Earth Crustal Model 1 (ECM1):
A 1º x 1º Global Seismic and Density Model

Supplementary Material

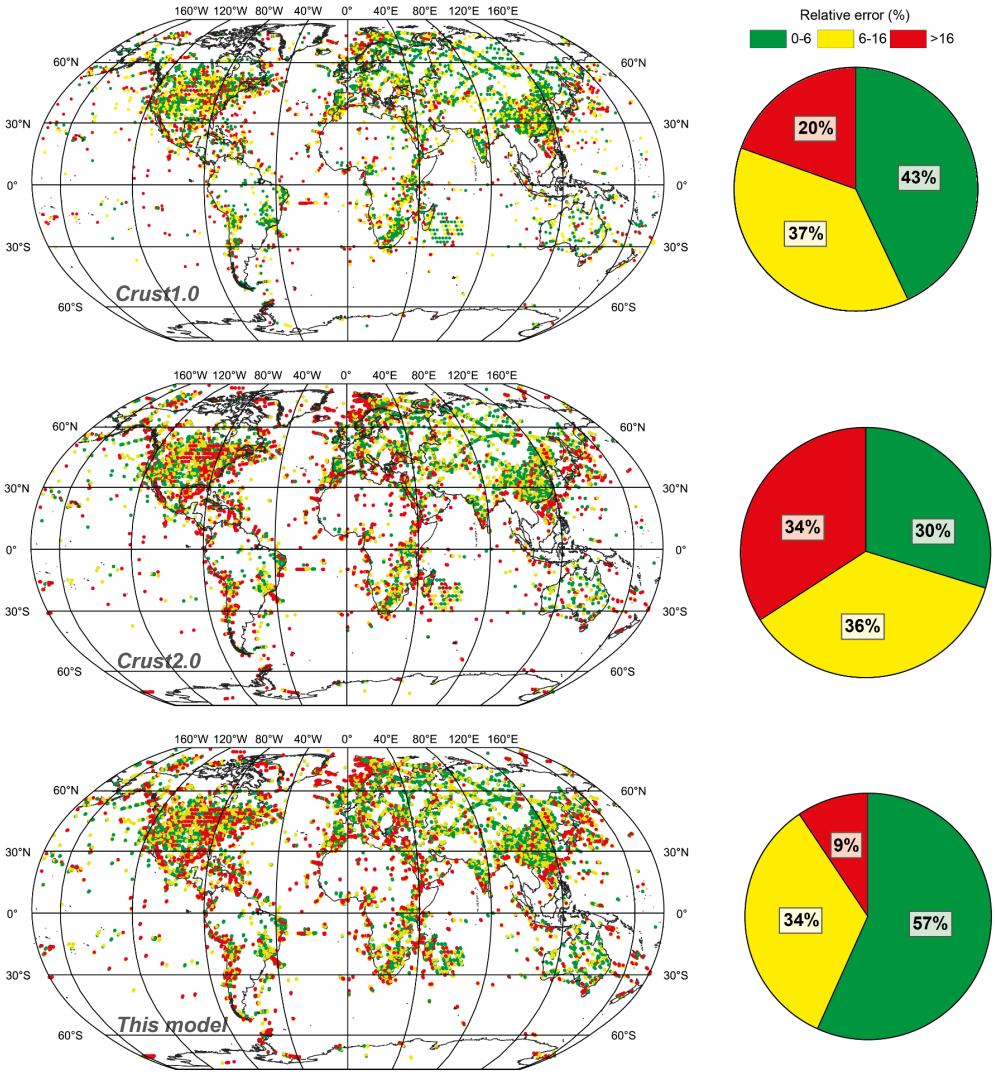

Figure S1. Relative error of crustal thickness values of (A) CRUST1.0 (B) CRUST2.0 and (C) ECM1 compared with field measurements of crustal thickness. Pie charts that show the percentage of model crustal thickness values that have a relative error of 0-6% (green), 6-16% (yellow) or more than 16% (red) in comparison with field measurements. For a relative error of 0-6%, model CRUST1.0 fits 43% of field measurements, CRUST2.0 fits 30% and model ECM1 fits 57%.

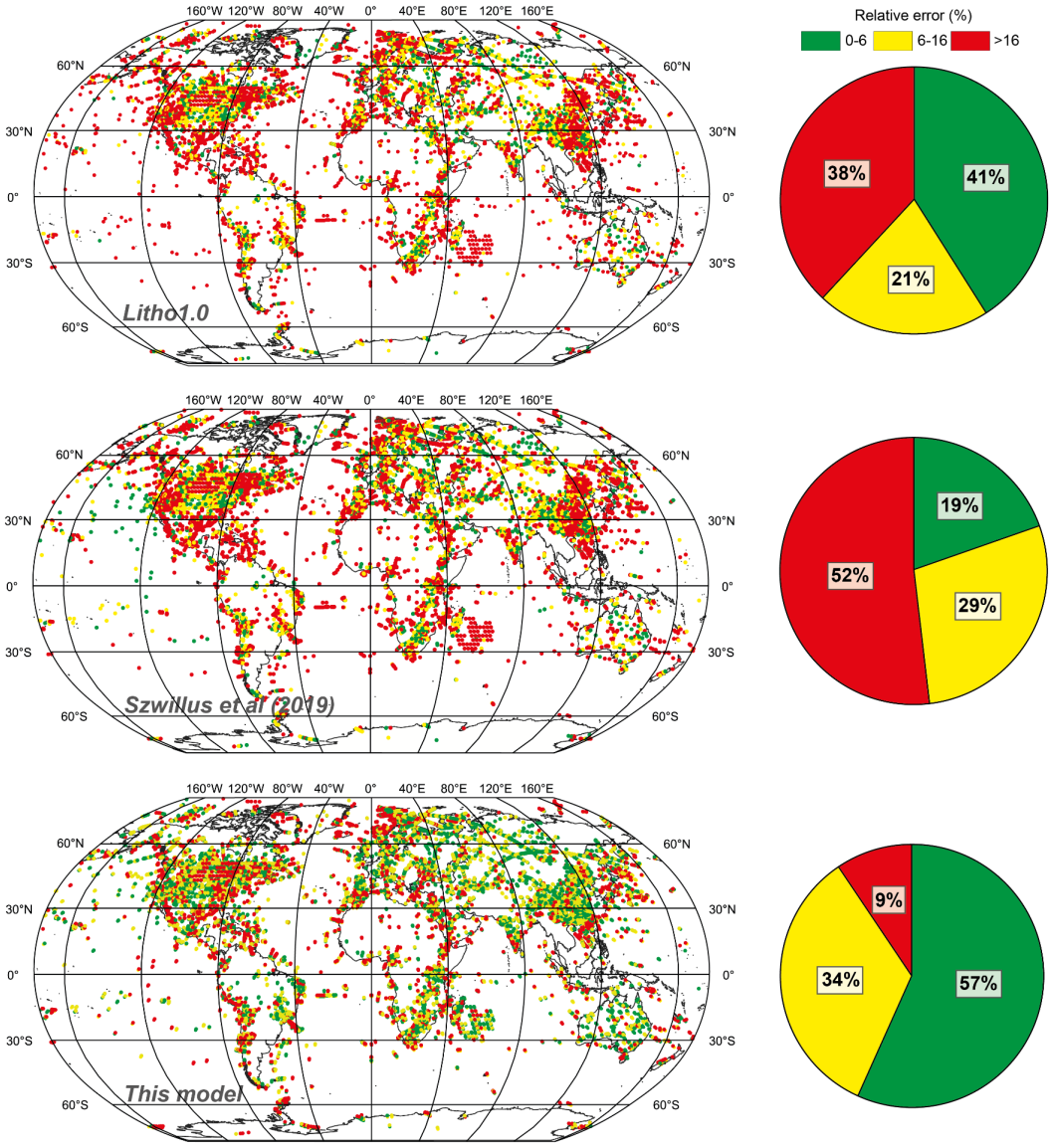

Figure S2. Relative error of crustal thickness values of (A) LITHO1.0 (B) Szwillus et al (2019) and (C) ECM1 compared with field measurements of crustal thickness. Pie charts that show the percentage of model crustal thickness values that have a relative error of 0-6% (green), 6-16% (yellow) or more than 16% (red) in comparison with field measurements. For a relative error of 0-6%, model LITHO1.0 fits 41% of field measurements, Szwillus et al (2019) fits 19% and model ECM1 fits 57%.

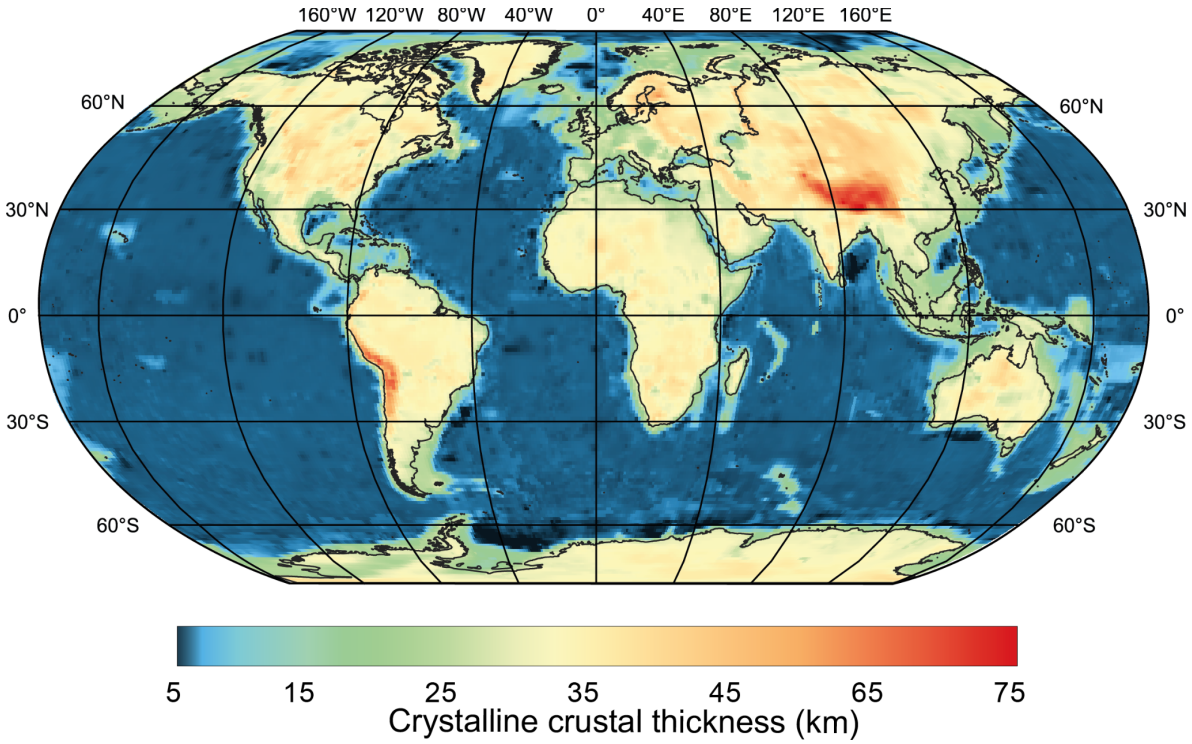

Figure S3. ECM1 crystalline crustal thickness, which is defined as the total crustal thickness minus ice, water, and sediments. Oceanic crystalline crust is about 7 km thick, continental margins are about 26 km thick, and the thickness of continental crust above sea level varies from 20 to 77 km.

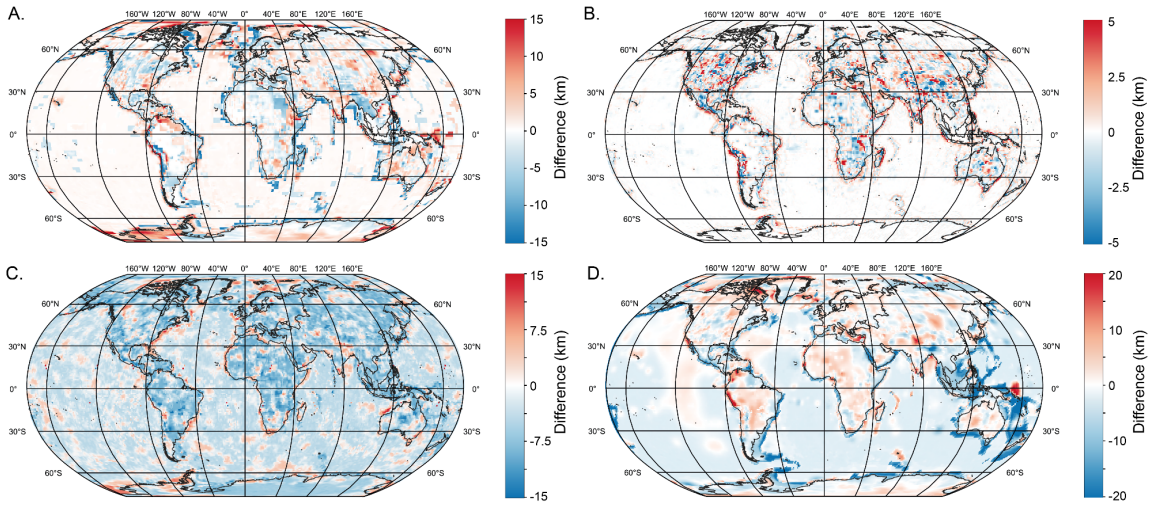

Figure S4. Difference in total crustal thickness of model ECM1 in comparison with four other models. (A) ECM1 minus CRUST2.0; (B) ECM 1 minus CRUST1.0, (C) ECM1 minus LITHO1.0, and (D) ECM1 minus Szwillus et al. (2019).

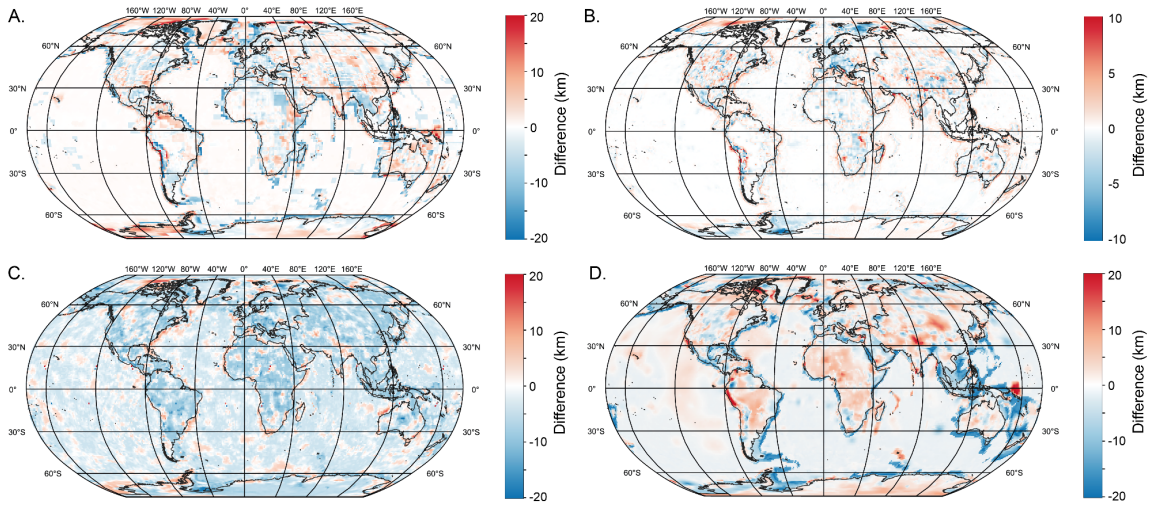

Figure S5. Difference in crystalline crustal thickness of model ECM1 in comparison with three other models. (A) ECM1 minus CRUST2.0; (B) ECM1 minus CRUST1.0, (C) ECM1 minus LITHO1.0, and (D) ECM1 minus Szwillus et al. (2019).

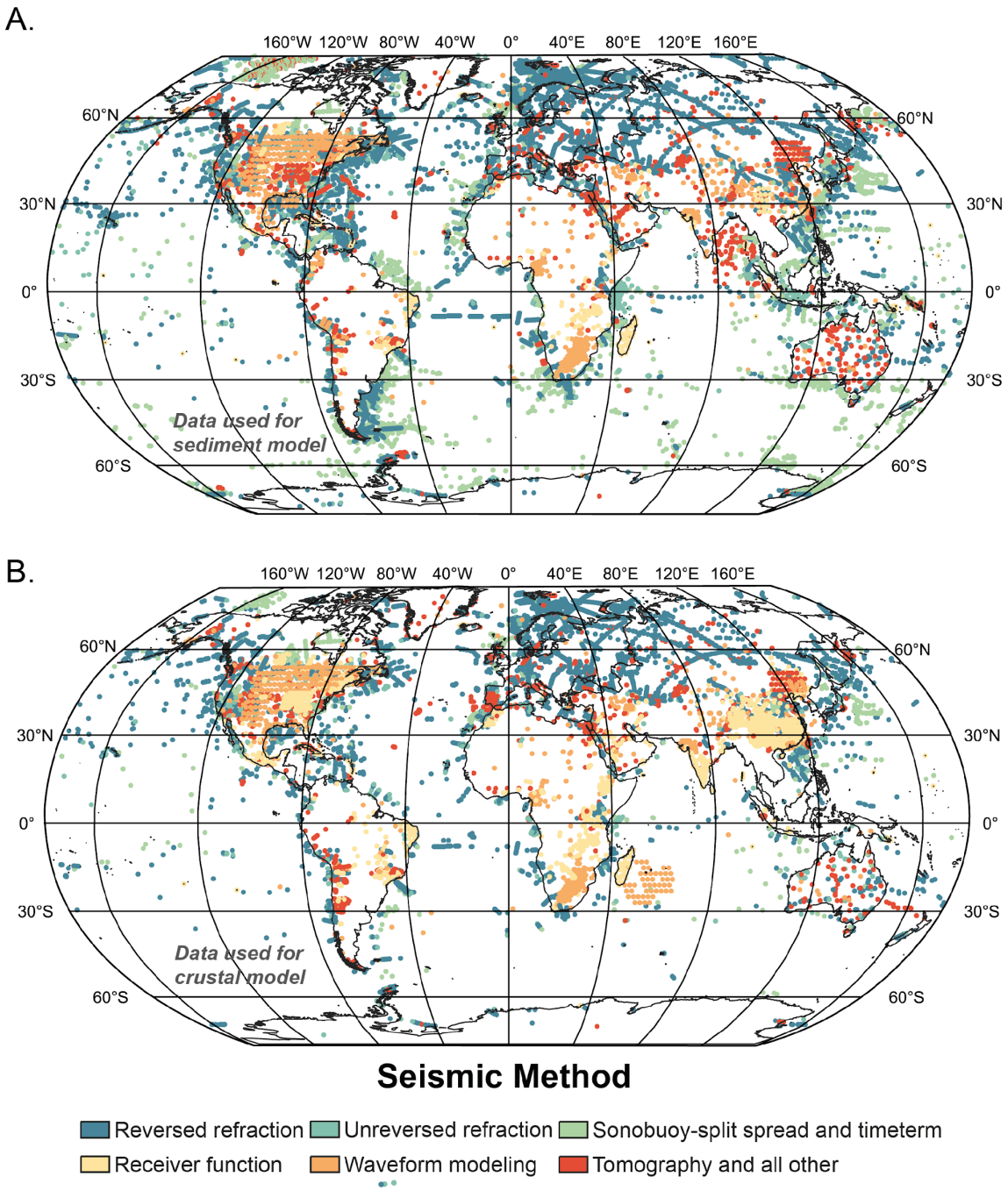

Figure S6. Locations of seismic crustal database: (A) data used to create the sediment model; (B) data used to create the crystalline crustal model. Seismic method is identified by color.

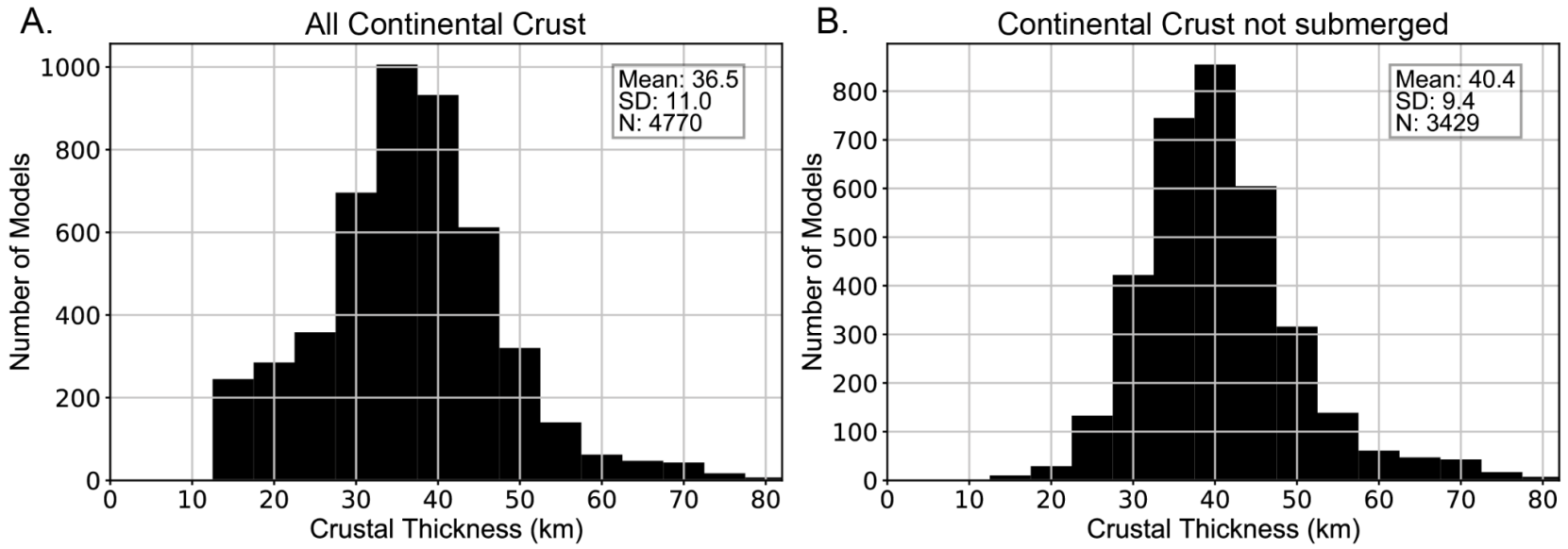

Figure S7. Histograms of field measurements of data used to calculate ECM1. (A) All continental crust, including continental margins, and (B) continental crust that is not submerged below water. No area balance has been applied to these data. Mean, mean value; SD, standard deviation; N, number of measurements.

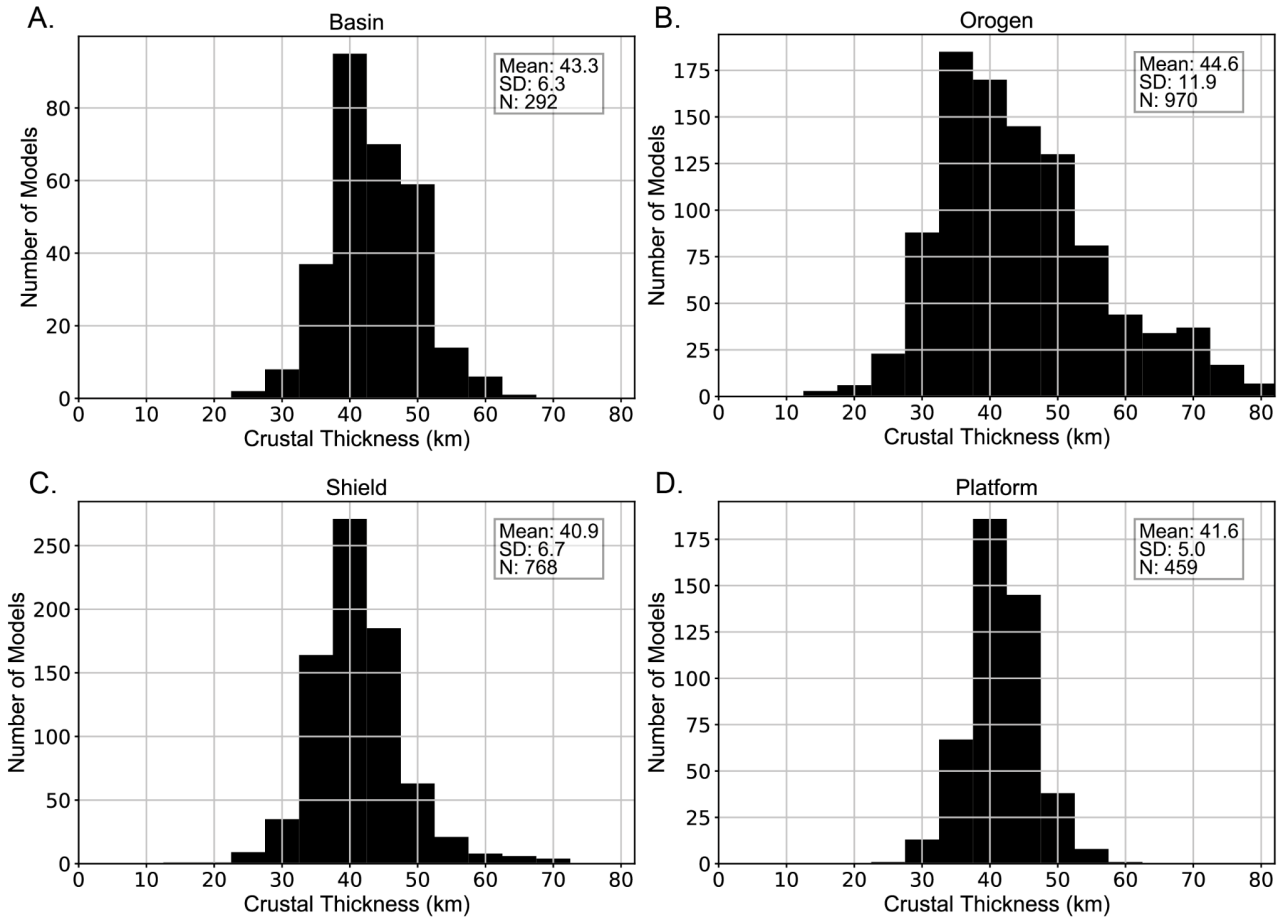

Figure S8. Total measured crustal thickness of four crustal types. (A) cratonic/foreland basins, (B) orogens, (C) shields, and (D) platforms. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

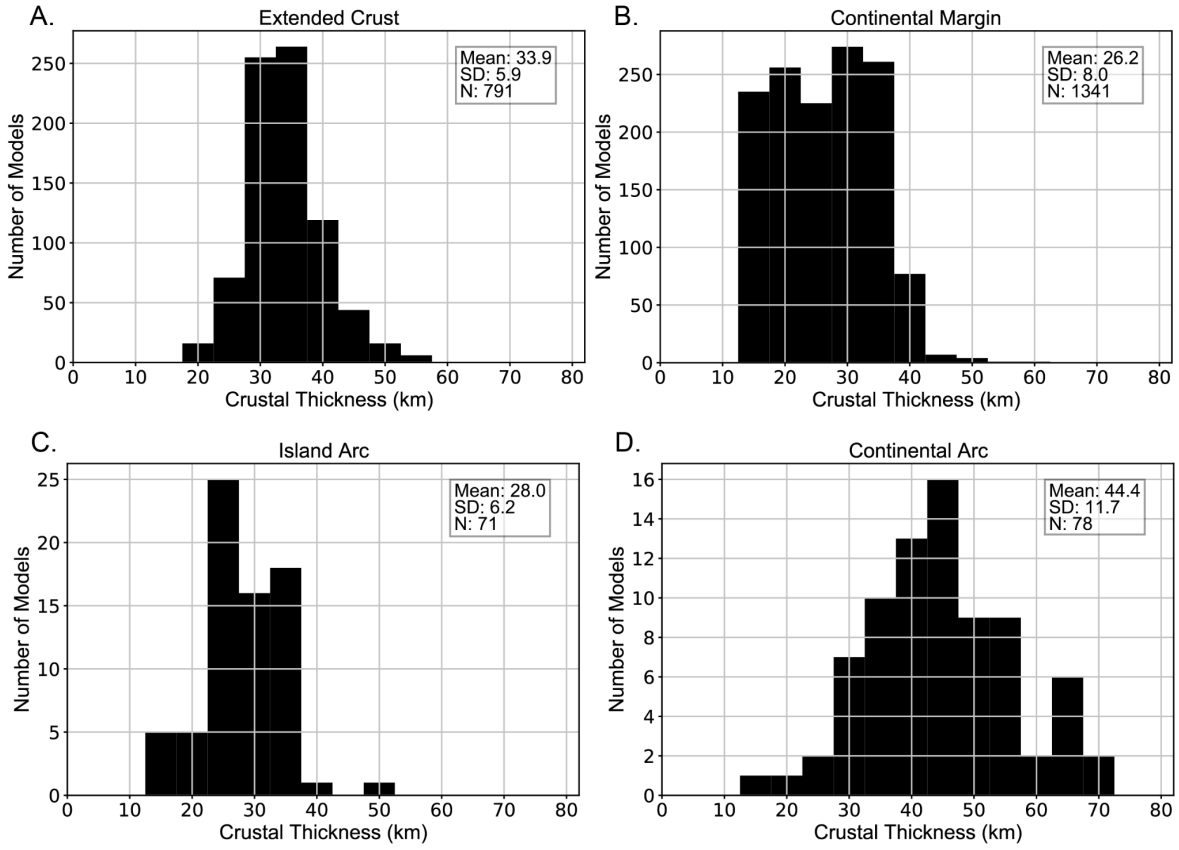

Figure S9. Total crustal thickness of four crustal types: (A) extended crust, (B) continental margins, (C) island arcs, and (D) continental arcs. Continental margins are rifted continental crust. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

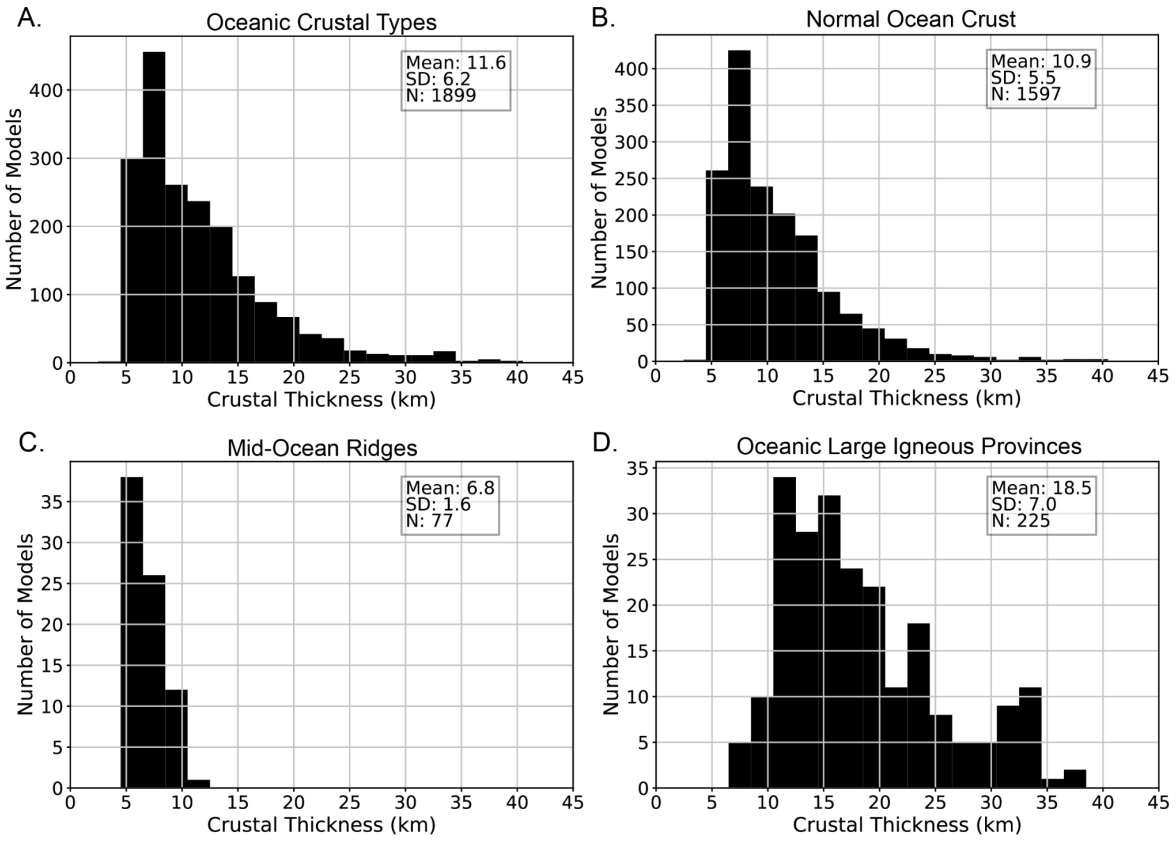

Figure 10. Measured crustal thickness of oceanic crustal types: (A) all oceanic crustal types, (B) normal ocean crust, (C) mid-ocean ridges, and (D). oceanic large igneous provinces. Normal oceanic crust (B) has a modal (most frequently measured) thickness of 7.5 km. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

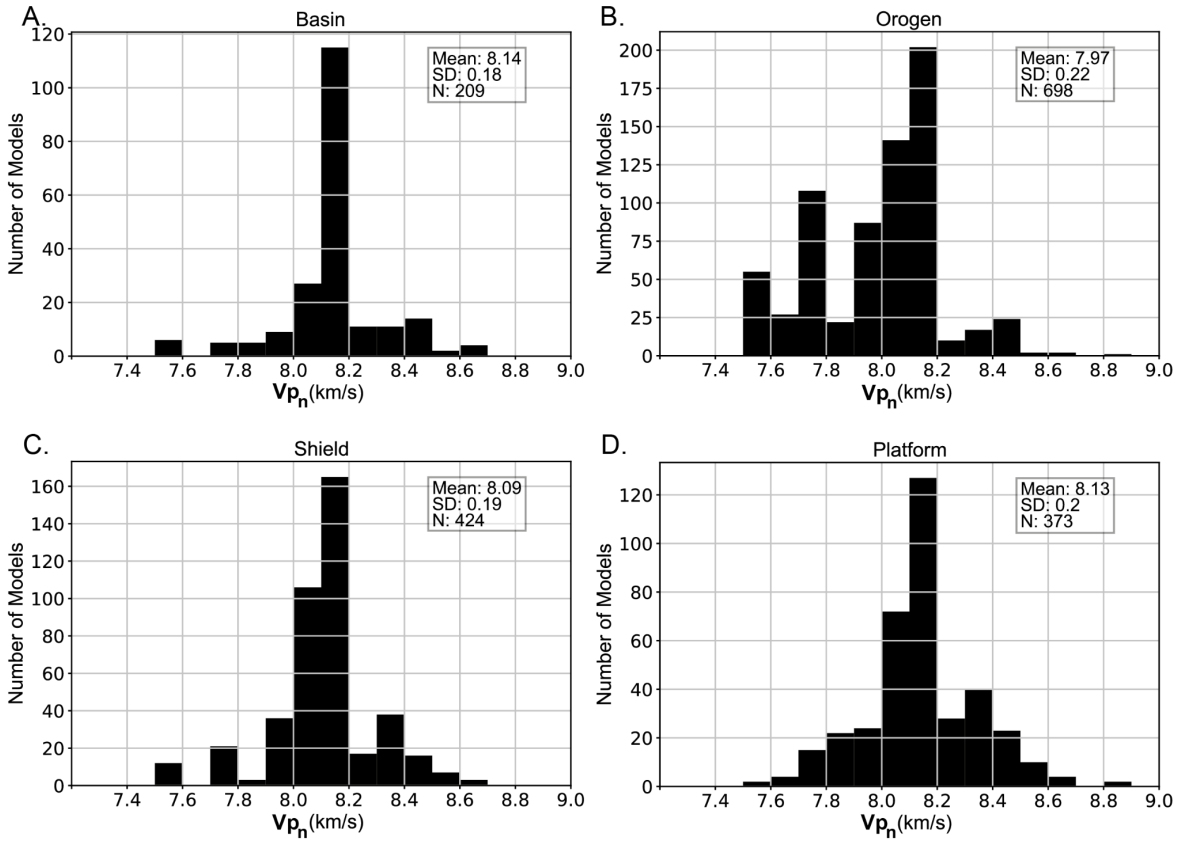

Figure S11. Sub-Moho (top of mantle) P-wave seismic velocity (Vpn) of four crustal types: (A) cratonic/foreland basins, (B) orogens, (C) shields, and (D) platforms. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

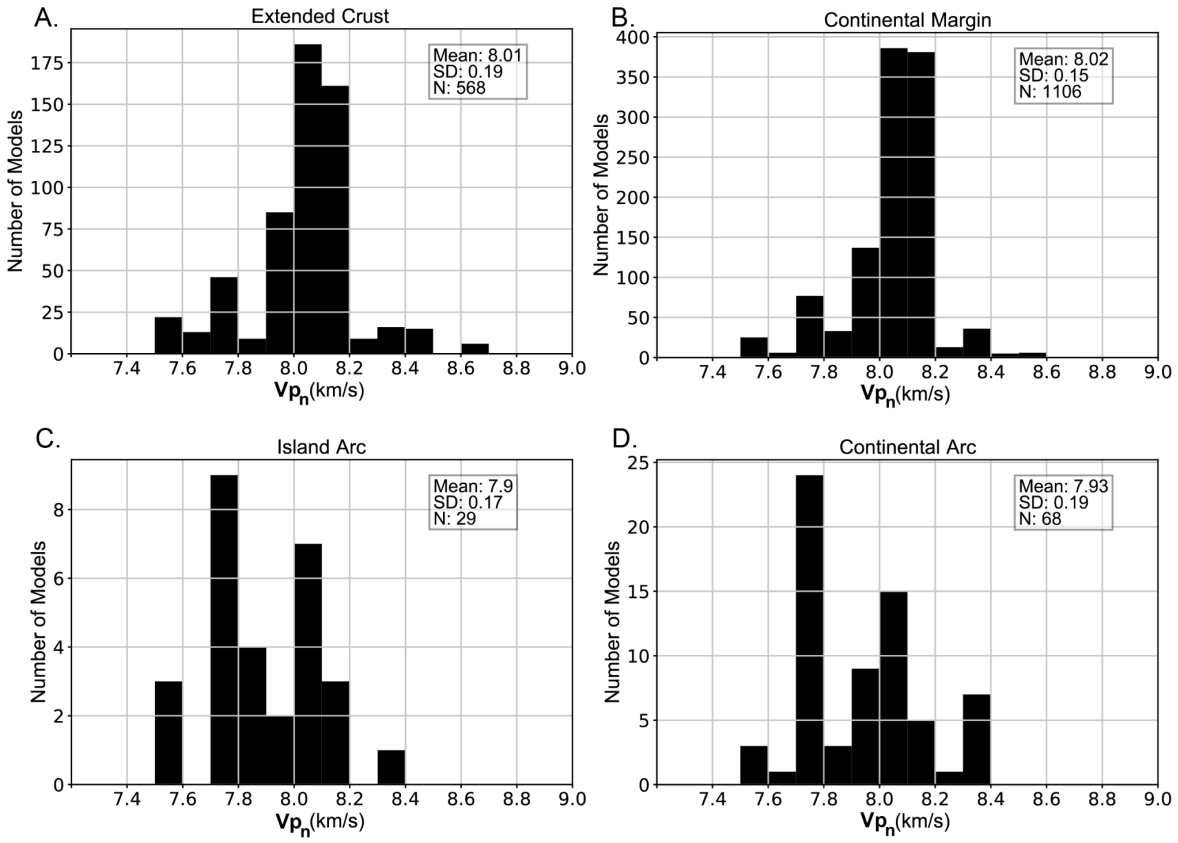

Figure S12. Sub-Moho (top of mantle) P-wave seismic velocity (Vpn) of (A) extended crust, (B) continental margins, (C) island arcs, and (D) continental arcs. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

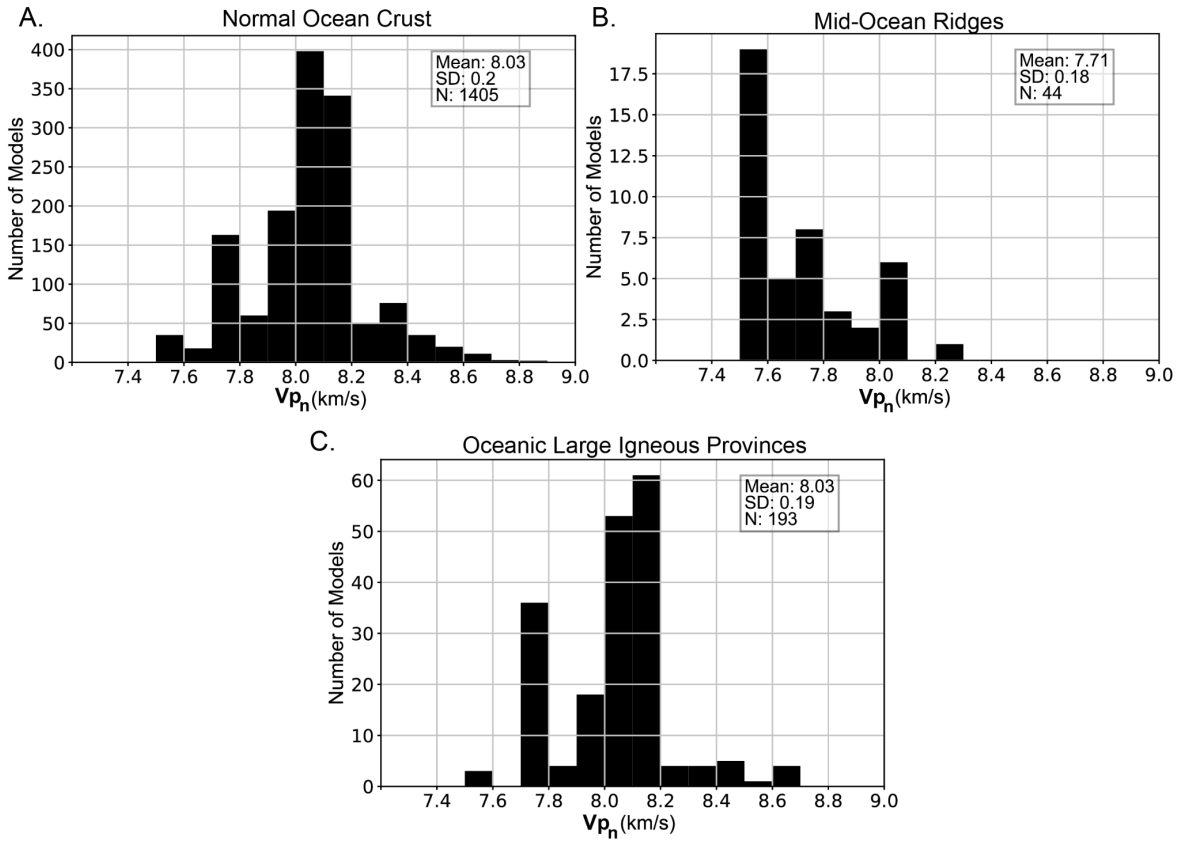

Figure S13. Mantle velocities of P-wave (Vpn) of (A) Normal Ocean Crust, (B) Mid-Ocean Ridges, and (C) Oceanic Large Igneous Provinces. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

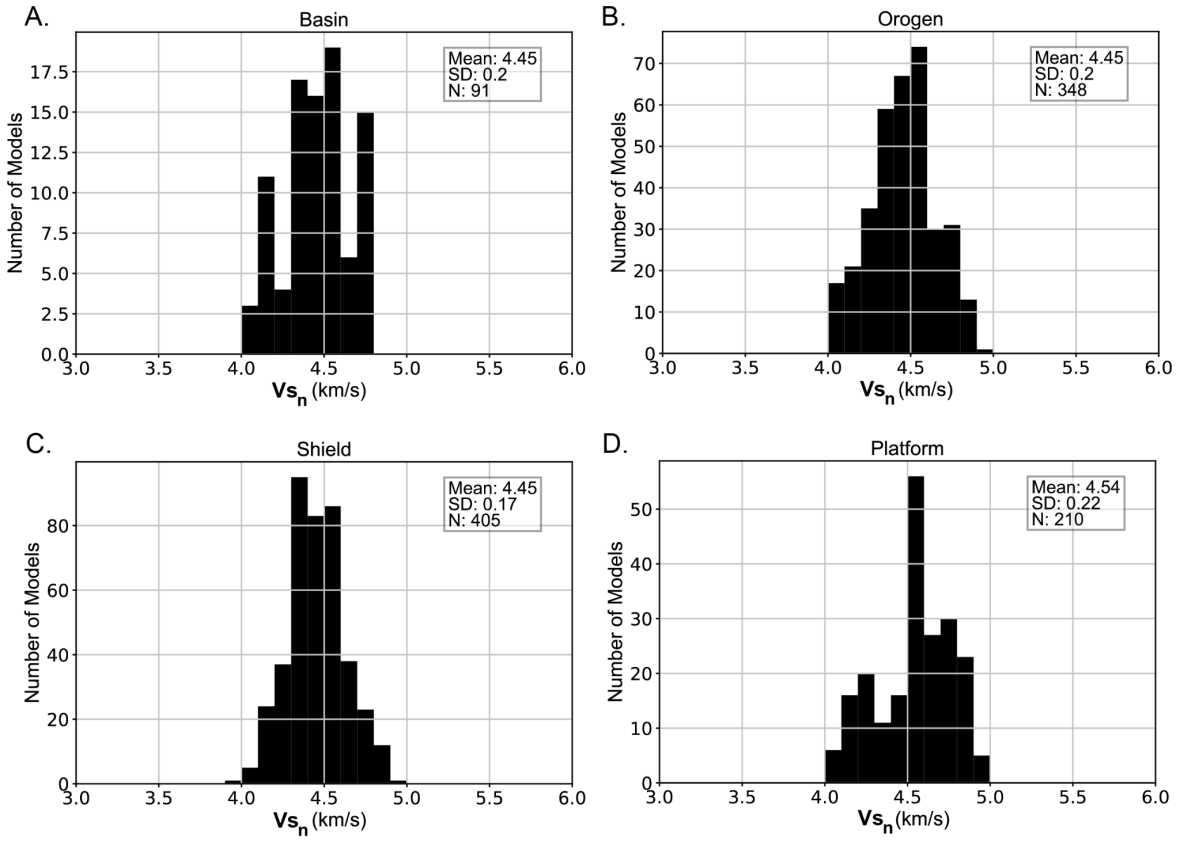

Figure S14. Mantle velocities of S-wave (Vsn) of (A) Basin, (B) Orogen, (C) Shield, and (D) Platform. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

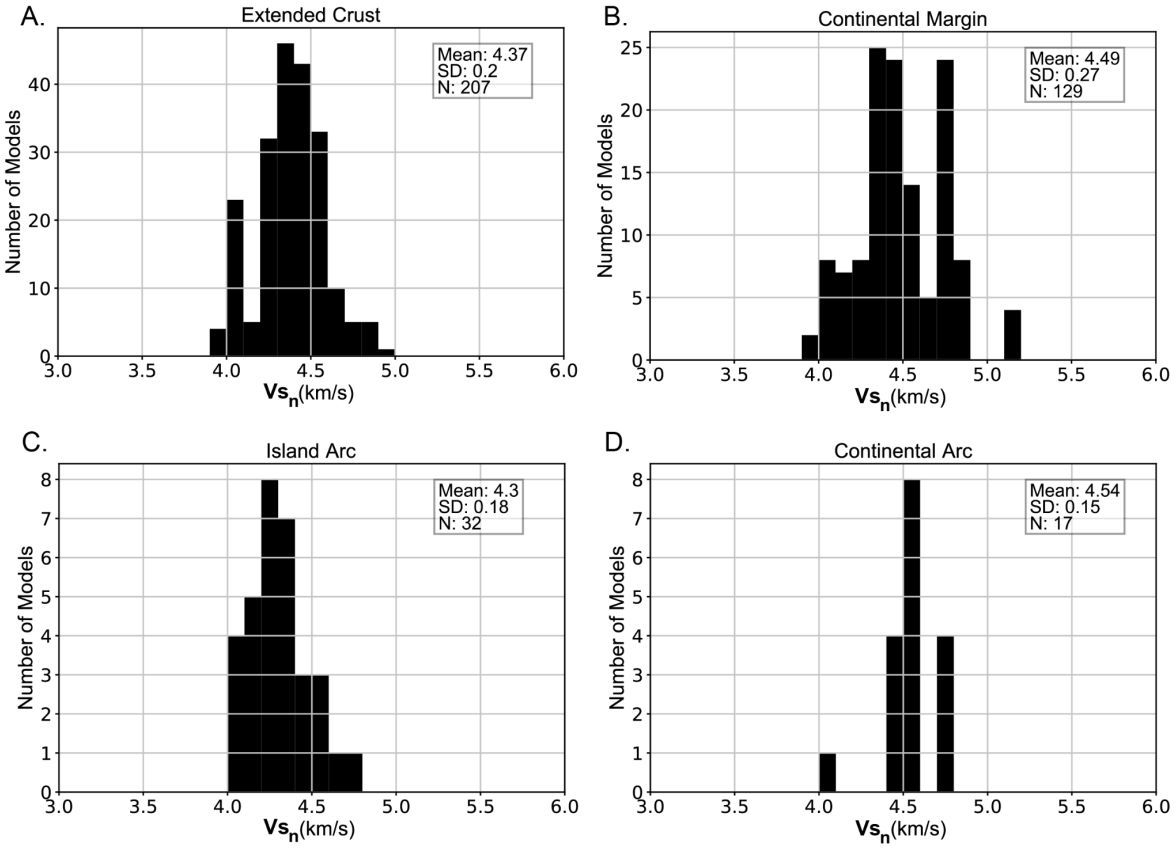

Figure S15. Mantle velocities of S-wave (Vsn) of (A) Extended Crust, (B) Continental Margin, (C) Island Arc, and (D) Continental Arc. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.

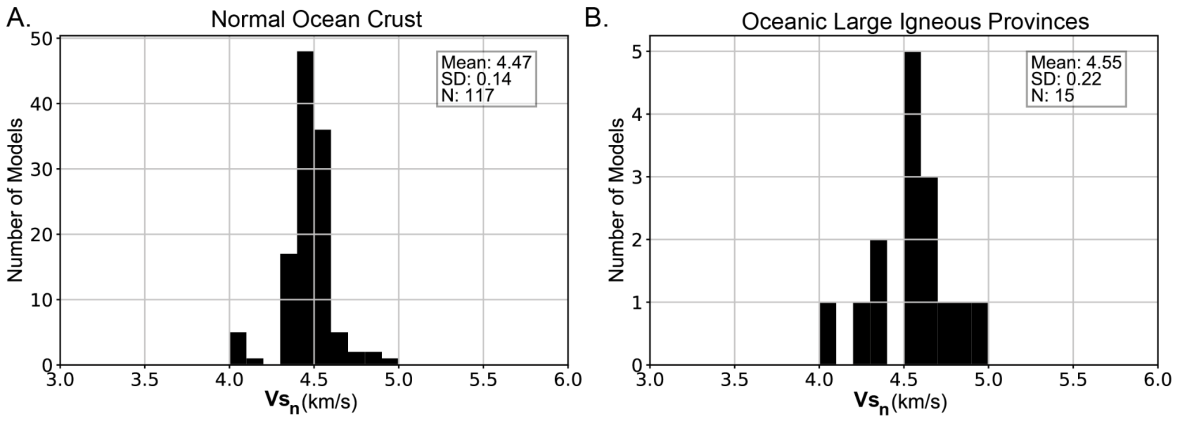

Figure S16. Mantle velocities of S-wave (Vsn) of (A) normal ocean crust, and (B) oceanic large igneous provinces. Data are the field measurements used to calculate ECM1. Mean, mean value; SD, standard deviation; N, number of measurements.