

Interactive comment on “Bardsey – an island in a strong tidal stream: Underestimating coastal tides due to unresolved topography” by J. A. Mattias Green and David T. Pugh

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Some comments on 'Bardsey – an island in a strong tidal stream Underestimating coastal tides due to unresolved topography' by Green and Pugh

I am not the topical editor or one of the reviewers for this paper, but I gave it a read and have some detailed comments that I hope are useful. I thought it was an interesting paper but the text is not very good and there are many minor problems, especially in the first half. I list these below. I will leave the official reviewers to comment more on

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the science.

19, 21, 24, 25 and many other places in the text - there are often mentions of 'altimeter data' or 'altimetry database' but the authors do not use that but instead use the outputs of a hydrodynamic tide model (TPXO9) in which altimeter data (and possibly tide gauge data) have been assimilated. There is a difference between these things and 'altimeter data' is a complete misnomer.

On the other hand, sometimes the language is correct e.g. line 18 'altimetry constrained product'. Fine.

Also everyone knows that altimetry has a coarse spatial (and temporal) sampling and provides elevations and not currents. But on line 14 we read about tidal streams and next line says they will be unresolved by altimetry. Well, yes, of course they will, whatever the spatial resolution.

So I think the text has to be gone through and the misleading language corrected. I suggest that first time you refer to 'altimeter-derived tide model information' (or similar) and thereafter just refer to TPXO9, which is what you mean anyway.

18 - observations

31 - ... constituents have been mapped using altimetry

32-34 - it is reasonable (or essential) to say e.g. TPXO here, but pointless to refer to FES and give a web site as you don't use the FES2014 model in the paper and there is no further mention of it below. I suggest that you reword to say e.g. TPXO and several other models and give a reference to Stammer et al. (2014) which the authors will be familiar with.

define TPXO acronym

Also you can add that, because TPXO9 is a model and not a simple altimeter database, it provides tidal currents as well as elevations.

35, 38 - again, there isn't an issue with altimetry products but rather with the models that have used altimetry.

39 - define GEBCO

50, 51 - ditto the above. I rest my case.

53 - We will make a ..

54 - .. for tide gauge (TG) locations ..

55 - in situ is Latin and has no hyphen, as you use correctly somewhere lower down. You could put it in italics as you do below.

... of the in situ tide gauge measurements).

Figure 1. There are many problems with this:

(i) In (a) can you please change the political Eire and UK to the geographical Ireland and Great Britain. If you insist on the former then I will insist on you showing the border with Northern Ireland.

(ii) In (b) there is no (b) shown

(iii) (b) shows longitudes but not latitudes. Also the caption says 'map data from GE' but there is no bathymetry shown (that would be essential I would have thought, surely you can get bathymetry to 50 metres or so from recent European databases) or land topography so I don't see where GE comes into this.

(iv) in the box for location East, the two sets of amplitudes and phases run into each other with no space.

(v) line 1 of caption meters should be metres as most of the paper has UK English spelling. line 3 - locations. line 3 - drop 'les' line 3 - I can't see any blue crosses. It may be that there are both green and blue dots, I can't tell, but they overlap and you can't see them separately and some people will also have problems telling green from blue.

Also Bardsey Island has no space.

line 4 - Phases should be phases to be consistent with elsewhere. line 5 - amplitudes should be M2 amplitudes, and then it should say 'the black numbers show ...', phases should be Greenwich phase lags and two minutes should be approximately 2 minutes, and 'for each tide gauge' should be 'for each tide gauge record'. Somewhere in the caption one should also refer to Table 1 and the caption should also mention the arrows.

It is important to refer to phase lags instead of phases as (i) they are lags anyway, and (ii) you also use the word phase to refer to a set of measurements.

88 - I don't think 3.2-16.5 is consistent with 'a few tens' which to me means a much larger number.

91 - this should read 'using the Tidal Analysis Software Kit of the National Oceanography Centre (NOC, 2020)' and then add NOC (2020) with the web reference to the reference list.

98 - say when Ophelia was

99 - in situ

I don't think a reader will automatically understand why the consistency of tidal age (and will he know what that is anyway?) and S2/M2 ratio is important. It could do with some extra words and a reference to Pugh and Woodworth (2014).

Also I felt at this point that there should be a para describing Table 2. The table sort of stands alone and is not really mentioned in the text although there are occasional mentions of it. But a para here would be justified. For example, why did you choose just to show M2, S2 and M4. Then, you are inviting the reader to compare the tide gauge and model values, but S2 is not strictly comparable as the measurements will come from pressure sensors and so include the air tide. You need to mention points like this before the reviewers do.

104 - 1 minute

Table 1 - column 3 should say East Longitude, 4 should be Time and Date Deployed (hour (GMT), day, month, year), 5 should be Time and Date Recovered (hour (GMT), day, month, year), 6 should be Mean Depth

It is important to spell out the date convention as there is often ambiguity between US and UK conventions.

Phase 2 deployed times have an extra /

108 - for the reasons explained above I think the title should be Tide Model Information and then the first sentence should read 'The tide model used in this paper is that of the TPXO9 ATLAS which is derived from assimilation of both satellite altimeter and tide gauge data (Egbert and Erofeeva, 2002).'

Actually I was surprised to learn lower down that you say TPXO9 included some tide gauge data as well as altimetry. Well, ok, if that is case the above sentence is needed.

112 - using the word 'astronomical' in this way is a bit strange. But as you say you are making some kind of analogy with Highest Astronomical Tide. But I wonder if it would better to define some acronym here such as GA to mean 'Greatest Astronomical'.

Also, many times below you refer to astronomic and not astronomical which must be the same thing. Use an acronym instead.

114 - drop 'we discuss'. reword 'This term is thus analogous to'

119 - give a reference to SNAP 7.0

123 - why was this hour chosen and not an hour later for example?

129 - reword. Summary of findings for M2, S2 and M4 from harmonic tidal analysis of tide gauge and TPXO9 model data. The latter were ... locations given ...

drop 'to ease reading'

Good to have *in situ* in italics and no hyphen.

Top left of table should be Station

You have TPXO here and in places in the text. It would be best to use TPXO9 throughout.

line 1 of phase 2 has TPXO9 phase to 4 decimal places instead of 2

135 - phase lags

137 - .. (west) (Table 2).

I struggled to understand some of the numbers in this para. For one thing why do -14 and -9 have minus signs as you don't specify by difference whether it is east-west or west-east.

Then surely at springs the amplitudes will be larger in the east by 16 cm (8 from M2 and 8 from S2), compared to spring total amplitude of about 1.8 m, which gives 9% to me and not 14.

Then I don't see where the 9% comes from along-island as you don't have a sensor in the south anyway. So please can you spell out things so there is no confusion? Also I don't see where 30 cm comes from - do you mean +/- 16 cm?

150, 151 - phase lags. altimetry data again!

152 - .. is a substantial model deficiency in representing the role of the island due to its limited resolution, resulting in ..

159 - drop the comma

I must say I don't find this para very surprising.

162 - you mean 'As a representation of the shallow-water harmonics, ..'

168 - altimetry alone. Ditto again.

173 - you have this the wrong way round. East is on the x-axis so you plotting the difference versus east.

174 - what does 'the first data point of the day' mean? Do you mean 0 hr on the day.

Figure 3: (i) the colour scale says current amplitude but the caption says current magnitude. I suggest use magnitude for both. Then line 185 says they are spring flood and neap flood but the caption says neap ebb and spring flood. And then because (b) looks to have smaller values anyway I guess that is for neaps? Anyway this is all inconsistent.

184 - perhaps it would be best to also have the Admiralty chart in the reference list.

194 - strait. You have called it a sound elsewhere

199, 201 and elsewhere - astronomic - see above

244 - this is not a suitable heading for a science paper. I suggest you have something like 'Island Tidal Wakes' and by all means express your reservations in the text.

245 - altimetry data again

246 - computation of what

253 - this sentence has no verb

266-269 - this sentence needs rewording. Makes no sense

Figure 4: needs (a) and (b) adding.

272 - mentions Landsat 8 twice. 273 - is halfway. 274 - 3b should be 4b.

278 - 3a should be 4a

You say here 4a and 4b are neaps and springs but in the caption says halfway between and after springs.

Also I had to read this twice as from the caption I originally understood that to mean

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just after a particular spring tide (say an hour after) whereas what I think you mean is after a period of springs (like a day later). Anyway, can you please make this clearer?

286 - altimetry-constrained models

'where the bathymetry is unresolved' - you mean unresolved in these models. There are in fact decent bathymetry databases available - I suggest you use them for Figure 1(b).

292 - one is not 'relying solely on altimetry' for the reasons above. You are relying on the models.

301 - sea level

302 e.g. → for example

reference - please check that you have included them all. Pugh and Woodworth (2014) for example is missing.

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