Referee #1

Line ref	Referee comment	Author response
22 - 23	Why so? Cook reached Botany Bay in that voyage. Could you clarify in which term the question remained unanswered?	A large southern continent was imagined to exist to act as counterbalance to the land in the northern hemisphere. I have now added the phrase *Terra Australis Incognito*. It was already understood that what is now known as Australia was not the great southern continent they were looking for.
40	I'd advise to add the geographical location of the two sounds. I think it is interesting to know that Dusky Bay is in south of the Southern Island, while Queen Charlotte Sound is in in the north.	They are shown in Fig 4. I have added this reference.
49 - 50	Sentence is a bit obscure: please clarify. Is the issue of consent central to your narrative? In general, is the issue of occupying land central to the issues at stake in the article? You might want to consider dropping this as it does not really add anything to the understanding of Bayly's and Wales's work.	The underlying motive of Cook's voyages was expansion of the British realm, but in doing so due consideration was to be given to any existing peoples. This expression of compassion adds a nice human touch to the narrative which I prefer to retain.
58	Use first name, Nevil, instead of academic title.	Agreed, done
60	Change "this period" to "this latter period"	Agreed, done
66 - 67	I find this phrasing ('that is the subject of this paper') a bit cumbersome. Maybe "after returning from Cook's second voyage".	Thanks, that is much better wording.
70	Who was the astronomer?	I have added his name, so it now reads "Wales married Mary, the sister of Charles Green, the astronomer on Cook's first voyage ..."
69	Did he take part in that voyage (Cook's first) as well? if yes it would be interesting to say so. if not maybe explain why he was charged of publishing its account	Wales was not on the first voyage. I have no explanation as to why he wrote that voyage's account, nor why it was not done sooner after except that Cook was quickly into his second voyage but that is speculation on my part.
70	Change 'Wales' to 'he'	Amended as suggested.
78	Due to the use of author date it is hard to know what Wales and Bayly 1777 is. Maybe write "In the extensive introduction to their account of the astronomical observations they took	Thanks, that is an improvement.

	during the voyage (Wales and Bayly 1777).	
88	I know, this is a wholly different story. But “taken away” sounds like such an understatement. What’s the story here: did they take only the gauge? and if yes what for? and how?	Wales used the phrase 'taken away'. He did not elaborate further about why/what for. I have replaced the phrase with the word "stolen".
89	‘measured downwards’ - so he only used negative numbers? was this common among hydrographers? may this be due to the fact that navy hydrographers used to measure depths rather than tides and were thus attuned to using negative numbers?	The downwards measurements were positive values. Hydrographers measure depths as positive and heights of rocks etc exposed above the water as negative. I have changed the wording to '... were measured below the reference mark."
101- 102	As mentioned above (Note that the distances to the water level are made in a top-down direction.)	Sentence changed to read: As the distances to the water level were measured down from the top of the tube, the least distance is associated with high water.
107	Change ‘for’ to ‘to’?	Agreed, amended.
134	Delete ‘being’	Word deleted
172	Did he record the difference between the two? It might be interesting explain this a little better. How was it supposed to work? How did he perform comparisons? In particular does he give any insight on why he thought it was a good idea?	Bayly measured the offset and I have added the value to Sec 6.4. No explanation is given for deploying two poles, nor any reason for not using the glass tube he used during his first visit to this location. This paragraph now reads: When Bayly returned to Ship Cove in December 1773, he set up two poles which were offset vertically such that the zero of the higher pole (for measuring high water) was above the pole used for low water observations. This offset must be added to the high water readings to bring them into terms with the low water measurement values.
186 - 187	Above you say that he did so for low water. what is the actual case, both low and high, or only low water measurements taken just once and without time notation	Mostly for low water, occasionally for high. I see now that my use of "frequently' applies to both so I have rephrased this statement to: Wales frequently recorded a single height at low water and several times at high water without noting the time.
197	It might be worth saying what this long excerpt does for the narrative. What should the reader get from it?	I have added the following sentence: Wales learns a valuable lesson when he finds the gauge to be too short after incorrectly judging the rise and fall of the tide against the shoreline

242 - 244	Is it possible to explain this in clearer terms?	This sentence was getting into tidal theory and doesn't add anything meaningful to Wales's observations so I have deleted the sentence.
256 - 267	If this is a quote as seems it needs to be made clear (indent?)	Yes, it was a quote - indenting was omitted accidentally. See next comment and action.
256 - 267	Maybe paraphrasing instead of quoting could help to make things clearer and add the author's voice in a way to clarify to the reader what is important.	I inserted the quote in full as I thought the language used was quite 'interesting', but on reflection following your comment I see that it is quite dense and contains more fine detail than needs to be included in this paper. As suggested, I have removed the verbatim quote and replaced it with the following to simplify the details and focus on the important details. A glass tube, four feet long and 0.7 inches in diameter, was attached to a long wood rod which was divided into feet, inches and quarters of inch to serve as a scale. The rod was, in turn, attached to a post set firmly in the water. A bamboo cane, with a very small hole, fitted to the tube provided a narrow aperture for admitting the water into the glass tube. The tube performed admirably as a stilling well as Bayly found that he could read the height of the water in the tube to a quarter of an inch, or better, and that the level fluctuated no more than one-tenth of an inch even as the sea would rose and fell by a foot due to wave action (Bayly, 1774b, p. 36).
274 - 276	Good	Thanks
313	Clarify what is meant by 'were placed truly level by the astronomical quadrant'	I have deleted the text you highlighted and added a new sentence: "Wales does not explain the need for two posts and, as their tops were set level, the second one would seem to be quite unnecessary."
319 - 321	This is interesting, maybe expand on it. Was the height of driftwood on the shore a common way to have rough idea of the extension of tides for mariners?	Yes, it was and continues to be used as an indicator today. I have added a further sentence: "The line of driftwood is still used today as an indicator of tidal inundation, but with due caution as the line is almost always landward of the actual high water line."

367 - 368	This reads a bit awkwardly to me. could you rephrase?	I have replaced the sentence with: Bayly set up two posts at different heights and measured the vertical offset of their zero marks to be 4 ft ¾ inch. The posts were, in effect, one gauge in two parts – one for high water, the other low water. The offset distance had to be added to the high water readings to obtain values consistent with the low water observations."
384 - 385	Maybe expand with lit on field work? night measurements were a common object of complaint among hydrographers around 1800.	I will leave Bayly's statement as it is. He may be referring to personal safety, not the difficulty of making measurements at night - he was, after all an astronomer and quite used to, and equipped for, making observations at night.
437	Why is it timely?	Good question! I have rewritten the sentence to: "To celebrate the 250th anniversary of the earliest tide gauge measurements of sea level made in New Zealand this paper has, for the first time, cast a light on this aspect of the non-astronomical work undertaken by Bayly and Wales during Cook's second voyage."

Referee #2

Line ref	Referee comment	Author response
7	Would a brief explanation of the **Board of Longitude**, its importance at the time etc., be of use to the reader?	I have added a footnote when the Board is first mentioned in the main text instead of the abstract.
10	Is it "**Queen Charlotte Sound**" or "**Queen Charlotte's Sound**" (Line 40) [I think it is the former]?- this difference appears throughout the text.	I use the latter when referring to Cook's time and the present name when referring to modern observations. Some inconsistencies had crept in which I've corrected. I have also improved the footnote (#4) explaining my nomenclature so it reads: Cook visited this sound during his first voyage and named it after the wife of King George III; it is now known as Queen Charlotte Sound / Tōtaranui. Cook's nomenclature is used when referring to the work carried

		out by Bayly and Wales, and the current name when using modern sources
35	I think a brief explanation of the phenomena "full & change of the Moon" would be beneficial.	I have added a footnote (#2) to explain this archaic term.
47	Should the latin term "prima facie" be in italics?	The house standard accepts common latin phrases in standard text, less common ones are italicised. I consider prima facie to be well known, but in any event the publishing process will pick up on this if required.
188	"The predicted tide curve, based on modern data, is shown in blue". Would a little more detail on this modern-day analysis (timeseries analysis, no of harmonic constituents, residual statistics etc), be of benefit to the reader?	I have now included, in Sect. 4.2, the durations of the time series that were analysed, and the years that the observations were made. I think this is sufficient for the reader to appreciate about the analysis.
General comment	Wales's "Tube" is essentially a 'stilling-well'. It could be worth making this comment somewhere in the text.	Agreed, I have now described Wales's wooden tube and Bayly's glass tube as stilling wells in Sect. 3.1.
In the conclusions (lines 403-404)	"These comparisons assume, firstly, that the tides have not changed materially during the intervening period..."...Might it be worth considering some sort of simple assessment of the bathymetry / geomorphology of the two locations over the years (i.e. between the dates of these historic observations to the dates of the modern-day records). This would then confirm that no significant 'natural' change has occurred adding to the validity of this statement.	The following sentence has been added at line 405: Whilst the former assumption is considered reasonable, Cook's bathymetric data is either too sparse (only 12 soundings in Dusky Bay), or non-existent in Queen Charlotte's Sound, to test this hypothesis.
424	"nonastronomical"? Would "non-astronomical" read better?	Changed to tidal as the Haigh paper discusses astronomical and non-astronomical tidal changes.
431	"Whilst the sea level observations made by Bayly and Wales are of little scientific value today (but would have provided valuable information for mariners, in the absence of further observations	Agreed, suggested wording adopted

	meanwhile, until the mid-20th century), now they are historically significant as the first measurements by tide gauge in New Zealand." Suggest rewording the last sentence to ".....their historical significance as the first measurements by tide gauge in new Zealand is undisputable."	

Referee #3

Line ref	Referee comment	Author response
8	I would reverse the names of Wales and Bayly so as to have 'respectively' before ', one to each vessel'. Unless there is some reason to have Bayly first. That would then be consistent with the order of the ship names on line 6 and the location names on line 10. (I do understand though that the pair are usually referred to as Bayly first.)	Names reversed as suggested; and you are correct that when referring to both subsequently I have put them in alphabetical order.
23	comma after journal	Comma inserted
51	would end the sentence after 'commerce'. Then have: This paper details the tide observations made by Bayly and Wales during their stopovers in New Zealand, and examines ...	Done.
57	farmer's	Apostrophe inserted.
58	I would call him Nevil Maskelyne rather than Dr. I am not sure he was formally a Dr. anyway, usually he is referred to as Rev.	Dr replaced with Nevil.
69	give Mary's surname	the sentence now begins: "Wales married Mary, the sister of Charles Green, the astronomer on Cook's first voyage ..."
74	it is amazing this was painted a century later	It would have indeed been amazing, but I made a typo and the caption now has the correct year (1794).
97	some readers are going to struggle with mean and apparent times so I would add here something like: (Apparent or 'sun-dial' time can differ from local mean time by aproximately a quarter of an hour due to the 'equation of time', Hughes et al. 1989). Hughes, D. W., Yallop, B. D., and Hohenkerk, C. Y.: The equation of time, Mon. Not. R. Astron. Soc., 238, 1529–1535,	your description added as a footnote (#5) and the publication added to the reference listing.

	https://doi.org/10.1093/mnras/238.4.1529, 1989.	
98	and were twice	'were' inserted
116	The hand-written	Line 117, I believe. Sentence now starts with The
130	comma before 'was used'	This sentence now a new Sect. 4.2 (Analysis of modern sea level data) and reworded to read: "Harmonic analysis, using software based on that of Foreman (1977, updated 2004), of hourly sea level data recorded at Motuara Island (over 8 months during 2022) and Many Islands (44 days during 2017) produced a set of tidal constituents (harmonic constants) for each island." The section headed Tide predictions becomes 4.3 and commences with this sentence: "Foreman's software can also be used to combine the amplitudes and phase lags of a location's tidal constituents to create tide predictions for a specified period of time for that place."
139	'which begins at noon on the civil day'. I think you should mention here therefore that in the astronomical day (and the naval day) PM comes before AM. Also you should give a reference to where it is said that Bayly and Wales used the astronomical day in their records.	Bayly and Wales use the 24hr clock for their times, they do not refer to AM or PM. I have not seen them state that they use the astronomical day, but I confirmed this by checking their timing of Jovian sattelite events with times computed by Gray (2020). The sentence now reads: "The predicted times then had 12 hours deducted to align with the astronomical day (which begins at noon, 12 hours after the beginning of the civil day), to conform to the time system used by Bayly and Wales."
148-152	this little section looks superficial. Could you not merge the two sentences into the following sections?	Agreed. The first sentence (lines 148-149) moved to the beginning of Sect. 5.1. Lines 150-152 deleted, rewritten and inserted at the beginning of Sect. 5.2 and reads: "As the historic and predicted sea level heights have no common vertical reference, it is not possible to relate the heights of the

		observed and predicted heights in an absolute way. Therefore, in order to investigate sea level heights, we must turn to comparing tidal ranges as calculated by differencing the heights of sequential high and low waters."
151	.. predicted tides in an absolute way. Therefore, water ... limited to comparisons of sets of heights with offsets between them. Or something like that, I have a problem with the way figures 5 etc. are plotted. You must have aligned the measurements and the predictions so they have the same average value? Otherwise I can't see how you can plot them both together. Then, what is the datum of the y-axis? I suspect it is the chart datum of the predictions. This needs a slightly fuller explanation.	see response to previous comment, also, the sentence starting at line 177 now reads: "After the historic measurements had been converted to 'upward' values, an arbitrary offset was applied to each series of observations to enable the observed and predicted datasets to be plotted together in Fig. 5, 7, 8, 11 and 12."
167	The 1773 ... could then .. (You use 'Now' several times)	Sentence now starts with The
170	comma before 'it was'	Comma inserted.
180	.. Wales, and a comparison of their ...	Done.
190	Gray (2020) is not in the references	it was there, but now I have put it in alphabetical order.
191	at noon of the corresponding civil day.	Done.
192	Again, this needs a fuller explanation of what the heights are. Whether as shown in the original records or adjusted.	"Tables A1 – A4 in Appendix A list the times, and heights (processed as described in Sect. 5.2), of the high and low waters observed by Bayly and Wales, the predicted values, and the differences between the times and tidal ranges derived from the heights."
221	and also a few in between	the 'few in between' is already covered by the words 'before, at and after'
241	when the largest spring tides	'larger' inserted instead of 'largest'
256	this section is a quotation and should be indented	agreed, it was a quote and indenting was accidentally omitted. Another reviewer suggested that this be paraphrased to clarify the important aspects in the quote as there is a lot of detail that could be difficult for a non-native English speaker to grasp. I accepted this suggestion and the text (non-quote) now reads: "A glass tube, four feet long and 0.7 inches in diameter, was attached to a long wood rod which was divided into feet, inches

		and quarters of inch to serve as a scale. The rod was, in turn, attached to a post set firmly in the water. A bamboo cane, with a very small hole, fitted to the tube provided a narrow aperture for admitting the water into the glass tube. The tube performed admirably as a stilling well as Bayly found that he could read the height of the water in the tube to a quarter of an inch or better, and that the level fluctuated no more than one-tenth of an inch even as the sea rose and fell by a foot due to wave action (Bayly, 1774b, p. 36)."
275	drop 'rate of'. The 30 and 10 mm are heights and not rates	Done.
315	maybe the 3 hours was just a throw-away remark. They were professional astronomers and their lunar transit times would have been reliable.	agreed that their transit times would have been reliable. I have accepted the 3 hour value at face value - my finding that the average was an hour longer (line 324) is a statement, not a judgement. No change.
343, 349	this is not the equilibrium tide involved here as such, it is just because of the length of the lunar day	thanks for picking up on this. Lines 343-344 now read: "... amounted to 6 hr 40 min was based on the length of a lunar day being 50 min longer than a solar day." Lines 348-349 now read: "... with the average over those days being less than that expected, hence his concern about the accuracy of his observations."
345	29 to 119 min because of the role of tidal constituents other than the predominant lunar semidiurnal tide (M2), so that	Suggested wording inserted.
367	offset. They ..	this sentence rewritten upon the suggestions of other reviewers. Now reads: "Bayly set up two posts at different heights and measured the vertical offset of their zero marks to be 4 ft ¾ inch. The posts were, in effect, one gauge in two parts – one for high water, the other low water. The offset distance had to be added to the high water readings to obtain values consistent with the low water observations."

414	drop 'rate of'	Done.
417	drop 'Regarding tidal ranges'	Done.
424	insights into any tidal changes. The Haigh et al. paper discusses astronomical and non-astronomical tidal changes	Wording changed as suggested.
429	of tide heights presented	my comparative analysis was of tidal ranges (which had been calculated from heights). No change.
445	heights and for the adjusted measured ones (presumably?)	sentence now reads: "Tidal ranges have been calculated where a high and its immediately following low water, or a low water and its following high water, were observed."
Table A1, line 1	22:17 minus 22:21 should be -00:04 and not -00:17? I just spotted this by chance and I haven't looked at others	thanks for 'accidentally' spotting this error. I have double-checked all difference values in the tables in Appendix A and amended entries as necessary.
Table B1	are these constants in time zone 1200 or adjusted ones? Please make it clear. Give the time zone. Phase should be phase lag.	The intro to Appendix B now reads: "As described in Sect. 4.3, the original phase lags for the modern locations have been adjusted to the longitude of the historic tide gauge sites to enable valid time comparisons." [Note that a new subsection has been added, so the section reference has been updated} The caption for Table B1 now reads: "Harmonic constituents used to generate tide predictions for comparison with Wales's observations at Pickersgill Harbour." The caption for Table B2 now reads: "Harmonic constituents used to generate tide predictions for comparison with Bayly's and Wales's observations at Ship Cove."