

Review of Booth et al., Thin-layer effects in glaciological seismic amplitude-versus-angle (AVA) analysis: implications for characterising a subglacial till unit, Russell Glacier, West Greenland

This paper concerns the use of active seismic methods to interpret basal conditions beneath glaciers and ice sheets. Specifically, it uses a modelling analysis to investigate the hypothesis that thin layers of sediment can introduce ambiguity in the interpretation of basal conditions from the results of AVA analysis. This in fact is the key message of the paper and one which will ultimately make it a worthwhile, even very useful, publication. In general, I very much like the paper and its progression from mini-review to critique of previous methods, the tests on synthetic data, and then the application to data from Greenland. Unfortunately, however, my first reading of it was undermined by numerous glitches in terminology and symbols (very notably w.r.t. Poisson's ratio). This made it harder work to read than it deserves, and I feel it should have been more thoroughly proof-read with respect to these issues before submission. I've noted some errors below but would prefer the authors return to this themselves and ensure on a resubmission (that I encourage) that these errors are thoroughly ironed out.

Some minor issues

At the close of the introduction (top of P762) the authors state the manuscript will apply their strategy to (a) Russell Glacier and (b) reinterpretation of Peters et al. (2007). Later in the paper, a whole Section (5) is devoted to (a), which is entirely deserving given it is the authors' data. In effect however the promised part (b) forms only a small part of Section 6. I guess from the introduction I expected more equal weight to be given to these objectives. I'd be more inclined only to mention the Greenland objective in your introduction, as this is the major "real data" section of the paper. The Peters et al data reinterpretation is fair enough as one implication to be discussed.

Throughout the manuscript there is an overuse of "notes" given in bracketed sentences. These statements are not always notes in my opinion, but valid points that should not be understated in this way. In most cases take away the brackets and word "note" and just leave the sentence in.

Inconsistency throughout manuscript concerning notation for Poisson's ratio (σ or ν ?).
Make sure Knott-Zoeppritz is always spelt with a hyphen.

P762, Eq 1 and line 19: Should use either capitals or not for z .

P763, Eq 2: Why use small p and capital S ?

P763, line 5: What is q in $R(q)$?

P763, line 15, Fig. 1a, Table 1: There is something wrong here. In Fig. 1a, acoustic impedance Z (or z , you decide!) decreases from curve i to curve v BUT in Table 1 acoustic impedance INCREASES from curve i to curve v. I think it's just that Table 1 column for z needs reordering.

P763, line 24: Should be Shuey (1985)?

P764, line 13: sp. Poisson's

P765, line 11: Missing word "till"

P765, line 26: remove hyphen between "more" and "rapidly"

P767, line 17: It would be more correct to say if it "were" resolved.

P771, Line 23: sp. within

Fig. 1: The first time I referred to this figure (from p.763) I had no idea what A and B were, so I think it's worth adding these into the caption for this figure. Also in this caption, "Poisson's" should be written with an apostrophe, and "specific" should be "specified".

Fig. 6: Remove comma after "data" and sp. Poisson's