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Interactive comment on “Evaluation of coral reef carbonate production models at a global scale” by N. S. Jones et al.

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Reviewing this paper has been an interesting exercise to go through. The authors have written the paper well, however, what nags me about the whole process is the question ‘How worthwhile and valid are the comparisons the authors are making?’... because in many ways this is an apples and oranges comparison. The TA method, for example, offers a snapshot of G values over a certain area on that particular day, whereas looking at G values derived from porites offers up the possibility of integrating over a longer time scale. It doesn’t approach the time scales I like looking at, but it goes in that direction. In many ways I don’t think any of the scenarios really come close to touching what really is going on in coral reef communities around the globe. One of the strongest controls on the G value of a given reef goes back to Maxwell’s concept of

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a juvenile to a mature to a senile reef. This explains the big differences between what a scientist will observe between a healthy reef in the Indo-Pacific and the Caribbean. Yes, it has a lot to do with accommodation space and circulation, and it is not really part of the model. It really is pretty cool that porites does so well when everything else is dying around them, but is it really a good basis for a global production model? I doubt it.

I can't help reading this sort of thing without wanting to put the story into a longer context. If you are talking about reef areas you really have to cite Steve Smith's 1978 paper in Nature. That is where the 600,000 square kilometer estimate of reefs originally came from, and Steve is no slouch. Milliman used it in his 1993 paper and I used it in my 'Return of the Coral Reef Hypothesis' paper. Now this reef area has a bit of a geologic component to it. . . in other words it includes shallow carbonate accumulations that are Holocene in age but no longer actively producing carbonate. In that context the ReefHab number of close to 200,000 square kilometers is probably more appropriate to approximate areas with higher G values today.

It is interesting that the Silverman estimate of 1.1 Pg is close to the 1.4 Pg that I included in the range of possible neritic accumulation. But we have to remember the 1.1 Pg value was measured under high modern pCO₂ conditions and saturation states were higher not that long ago.

So after reading through this a number of times, I think it is a worthwhile contribution, not so much for what it includes, but for pointing out (to me) what is missing.

Cheers,

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