

COMMENT ON “COASTAL CAVES IN BAHAMIAN EOLIAN CALCARENITES: DIFFERENTIATING BETWEEN SEA CAVES AND FLANK MARGIN CAVES USING QUANTITATIVE MORPHOLOGY”

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Waterstrat et al. (JCKS (2010), 72 (2) 61–74) calculated means of various geometric properties of collections of sea caves and flank-margin caves with the professed aim of showing that they can be statistically distinguished. If this is meant to be useful for determining whether a given coastal cave is one sort or the other, the results are useless, because the standard deviations of the distributions are larger than the differences in the means—a fancy way of saying that the distributions overlap substantially.

If the intention of the paper is to show that the two types of caves differ in the various properties to a statistically significant extent, it is hardly noteworthy. Statistical tests such as Student’s *t* are useful in cases where the natural assumption is that there is no difference between two classes, a typical example being whether a new drug is more effective than an old one. In the case of caves, I can state with full confidence that any sufficiently

large collections of caves formed by different mechanisms, or indeed by the same mechanism in different geological environments, will differ significantly in shape, however that is defined. Indeed, the authors point out various qualitative features that can be used to differentiate flank-margin caves from sea caves. When anyone familiar with coastal caves can usually tell from a glance at its map which category a cave belongs to, it is not surprising that extremely high levels of statistical significance can be reached, limited only by the number of data points available.

One of the parameters investigated by the authors is not even dimensionless. Given two collections of caves that match one-to-one in shape exactly, but with one collection being systematically 1% longer than the other, their mean ratios of perimeter to area will differ to any level of significance you like, given large enough samples.