

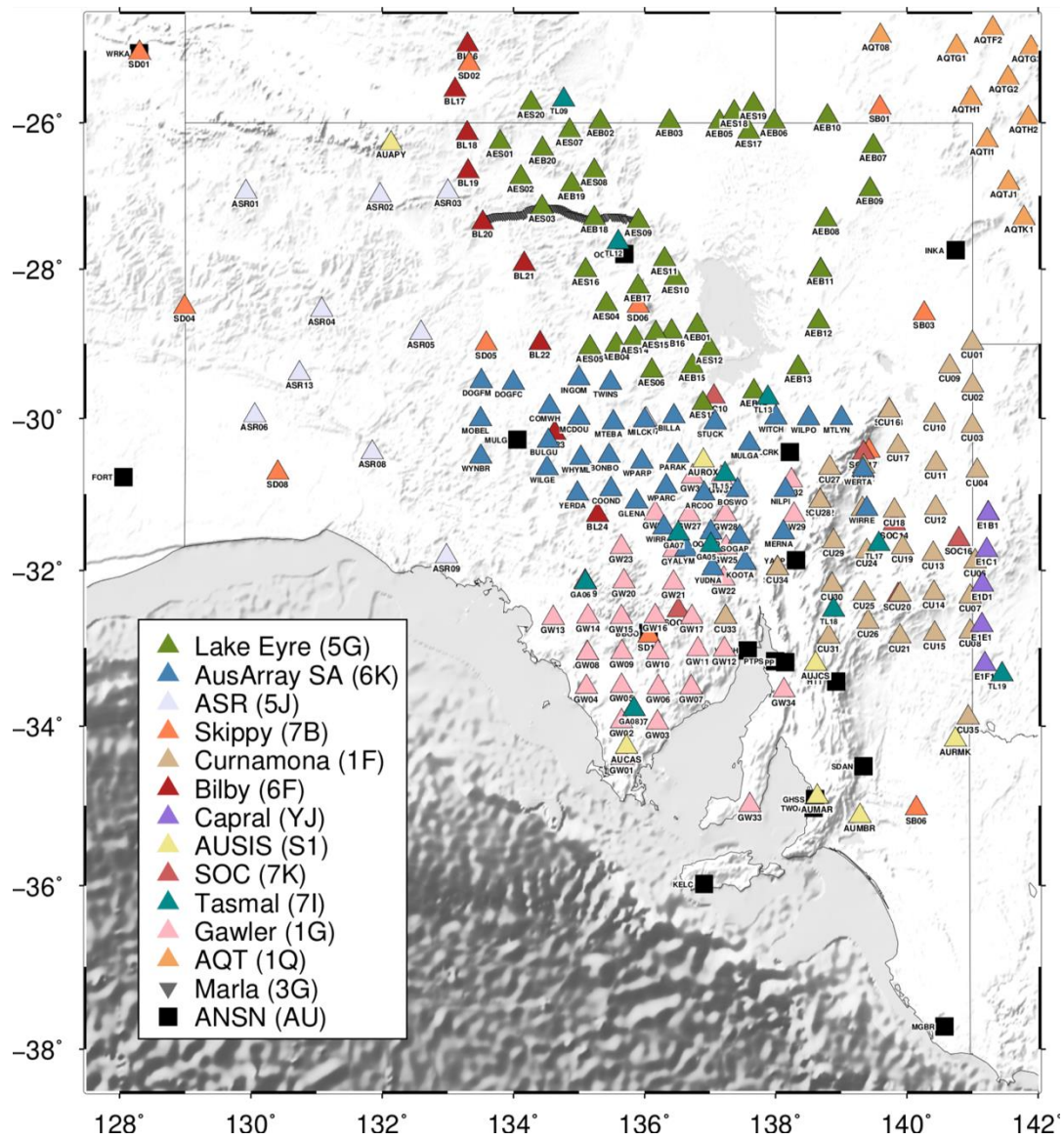
## Supplemental Material

*Characterising the depth of cover across South Australia: A simple passive-seismic method for estimating sedimentary thickness*

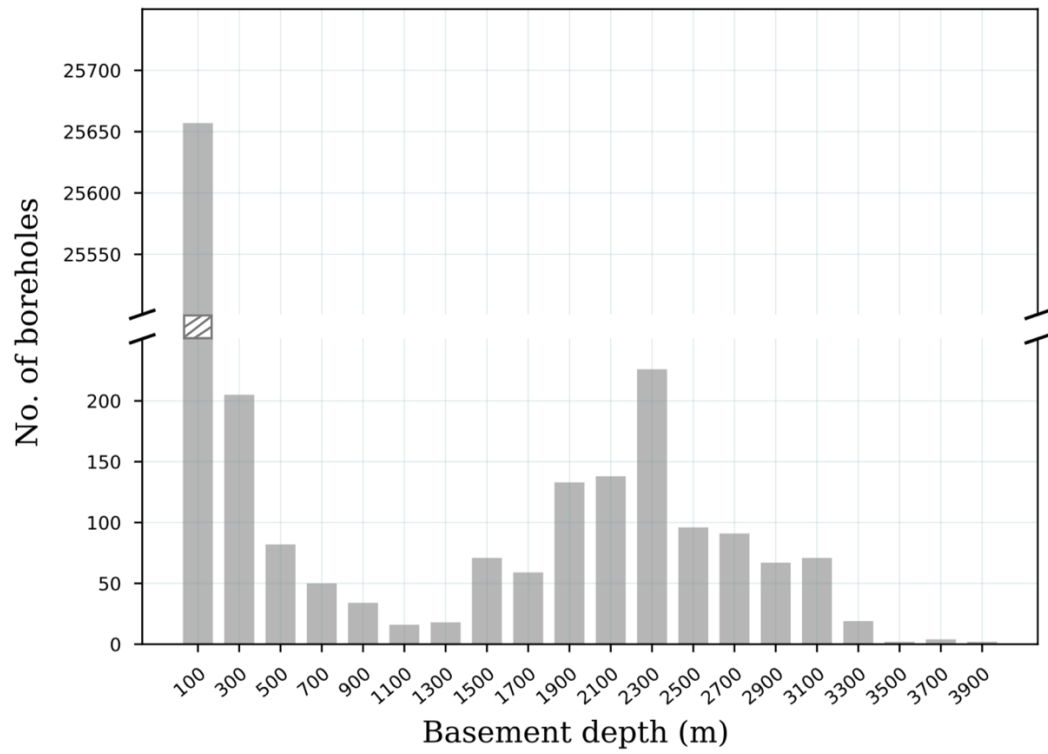
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This document contains the supplementary figures (**S1-S6**).

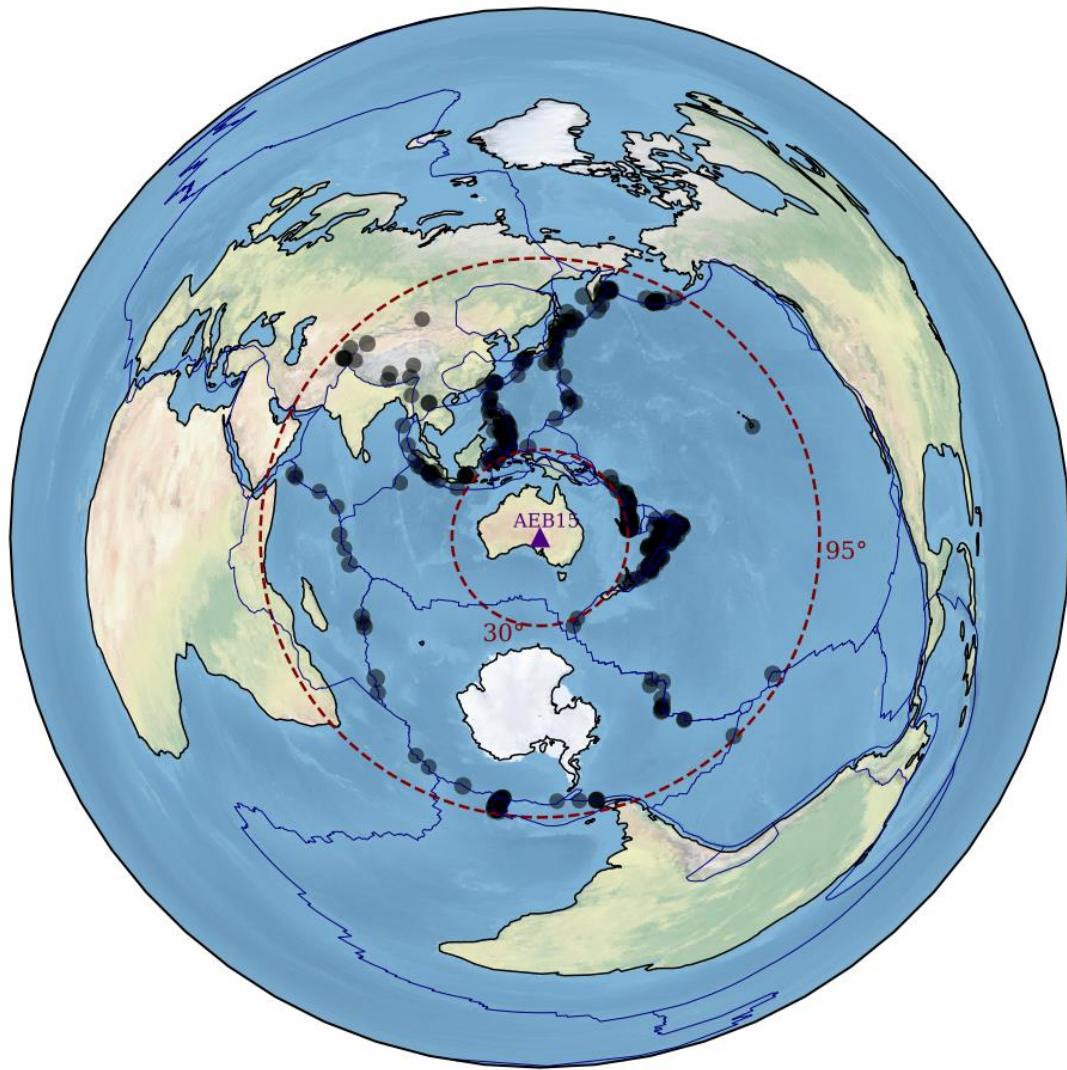
**Table S1:** Table contains the Psb phase arrival information and the RF estimated basement depth. N total, it contains 231 seismic stations which had at least 10 individual receiver functions that passed the quality control. Columns represent – Network, Station, Latitude (North), Longitude (East), No. of RF, Psb arrival (sec), RF estimated Basement depth (m).



**Figure S1.** Map of all the seismic stations (243) used in this study. Stations are coloured by the seismic networks, according to the legend. See Data and Resources Section for more information.

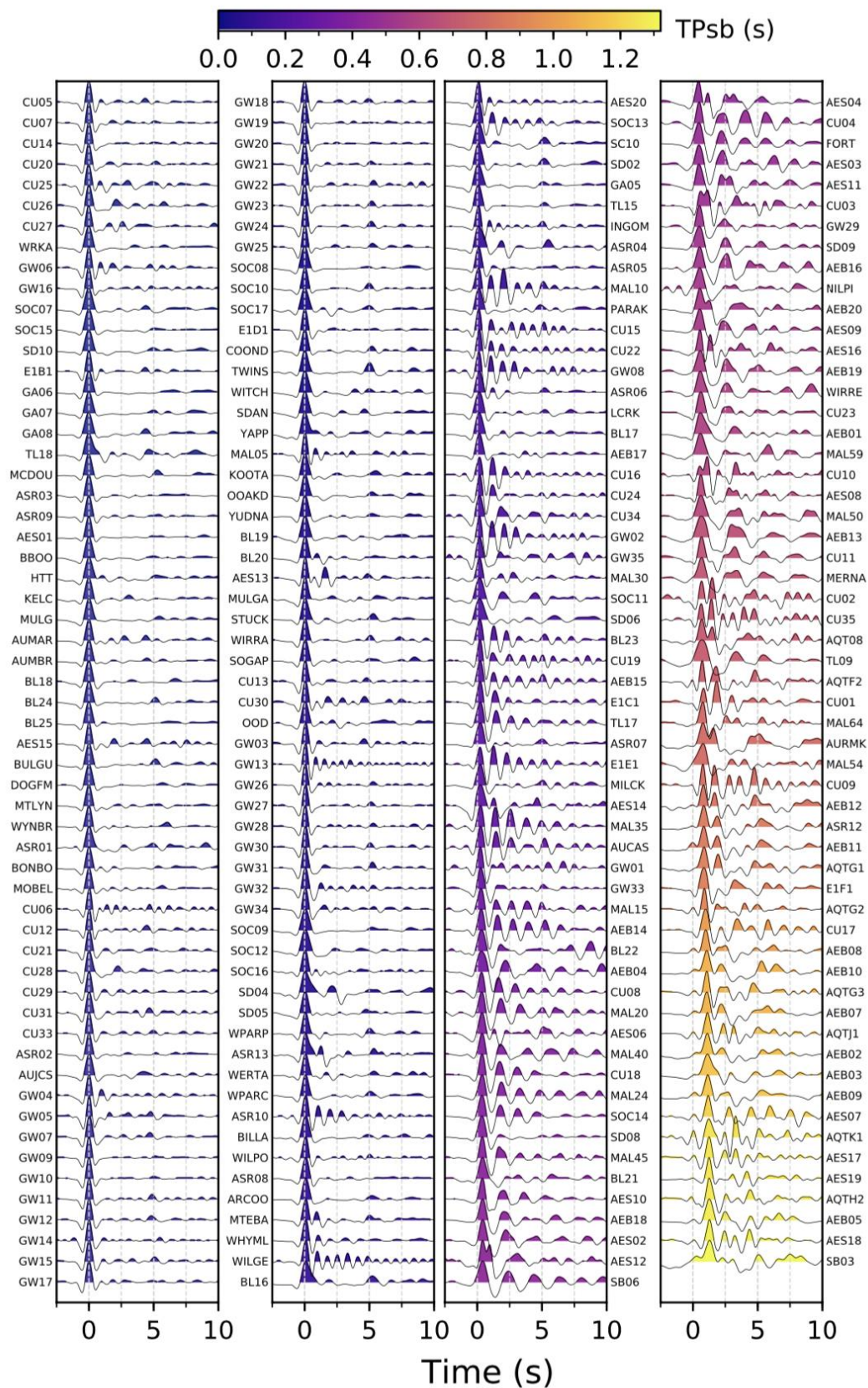


**Figure S2.** Histogram depicting the variation in the borehole depths in South Australia (see Data and Resources Section for details). Out of 27,100 boreholes, more than 25,657 were drilled in places with less than 200 m of sediments. The parallel bars on the y-axis represent a change in scale along the y-axis.

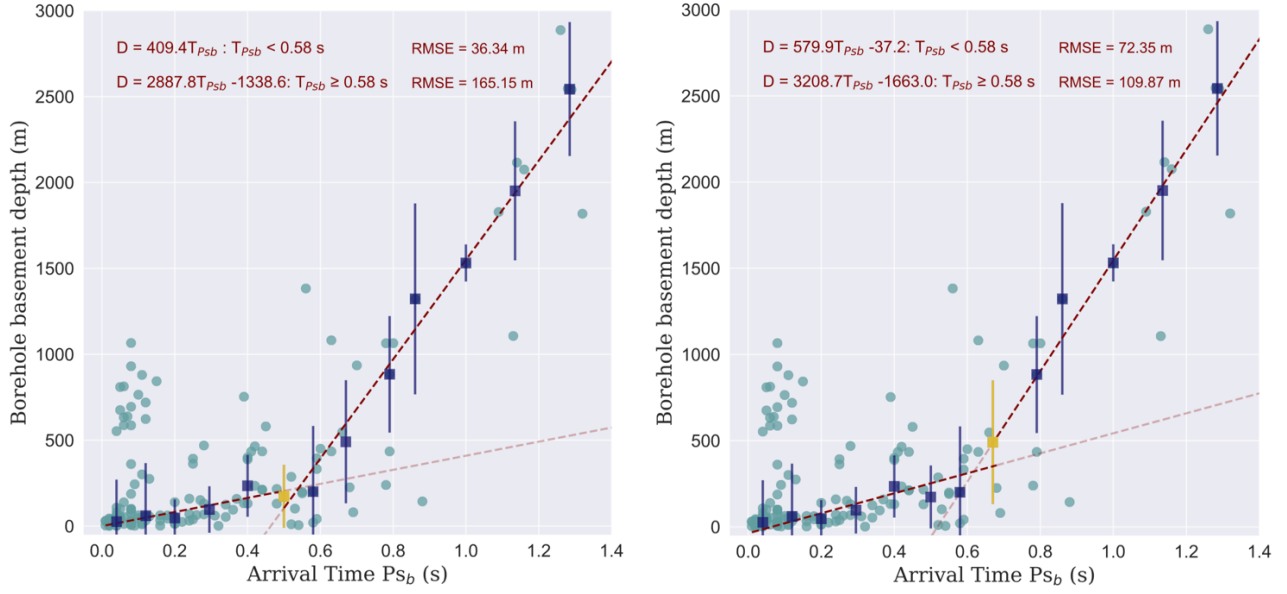


**Figure S3.** Earthquakes (black circles) available for receiver function analysis for a typical station AEB15 (Lake Eyre seismic array). The dashed red circles represent the epicentral distance between which the earthquakes were used. In total, 246 earthquakes of  $M_w > 5.5$  were available.

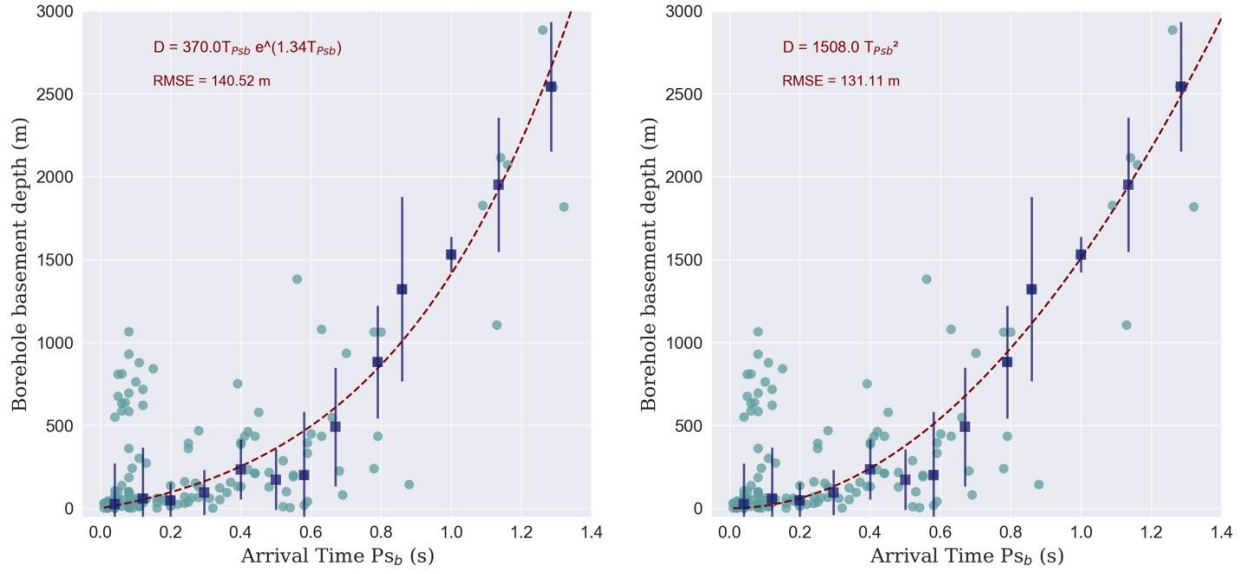




**Figure S4.** Stacked radial receiver functions for 231 seismic stations which had at least 10 individual receiver functions that passed the quality control. The stacks are coloured and sorted by the TPsb value. Station name is printed next to the waveform.



**Figure S5.** Statistical comparison of the receiver function estimated  $TPsb$  and borehole basement depth beneath 200 seismic stations, plotted as turquoise circles. Dark blue squares are the binned median values for every 0.9 s, with solid blue lines representative of the standard deviation. The yellow squares (left 0.5 s; right 0.68 s) denotes the point of inflection in the data, about which two linear equations (maroon dotted lines) are regressed. When a different inflection point is chosen, as shown here, then the root mean square error (RMSE) increases compared to Figure 5.



**Figure S6.** Same as Figure S5, except data is regressed to an exponential (left) and quadratic (right) relation between basement depth and  $TP_{sb}$ . In both cases the RMSE is larger than the best fitting linear relations (Figure 5).