NEW CALCULATIONS AND ESTIMATIONS FOR HYDROTHERMAL ZONES AND IMPACT CONDITIONS ON CHICXULUB, EARTH AND ISIDIS PLANITIA, MARS.

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Synopsis: Chicxulub [1] is among the largest impact crater on Earth and a good analogue for Mars impact processes. Mars's Isidis Planitia [2] is one of the largest impact Planitias on Mars with a diameter of about 1,238 km. Isidis is located at N 14.1 deg and W 271.0 degrees and is the boundary between ancient highlands and the Northern Plains. The exceptionally well-preserved Chicxulub crater is located in the Peninsula of Yucatan in Mexico, and research has identified at least 3 concentric structural rings, which comprise a complex ~ 200 km diameter impact basin.

Analytical Method and Results: Our model [3,4] shows for Chicxulub that the asteroid diameter is ~ 7.01 km, with a velocity and impact angle of ~ 47.38 km/s and ~ 33.12° respectively. The number of rings are calculated in ~ 5.73 with a crater profundity of ~ 1.31 km and melt volume of ~ 37,414 km³. The number of ejected fragments are estimated in ~ 1,903 millions with sizes of ~ 5.66 m, the asteroid density is ~ 5.39 g/cm³. The total energy in the impact is calculated in ~ 1.2E30 Ergs, i.e., ~ 571 millions of Hiroshima. The hydrothermal zone is of ~ 61.2 km to 98 km from the nucleus of impact. The lifetimes estimated are of ~ 1.19 Ma to 1.86 Ma with uncertainties of ~ +/- 0.0076 Ma to +/- 0.0131 Ma. Hydrothermal temperatures for 0.25 years to 1,400 years are estimated in ~ 246.34°C to 96.65°C. The fragments are ejected to ~ 500.04 km from the impact center, with velocity of ejection of ~ 5.87 km/s, ejection angle of ~ 4.10° and maximum height of ~ 8.97 km.

For Isidis Planitia, the asteroid diameter is ~ 438.65 km, with a velocity and impact angle of ~ 19.42 km/s and ~ 74.09° respectively. The number of rings could be ~ 206 with a crater profundity of ~ 4.8 km and melt volume of ~ 5,765,600.6 km³. The number of ejected fragments are estimated in ~ 3.3E14 with sizes of ~ 6.35 m. The total energy in the impact is calculated in ~ 2.78E33 Ergs, i.e., ~ 66,110 millions of megatons. The hydrothermal zone is of ~ 69.69 km to 617.63 km from the nucleus of impact. The lifetimes estimated are of ~ 68.09 Ma to 106.28 Ma with uncertainties of ~ +/- 0.88 Ma to +/- 3.74 Ma. Hydrothermal temperatures for 0.25 years to 1,400 years are estimated in ~ 527.63°C to 207.16°C. Finally the fragments are ejected to ~ 79,276 km from the impact center, with velocity of ejection of ~ 24.42 km/s, ejection angle of ~ 75.18° and maximum height of ~ 74,894 km, these enormous distances could to eject the fragments out of the Mars planet, in a closed orbit.

All the calculations are obtained using a HP 49g , which is a Scientific Programmable Graphing Calculator with 1.5 Mb in RAM memory.

References: [1] Pope, K.O., Ocampo, A.C., Kinsland, G.L., and Smith, R. (1996) *Geology., 24 ,* 527-530. [2] Scott, D., and Tanaka, K. (1986) *Geological Survey Misc. Inv. Map,* I-1802-A. [3] Pope, K.O., Baines, K.H., Ocampo, A.C., and Ivanov, B.A. (1997) *Journal of Geophysical Research., 102 ,* 21,645-21,664. [4] Echaurren, J.C., and Ocampo, A.C. (2003) *EGS-AGU-EUG Joint Assembly*.