MATHEMATICAL MODEL AND IMPACT CONDITIONS FOR WETUMPKA IMPACT CRATER, ALABAMA, USA.
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Synopsis: Wetumpka impact structure, located in Elmore
County, Alabama, USA (entered at N32° 31.3’, W86° 10.4’), is a
locally prominent, semi-circular, rimmed feature with a structural
diameter of 7.6 km and a modern rim height of as much as 120 m
[1,2]. This impact structure is composed of relatively highly indu-
rated crystalline rock, which forms the impact-structure rim, and an
unconsolidated mélange of resedimented and (or) deformed Upper
Cretaceous sedimentary formations comprising two impact-structure
related sedimentary terrains: (a) within the crystalline rim (interior
unit); and (b) directly outside the crystalline rim on the southern side
(extra-structure or deformed unit) [1,2]. Both the marine target set-
ting and composite target stratigraphy had a profound effect upon
the shape and sedimentology of this impact structure [3,4]. In ma-
rine setting, which was less than 100 m deep, a water crater was
opened and then collapsed with a violent resurge. The inability of
the missing southern rim to withstand this resurge is interpreted to
be the origin of an early modification stage rim collapse event.

Analytical Method and Results: According this model [5], the
asteroid diameter is ~ 246.5 m, with a velocity and impact angle of ~
18.46 km/s and 43.18° respectively. The number of rings are calcu-
lated in ~ 0.84 with an initial crater profundity of ~ 572.68 m, this
quantity could be altered across the passage of time to ~353.03 m,
the melt volume is ~ 2.2E10 m³ or ~ 22.03 km³. The number of
ejected fragments are estimated in ~ 2.55E6 with average sizes of ~
1.81 m, and a cloud of dust with diameter of ~ 9,498 km. The total
energy in the impact is calculated in ~ 7.7E25 Ergs, i.e., ~ 1,833
megatons. Before of the erosion effects the transient crater is esti-
mated in ~ 4.29 km, the hydrothermal zone (hydrothermal systems)
is of ~ 338.08 m to 2.15 km from the nucleus of impact. The life-
times estimated are of ~ 37,077 years to 57,874 years with uncer-
tainties of ~ +/- 0.67 % to +/- 3.00 %, i.e., from +/- 249 years to +/-
1,737 years. Hydrothermal temperatures from 0.25 years to 1,400
years are estimated in ~ 158,14°C to 61.35°C respectively. The
fragments are ejected to ~ 87.74 km from the impact center, with a
velocity of ejection of ~ 2.2 km/s, ejection angle of ~ 5.14° and
maximum height of ~ 1.97 km. The density of the asteroid is calcu-
lated in ~ 4.97 g/cm³ and the combined density (maximum and
minimum) for the ejected fragments is estimated in ~2.08 g/cm³.
The maximum height of Tsunami for 400 m and 7.5 km from the
source is ~ 414 m and 22 m respectively. The seismic shock-wave
magnitude is calculated in ~ 8.1 in the Richter scale. The maximum
time of permanency for the cloud of both dust and acid in the at-
mosphere is ~ 28 days and 4.6 months, respectively. The tempera-
ture peak in the impact is calculated in ~ 1.17E3 times the tempera-
ture of the solar nucleus, by a space of time of ~ 1.16 ms. The pres-
ture to 1.01 km of the center of impact is ~ 4.18 Gpa.

Ocampo A.C., (2003), EGS-AGU-EUG Joint Assembly, Nice,
France.