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Editor, *Journal of Geophysical Research: Solid Earth*

June 28, 2021

Dear Editor,

Enclosed is the manuscript titled “Depth and thickness of tectonic tremor in the northeastern Olympic Peninsula” that we wish to be considered for publication in the *Journal of Geophysical Research: Solid Earth*. This paper was co-authored with Kenneth Creager and is composed of entirely unpublished work. The submission contains a PDF file of the manuscript with text, tables, and figures and a PDF of supplementary materials, which contains an additional seven figures.

We developed a method to estimate the depth of the source of the tectonic tremor, and the depth extent of the region from which the tremor originates, using S minus P times determined from lag times of stacked cross-correlations of horizontal and vertical components of seismic recordings from small aperture arrays in the Olympic Peninsula, Washington. We found that the source of the tremor is located close to the plate boundary in a region no more than 2-3 kilometers thick. The source of the tremor is thus distributed over a slightly wider depth range than the low-frequency earthquakes. However, due to the depth uncertainty, it is difficult to conclude whether the tremor is located near the top of the subducting oceanic crust, in the lower continental crust just above the plate boundary, in a layer distributed above and below the plate boundary, or confined to a very narrow plate boundary. The location of the tremor relative to the low-velocity layer also observed near the plate boundary also remains uncertain. Tremor and LFE depths are consistent with filling a volume in the upper subducted crust that is characterized by high fluid pressure and very low S-wave velocities described as the preferred model by Bostock (2013).

To aid in the review process, we have compiled a list of suggested reviewers. For their previous work on tectonic tremor we suggest Kazushige Obara at the University of Tokyo ([obara@eri.u-tokyo.ac.jp](mailto:obara@eri.u-tokyo.ac.jp)), Michael Brudzinski at Miami University ([brudzimr@miamioh.edu](mailto:brudzimr@miamioh.edu) ), Roland Bürgmann at the University of California Berkeley ([burgmann@seismo.berkeley.edu](mailto:burgmann@seismo.berkeley.edu)), Satoshi Ide at the University of Tokyo ([de@eps.s.u-tokyo.ac.jp](mailto:de@eps.s.u-tokyo.ac.jp)) or Michael Bostock at the University of British Columbia ([bostock@eos.ebc.ca](mailto:bostock@eos.ebc.ca)).

Thank you for your consideration of our submission. We look forward to hearing from you regarding the manuscript.

Sincerely,

Ariane Ducellier

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