Geophysical research Letters

Supporting Information for

Post-subduction tectonics of Sabah, North Borneo, inferred from surface wave tomography

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Contents of this file

Additional Supporting Information (Files uploaded separately)

Introduction

This supplementary information includes:

- Locations of the grid nodes used in the inversion for phase velocity
- Results from synthetic recovery tests
- Plots showing the phase velocities calculated for each period and each model.
- Crustal thicknesses calculated using different velocity contours.
- Details of the Vs-to-T conversion including the look-up-table and results for the 1D shear wave structure
- Results for Vs synthetic recovery tests for low-velocity layers at depth.
- Details of the earthquake catalogue used.
- The locations of stations
- Tabulated average dispersion curves and 1D velocity model
- Final phase velocity, Vs and depth to LAB models

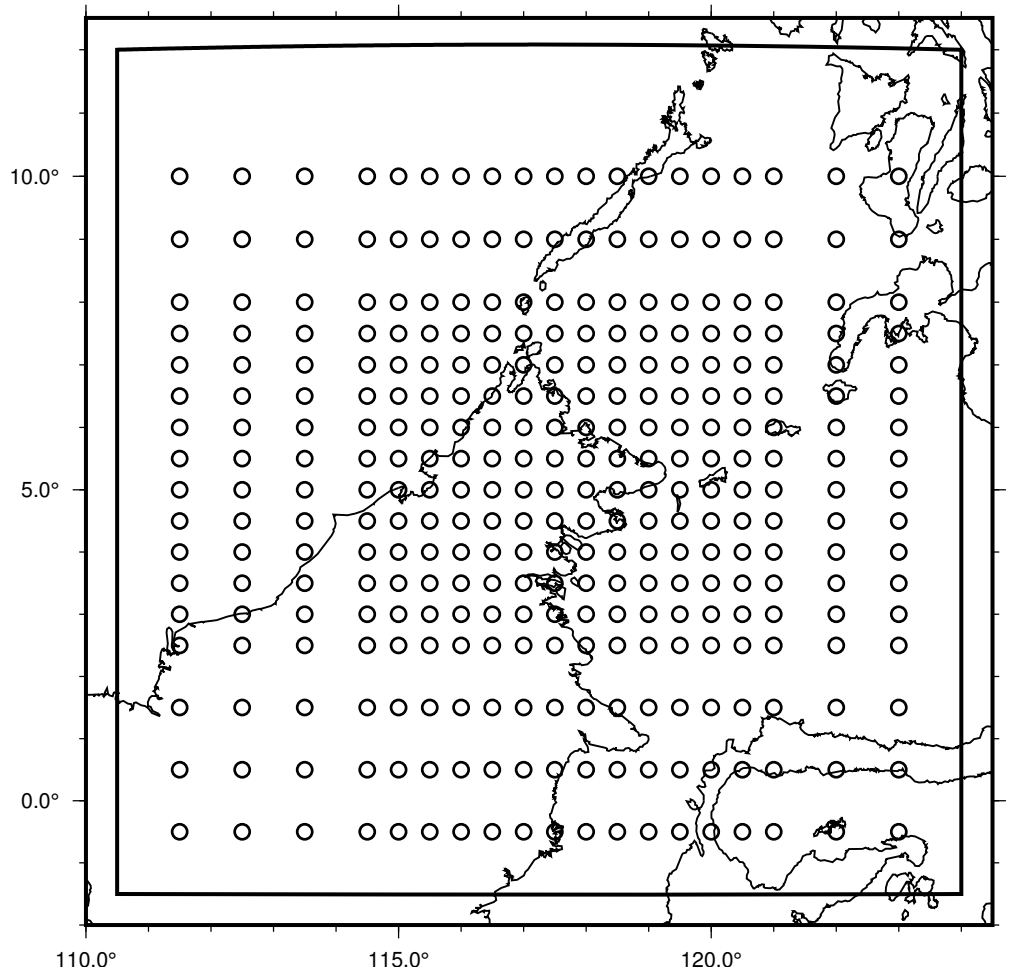

Figure S1. Node locations for the phase velocity inversion.

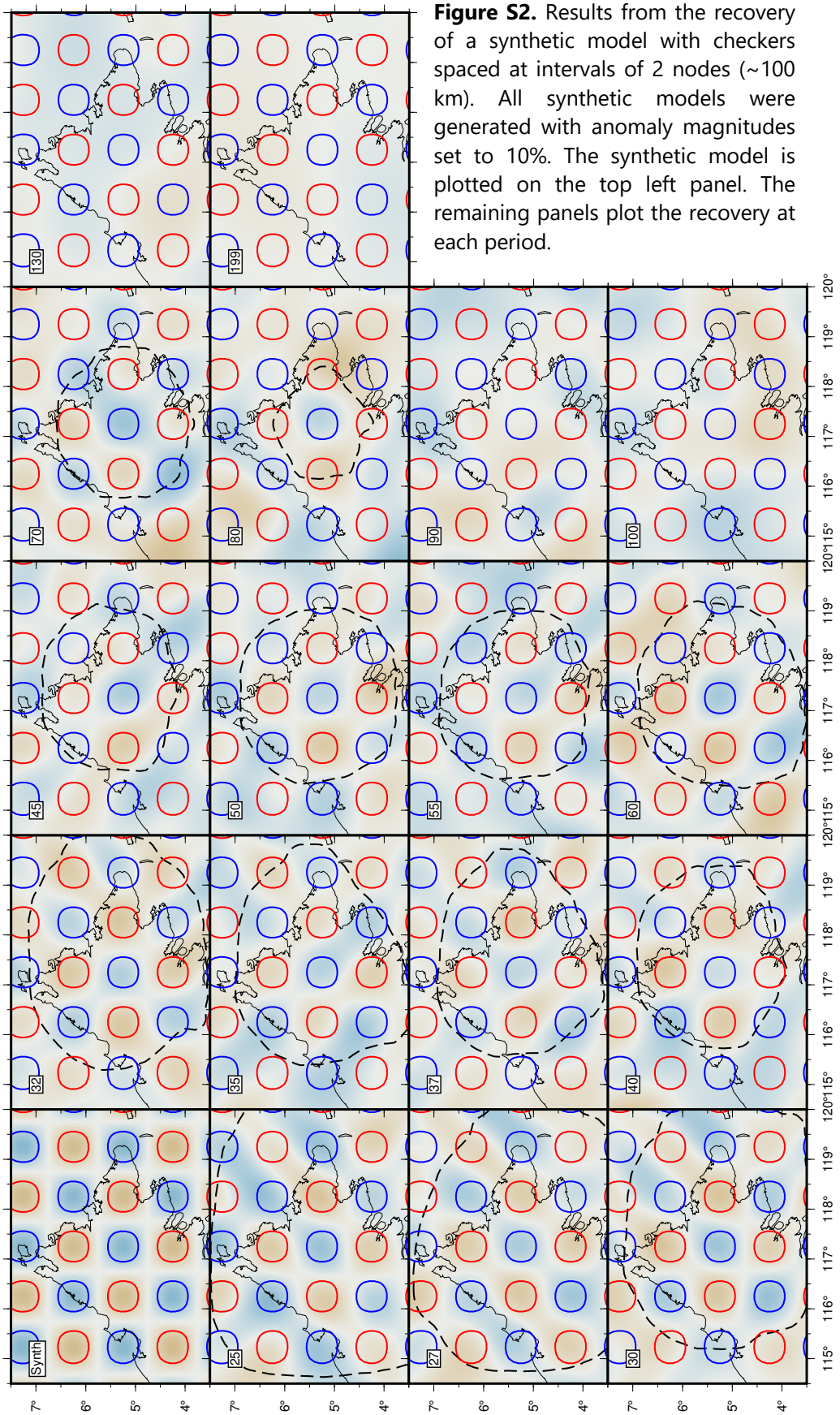

Figure S2. Results from the recovery of a synthetic model with checkers spaced at intervals of 2 nodes (~100 km). All synthetic models were generated with anomaly magnitudes set to 10%. The synthetic model is plotted on the top left panel. The remaining panels plot the recovery at each period.

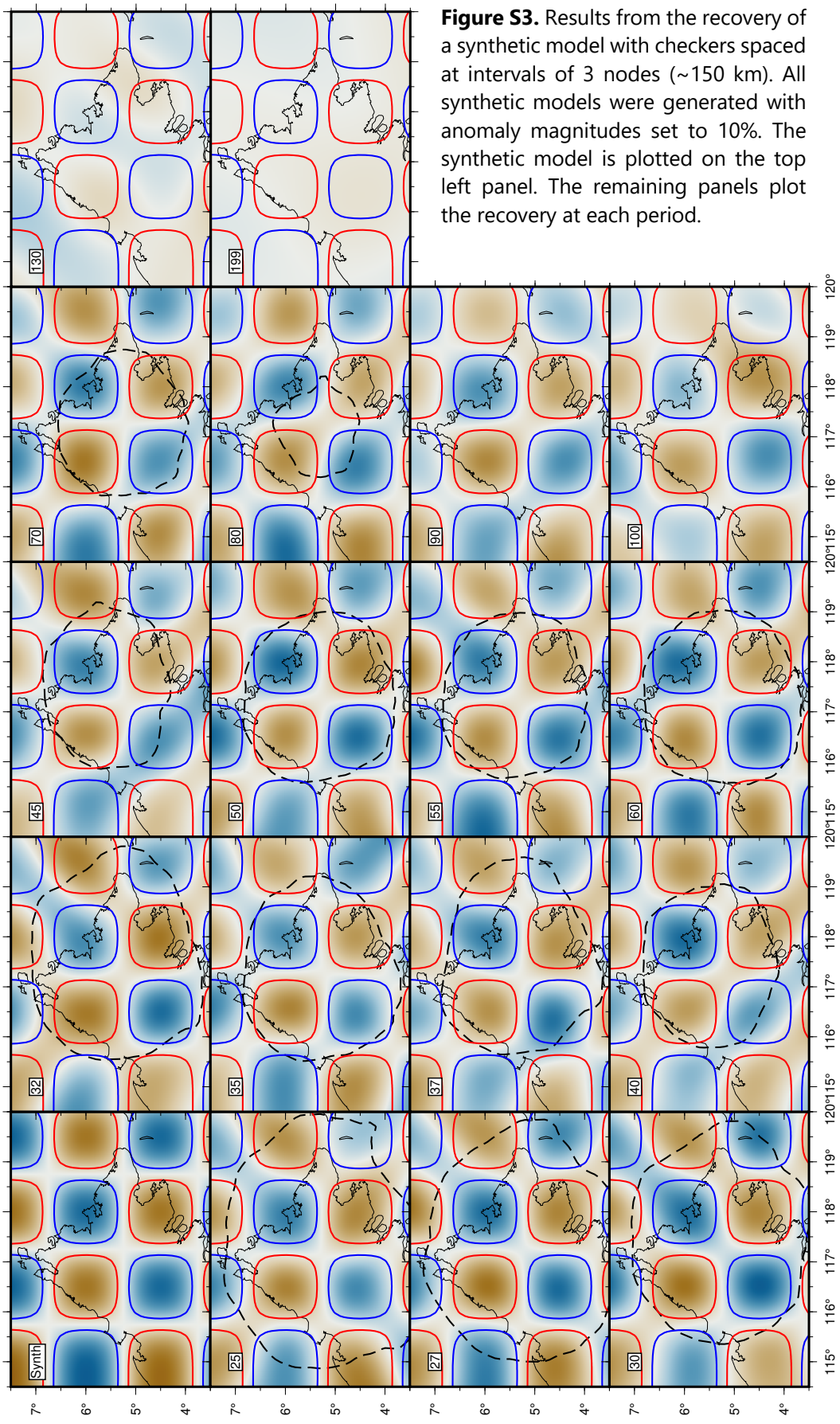

Figure S3. Results from the recovery of a synthetic model with checkers spaced at intervals of 3 nodes (~150 km). All synthetic models were generated with anomaly magnitudes set to 10%. The synthetic model is plotted on the top left panel. The remaining panels plot the recovery at each period.

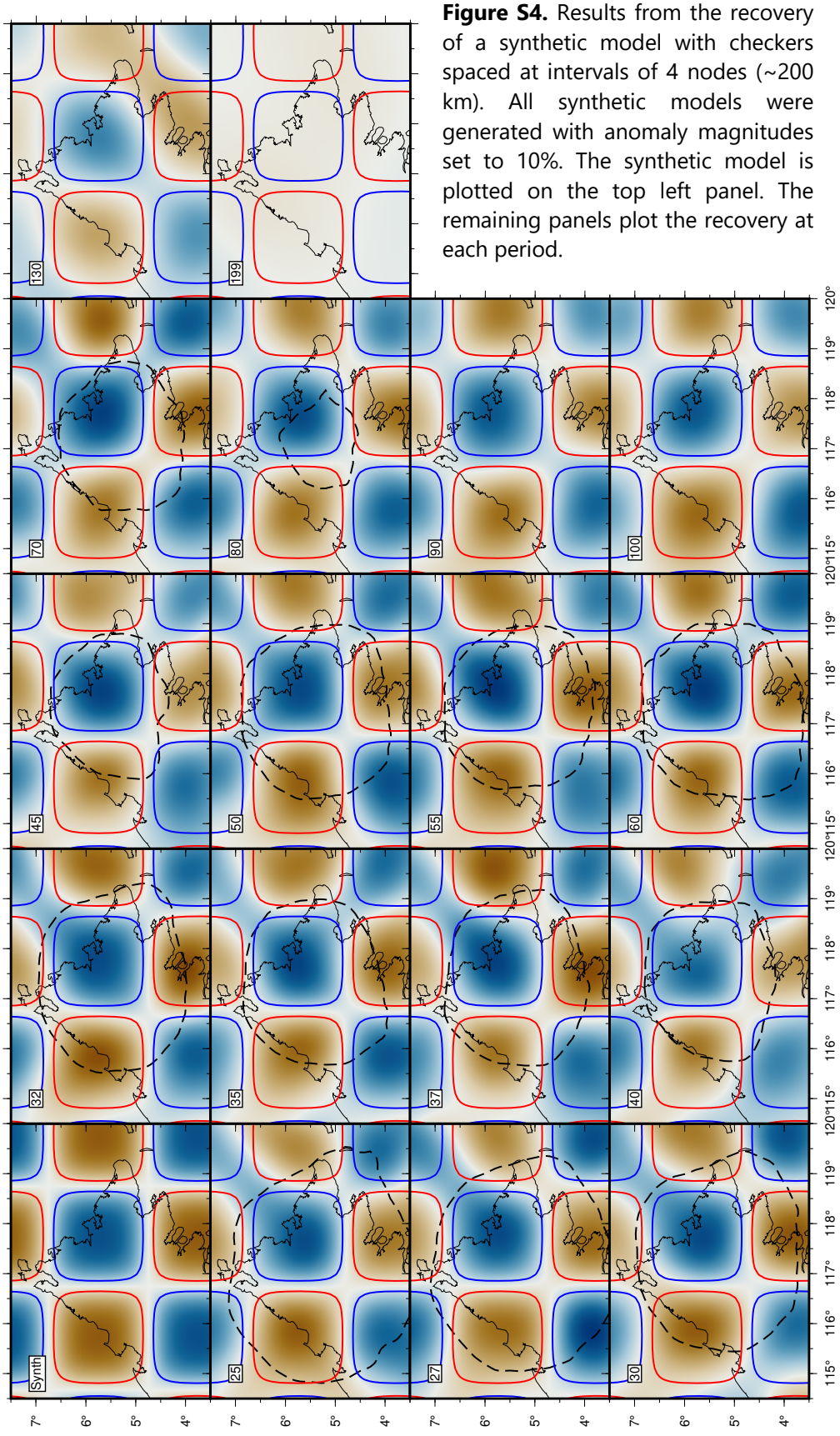

Figure S4. Results from the recovery of a synthetic model with checkers spaced at intervals of 4 nodes (~200 km). All synthetic models were generated with anomaly magnitudes set to 10%. The synthetic model is plotted on the top left panel. The remaining panels plot the recovery at each period.

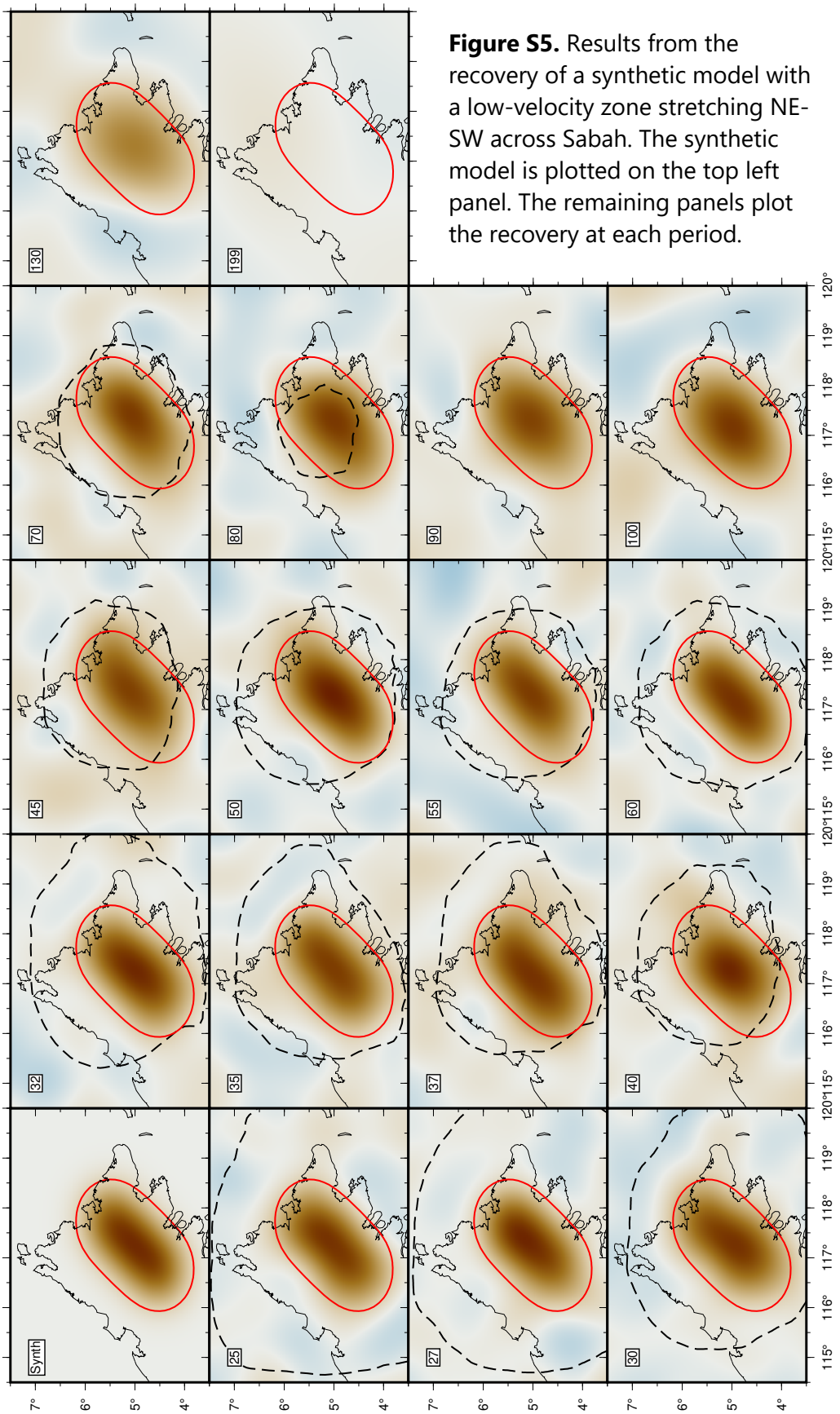

Figure S5. Results from the recovery of a synthetic model with a low-velocity zone stretching NE-SW across Sabah. The synthetic model is plotted on the top left panel. The remaining panels plot the recovery at each period.

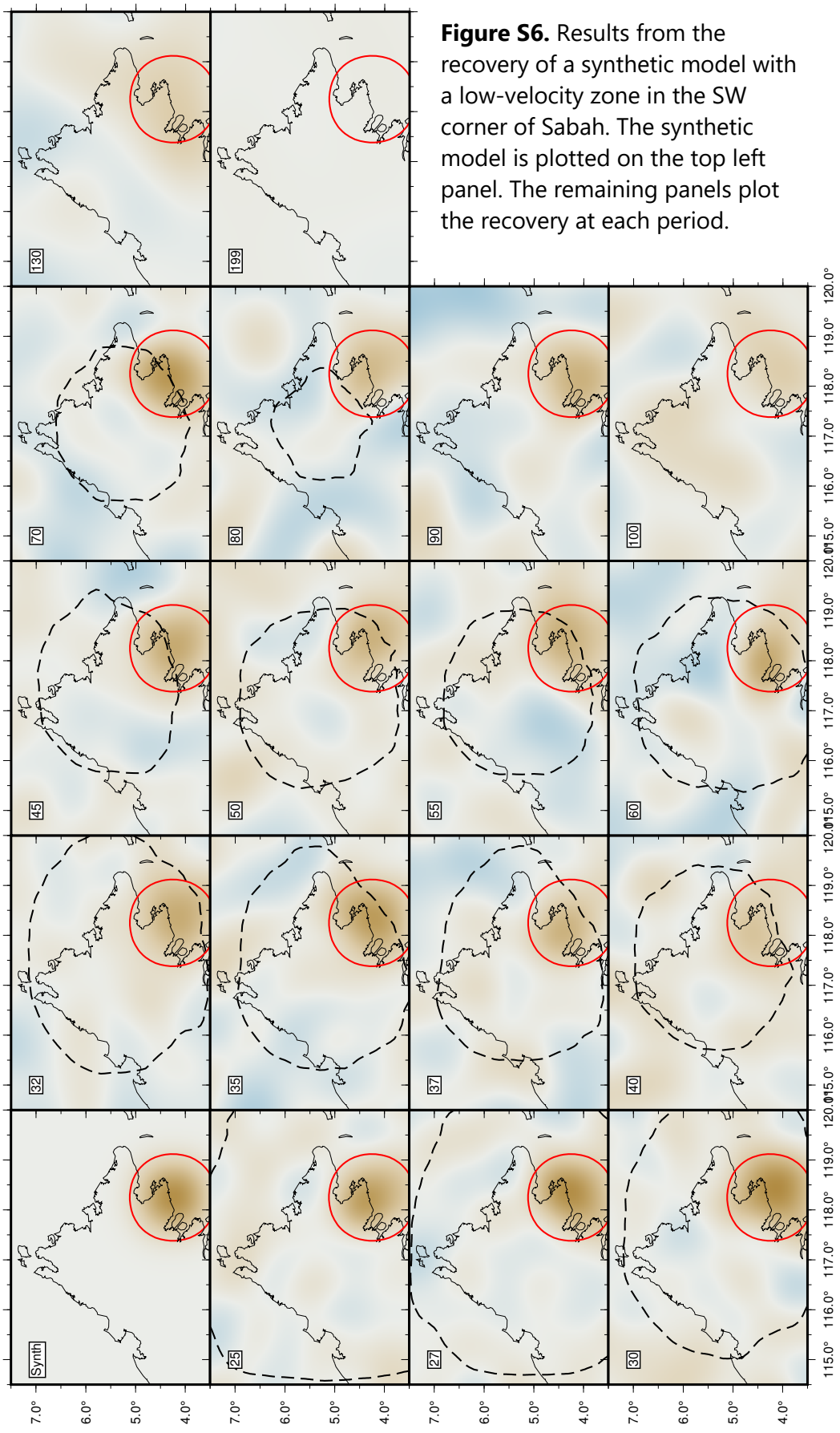

Figure S6. Results from the recovery of a synthetic model with a low-velocity zone in the SW corner of Sabah. The synthetic model is plotted on the top left panel. The remaining panels plot the recovery at each period.

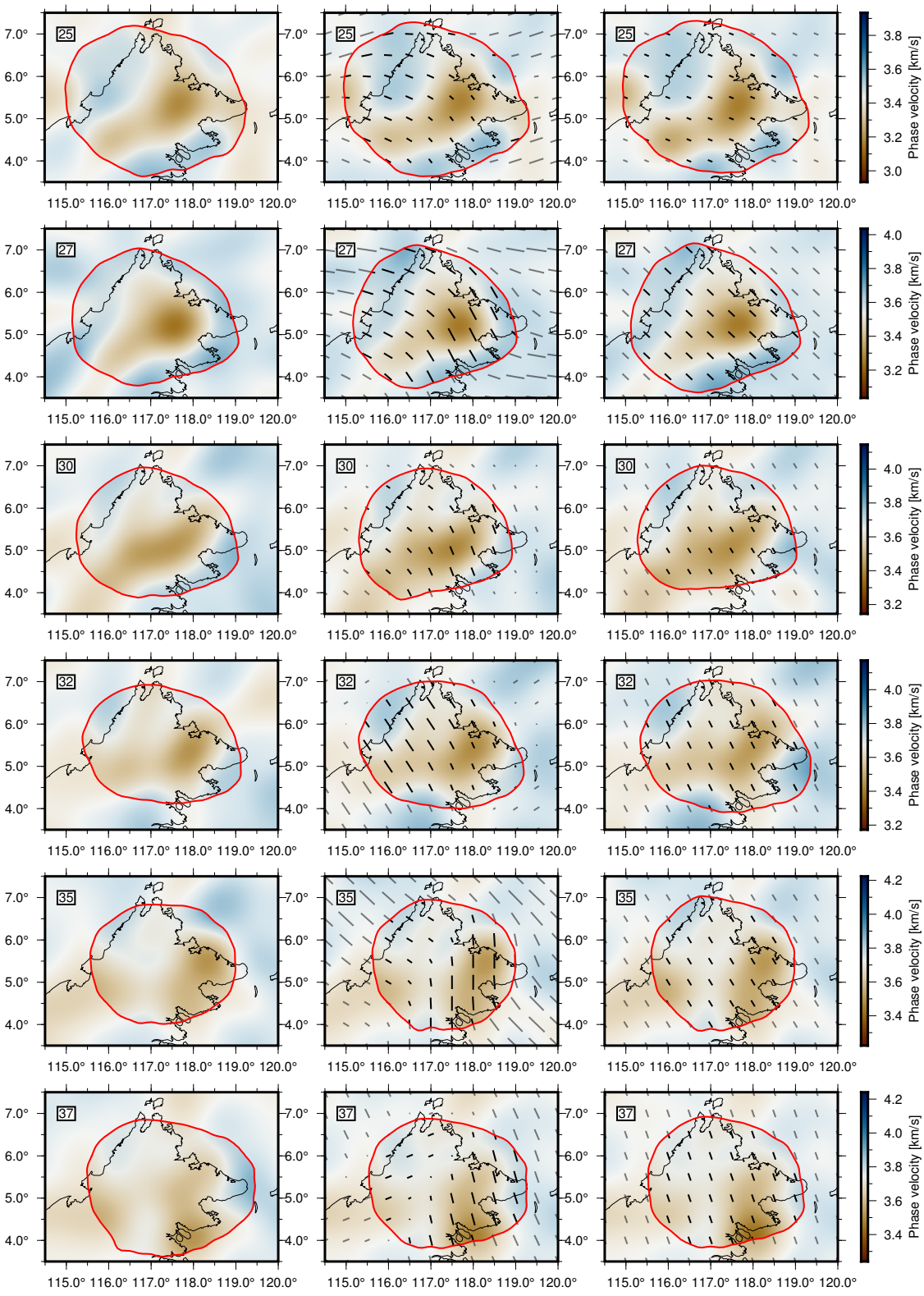
25
27
30
32
35
37
7.0°
6.0°
5.0°
4.0°
115.0° 116.0° 117.0° 118.0° 119.0° 120.0°
Phase velocity [km/s]

Figure S7.

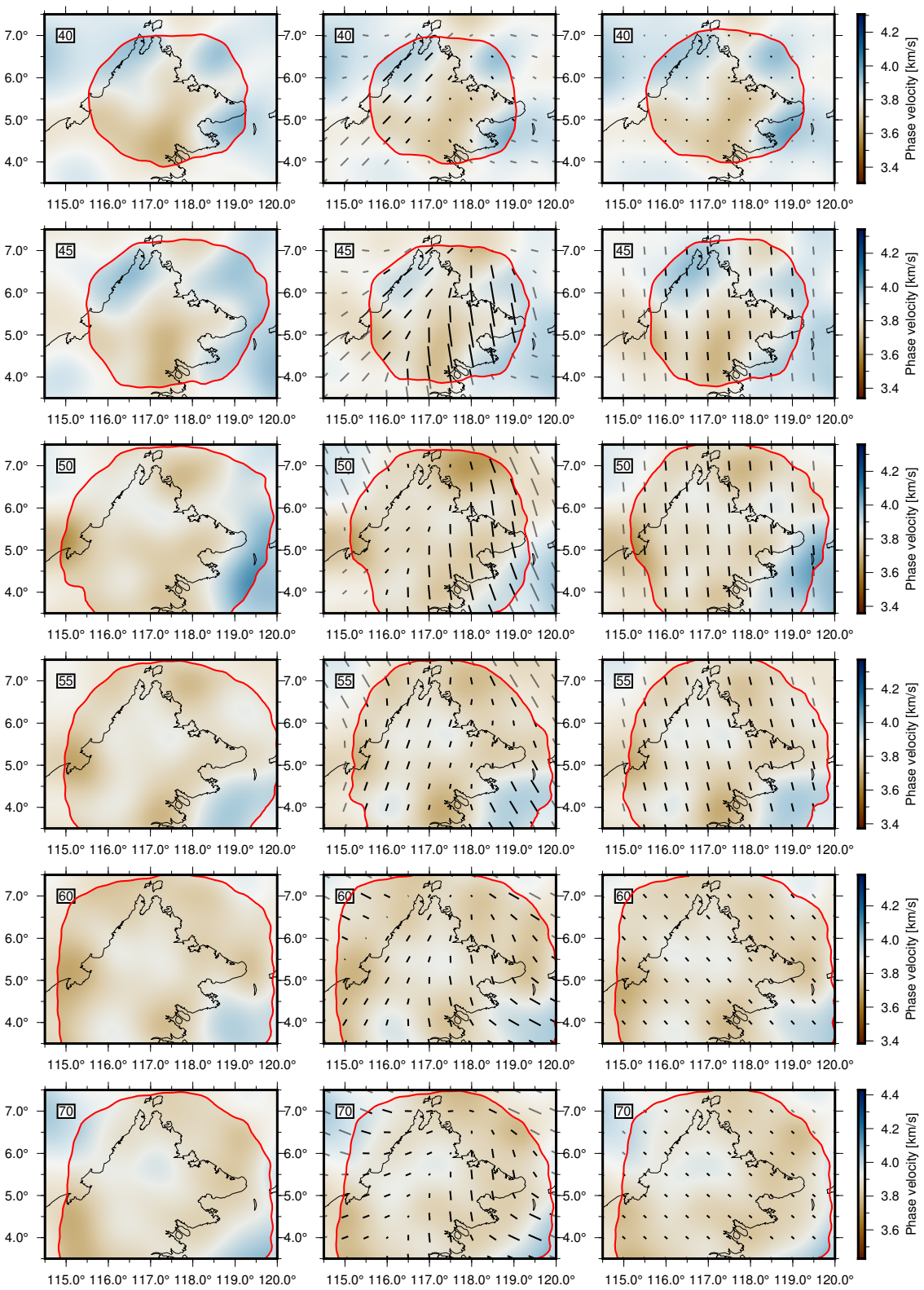

Figure S7. (cont.)

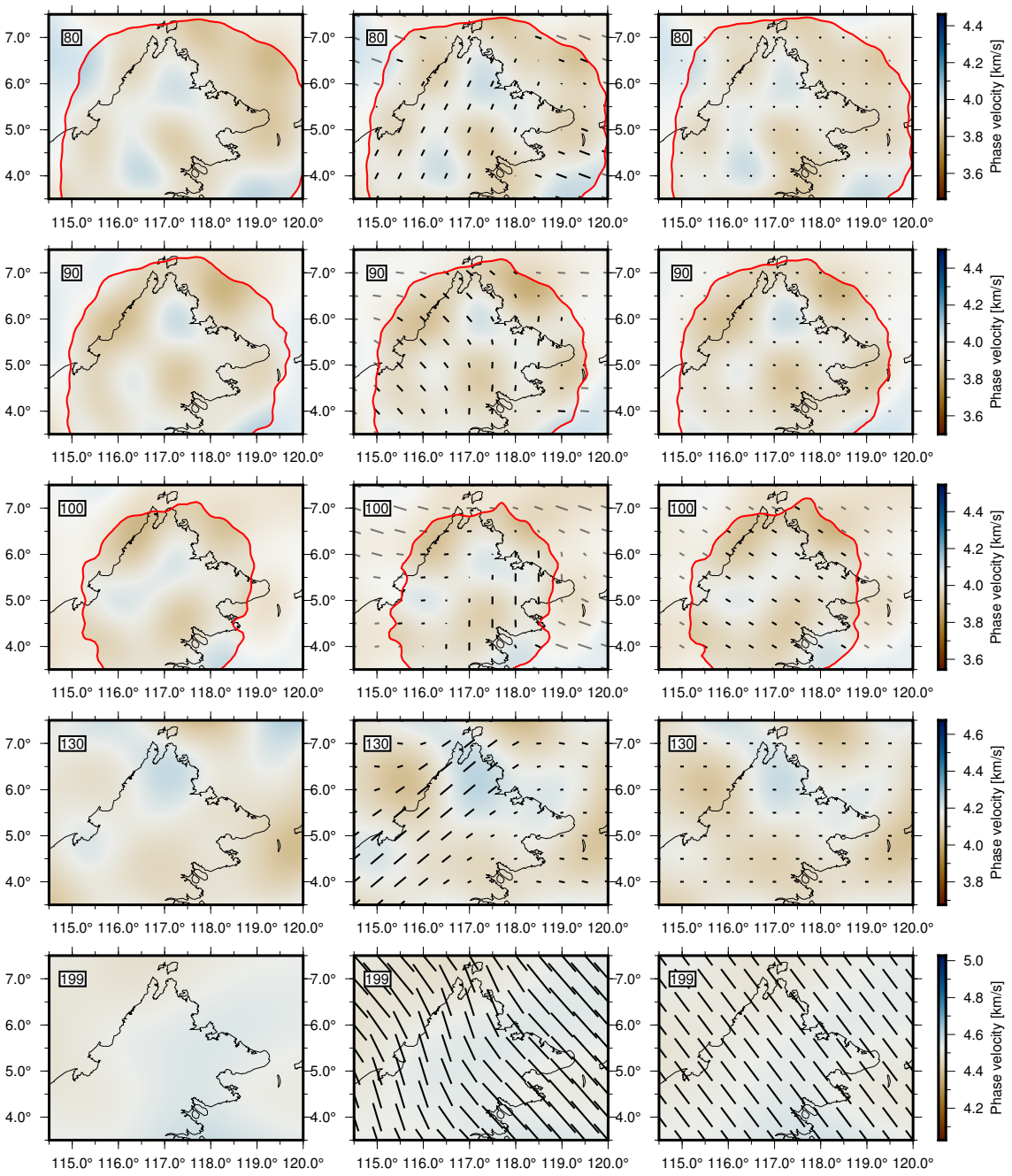

Figure S7. (cont.) Phase velocity maps for each of our models (isotropic, left column; 3 anisotropic regions, middle column; 1 anisotropic region, right column). The value in the top left corner of each panel indicates the period of the fundamental mode Rayleigh wave phase velocity. Each period is plotted relative to the average phase velocity from the 1D inversion.

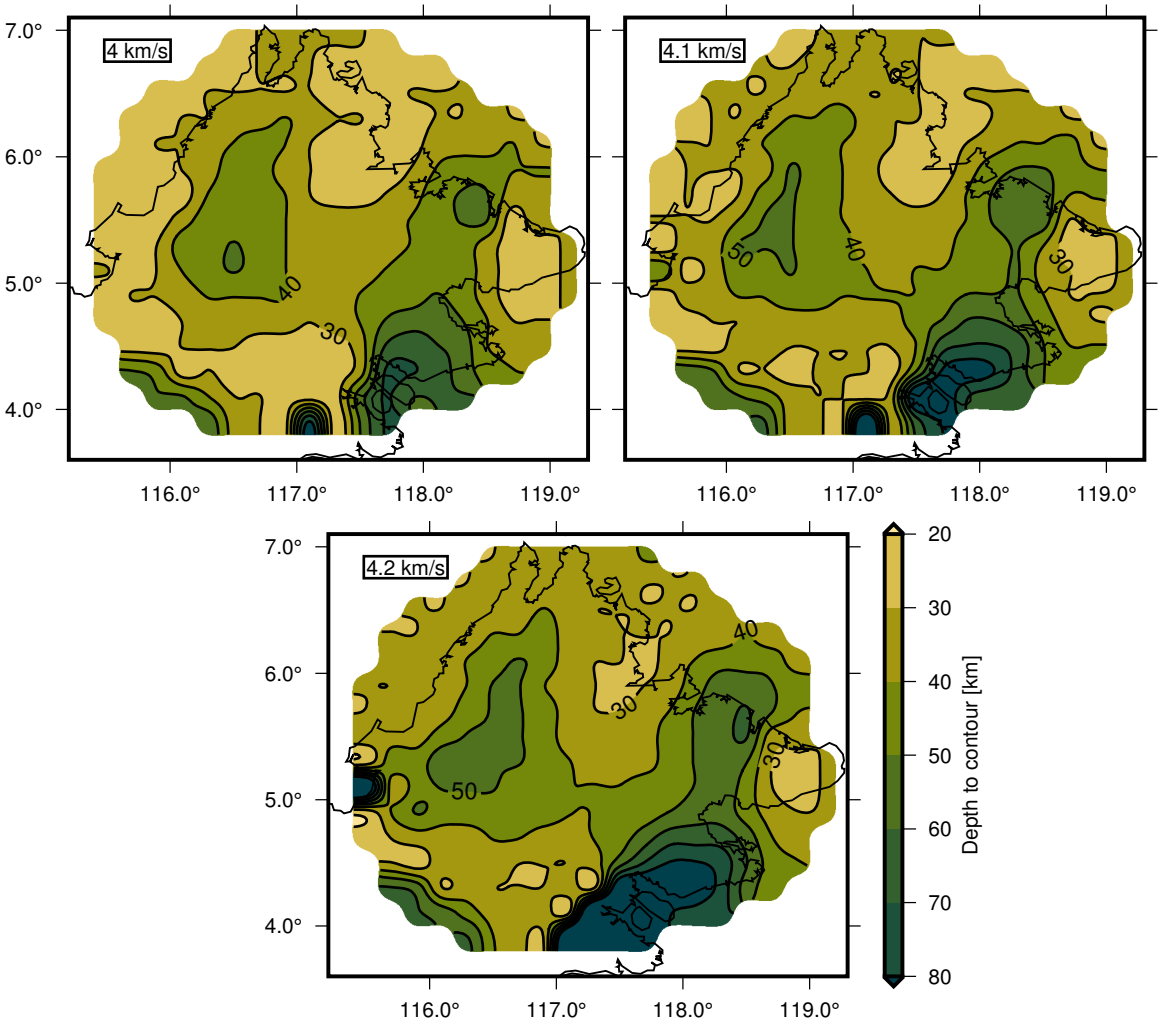

Figure S8. Crustal thickness maps calculated using different Vs contours as a proxy for Moho depth. All panels use the same scale and the velocity contour used is indicated in the top left of each panel.

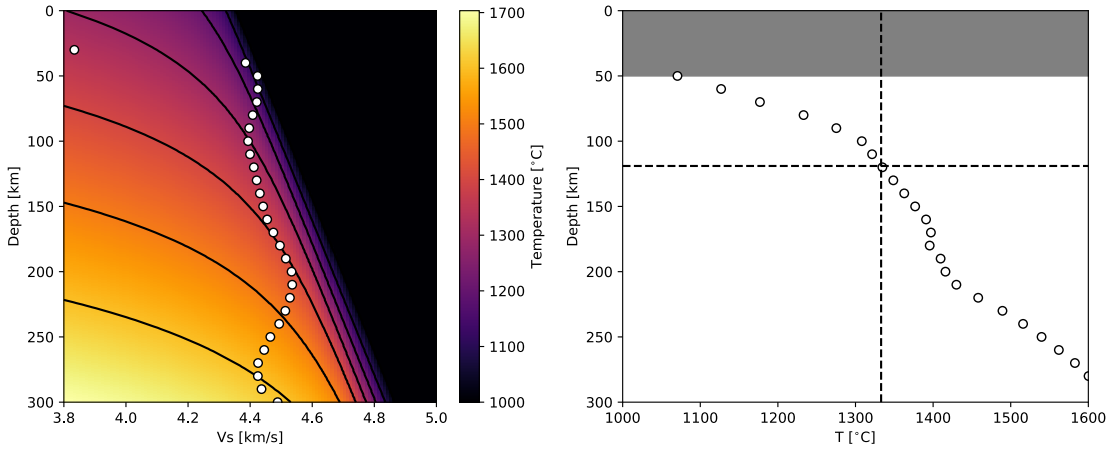

Figure S9. Vs to temperature conversion using Equation (1). Left panel shows the temperature look-up table for each depth and value of Vs. The average 1D Vs model for Sabah is plotted as white circles. The right panel indicates the temperature profile calculated for the same Vs model with the temperature we define as the base of the lithosphere (1333°C) and the LAB depth indicated by the black dashed lines.

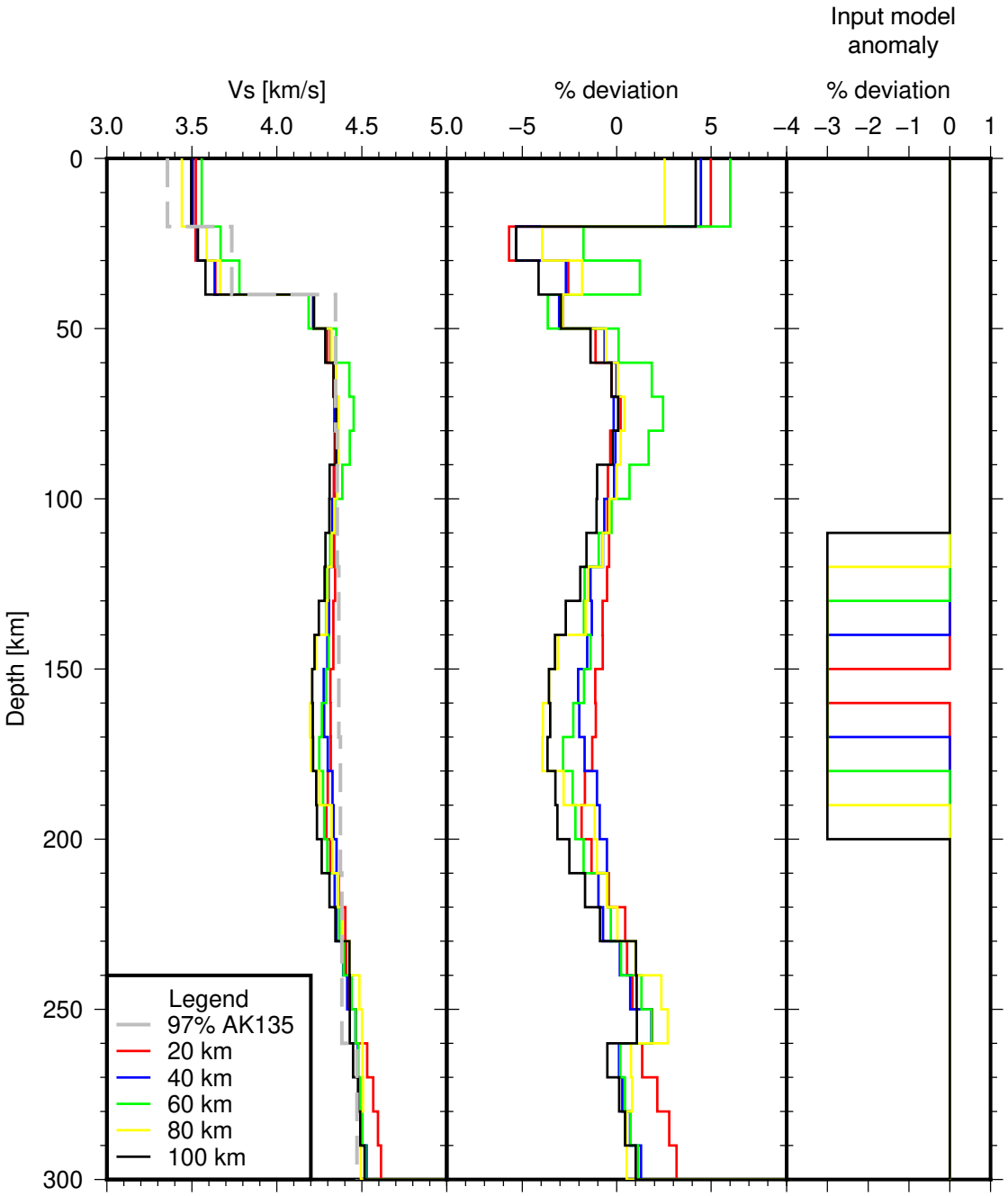

Figure S10. Synthetic recovery tests for the rjMCMC Vs inversion. A reasonable fit to the 1D dispersion curves is a velocity model with wavespeeds equal to 97% of AK135 (gray dashed line). We use this as a base model and generate a series of synthetic models with a low-velocity zone at 150 km depth with differing depth ranges (20-90 km). The percentage deviation from the initial model is shown in the right panel. Results are plotted in the left and middle panels (absolute wavespeed and percentage deviation respectively) and indicate the difficulty in constraining the width of anomalies at depths > 100 km using our observations.

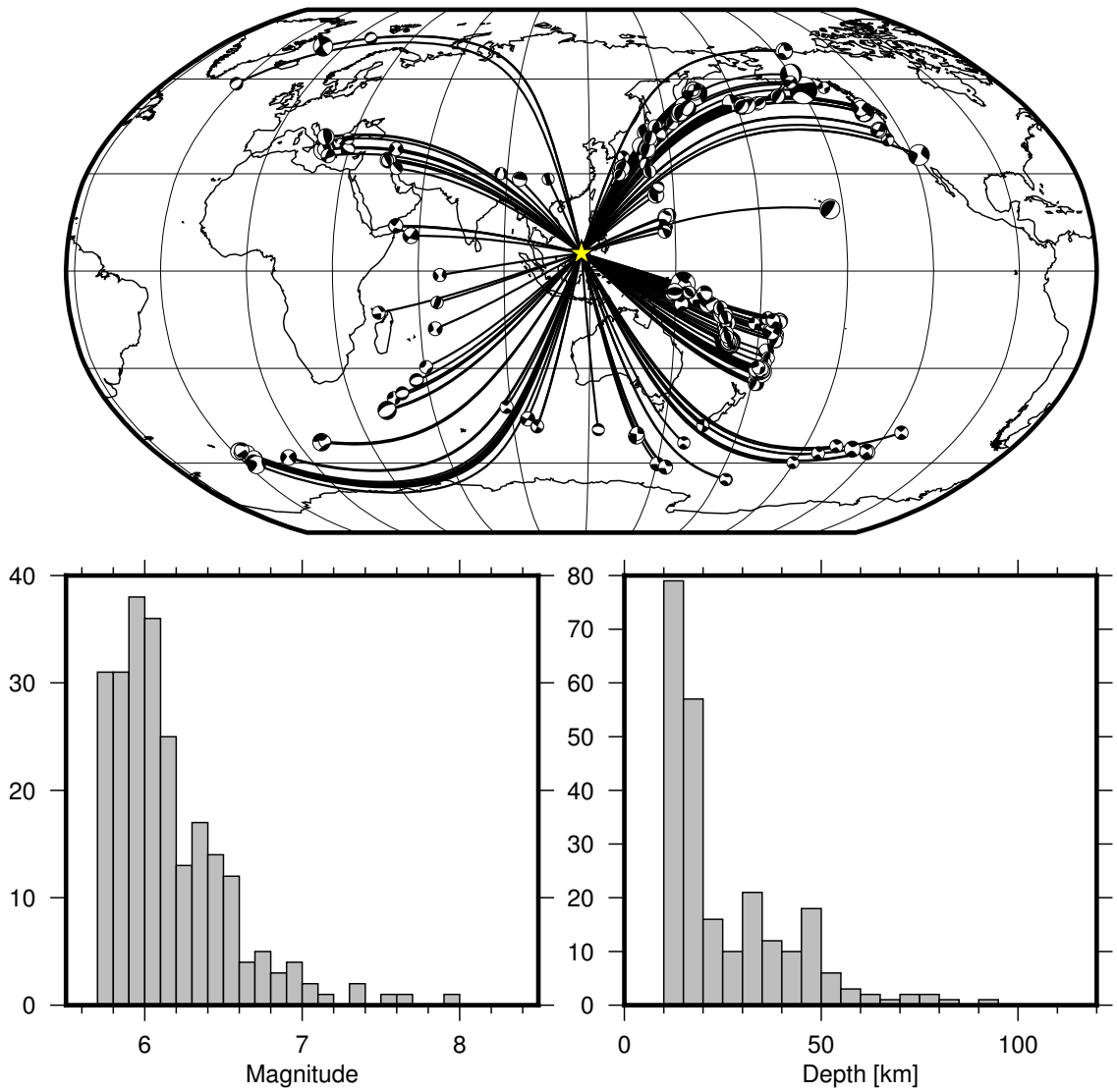

Figure S11. Earthquake catalog used in this study. Top panel shows the location of the earthquakes and their GCMT mechanisms. The yellow star indicates the location of Sabah. Bottom left and right panels show the magnitude distribution (M5.7 was the lower cut-off) and depth distribution respectively.

Figure S12. (next page) Backazimuthal distribution of data at each period

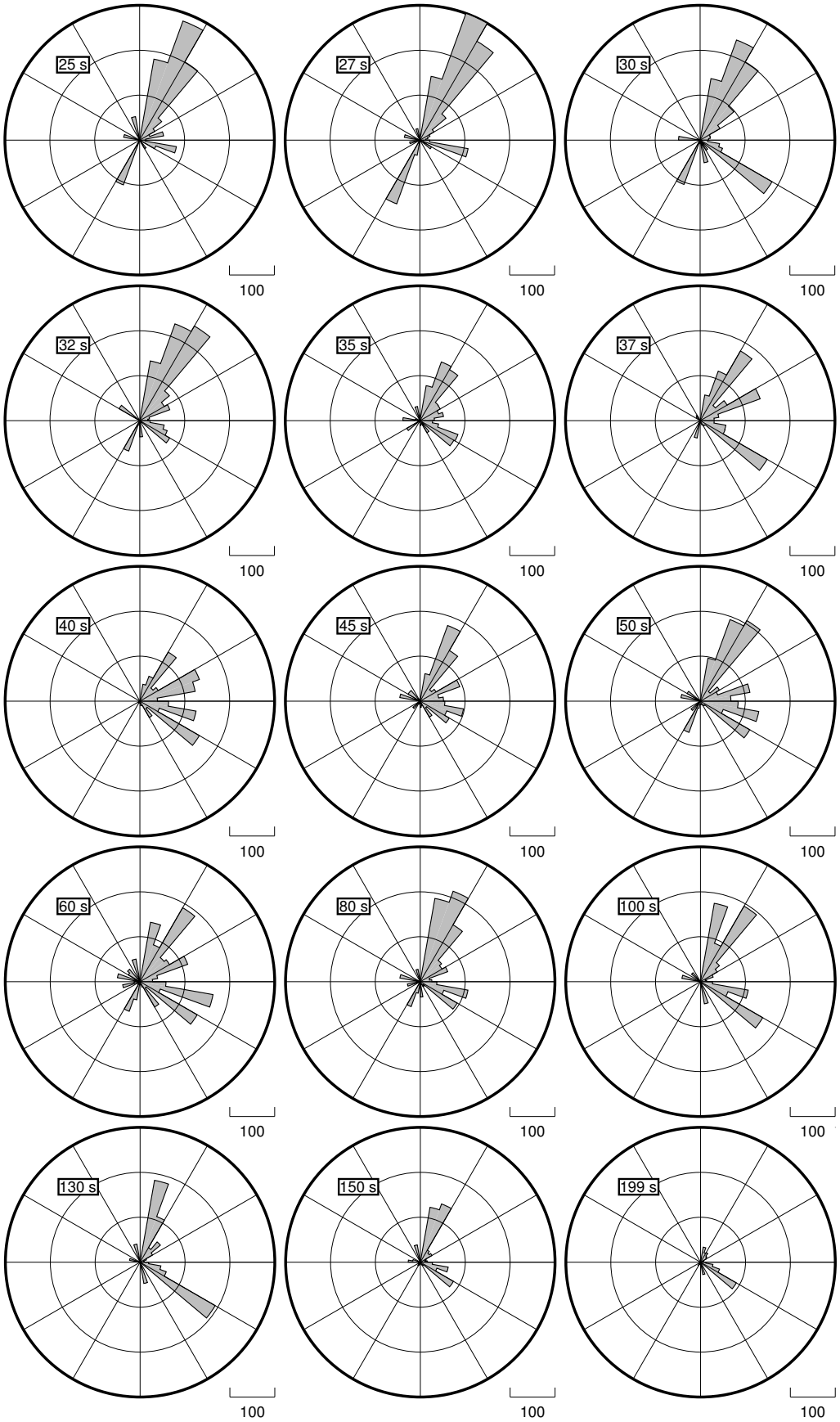
25 s
27 s
30 s
32 s
35 s
37 s
40 s
45 s
50 s
60 s
80 s
100 s
130 s
150 s
199 s
100

Table S1. The locations of stations used in this study

Table S2. Final 1D Vs velocity model interpolated at 10 km depth intervals.

Table S3. Final 1D dispersion from this study

Table S4. Earthquakes used in this study from the GCMT catalogue. Moment tensor components are in Nm.

Data Set S1. Depth to the LAB calculated in this study.

Data Set S2. Vs model. The model is presented as a series of 1D depth profiles on a 0.2-degree grid. Each file is named for its number and lat/lon.

Data Set S3. Phase velocity models. Results from each model parameterization (isotropic, 1 region anistotropic and, 3-region anisotropic) is included in 3 folders. Each folder contains the results for each period as an interpolated onto 0.1-degree grid. At each gridpoint the velocity and error (in m/s) are included. For anisotropic runs the direction and strength of anisotropy (as zero-to-peak amplitude in km/s) are also included.