

Technical comments:

l. 25: Complicated sentence. Can you simplify by dropping sub-clauses?

l. 36: ... AT correlated well and positiveLY with reef growth ...

l. 46: Incorrect statements. There are highly functional and very important cold-water reefs. Even warm water coral reefs can exist and thrive under oligotrophic conditions. And to some degree reefs can occur in marginal or even hostile environments.

Suggestion for rewording: Positively accreting warm-water coral reefs usually occur in aragonite-saturated and oligotrophic ~~tropical~~ oceans, where pivotal ecosystem functions can be best maintained...

l. 54: Too simple a view? OK, maybe you have to keep it short... Still, maybe have a look at

[Perry CT, Harborne AR. Bioerosion on modern reefs: impacts and responses under changing ecological and environmental conditions. In Coral Reefs at the Crossroads 2016 \(pp. 69-101\). Springer, Dordrecht.](#)

[Schönberg CH, Fang JK, Carreiro-Silva M, Tribollet A, Wisshak M. Bioerosion: the other ocean acidification problem. ICES Journal of Marine Science. 2017 May 1;74\(4\):895-925.](#)

Glynn 1997 and Glynn and Manzello 2015 are the same thing. Please choose one.

l. 63: Should “slowing down” not be replaced with something like “interrupting”? Corals often die, after all.

l. 64: Convoluted sentence. How about: As ocean acidification decreases the ocean’s pH and  $\Omega_a$  at the same time, calcification becomes energetically more costly (...).

l. 67: There are so many examples for OA-enhanced bioerosion by now that you need to use “e.g.” or cite an overview. Please also add: “frequently” a hallmark.

l. 82: Replace “is” widely attributed with “was” to refer to earlier results, not a fact.

l. 83-84: Again, use the past tense to indicate that you refer to other people’s results.

l. 89: Replace “Aside” with “Apart”

l. 90: What about e.g.

[Lazar B, Loya Y. Bioerosion of coral reefs-A chemical approach. Limnology and Oceanography. 1991 Mar 1;36\(2\):377-83.](#)

[Mokady O, Lazar B, Loya Y. Echinoid bioerosion as a major structuring force of Red Sea coral reefs. The Biological Bulletin. 1996 Jun 1;190\(3\):367-72.](#)

[Alwany MA, Thaler E, Stachowitsch M. Parrotfish bioerosion on Egyptian red sea reefs. Journal of experimental marine biology and ecology. 2009 Apr 15;371\(2\):170-6.](#)

[Bertram GC. 60. Some Aspects of the Breakdown of Coral at Ghardaqa, Red Sea. Journal of Zoology. 1936 Dec 1;106\(4\):1011-26.](#)

[Erez J, Reynaud S, Silverman J, Schneider K, Allemand D. Coral calcification under ocean acidification and global change. In Coral reefs: an ecosystem in transition 2011 \(pp. 151-176\). Springer, Dordrecht.](#)

[Hassan M. Modification of carbonate substrata by bioerosion and bioaccretion on coral reefs of the Red Sea. Shaker Verlag; 1998.](#)

[Zundelevich A, Lazar B, Ilan M. Chemical versus mechanical bioerosion of coral reefs by boring sponges-lessons from Pione cf. vastifica. Journal of experimental biology. 2007 Jan 1;210\(1\):91-6.](#)

[Mokady O, Graur SR. Coral-host specificity of Red Sea Lithophaga bivalves: interspecific and intraspecific variation in 12S mitochondrial. Molecular Marine Biology and Biotechnology. 1994;3\(3\):158-64.](#)

[Cornelia Maier 1997. Distribution and abundance of internal bioeroders in coral reefs. A field survey in the northern Red Sea. MSc \(diploma\) thesis, ZMT & Bremen University, Germany, 94 pp.](#)

And there is more on calcification as well:

[Braithwaite CJ. Patterns of accretion of reefs in the Sudanese Red Sea. Marine Geology. 1982 Feb 1;45\(3-4\):297-325.](#)

Etc...

There was a bit of an overview re bioerosion and lack of data from the Red Sea in

[Schönberg CH, Fang JK, Carballo JL. Bioeroding sponges and the future of coral reefs. In Climate Change, Ocean Acidification and Sponges 2017 \(pp. 179-372\). Springer, Cham.](#)

l. 91: OR bioerosion.

l. 100: Settlement blocks capture ambient endolithic bioerosion rates only after several years, see research by e.g. William Kiene. Blocks can underestimate bioerosion by magnitudes. It is thus good that you had a set of 30 mo ones, which may still be a bit early, but better than in other studies. Consider that you may have captured an early stage endolith community, which would likely be dominated by different organisms than later. Please replace “on” potential drivers with “of”.

E.g. Kiene WE. A model of bioerosion on the Great Barrier Reef. InProc 6th int coral Reef Symp 1988 Aug (Vol. 3, pp. 449-454).

Hutchings PA, Kiene WE, Cunningham RB, Donnelly C. Spatial and temporal patterns of non-colonial boring organisms (polychaetes, sipunculans and bivalve molluscs) in Porites at Lizard Island, Great Barrier Reef. Coral Reefs. 1992 Apr 1;11(1):23-31.

Kiene WE, Hutchings PA. Bioerosion experiments at Lizard Island, Great Barrier Reef. Coral reefs. 1994 May 1;13(2):91-8.

l. 101: provides “a” broad insight

l. 106: As the other 2 papers are in a slightly different context it would be good to provide the basic data on the cross shelf differences?

l. 111: Nearshore-fore, midshore-fore, midshore lagoon and offshore-fore? Why is the lagoon in there? The midshore data are not independent of each other.

l. 114: This sentence can again be made easier to read by dropping commas: At each station additional seawater samples were collected on SCUBA for 5 - 6 consecutive weeks during each of the seasons for the determination of inorganic nutrients and carbonate chemistry: nitrate...

l. 119: Use small characters in the title, also in l. 120 for the loggers

l. 122: Insert “the” in front of “pH probes”

l. 127: “cubitainer” is a brand name. Either use “container” or add a bracket with the producer info.

l. 128: Replace “over” with “via” or “through” or something

l. 129: Which were the discrete samples, the 4L or the syringe samples?

l. 140: salinity with a small letter

l. 142: use small letter in “free scale” and provide reference for free the free scale being a good equivalent, e.g.

Dickson AG. pH scales and proton-transfer reactions in saline media such as sea water. *Geochimica Et Cosmochimica Acta*. 1984 Nov 1;48(11):2299-308.

Waters JF, Millero FJ. The free proton concentration scale for seawater pH. *Marine Chemistry*. 2013 Feb 20;149:8-22.

l. 149: How many blocks were there in total? 64?

l. 151: How were the blocks deployed? It would make a huge difference whether they were fastened directly on the bottom (allowing direct lateral borer invasion and urchin grazing), as opposed to placing them on some sort of rack (where only larval settlement occurs and grazer access would be reduced).

l. 154: Presumably after bleaching the blocks were thoroughly rinsed to remove the bleaching salts? How were the sites distributed over the exposure times? Can you provide a schematic figure? Wouldn't it be much easier to understand if you gave the lagoon the same status as the backreefs? Then you would have 3 fore-reef, exposed sites and 3 sheltered sites? It does not make much sense that the 30 mo approach included the lagoon, and you should not include it giving it the same status as the fore-reef sites. In your case the factor “exposure” would be nested within reef transect, it would be like a subsample per reef.

l. 160: How was this information matched with biota in the blocks? Were any of the species identified, either those seen on the reef or in the blocks? The Red Sea is not well represented in the borer taxonomies, except for the bivalves.

l. 163: WERE assessed

l. 164: What do you mean with non-calcifiers? General reef biota or only bioeroders?

l. 166: Sponges are a major group of bioeroders, yet you grouped them with algae? And didn't you have area that was not covered by living organisms, e.g. patches of sand? It would have been good to have a value for bioerodable calcium carbonate as opposed to area covered by calcifiers or non-bioeroders. Borer abundances strongly vary with substrate type and dead surface areas and have to be normalised to the available substrate in order to make their occurrences comparable between sites (mainly shown for sponges):

Carballo JL, Bautista-Guerrero E, Leyte-Morales GE. Boring sponges and the modeling of coral reefs in the east Pacific Ocean. *Marine Ecology Progress Series*. 2008 Mar 18;356:113-22.  
 Schönberg CH. Monitoring bioeroding sponges: using rubble, quadrat, or intercept surveys?. *The Biological Bulletin*. 2015 Apr;228(2):137-55.

That doesn't apply to your block data (unless you fastened them in areas without abundant dead substrate = lower of larval supply), but will have an effect on your distributions.

l. 170: You did not assess general borer densities, but only the two dominant epilithic bioeroder groups or grazers. Please reword, be more specific (also 2.5). It would also be important to know whether you only included parrots that really have an impact on bioerosion or also others, like scapers and spp. that mainly eat erect sea weeds (see references below). I guess you included all, because you had fairly small size classes in there? That would dilute the data. Pity that you did not look the borers.

Bellwood DR, Choat JH. A functional analysis of grazing in parrotfishes (family Scaridae): the ecological implications. In *Alternative life-history styles of fishes 1990* (pp. 189-214). Springer, Dordrecht.

McAfee ST, Morgan SG. Resource use by five sympatric parrotfishes in the San Blas Archipelago, Panama. *Marine Biology*. 1996 May 1;125(3):427-37.

Lokrantz J, Nyström M, Thyresson M, Johansson C. The non-linear relationship between body size and function in parrotfishes. *Coral Reefs*. 2008 Dec 1;27(4):967-74.

l. 182: How did you assess accretion and bioerosion? You can provide the details in the supplement, but the main text still needs to be understandable by itself, so why not say that the local accretion/erosion data were assessed by you and published earlier? Gnetbenthos was derived from the blocks? Then you can only rely on 30 mo data for the forereefs (the other periods being even shorter)? And you only have net values? Considering the extreme variation you found this may be a problem.

l. 184: I assume that the "site-specific" net data refer to the blocks? How did you assess calcification by itself? Please specify

l. 202: "showed" = in the past, and delete "a"

l. 212: Gbudget DATA were tested...

I am not quite sure I understand your data design? You had the factors "time" and "reef = distance to shore". You only had very few replicates (blocks) at the lowest level with N=4. This is very small sample size for something as variable as net calcification/bioerodion. Where does your factor "reef area = fore/back/lagoon" go? I think you are quite wrong to use simple ANOVAs, because "reef area" is not independent and should be nested within "distance from shore". So your factors "time" and "distance from shore" are independent between factors and fully crossed for 6 and 12 mo, but "reef area" is a within factor and presently unbalanced. Thus you don't have a 1-factorial simple ANOVA, but a 2-factorial mixed model with the additional factor "reef area" nested within "distance from shore". It would make your life easier if you would call "reef area" "exposure to water movement" and give backreef and lagoon the same status. Having only 4 blocks at the lowest level means you will have to be very careful with your data design, and your present analysis seems misguided to me. I think you should evaluate your data like this:

DISTANCE FROM SHORE			x
NEARSHORE	MIDSHELF	OFFSHORE	TIME OF EXPOSURE: 6 and 12 mo 30 mo
Exposed: forereef	Exposed: forereef	Exposed: forereef	
Sheltered: backreef	Sheltered: lagoon	Sheltered: backreef	

Distance from shore

Time of exposure

Time of exposure x distance from shore  
Exposure to water movement (nested in distance from shore)

Why don't you evaluate everything in PERMANOVA, which saves the need for transformation and gives you more test power than nonparametrics, as well as allowing testing for factor interaction etc.

l. 221: You have 3 reef sites (near, mid, off) and 2 or 3 reef areas (fore, back, lagoon), which are nested within reef site. You should not use 4 levels in this approach.

l. 225: Why did you exclude urchins for the data analysis of the blocks? Wouldn't urchins have grazed on your blocks? Same for coral cover. Your data are net values, i.e. they include coral settlement. Please increase the range of the tested parameters for the block values. Did you cull out covariables?

l. 240: The difference across the shelf? I assume the water became cooler with distance from shore? This needs to be clear without access to the supplement. The next sentence seems to be wrong? Do you mean the "OFFshore and the midshore"?

l. 248: All 6 sites? Are these hierarchical means, i.e. per reef area and then seasonal means across the distances? Please note that in nested designs the means need to respect the same data hierarchy and need to be calculated stepwise. This part is also not quite clear in the earlier parts of the Methods, please specify and consider for all displayed means. "Nearshore reef" is that back or fore or a mean of back and fore?

l. 253: replace "in" with "at the sites"

l. 254: delete "was"

l. 258: "while the midshelf lagoon", replace "was" with "were". Did you include the backreef sites? Looking at your figures shows me that you didn't, which is a shame. In this case you can explain differences between sheltered vs. exposed only for the midshelf site and should not generalise.

l. 257: please reword to "small at the exposed offshore and midshore sites"

l. 261: delete "a"

l. 264: replace "contents" with "levels"

l. 268: All this and some of the following is horrible to read with all the parameter abbreviations and long brackets. It is difficult to find the bits of sentences in between. Having all the data in clean overview in a table, is it necessary to clutter the text with so many brackets or can you delete a few of them? The last you can probably do is reducing the number of repetitive units, e.g. "(2422  $\mu\text{mol A}_T \text{kg}^{-1}$ , 2076  $\mu\text{mol C}_T \text{kg}^{-1}$ , and 1821  $\mu\text{mol HCO}_3^- \text{kg}^{-1}$ )" could become "(2422, 2076, and 1821  $\mu\text{mol kg}^{-1}$ , respectively)"?

l. 271: the "p" in pCO<sub>2</sub> is usually written in italics, which makes it clear that it is a defined unit (correct throughout). Could you also put definitions in the text for the main parameters, not just in the table legend? "Ranged" infers the use of "from... to"

l. 272: "increased" (past tense). Replace "of note, ..." with "it should be noted that..."? What do you mean with "propagates to uncertainty"? Do you mean "was in part near the resolution level"?

l. 279: hyphen between ocean and facing

l. 284: Accretion is half of your budget. You need to put some of this in your main text, I think. The results need to be clear in the end, e.g. what they are based on.

l. 286: They are epilithic macrobioeroders. Please make that clear, you did not assess any of the endolithic bioeroders.

l. 288: Urchin and fish means are often in the same range of magnitude as the error values. The large errors make these values highly unreliable.

l. 290: I disagree with the statements of this para. I used the raw data from the supplement to get a better visual impression of your data. I will send an Excel file in attachment to show what I mean. You cannot really say that the urchins were most abundant nearshore and then decreased, because all the error bars overlapped. There is no evidence for a trend. I would strongly recommend to include figures like the ones I tried out, because then you can easily see that the urchins cannot be matched to any particular straightforward pattern, with the possible exception of a much reduced urchin biomass at the offshore site. This would be due to much smaller urchins, because the abundances themselves do not look significantly different. For the parrotfish, however you will be able to find differences, and this looks quite interesting: Abundances increased across the shelf at the sheltered sites, but decreased at the exposed sites. Bioerosion was strongest inshore exposed sites, but with huge error bars. Overall means: no difference for anything.

So it would be much more interesting to display the effects for both factors cleanly separated, not sure whether it is so interesting to know the range – e.g. especially the bigger parrotfish would have an impact for bioerosion. The overall plots suggest that the parrotfish will have the larger influence (should better be plotted with a secondary axis).

l. 301: Cumulative? Please explain. My understanding was that you had 4 replicates per situation, and no repetitive measurements? You can't add results from different block dets together, you need to respect successional stages of settlement. Replace "in" with "at".

Maybe it would be good to have Figure S1 in the MS. The respective analyses again need to be nested (exposure within distance from shore). Pity that you did not fully replicate all settings. The block data for 6 and 12 mo do not mean much and do not separate out in your supplementary figure. Only after 30 mo the mid- and offshore blocks start to show different patterns. But you can only judge the "exposure to water movement" effect at the midshelf site.

l. 313: Please recalculate respecting the nesting level. It is quite bad that your error is larger than the mean, maybe it would be better to express that same value only for the forereef data? Or separate for exposed and sheltered?

l. 318: What is "net-accretion/erosion of bare substrate Gnetbenthos"? Is that different from Gnet? Maybe 2.5 could be a bit more detailed?

l. 322&323: showED, negatively correlated with what?

l. 329: Can you be more specific about the percentages? If you have 81% of the variation explained, then the difference to 74% would be 7, not 78? Obviously, you had co-varying factors in your model (e.g. T means and SDs), why didn't you test and cull some of that in PERMANOVA?

l. 334: Replace "so far" with "to date"

l. 337: I would not call this "comprehensive", but "detailed" would be OK.

l. 338: linkED

l. 341: integrated

l. 353: "weather goal"? replace with "standard", delete "as"?

l. 360: Convolved sentence, difficult to follow. How about:

To ASSESS ~~test the hypothesis~~ whether Red Sea reefs LIKE OTHER MARINE HABITATS will IN FUTURE reach a critically low  $\Omega_a$  ~~later, and~~ OR maintain a LONG-TERM calcification-friendly sea water chemistry ~~on longer terms,~~

compared to other tropical reef regions under OA, an HIGH PRECISION experimentS and a high precision and high resolution monitoring of reef carbonate chemistry are needed.

l. 367: decreasedD, (comma)... increasedD

l. 370: replace “on local” with “at”, “WERE similar”, add “patterns’ after “seasonality”

l. 377: Don’t understand sentence: Amongst the range maxima of pH units was ~1.40. Please reword.

l. 378: Replace “in the” with “at the”; siteS, (comma)...

l. 382: What was not considered?

l. 386: delete “s” from “averages”; the wording is not quite clear, better remove “average” and “for the crossshelf gradient”? Use “gradient” instead of “differences” in next sentence.

l. 391: Replace “supplied” with something like “modified”, “affected” or “replenished”. Please provide a reaference for this statement. DepleteS.

l. 394: Please simplify this fragmented sentence. It should be “correlated WITH”

l. 397: reflectedD (please carefully check the MS and keep the tenses uniform); might read better as: “Nearshore habitats with low reef growth capacity were associated with higher mean temperatures and strong biotic feedbacks that caused comparatively intensive pH fluctuations.”

l. 399: Silbiger et al. net accretion responded to pH anomalies: “Previously, SMALL-SCALE pH ANOMALIES HAVE been shown to have a significant impact on LOCAL accretion and erosion dynamics” (probably too small-scale to generalise, see Schönberg CH, Tribollet A, Fang JK, Carreiro-Silva M, Wisshak M. Viewpoints in bioerosion research—are we really disagreeing? A reply to the comment by Silbiger and DeCarlo (2017). ICES Journal of Marine Science. 2017 Oct 3;74(9):2494-500.).

l. 400: Use past tense if referring to your own results, insert “can” in front of “exert” if meant as a more general statement.

l. 405: identifieD, add “as a positive factor” after “concentration” and delete the subclause after the bracket

l. 409: replace “shown” with “demonstrated” (avoid repetition)

l. 410: better to use “coral-algal symbioses” throughout, without “the”?

l. 411: Remove “and”, start new sentence with “Conversely”

l. 412: remove “the”, make it “in light of”

l. 413: nutrient ratios IN THE CENTRAL RED SEA to understand their effects on LOCAL large-scale and long-term trends of reef growth in the central Red Sea

l. 418: replace “on” with “at”

l. 420: WAS reported, replace “negative production” with “erosional”

l. 427: showedD. This part is a bit confusing. The methods implied that parrots were counted as epilithic bioeroders? But here it seems the effect of macroalgal cropping was more important? Given the context, this needs to be made clearer here and in the methods: Which groups were included for what purpose of assessment? In the following the two contrasting effects (macroalga cropping and possible bioeroder control vs direct bioerosion) are mixed together. When more parrots correlates to reef growth, I guess you mostly counted the croppers, not the bioeroders? Potentially there is also a lot of among-biota feedback that can be important, but difficult to separate out, see e.g.

Carreiro-Silva M, McClanahan TR. Echinoid bioerosion and herbivory on Kenyan coral reefs: the role of protection from fishing. *Journal of Experimental Marine Biology and Ecology*. 2001 Jul 30;262(2):133-53.

Brown-Saracino J, Peckol P, Curran HA, Robbart ML. Spatial variation in sea urchins, fish predators, and bioerosion rates on coral reefs of Belize. *Coral Reefs*. 2007 Mar 1;26(1):71-8.



Mapstone BD, Andrew NL, Chancerelle Y, Salvat B. Mediating effects of sea urchins on interactions among corals, algae and herbivorous fish in the Moorea lagoon, French Polynesia. *Marine Ecology Progress Series*. 2007 Mar 5;332:143-53.

McClanahan TR. Response of the coral reef benthos and herbivory to fishery closure management and the 1998 ENSO disturbance. *Oecologia*. 2008 Feb 1;155(1):169-77.

Kennedy EV, Perry CT, Halloran PR, Iglesias-Prieto R, Schönberg CH, Wisshak M, Form AU, Carricart-Ganivet JP, Fine M, Eakin CM, Mumby PJ. Avoiding coral reef functional collapse requires local and global action. *Current Biology*. 2013 May 20;23(10):912-8.

l. 438: Use “biomass was” (singular)

l. 439: insert “sites” after “offshore”

l. 441: replace “is” with “has been”

l. 443: Bit lost here. You cite evidence for fishing pressure, but the parrots were one of your main structuring force? How then do your sites compare to the less fished sites?

l. 448: This works only when using the 30 mo blocks, right?

l. 450: ...I don't understand this. If your bioerosion data were all assessed as net values, how can you separate out the two processes to give separate values? No, you are still doing this as net values, right? I think you need to reword this. How about:

Net reef accretion increased across reef sites from nearshore to offshore, with offshore accretion being twice as strong as inshore erosion. Our Gbudget estimates can thus be interpreted as evidence for the formation of an offshore barrier reef in the central Red Sea

l. 452: showed; delete “states” and change to singular

l. 453: replace “lowest” with “most intense”

l. 457: remove “s” from “in part”, put bracket at the end of the sentence or at least after “complex”

l. 459: Confused again... You counted the fish, but you didn't count bite marks? If your parrots included a significant amount of herbivores rather than excavators, how would your biomasses allow a good estimate of fish-generated bioerosion? How can you sound so sure?

l. 461: replace “in” with “on”

l. 469: insert “data” after Gbudget, and “with conditions at the majority” This sentence contradicts the last sentence of the paragraph above it. -0.8 to 4.5 is a large range, caused by widely different conditions. How is this “comparable”? I am not sure whether your data are representative enough to be set into a global context. Your overall budget was  $0.65 \pm 1.73 \text{ kg m}^{-2} \text{ y}^{-1}$ , i.e. your error was almost 3x as high as your value, so what is the value really? You used net values that were not controlled for calcification, i.e. you could not separate accretion and erosion from your block data, which only had 4 replicates and likely still represented early stages of colonisation, maybe not so typical. And I am not sure how accurately your epilithic biota counts reflect bioerosion. I felt more comfortable with the last sentence of the paragraph before.

I am even less happy with the historical comparison, where people used a different approach than you, which would again have an impact on the outcome, apart from having been conducted at different sites. You cannot say whether there was a change over time, and you lose credibility by doing so, especially by putting enough weight on this to mention it in the abstract. It would be better to delete 4.4 or to use this part to highlight the lack of historical data in a context that can suitably compared. The last part is OK, but I would not call your data as “valuable baseline” with this extreme error. Please re-assess your data, maybe after an improved data assessment the error value will be lower?

l. 479: provided

l. 510: Please replace “geographic” with “spatial”, you cannot generalise enough

to claim you can explain things at geographic level.

l. 510: Delete “not higher than but”? Specify “other regions”. Across the shelf? Of the world?

l. 510: I am not sure you captured bioerosion very well. I assume that the blocks did not yet reflect the big borers adequately, and did they allow access to grazer-bioeroders? The small sample size and the missing calcification control also made it difficult to arrive at more reliable values. Given your large error values, bioerosion might have been much higher than your means.

l. 512: I would suggest that you delete any statements re historical trends and rather stress the lack of comparable data, urging for more research.

#### References:

Please choose whether you want to use any of the extra literature I provided. Can you please use uniform formats in the references and carefully check through the list for correct formats and writing? E.g. some titles use capitals in each word, others not. Latin names are not always in italics, the species name sometimes starts with a capital letter. L. 368: should be New York. The 2 in CO<sub>2</sub> should be subscript. Etc... Also in the supplement.

Fig. 2: Daytime is one word.

Fig. 3: What is the difference between measured and estimated? Giving the two midshelf sites the same status as the near- and offshore sites is misleading. Maybe it would be best to use only the 3 sites, or to leave gaps for the other 2 sheltered sites, or to display the lagoon site in a separate panel series.

Fig. 4: Your blocks do not yet look very affected by bioeroders. There is no clear evidence of grazer-bioerosion, yet you gave the parrots a big importance. Did you find any bioeroding molluscs in the blocks (which have an important role in the RS).

Fig. 5: Same problem as for Fig. 3 re site hierarchy. You have two data pairs each reef, sheltered and exposed. These are not independent, which needs to be obvious in the figures as much as it needs to be respected in the analyses. Your in- and offshore error bars are huge. The netbenthos and echino bars need a different scale, this way the data cannot be appreciated. What does the “c” mean over the grey offshore bar?

#### Table 1:

Please note that your means need to be calculated in analogy to your model, and I assume that they are presently incorrect. Within a given season, you need to first calculate means across 4 replicates, then across per reef area (exposed, sheltered – this results in an unbalanced situation, because you only have sheltered values midshelf), then across the reef sites (near, mid, off). Do you mean “calculate” when you write “estimate”?

Tab. 2: This is finally a data display in full analogy. What do you mean with “cumulative”? Please explain in Methods.

Tab. 3: Again problem with non-independence of midshelf sites and large error values in- and offshore, making the means very unreliable.



Tab. 4: I think you need to reduce the number of variable and remove the co-variables.

Tab. 5: You need to make clear that your R2 you mentioned in the text were accumulative. It may be better to use the un-cumulative ones in the text – more intuitive.

Supplement: OK, so this makes it clearer how you assessed epilithic bioerosion. I still think you should mention in the methods that you concentrated on species that are known bioeroders, providing the references. Hoey et al. is printed and a 2016 paper.

Tab S6: Why is fish bioerosion expressed as negative data, but not urchin bioerosion?

Tab S7: Is the first error value 0.6 a printing error or is it really so huge?

Tab S8: That suggests, however, that you included non-eroding parrots after all. Why did you assume these eroded?

Tab S6 and S9: Why do you have 4 data sets here if you have 6 in the tables these are based on? You have the data to display all 6 don't you, why don't you show them?

Otherwise you have the same problem re your midshore sites here that need to be addressed.

Fig. S1: Maybe better in the main text?