Methods

Surface rocks were collected along road cuts within and outside the Chicxulub crater basin, with emphasis on transects crossing the cenote ring. Special attention was given to collecting un-weathered rocks. Surface water samples were collected from cenotes, and groundwater samples were taken from wells or caves throughout the study area. Sampling locations were determined using a hand-held GPS. Surface-cleaned rock samples were crushed and about 20 mg were dissolved in 1 ml 1N HCl (trace-metal grade) for about 30 min. Samples were centrifuged and an aliquot of 200 µl was evaporated to dryness. The samples were subsequently dissolved in 100 µl of ultra-pure 3.5 N HNO₃ and run through micro-columns loaded with strontium-specific crown resin (Eichrom™ Sr resin) to isolate the strontium (Pin and Bassin, 1992). For water samples, 5 to 6 ml were evaporated, followed by the same strontium separation technique applied to the rocks samples.

Strontium isotopes were measured using a Micromass Sector 54 thermal ionization mass spectrometer (TIMS) in the Department of Geological Sciences at University of Florida. Each sample was measured for 200 dynamic ratios at a beam intensity of about 1.5V for $^{88}$Sr, and corrections were applied for instrumental fractionation, assuming $^{86}$Sr/$^{88}$Sr = 0.1194. Errors in measured $^{87}$Sr/$^{86}$Sr are better than +/- 0.000015 (2σ) based on long-term reproducibility of the standard NBS 987 ($^{87}$Sr/$^{86}$Sr =0.710246). The data set was augmented with strontium isotope values for rock and water samples from northwestern Yucatán published by Hodell et al. (2004), who applied identical pretreatment and measuring protocols. The $^{87}$Sr/$^{86}$Sr values were
used to assign ages to the rock samples using the seawater strontium isotope
calibration curve (“SIS Look-Up Table Version 4: 08/03” (Howarth and McArthur,
1997; McArthur et al., 2001), assuming no diagenetic alteration. Uncertainty of age
determination is in the range of +/- 0.5 Ma depending on Sr isotope measurement
top error, as well as on the slope and error of the Sr seawater curve.

References

strontium isotopes (Sr-87/Sr-86) in the Maya region: a tool for tracking
ancient human migration: Journal of Archaeological Science, v. 31, p. 585-
601.

A robust LOWESS fit to the marine Sr-isotope curve for 0 to 206 Ma, with
441-456.

stratigraphy: LOWESS version 3: Best fit to the marine Sr-isotope curve for 0-
509 Ma and accompanying look-up table for deriving numerical age: Journal

Pin, C., and Bassin, C., 1992, Evaluation of a strontium-specific extration
chromatographic method for isotopic analysis in geological materials: Analytica
Table DR1: Strontium isotopes on bedrock samples

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South of Mayapan 2 20.59  -89.40  0.70902  5.46
Chan-Kom 20.58  -88.53  0.70865  17.13
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South of Mayapan 3 20.57  -89.38  0.70804  28.47
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South of Mayapan 4 Rancho Chun-Chen-Chaa 20.55  -89.38  0.70787  32.86
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Table DR2: Strontium isotopes on water samples

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