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Supplemental Material

Tracking crustal thickness at the sediment inundated edge of the Gawler Craton, South Australia

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Additional Supporting Information (Files uploaded separately)

1. Captions for large Table S1

Contents of this file

1. Figures S1 to S6

Table S1. (Uploaded separately) Table contains obtained Moho depths for Lake Eyre Basin and AusArray-SA stations. Ps_m and Ps_b represent the P converted to S phase at the base of crust and sediment, respectively.

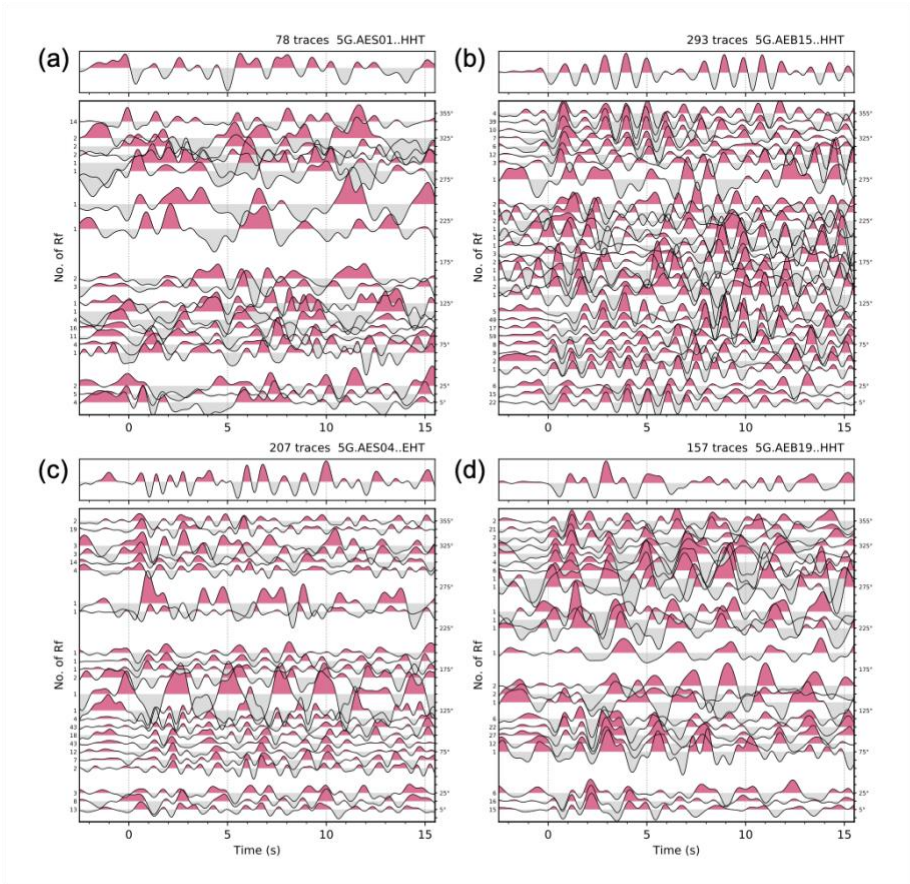

Figure S1. Transverse receiver functions for four stations with increasing sediment thickness (a-d). Please refer to Figure 4 of manuscript to compare with Radial RF for these stations.

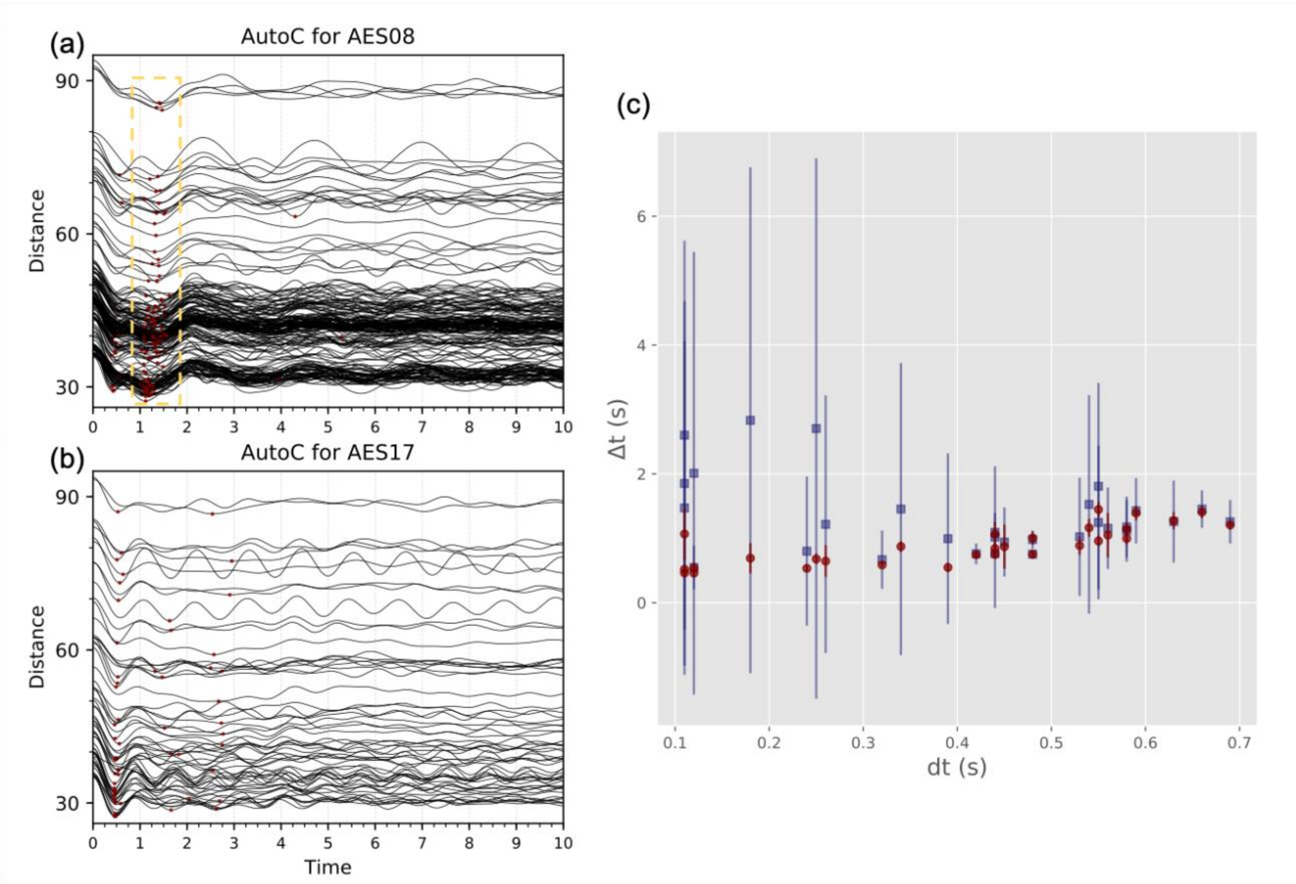

Figure S2. Receiver function autocorrelations for stations AES08 (a) and AES17 (b). Red dots are automatically picked location of minima, which provide the resonance filter parameters - r_0 and Δt - for each earthquake. For station AES08 (a), majority of red dots are within the yellow dashed box, while those outside are discarded. Contrastingly, for station AES17 (b) located on thick sedimentary cover (~ 1500 m), red dots are distributed in a wide range; thus, for such stations, the resonance filter was not applied. c) Δt values for all stations where resonance filter was applied before (purple) and after (red) removing unreasonable Δt values (refer to main text for constraints). Δt values are plotted against Ps_b arrival time (P converted to S at the base of sediments).

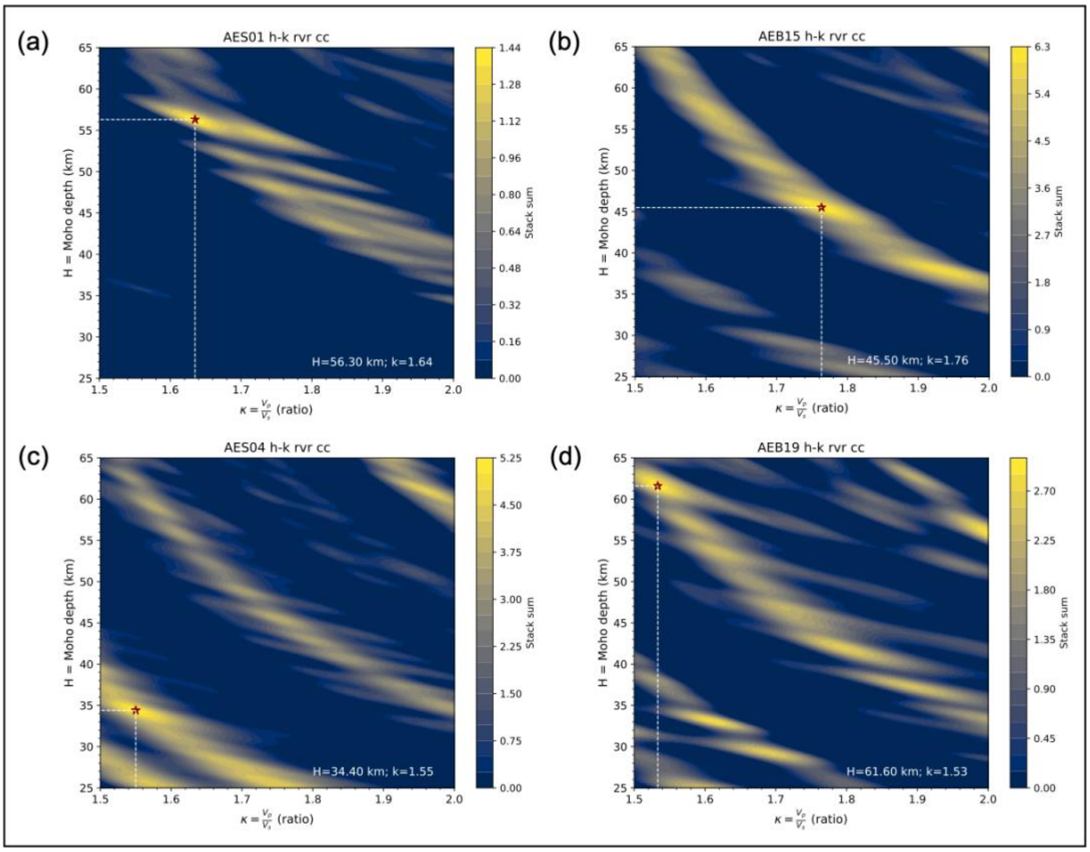

Figure S3. H-k stacking results (using equation 5 of Yu et al., 2015) for four stations from the Lake Eyre Basin array, arranged in increasing order of sedimentary thickness (a-d). (a) AES01 had weak Moho signature in the waveforms, and the resulting h-k solutions are unconstrained. (b) AEB15 has strong reverberatory signature and despite being significantly corrected by the resonance filter, the h-k grid search results in a band of acceptable solutions. (c-d) h-k search for both AES04 and AEB19 resulted in largely unstable solutions.

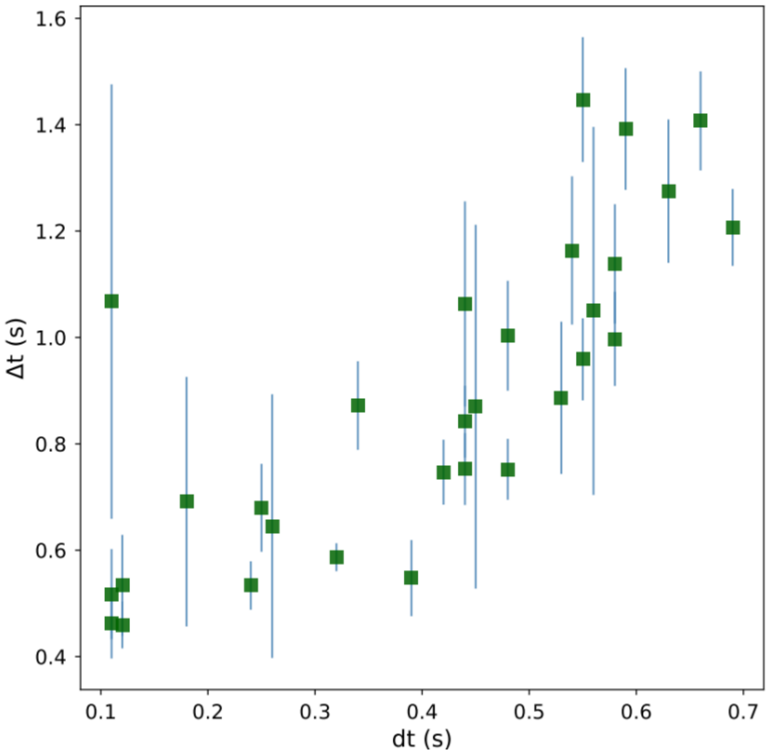

Figure S4. Mean Δt values for each station plotted against the Ps_m arrival time (dt) with standard deviations represented as blue vertical bars. A positive correlation exists between the two variables.

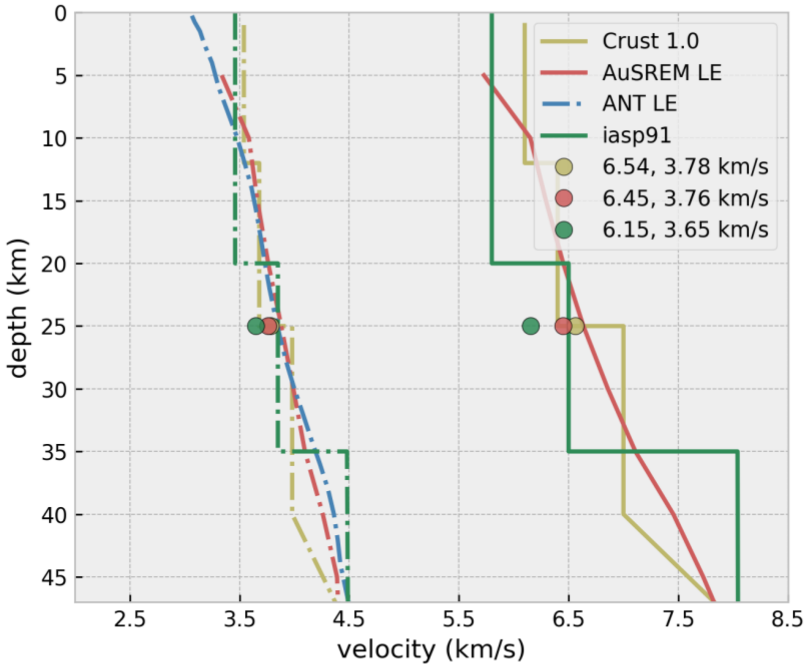

Figure S5. 1-D velocity profiles for P-wave (solid lines) and S-wave velocities (dashed lines) for the study region from four different velocity models (Crust1.0 – Laske et al., 2013; AusREM LE - Salmon et al., 2013; ANT LE - Chen et al., 2021; iasp91 - Kennett and Engdahl, 1991). Coloured circles represent the average velocity within the crust (assumed as 40 km thick). The 3-D velocity models (Crust1.0, AusREM, and ANT) are spatially averaged for the study region to obtain the 1-D velocity model.

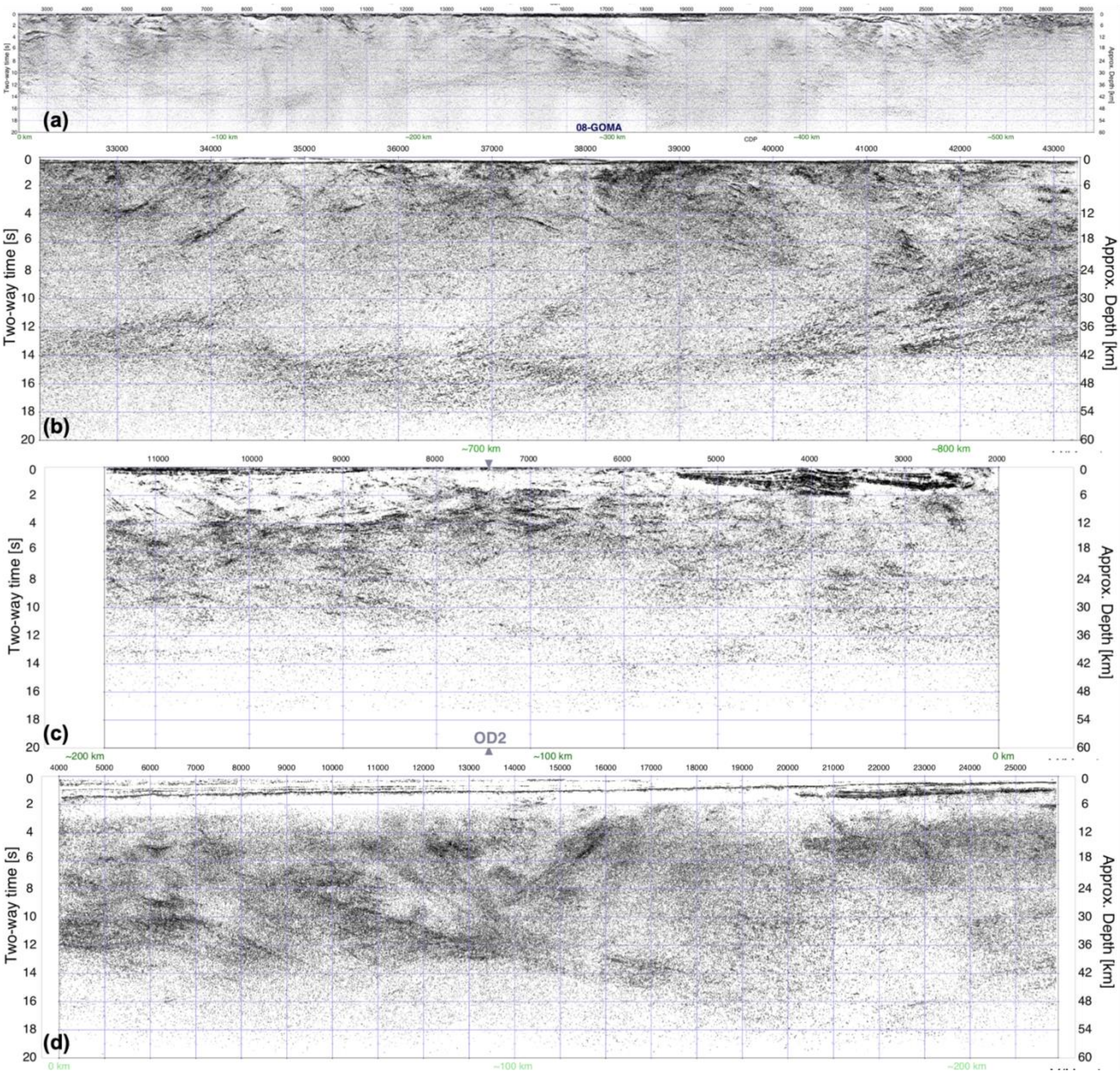

Figure S6. Active reflection profiles for seismic lines within the study area. These include (a) GOMA, (b) eastern most 200 km of EC-GW, (c) OD1, and (d) 14-CF2. Reflection data is from Geoscience Australia's portal (http://portal.ga.gov.au) and profile plots are from Kennett et al. (2016). For the location of the lines, the reader is referred to Figure 1a in the main text.

References

1. Chen, Y., Saygin, E., Kennett, B., Tork Qashqai, M., Hauser, J., Lumley, D., Sandiford, M., 2021. Next-generation velocity model of the australian crust from synchronous and asynchronous ambient noise imaging. v1. URL: https://doi.org/10.25919/m2a2-qb97, doi:10.25919/m2a2-qb97.
2. Kennett, B., Saygin, E., Fomin, T., Blewett, R., 2016. Deep Crustal Seismic Reflection Profiling: Australia 1978–2015. ANU Press and Geoscience Australia.
3. Kennett, B. and Engdahl, E.R, 1991. Traveltimes for global earthquake location and phase identification. Geophysical Journal International 105, 429–465.
4. Salmon, M., Kennett, B., Saygin, E., 2013a. Australian seismological reference model (ausrem): crustal component. Geophysical Journal International 192, 190–206.