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Ballography: A Billion Nanosecond History of the Bee Bluff Impact Crater of South Texas

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Study of an area of disturbed geology south of Uvalde, Texas in Zavala County has resulted in evidence for a meteorite impact site.* The local sedimentary geology, with an approximate two-to-three m thick hard cap of sandstone and siltstone, a two cm layer of hydrous iron-oxide, and a deep, soft-calcareous silt, dominates both residual site characteristics and impactite samples. A crater of about 1.6 km in diameter and about 10 m in depth is evident from 1942 aerial photographs. Loose silt debris flow and deposit of the prompt venting of the silt is evident from a wake deposit behind local uplifted rocks and throughout the region. A suite of samples obtained in the area shows evidence for high-pressure shock modification. Impact modification of the hydrous iron-oxide provides expression for complex shock-processes in these materials. Especially important to the scientific documentation is discovery of a 300 kg rock 'The Uvalde Crater Rosetta Stone' that contains numerous features of the shock modification in a configuration that can be directly related to the target configuration and the impactite collection. Calculations show that the impact of an approximate 60 m diameter iron meteorite at a velocity of 14.2 km/sec with an impact pressure of 350 GPa produces a crater diameter of about 2 km. In the present thin-target configuration the meteorite quickly penetrates the hard rock with release waves from the bottom resulting in a prompt bottom-up rather than the usual top-down pressure release and melt. Such upward high pressure-temperature flow results in prompt melting and radial flow along the iron meteorite interface as evident in residual impactite instability patterns and the presence of Uvalde suevite. * R. A. Graham and W. F. Wilson, Lunar Planet. Sci., 2005, 1086.pdf