APOLLO BASIN, MOON: ESTIMATION OF IMPACT CONDITIONS.

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Introduction: The Apollo Basin is a, pre-Nectarian, multi-ring basin located within the large South Pole-Aitken Basin (SPA). Multispectral data from both Galileo and Clementine showed that the composition of materials in Apollo is distinct compared to its surroundings. To the south and west of Apollo are mafic (largely noritic and basaltic) materials associated with the interior of SPA; to the north and east are SPA basin massifs and anorthositic materials associated with the Feldspathic Highlands Terrane [1], according to [2], the diameter of this basin is estimated in ~ 524 km. The models used here are based on: some equations postulated by *Holsapple* (crater depth) [3]; scaling; polynomial analysis; and an adaptation of quantum formalism for the mathematical representation of the energy pulse generated in the impact point, in where besides, is used one solution (soliton type) of the *Korteweg-De Vries's* equation [4].

Results obtained with the models: The development of this crater is realized in 4 stages [5], in which are specified the variables of impact more common, as follows: a). Contact/Compression Stage: In this stage the diameter of the impactor is estimated in *~ 60.81 km*, the velocity of impact is *~ 2.75 km/s*, the impact angle is *~ 61.19°*, the density of impactor is *~ 1.38 g/cm^3*, the crater depth is estimated in *~ 7.44 km* [3], the melt volume is *~ 47,281.21 km^3*, the total energy of impact is estimated in *~ 1.53×10^{31} Erg (~ 3.64×10^8 megatons)*, pressure to *1 km* of the impact point is *~ 65,374.07 Gpa*, and the seismic shock-wave magnitude is *>10.0* according the *Richter Scale*. b). Modification/Excavation Stage: In this stage the diameter of transient crater is *~ 346.98 km*, the number of ejected fragments *is ~ 7.52×10^{11}*, the average size of the fragments is *~ 14.75 m*, the average density of fragments is *~ 2.08 g/cm^3*, the distance of ejection of the fragments is *~ 36.25 km*, the velocity of ejection is *~ 425.63 m/s*, the minimal angle of ejection is *~ 9.46°*, and the minimum height of ejection is *~ 1.51 km.* c). Collapse/Modification Stage: In this stage the pressure toward the final crater rim decrease to *~ 0.95 Gpa*. d). Final Crater Stage: The relation between the transient crater and the final crater is *~ 0.66* [5], the time of creation for the final crater can be estimated in *~ 3.57 minutes* according to *Schmidt* and *Housen* [3], the hydrothermal zone could spread from *~ 77.25 km* to *~ 173.49 km* from the nucleus of impact, i.e., a hydrothermal band of *~ 96.24 km*, the lifetimes estimated for this hydrothermal band are of *~ 9.15 Ma* to *~ 14.28 Ma* with uncertainties of *~ (+/-) 0.94 %* to *~ (+/-) 2.60 %*, i.e., from *~ (+/-) 0.08 Ma* to *~ (+/-) 0.37 Ma*, hydrothermal temperatures from *0.25 years* to *1,400 years*, after of the impact, are estimated in *~ 313.93 °C* to *~ 126.47 °C*.

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