (HiRISE image PSP_007845_2190_RED). **E**: Central uplift of the ~115 km Pickering crater on Mars (33.5°S, 132.7° W; HiRISE image PSP_006865_1460_RED); HiRISE image source: NASA/JPL/University of Arizona.