

Interactive comment on “Using Horizontal to Vertical Spectral Ratios to construct shear-wave velocity profiles” by Janneke van Ginkel et al.

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Dear Malgorzata Chmiel,

Thank you for your positive remarks and some insightful comments on the paper. We appreciate the time and effort that you have dedicated to our manuscript. We have discussed your 3 main suggestions and summarized the outcome below. Your technical comments in the manuscript will be updated in the final revised manuscript, which will be uploaded in a later stage.

1. Thanks for pointing this out since it is an interesting thought. Indeed, we assume a stationary subsurface across the timescale of the different teleseismic events. Mordret et al. (2020) and Brenguier et al. (2020) have shown that the Chalk Group and NSG

C1

can experience velocity variations. However, they conclude that the largest shear-wave variations (reaching ± 1.5 per cent) are located below 800 m in the faster layer of the Chalk Group, while smaller variations are observed in the shallower North Sea Group (max 0.2%). With a 0.2% velocity change, the fundamental resonance frequency would be scaled by 1.002. For instance, a resonance frequency of 0.1700 Hz would scale to 0.1703 Hz. Such a change is far below the resolution of the method, which is about 0.01 Hz. Similarly, changes in resonance amplitude, due to tiny changes in impedance contrast, are too small to detect with teleseisms. An-event dependent noise term, caused by waves that are not resonating, has a much larger impact on the (apparent) resonance amplitude that is recorded.

2. We had missed these recent references. Thank you for pointing us to them. In Section 7.3, we have added these references in the light of discussing the Groningen ambient noise field.

3. You have raised a good point here and accordingly, we have restructured the introduction. The revised manuscript will contain the update.

We hope we cover your comments and are willing to respond to any further questions and suggestions you may have.

Sincerely,

Janneke van Ginkel, Elmer Ruigrok and Rien Herber

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-86>, 2020.

C2