Review of Evidence That Reefs Formed During The Last Interglacial Period Suggest That 3 Meter Jumps In Sea Level In a Few Decades Could Be Expected Today

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Blanchon et al. (Nature, 2009) contend that 3 m differences in the elevation of two former Yucatan reefs occurred in a few decades and that by analogy, similar 3m jumps of sea level in a few decades could occur today. However, the evidence they provide fails far short of demonstrating such events.

^{230}Th dating of the upper (6m) reef and lower (3m) reef indicate that the two reefs formed during the last interglacial period about ~120,000 years ago. The authors claim that *"these reliable ^{230}Th ages confirm that both reef tracts are contemporaneous."* The authors claim an accuracy of ± 2,000 yrs.for the dates (0.001%), although admitting *"that the δ^{234}U(T) criterion alone is insufficient to identify all corals affected by open-system diagenesis and that >50% of ^{230Th} ages with reliable isotope values can have discordant ^{231}Pa age."*

Although the authors claim that the ^{230Th} dates show that the two reefs are contemporaneous, the ^{230}Th dates cannot possibly demonstrate that. In fact, *what is most significant about the dates is just the opposite*—the dates show that the reefs are *not* within a few decades of one another in age. The ^{230}Th dates of the lower reef range in age from ~139,000 yrs. to ~107,000 yrs. but even using only dates considered "strictly reliable" (because their δ^{234}U(T) values are similar to modern corals), dates from the lower reef vary from 134,000 to 139,000 yrs, whereas dates from the upper reef range in age from 117,000 to 128,000 yrs. The difference in age between the youngest date from the lower reef (134,000 yrs.) and the oldest date from the younger reef (128,000 yrs.) is 5,000 yrs., which *precludes* the possibility of contemporaniety of the two reefs.

In the same stratigraphic section, a coral date of 119,600 yrs. lies stratigraphically above coral dated at 117,700 yrs. In addition, corals at the same elevation in the upper reef were dated at 117,700 yrs. and 125,400 yrs. Instead of proving that the two reefs are contemporaneous, the ^{230}Th dates show that two reefs are *not* contemporaneous.

Blanchon et al. contend that *"differences in biofacies and elevation confirm that the two reefs are contemporaneous and had a back-stepping pattern of development."* However, their stratigraphic sections do not support this claim. The two reefs do not appear in the same cross–section but rather in sections separated by a considerable distance, making correlations highly tenuous. The cross–section of the upper reef shows that the base of the upper reef lies at the same elevation as the top of the lower reef, which they contend was killed by a 3m sea level rise. If a 3m rise in sea level killed the lower reef, how could the upper reef begin growing at the same level? That makes no sense at all. Also, why would a sea level rise of 3m kill the lower reef? Coral reefs live today at greater water depths than that.

The only logical conclusions that can be drawn from the evidence presented is:

1. As shown by the ^{230}Th dates, the lower reef is about 5,000 years older than the upper reef, not contemporaneous.

2. The stratigraphic sections *do not* support the contention that the two reefs are within a few decades of one another in age.

3. No evidence is presented to show that a 3m sea level rise killed the lower reef while coral at the base of the upper reef began to grow at the same level.

4. No evidence is presented to demonstrate sudden melting of polar ice.

5. The last interglacial period has been dated from ~127,000 yrs. to ~100,000 yrs., so the 120,000 yr. age of the reefs was not *"at the close of the last interglacial"* but rather in the early part of the interglacial.

6. The contention that the two reefs provide evidence of a sudden, 3m jump in sea level over a few decades and that such a jump is possible today is *not* demonstrated in the paper.