

## ***Interactive comment on “An overview of underwater sound generated by inter-particle collisions and its application to the measurements of coarse sediment bedload transport” by P. D. Thorne***

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Reviewer 1

As far as I can tell, the manuscript is simply a regurgitation of results from Thorne (1985), Thorne (1986), Thorne and Foden (1988), and Thorne et al. (1989). This includes figures that seem self-plagiarized and yet are not even clearly attributed (for every figure that re-plots a figure that has previously been published, I expect a citation in the caption). This is not acceptable, even in a review paper. Unfortunately, this

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manuscript does not even serve the purpose as a review, since it really only discusses work by the author and his coauthors, and the latest results shown seem to be from 1989, i.e. 25 years ago, with only a handful of the references being to papers written in the last 10 years. This is simply not acceptable, and should not be published. To be specific about which criteria of ESurf are not met, the following questions posed by ESurf to reviewers are answered in the negative: Does the manuscript represent a substantial contribution to scientific progress within the scope of Earth Surface Dynamics? No. Does the paper present novel concepts, ideas, tools, or data? No. Are substantial conclusions reached? No. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? No.

Reviewer 2 (first review)

We agree that there is substantial mention of previous personal research throughout this article. From the author, I would like to see explicit statements indicating the new research approaches and/or results. I also agree with your analysis of the ESurf criteria. If revised, there is substantial changes needed.

Author's first response to the reviewers

The intention of the manuscript is to provide an overview on the production of sound by impacting bodies and how such sound may be used to measure bedload transport. It was written in response to a request from the organisers of the International workshop of Acoustic and Seismic Monitoring of Bedload and Mass Movements held in Zurich Switzerland, 4th -7th September 2013. The expectation was that I would produce a manuscript along the lines of the Keynote presentation I gave at the conference on 'The acoustics of colliding bodies and its use in monitoring bedload' for the SI 'Acoustics and seismic monitoring of bedload and mass movement' in ESurf.

To provide the reader with an overview on the topic the major part of the manuscript was aimed at synthesising earlier works on impact sound radiation. It is readily acknowledged that works from the 1980's are used; however, as far as the author is aware the

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laboratory and theoretical studies of Thorne et al have not been superseded. The aim in the manuscript was not to present new theoretical research works, but utilise the impact theory in a somewhat different manner than previously employed. In the earlier theoretical studies the main aim had been to understand experimental observations of impacting spheres. However, in the present study, the object was to examine more systematically the effect different impact parameters had on the radiated sound and present a manuscript with results more focussed on acoustic monitoring of bedload transport and thereby more relevant to coastal and riverine scientists.

Regarding the inference to a lack of references from the past decade, the author carried out a number of searches and contacted some of the leaders in the field. The reason for choosing the Nature paper, to highlight the field capability of acoustic monitoring of bedload transport, is that it has been one of the more successful field studies. The author would be happy to receive contemporary papers/references on successful field studies of acoustic measurement of bedload sediment transport processes.

The author prepared the manuscript with the aim of making the understanding of acoustic monitoring of bedload transport more accessible to the non-acoustician wanting to use the technique. It is anticipated that equipped with this understanding the earlier more detailed papers could then, if required, be usefully engaged. This understanding and access is the contribution the author wishes to make to the SI and scientific community in the present overview manuscript.

Reviewer 2 (second review in response to author's reply given above) and the author's point by point response to this second review.

1. I have provided my formalized comments to the author in the following text. My recommendation is the work needs significant revision before consideration to publish. Regarding the Manuscript Evaluation Criteria listed by esurf, here are my evaluations: Scientific Significance: Poor While the manuscript provides a large overview of the author's previous work, there is little contribution to new ideas, theories, methods, or even

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data. I understand the circumstances leading to submission of the paper. However, I'm simply following esurf protocol for evaluation and it is clearly lacking in this metric.

I have tried to deal with this point in 'Author's first response to the reviewers' above.

2. Scientific Quality: Good The author's former work is comprehensive and valid. However, I have some concerns regarding the research design of the rotating drum and its effective ability to replicate true sediment generated noise that one would observe in the field. Maybe a discussion of this concept would help alleviate this concern.

I would be happy to briefly deal with the reviewers concerns and refer to references on the design and effectiveness of the drum measurements

3. Presentation Quality: Good The paper reads well, however, the equations and their associated definitions are cumbersome. A more suitable approach would define the constants and variables more clearly.

I can do this and add a list containing the definition of the main parameters at the beginning of the text.

4. The following comments are specific changes to be made and other notes: Abstract: Line 7, misspelling of "amount" Line 16, remove comma after "environment"

I will do this.

Introduction: This section needs a more comprehensive literature overview. Line 3 on page 3, add a comma after "difficulties"

The review on the acoustics literature is comprehensive; however, I could add more contemporary details of alternative surrogate bedload measuring techniques. I can add a comma.

Section 2: Lines 18-19 on page 6, Below equations 2a and 2b, I did not see a definition for "c". I am finding it difficult to easily find the definitions of the variables within the context of your equations. Please consider revise your equations, so readers can easily

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step through the variables.

I will attend to this and provide a list of parameters with units at the beginning of the text

Section 3: Line 26 on page 7, why were these sizes specifically chosen? Line 23 on page 9 needs a period after "changed"

The sizes were chosen to represent a broad range of particle sizes from granular to cobbles. This was considered to be reflective of the common sizes of materials on which the acoustic technique would be used for bedload measurements. I could add this to the text to explain why the sizes were chosen. I will add the period.

From Fig. 6a, it is clear that the theory matches best around 10 kHz for both size spheres. However, this is not true for the 0.00075 m gravel in Fig. 6b, which matches best around >100 kHz. Any explanation?

In figure 6b two plots are presented for particle sizes of 0.0015m radius spheres and 0.00075m radius gravel. In both cases the prediction compare reasonably well with the observations. I am not clear on what explanation the review is concerned about.

General comment from the author

The use of sediment generate noise, SGN, to acoustically measure bedload transport and the underlying theory of rigid body radiation, is distributed among acoustic, geological, hydraulic, geophysical and sedimentological journal. The aim of the present manuscript was to bring together an overview of SGN and its underlying theoretical basis, in a single, clear, reasonably digestible manuscript, which non-acousticians interested in using acoustic for bedload transport would find useful. The author is well aware of the citations in the manuscript referencing some of their published works from the 1980's and early 1990's; however, the acoustic analysis of SGN has not been superseded in more recent publications. In the present manuscript the author has simplified the main solutions from rigid body radiation analysis to make the topic more accessible

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and focussed the output on bedload transport. In many respects the manuscript aims to reinvigorate contemporary interest in SGN by making the acoustic analysis more straightforward and illustrating its potential capability.

The author is happy to resubmit a revised manuscript attending to the points made by reviewer 2 in their response to my 'first response to the reviewers' if this was encouraged by the editors. However; the central analysis will necessarily remain comparable to what it is at present; a synthesis of a simplified theory on acoustics of particle impacts and its application to bedload transport. As commented by Dr Jonathan Laronne, a world leading expert in surrogate measurements of bedload, in the interactive discussions; 'this paper expounds the relevant issues, exemplifies them' and 'It is expected that the basic physics clarifications made by the author will serve to attract researchers to this exciting methodology.'

Please also note the supplement to this comment:

<http://www.earth-surf-dynam-discuss.net/2/C388/2014/esurfd-2-C388-2014-supplement.pdf>

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