

MINERALOGY AND STRUCTURAL FEATURES OF THE WAQF AS SUWWAN IMPACT STRUCTURE

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Introduction: Jabal Waqf as Suwwan (JWaS) in Jordan is the first complex impact crater discovered to date in the entire region of the Middle East. The only previous impact structures known in this region are the small Wabar craters in the Rub' al Khali desert of Saudi Arabia. The 6.5 km diameter JWaS impact structure is located in the central-eastern region of the Kingdom of Jordan, about 150 km southeast of Amman. It was formed as a result of the impact of an extraterrestrial projectile in presumably post-late Eocene times. The results from reflection seismic and gravity data provide independent support for an earlier suggestion of impact obliquity based on vergency of folds exposed on the central uplift. Jabal Waqf as Suwwan is another example of a terrestrial complex impact structure where impact obliquity is manifested in the internal structure of a central uplift. No impact melt rock or other impact breccias have been detected to date – likely because of significant erosion of this structure [1, 2].

Results and Conclusions: The Jabal Waqf as Suwwan complex impact crater has been confirmed due to widespread occurrence of shatter cones in the central uplift structure, as well as findings of some chert and quartzite nodules with PDF, PF, and FF. The rarity of shock metamorphic effects in the rocks could be related to the fact that this impact took place into soft, porous, and strongly stratified sedimentary target strata, and has been possibly further enhanced by the structure's strong degradation.

Three boreholes were drilled into the moat around the central uplift structure. The deepest borehole was drilled vertically to the north and outside of the central uplift to a depth of 140 m. The first 11 m core revealed the presence of fluvial sediments (wadi deposits) that are dominated by chert breccias (cataclasite). The rest of the core is made up of upper Cretaceous limestone and dolomite. Limited cataclasis and fracturing with vertical, as well as inclined fractures occur throughout the cores. The rest of the core is made up of fractured and brecciated limestone and dolomite. Calcite and dolomite crystals in the carbonates are locally characterized by intense twinning. The drilled strata below the wadi deposits represent a level of unshocked, or at best very weakly (< 5 GPa) shocked, rock – presumably of the lower crater floor. The stratigraphic information from drilling, specifically the study of pollen and spores, supports the conclusion that the impact took place at Tertiary, likely at post-late Eocene, times [2].

References: [1] Salameh, E., Khoury, H., Reimold, W.U., and Schneider, W. (2008) First Large Meteorite Impact Structure Discovered in the Middle East: Jebel Waqf As Suwwan, Jordan: *Meteoritics and Planetary Science*, v. 43, p. 1681-1690. [2] Salameh, E., Khoury, H., and Reimold, W. (2014): Drilling the Waqf as Suwwan impact structure. *Int. J. Earth Sci. (Geol. Rundsch.)*, 103: 253-264. DOI 10.1007/s00531-013-0932-2.