Appendix A Residual Figures

This appendix contains a larger set of residual figures. Between-event, between-site, and within-site residuals are shown for the following frequencies: 0.1, 0.15, 0.2, 0.3, 0.5, 0.8, 1, 1.5, 2, 3, 5, 8, 10, 15, 20, and 24 Hz.

A.1 BETWEEN-EVENT AND BETWEEN-SITE RESIDUALS

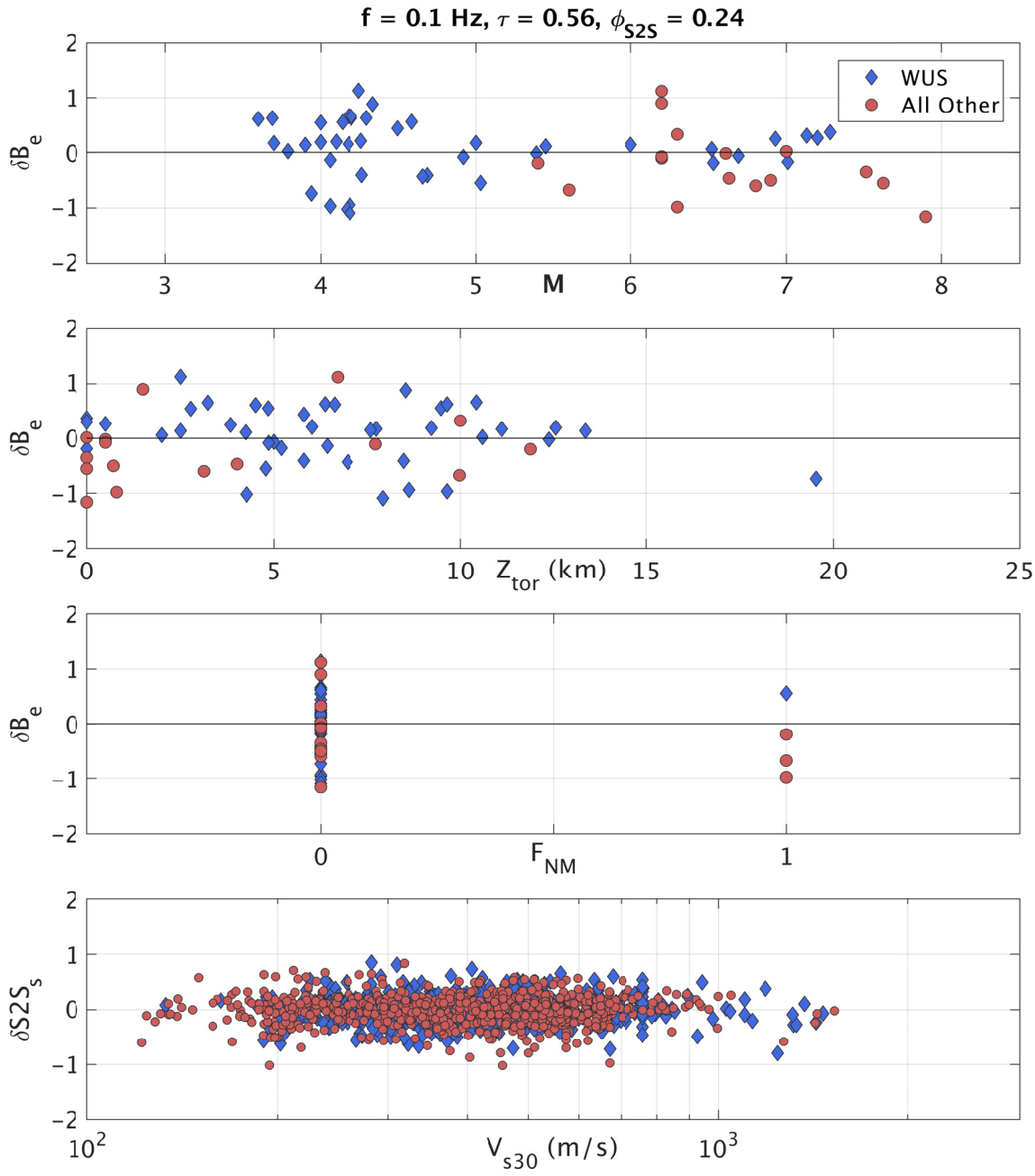

Figure A.1 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 0.1 Hz.**

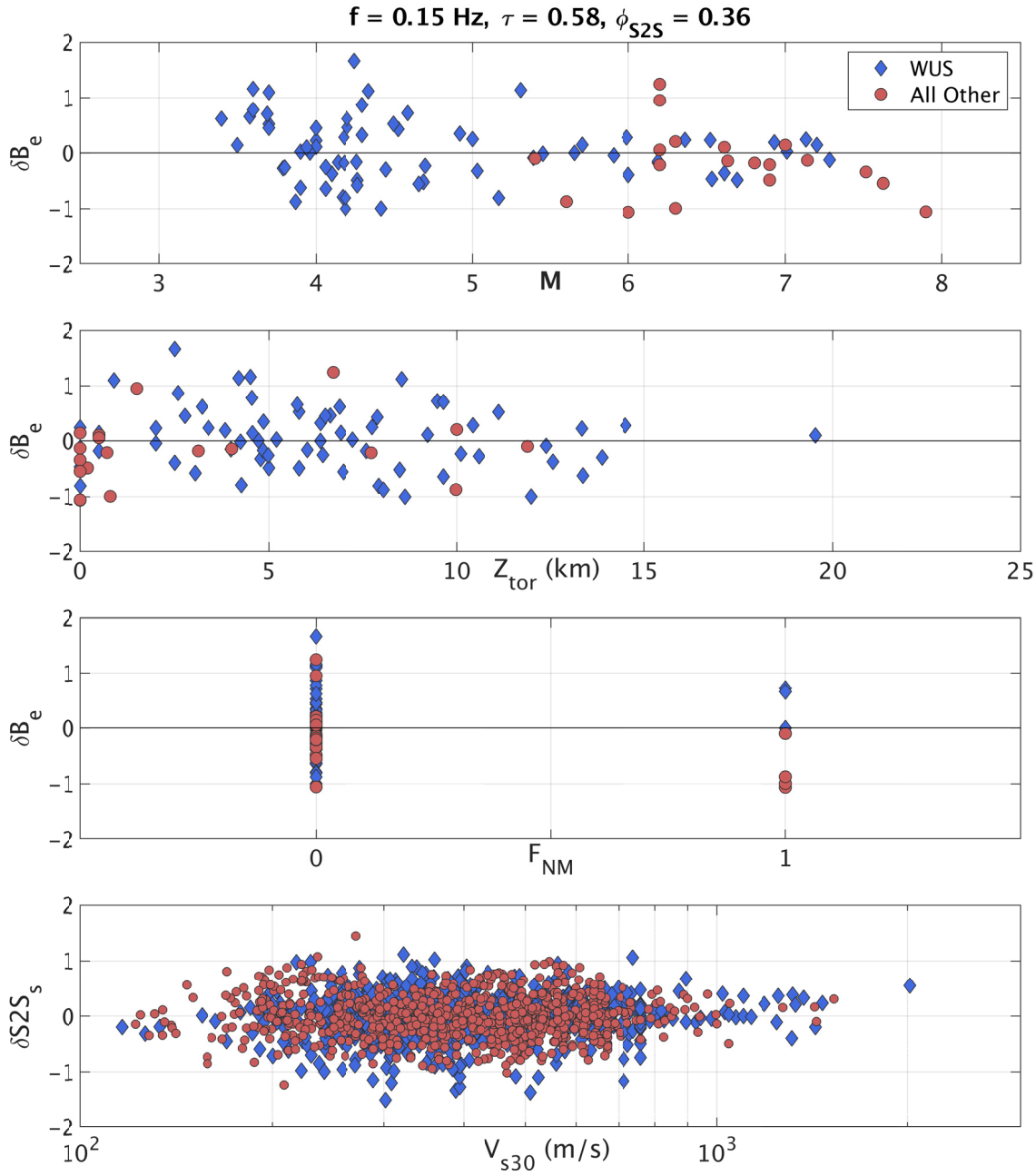

Figure A.2 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 0.15$ Hz.**

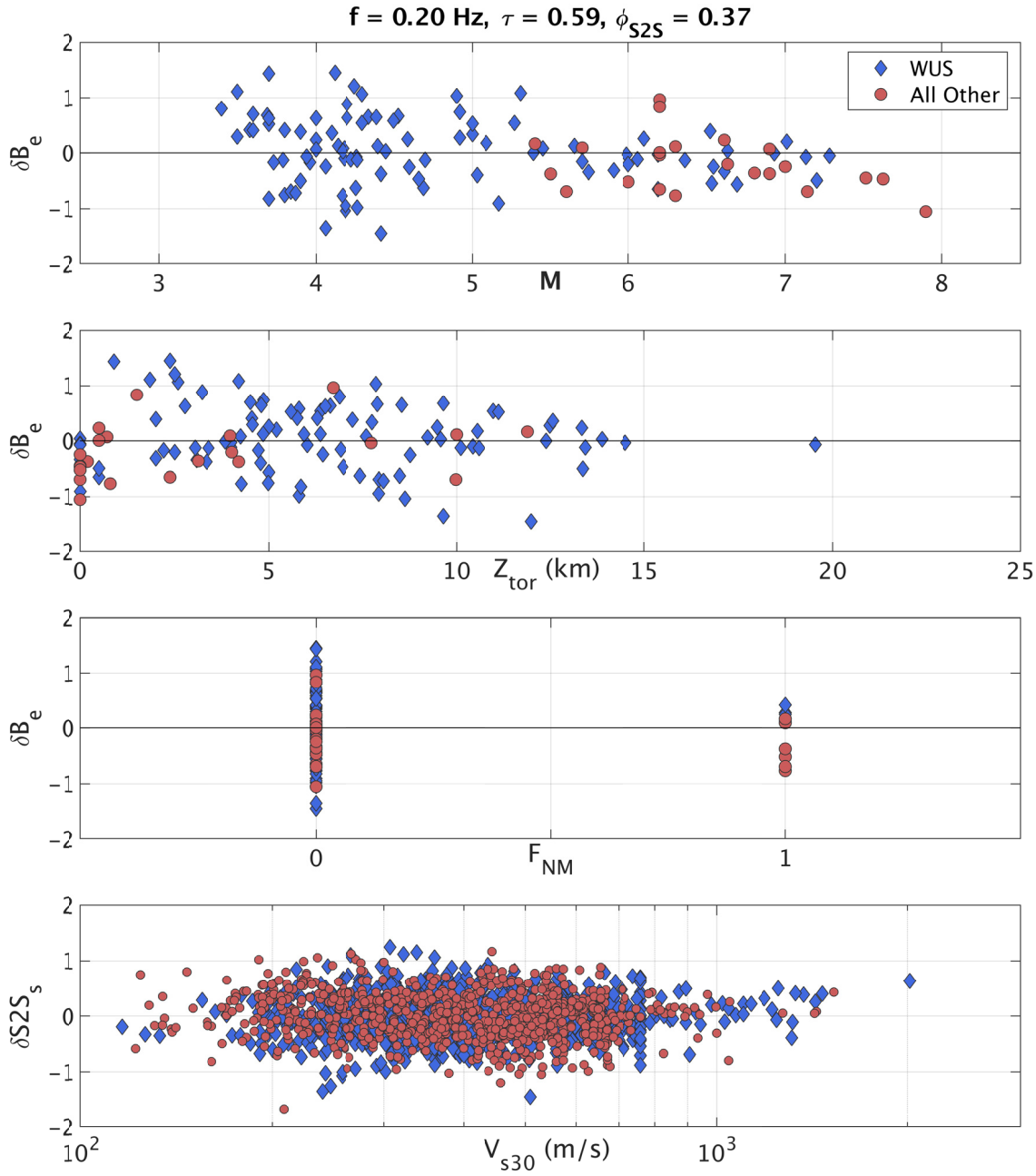

Figure A.3 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 0.2 Hz.**

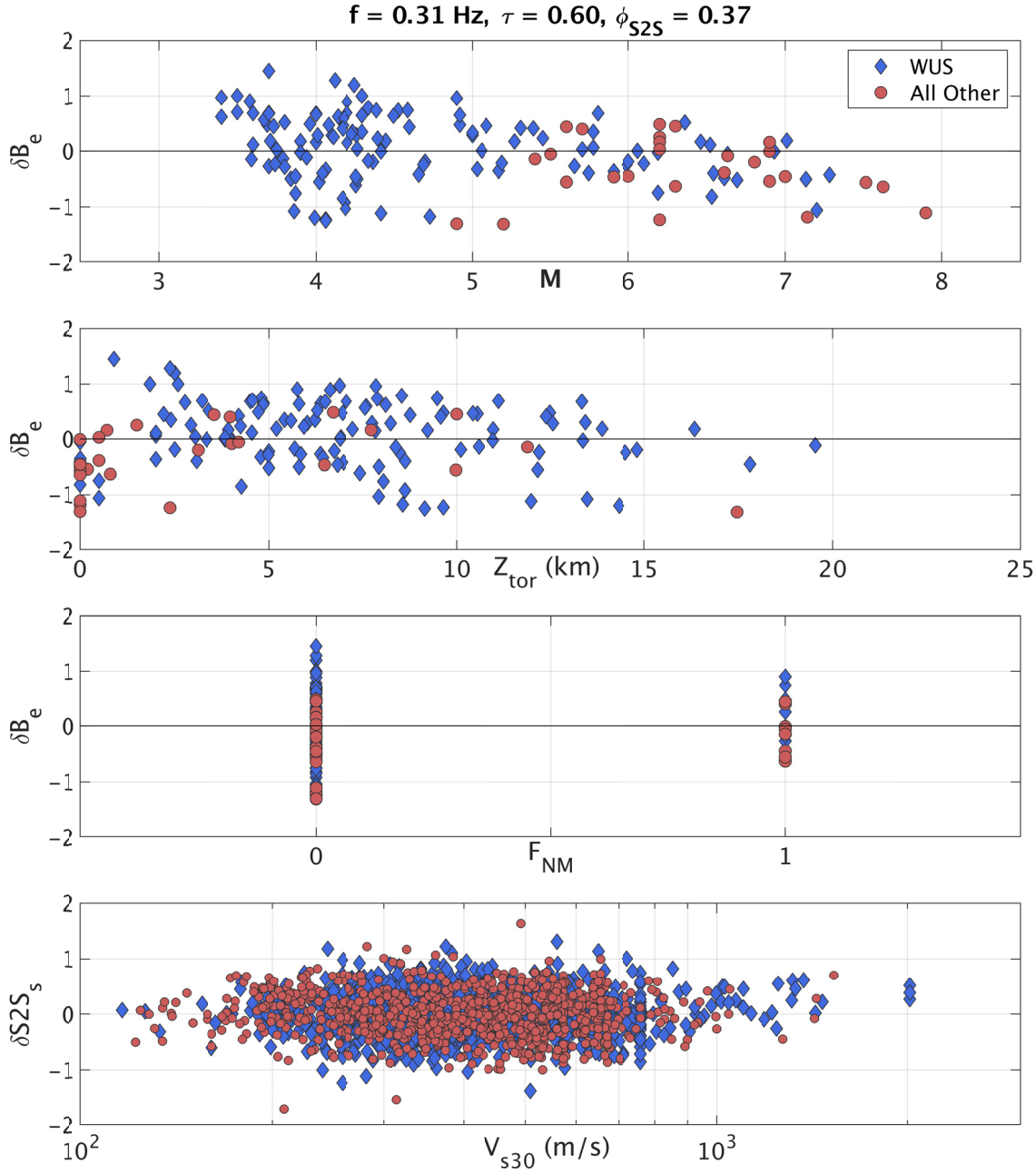

Figure A.4 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 0.3 Hz.**

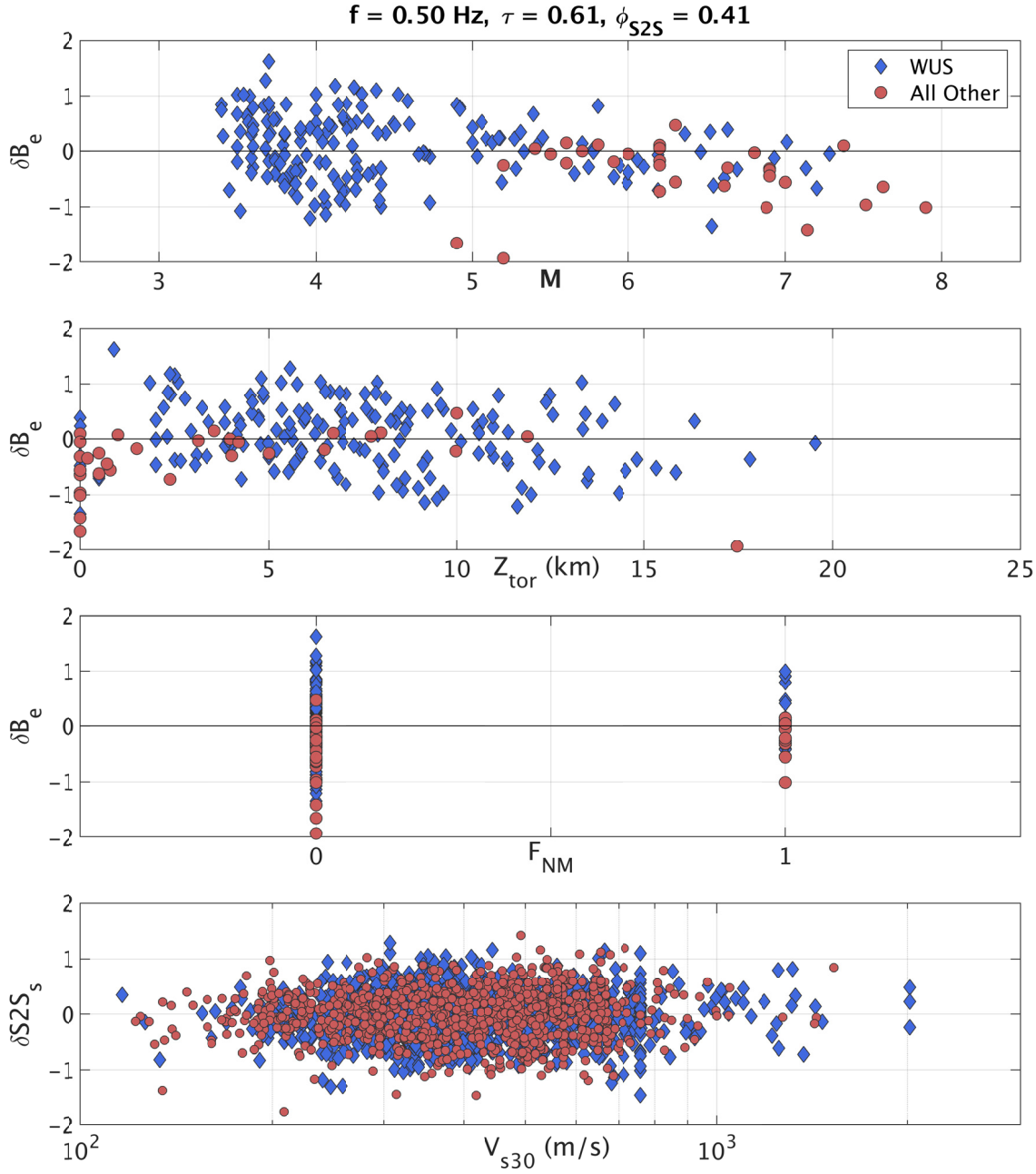

Figure A.5 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 0.5$ Hz.**

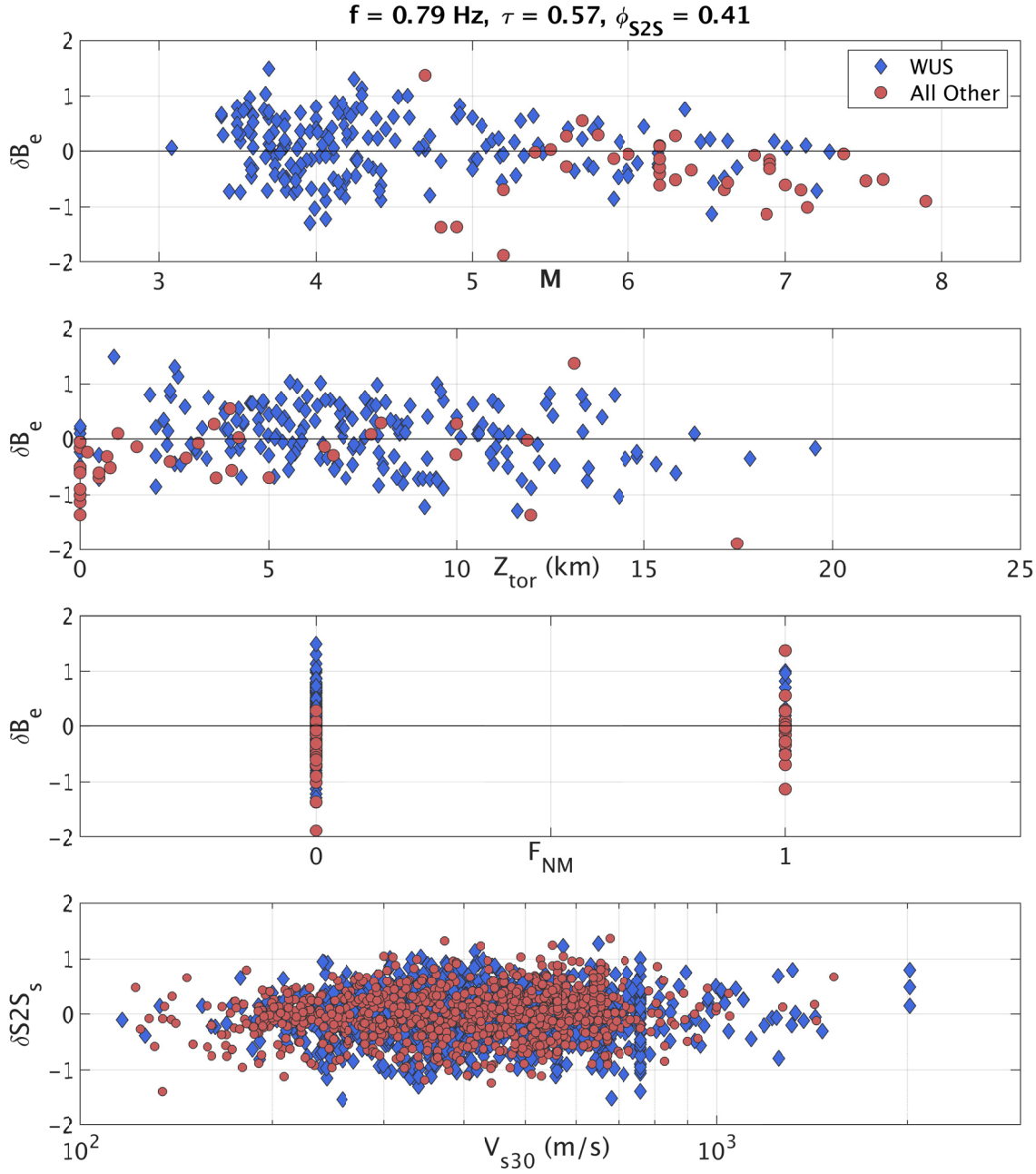

Figure A.6 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 0.8$ Hz.**

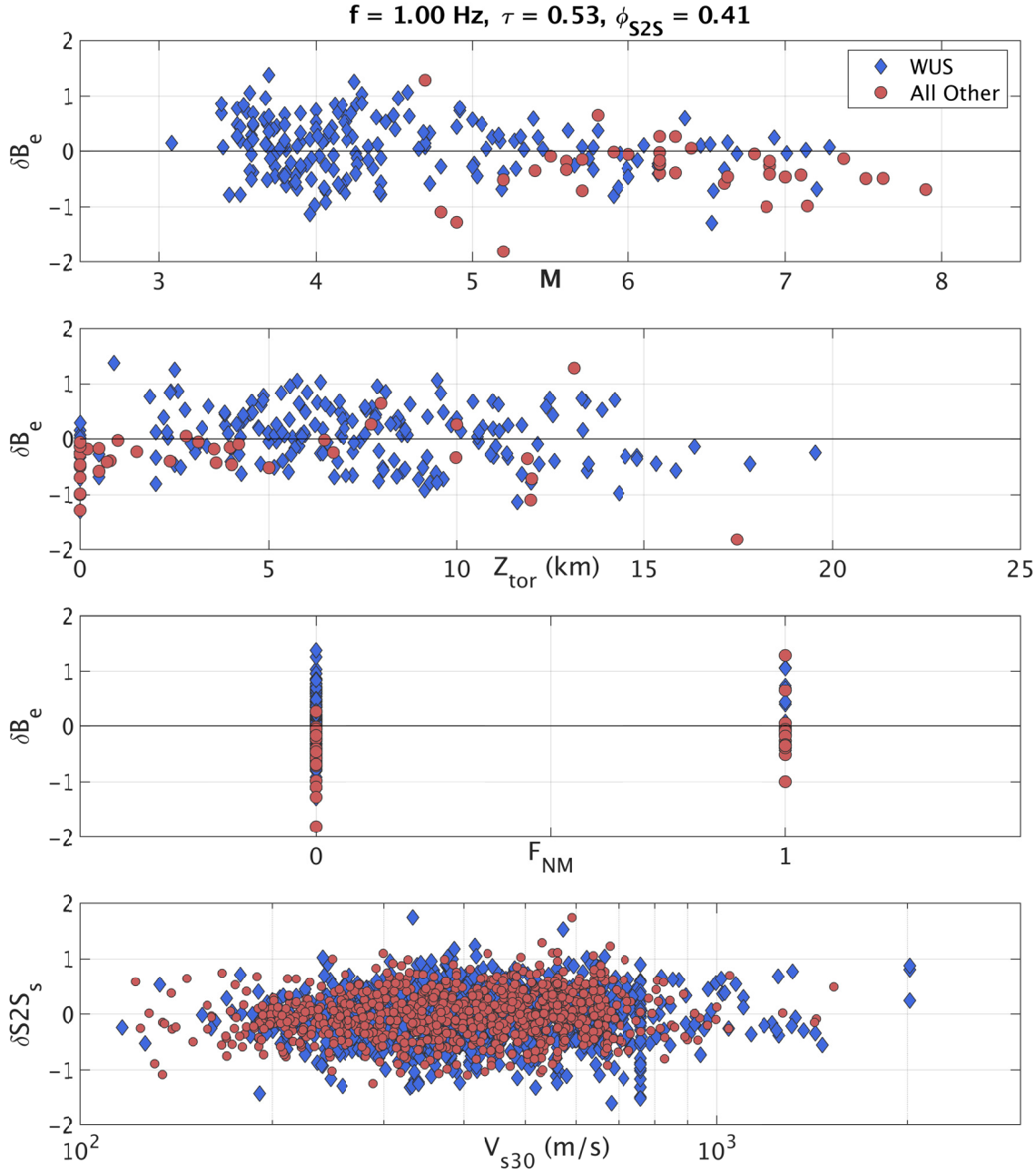

Figure A.7 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 1$ Hz.**

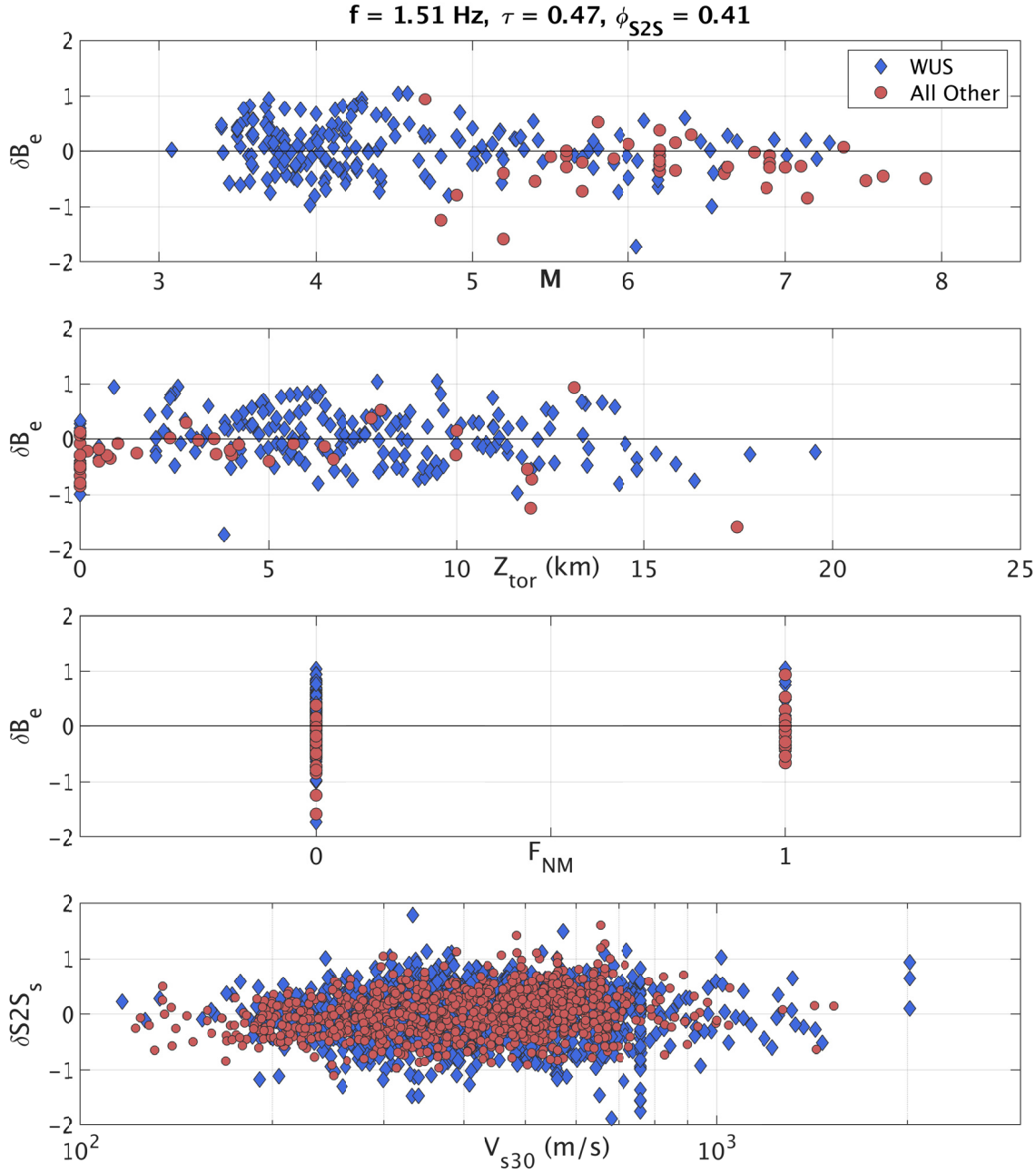

Figure A.8 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 1.5 Hz.**

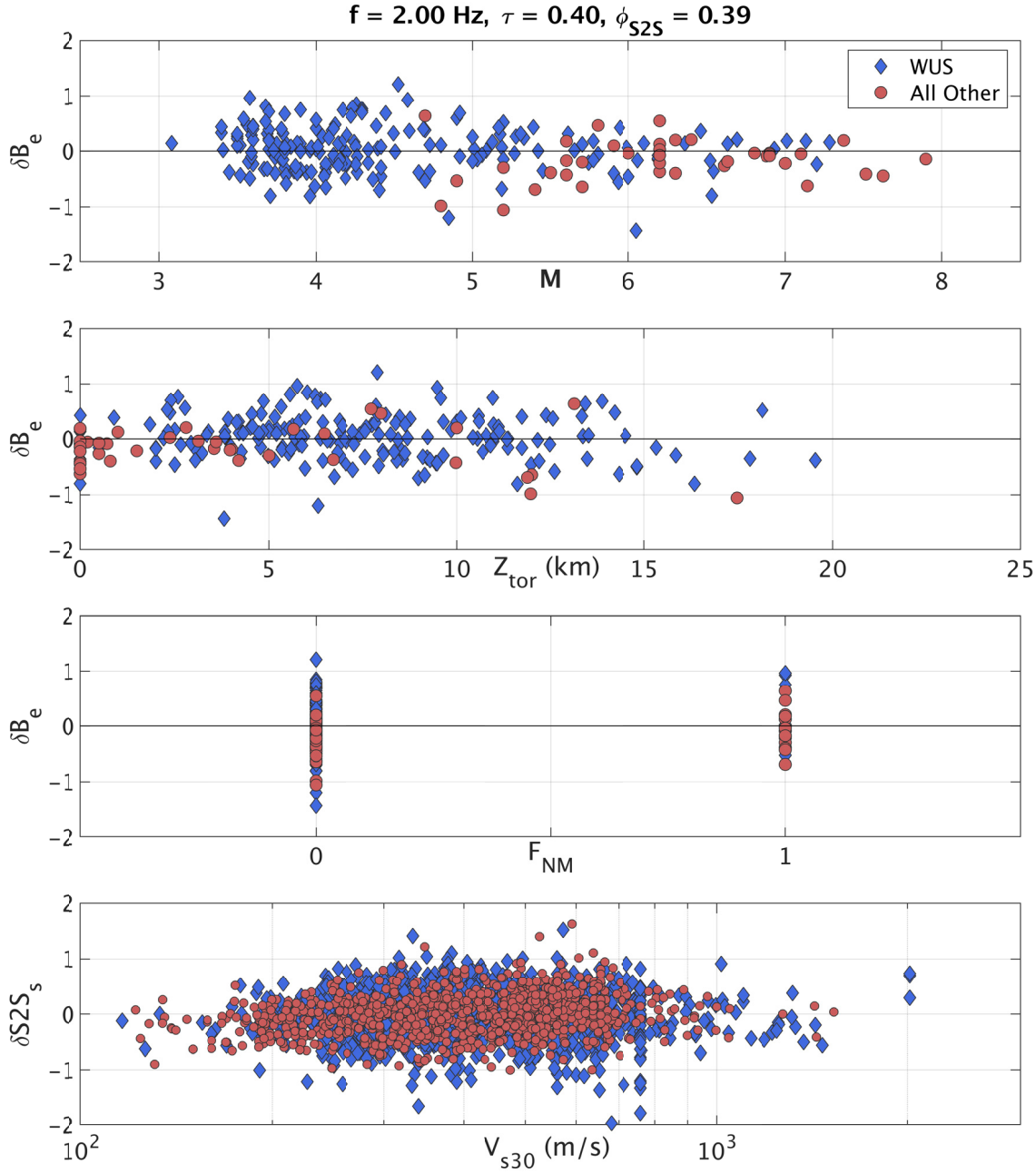

Figure A.9 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 2 Hz.**

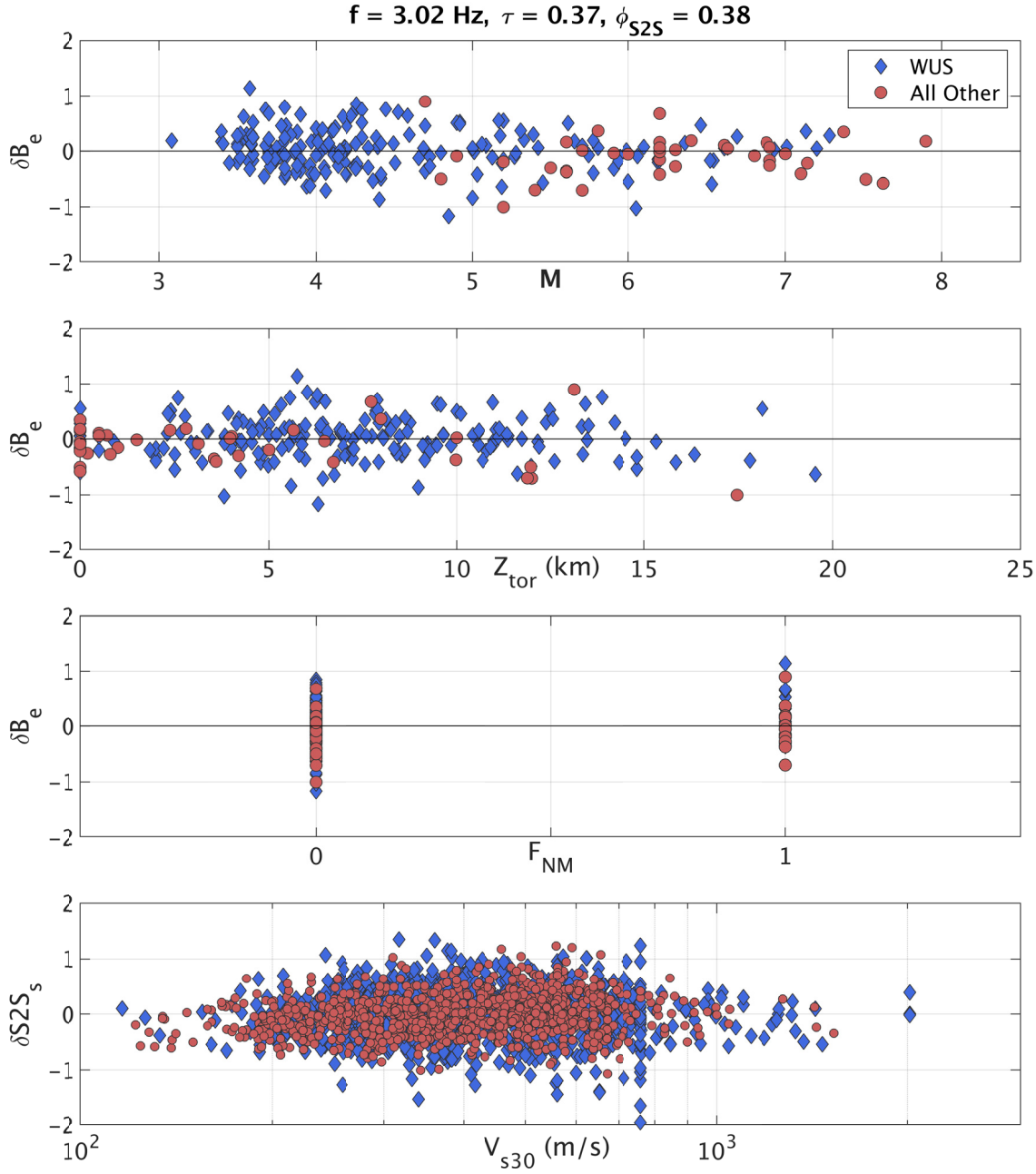

Figure A.10 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 3$ Hz.**

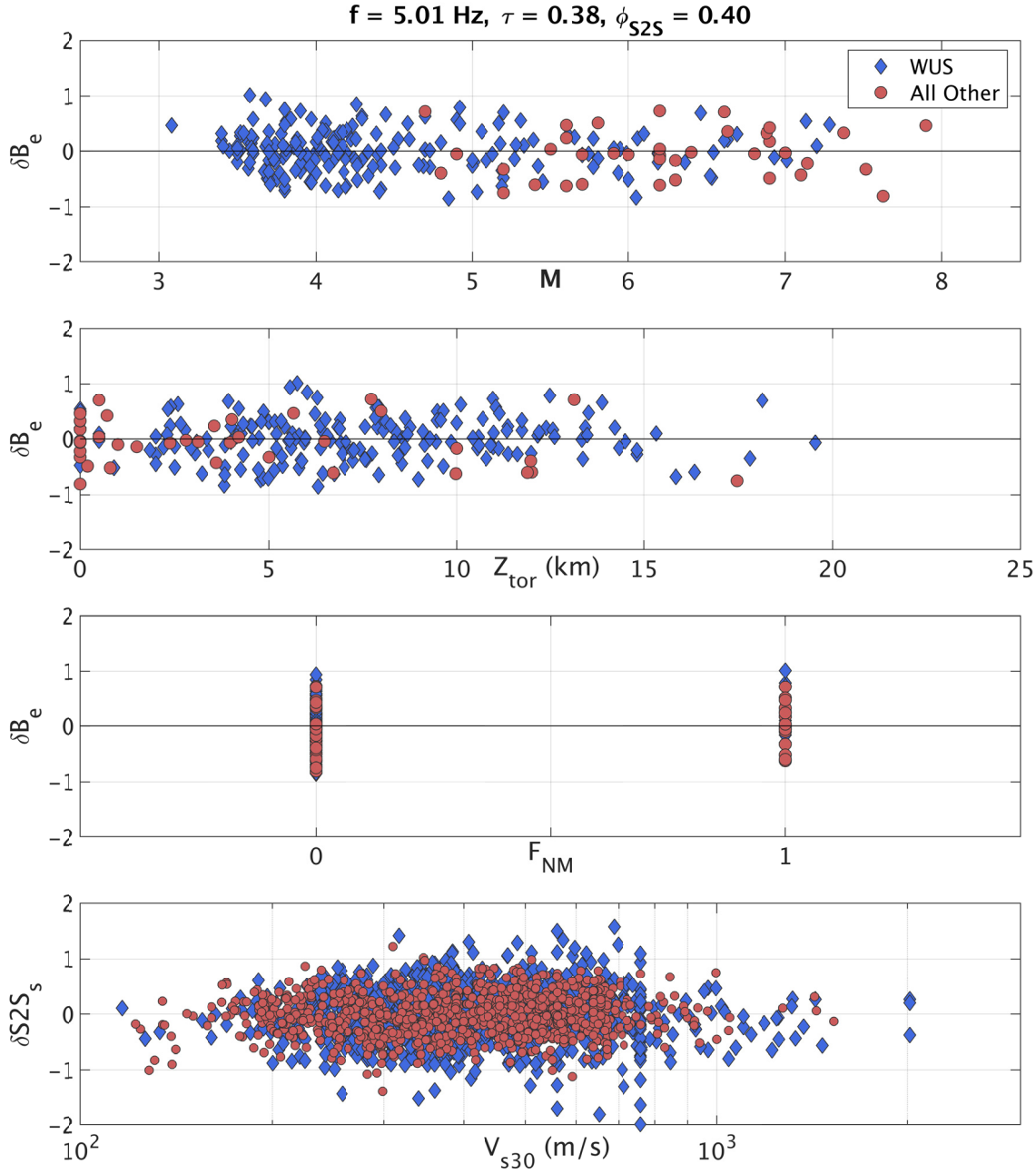

Figure A.11 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 5$ Hz.**

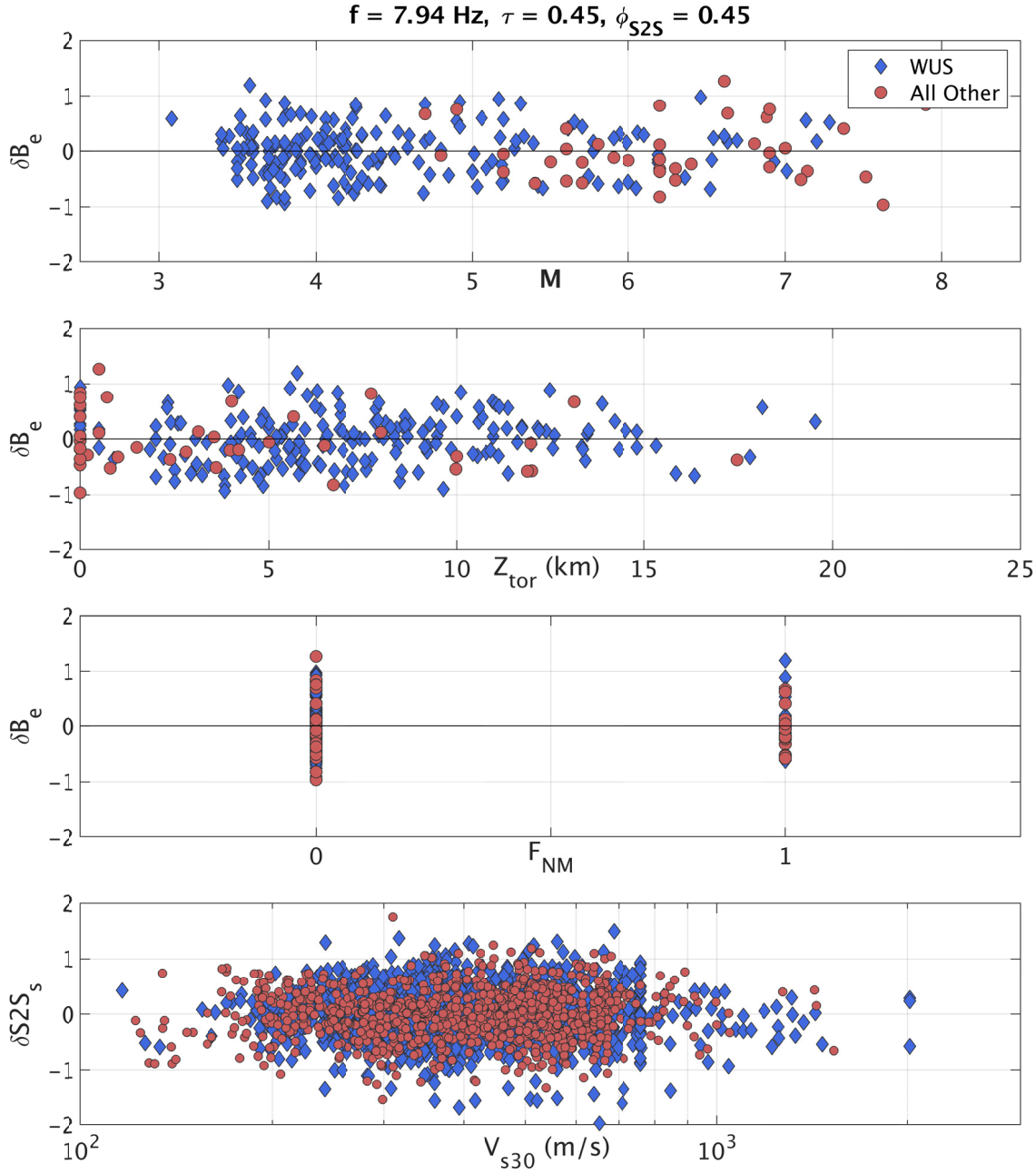

Figure A.12 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 8$ Hz.**

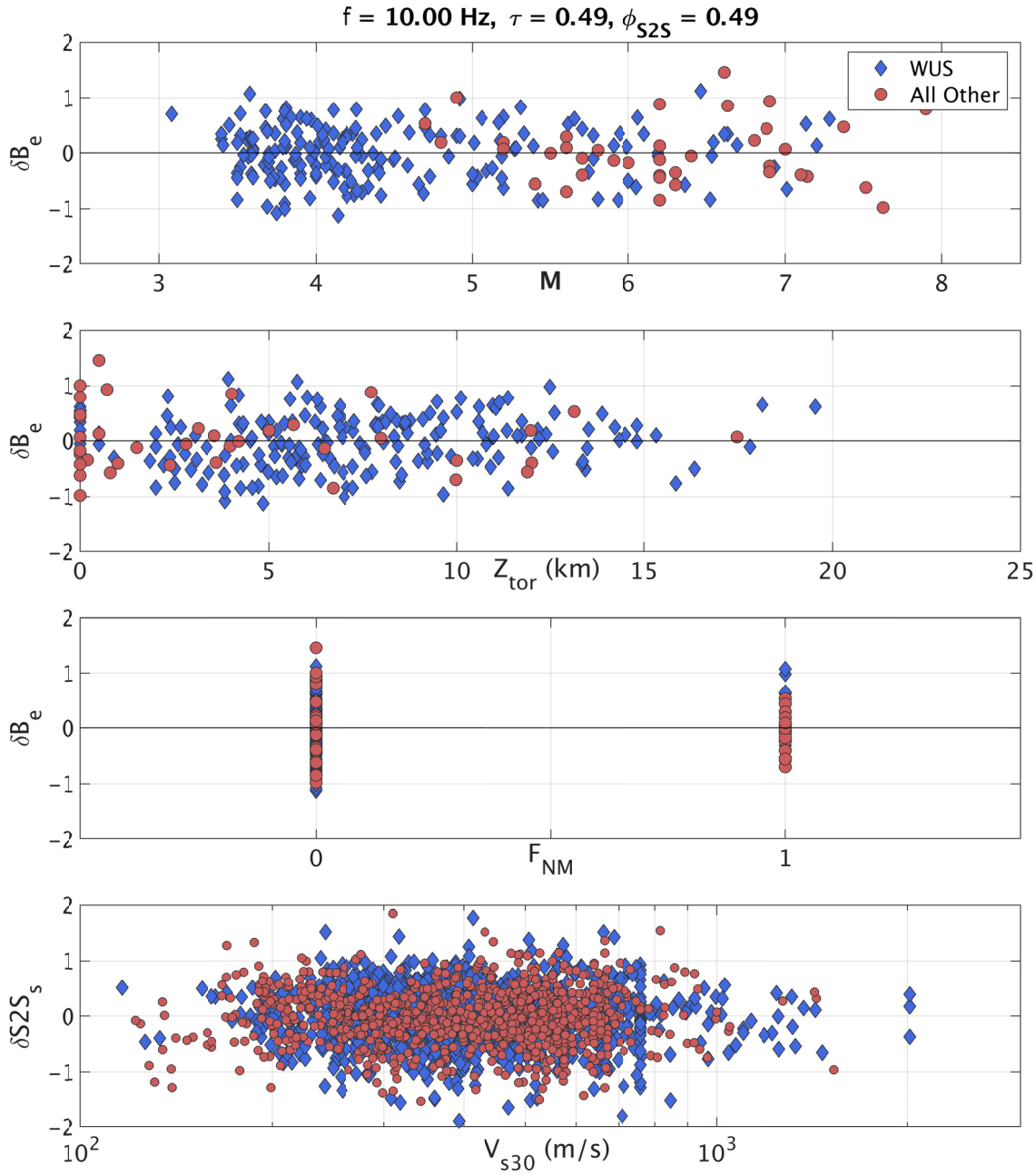

Figure A.13 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 10 Hz.**

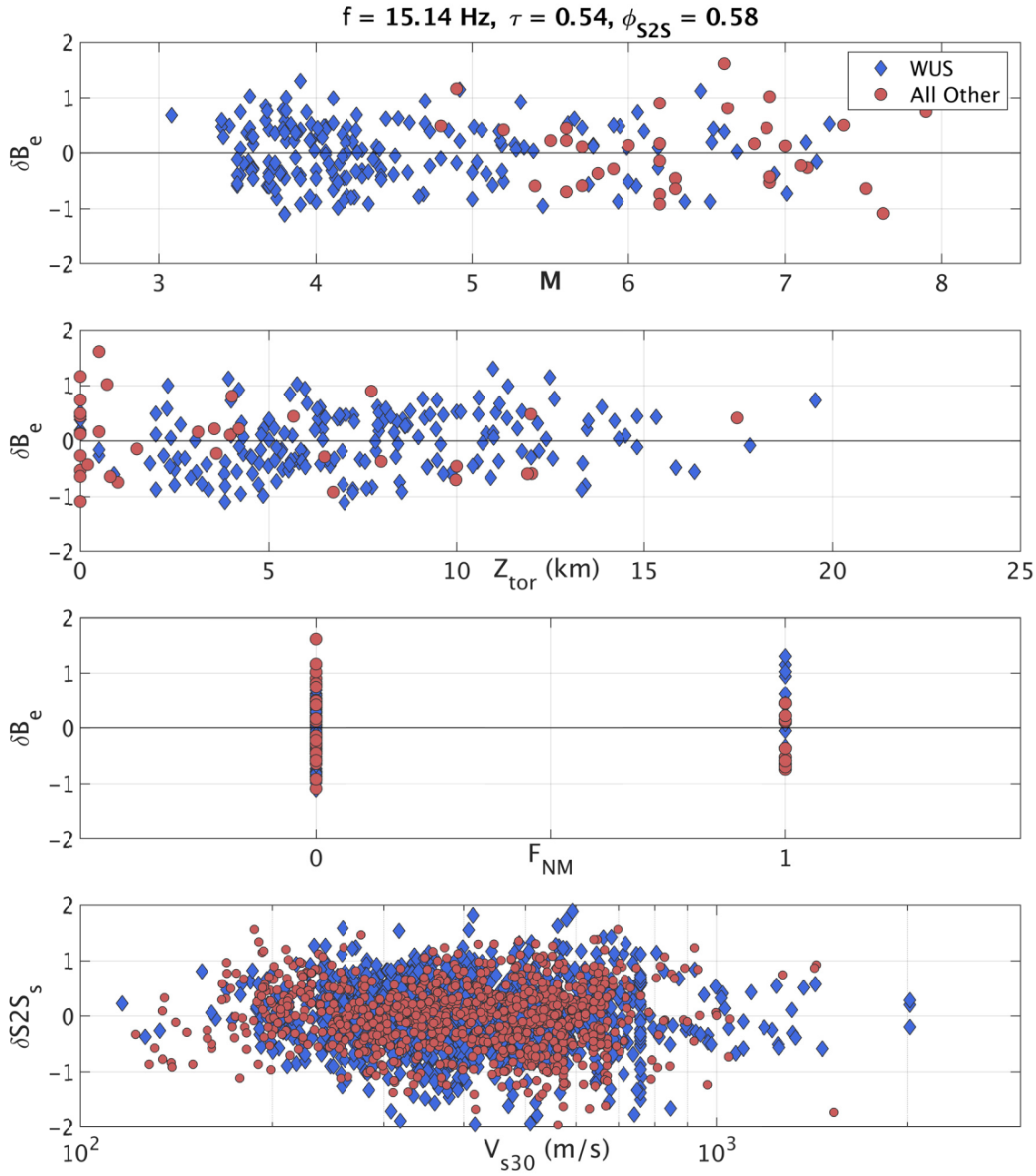

Figure A.14 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 15 Hz.**

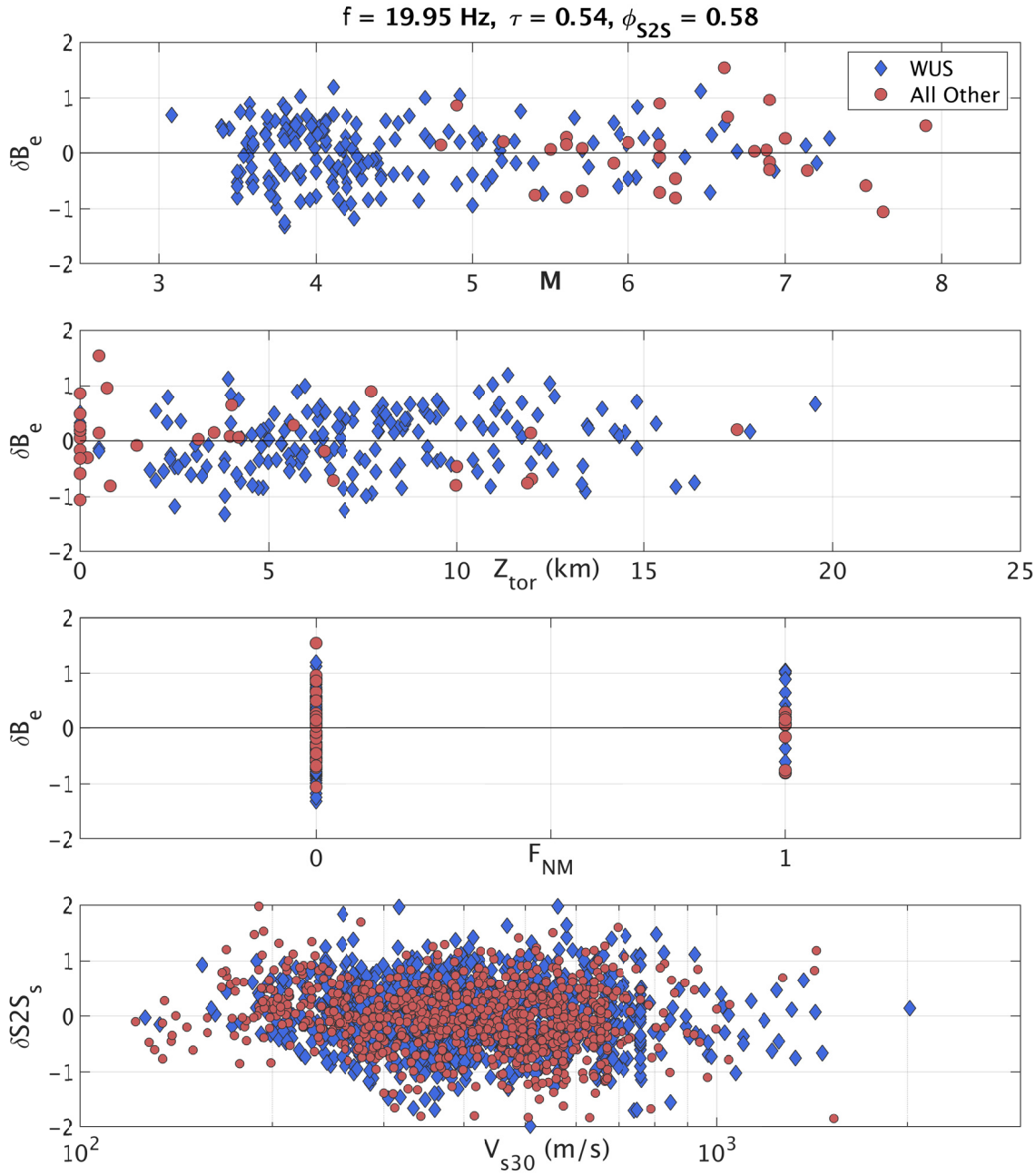

Figure A.15 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for $f = 20$ Hz.**

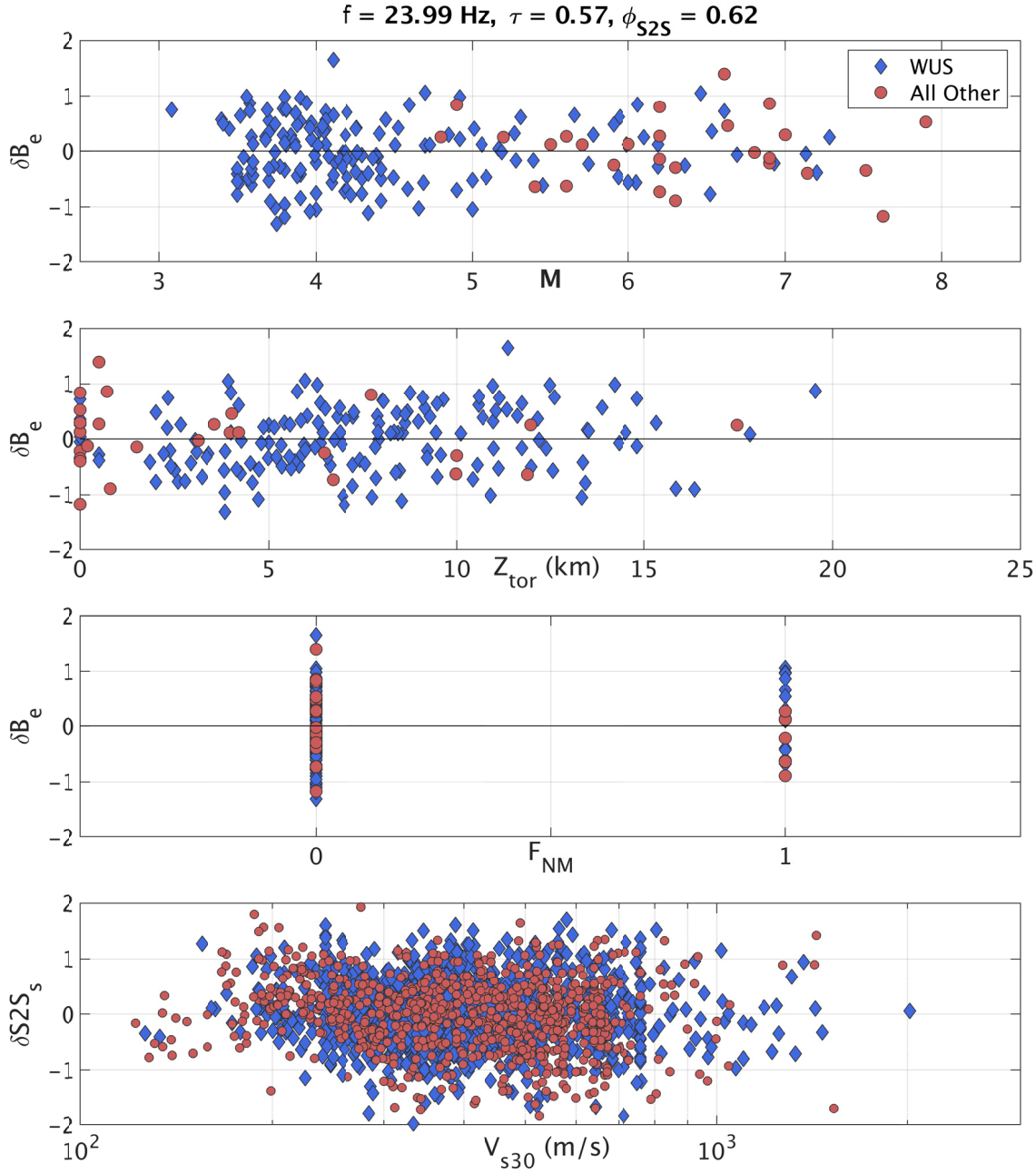

Figure A.16 **Between-event residuals (δB_e) versus M, Z_{tor}, and F_{NM} and between-site residuals ($\delta S2S_s$) versus V_{s30}, for f = 24 Hz.**

A.2 WITHIN-SITE RESIDUALS

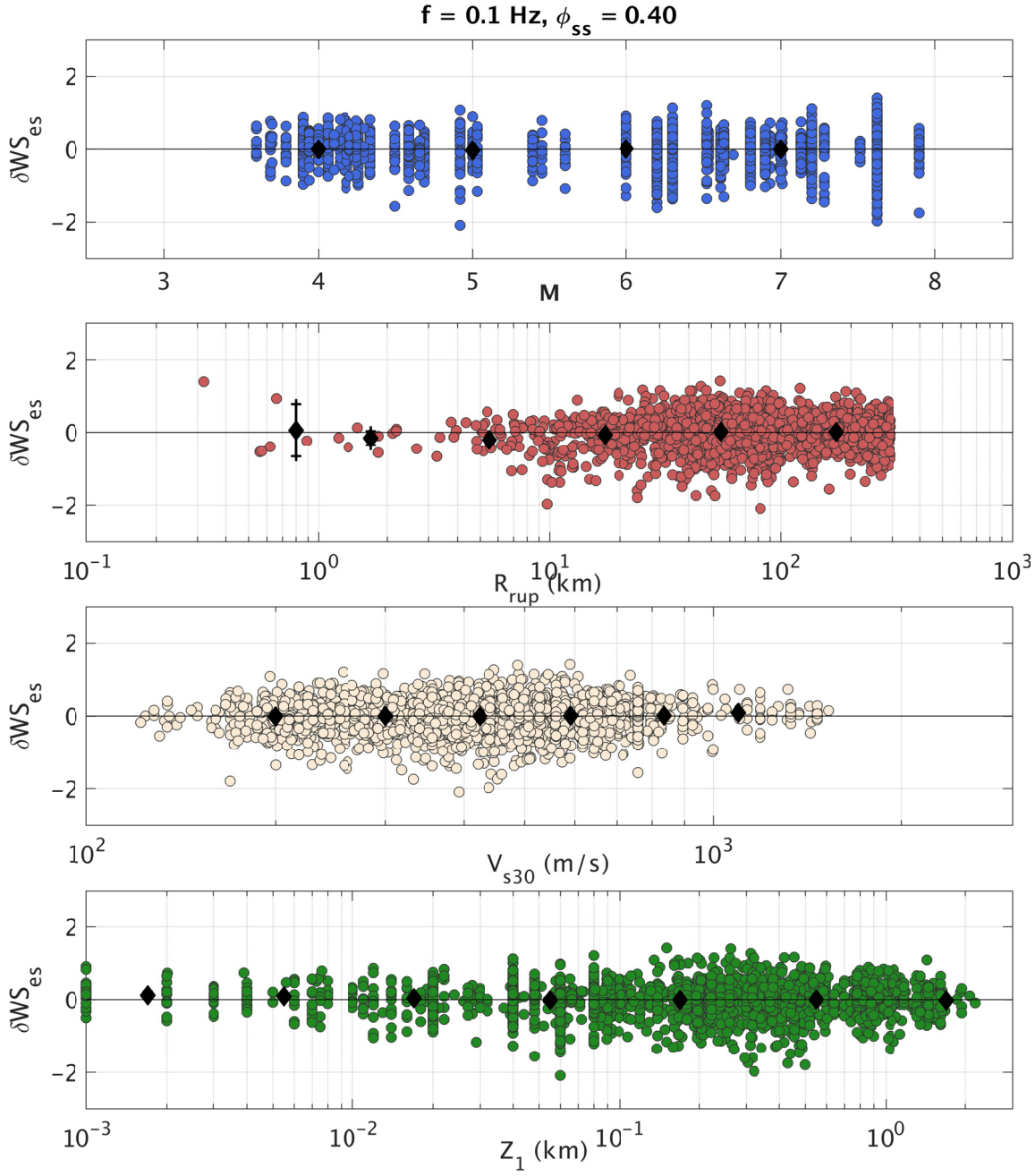

Figure A.17 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 0.1$ Hz.

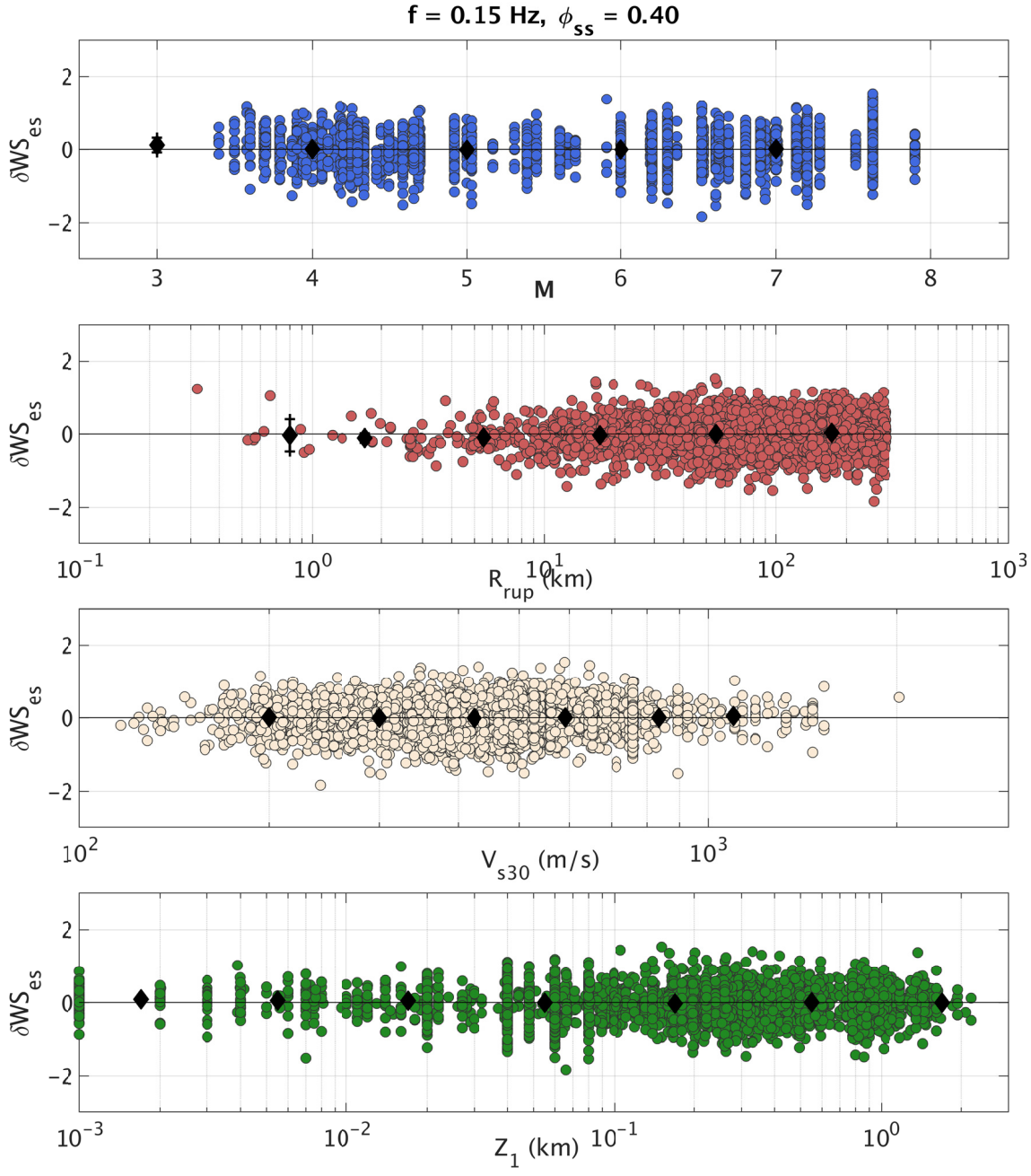

Figure A.18 **Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 0.15 Hz.**

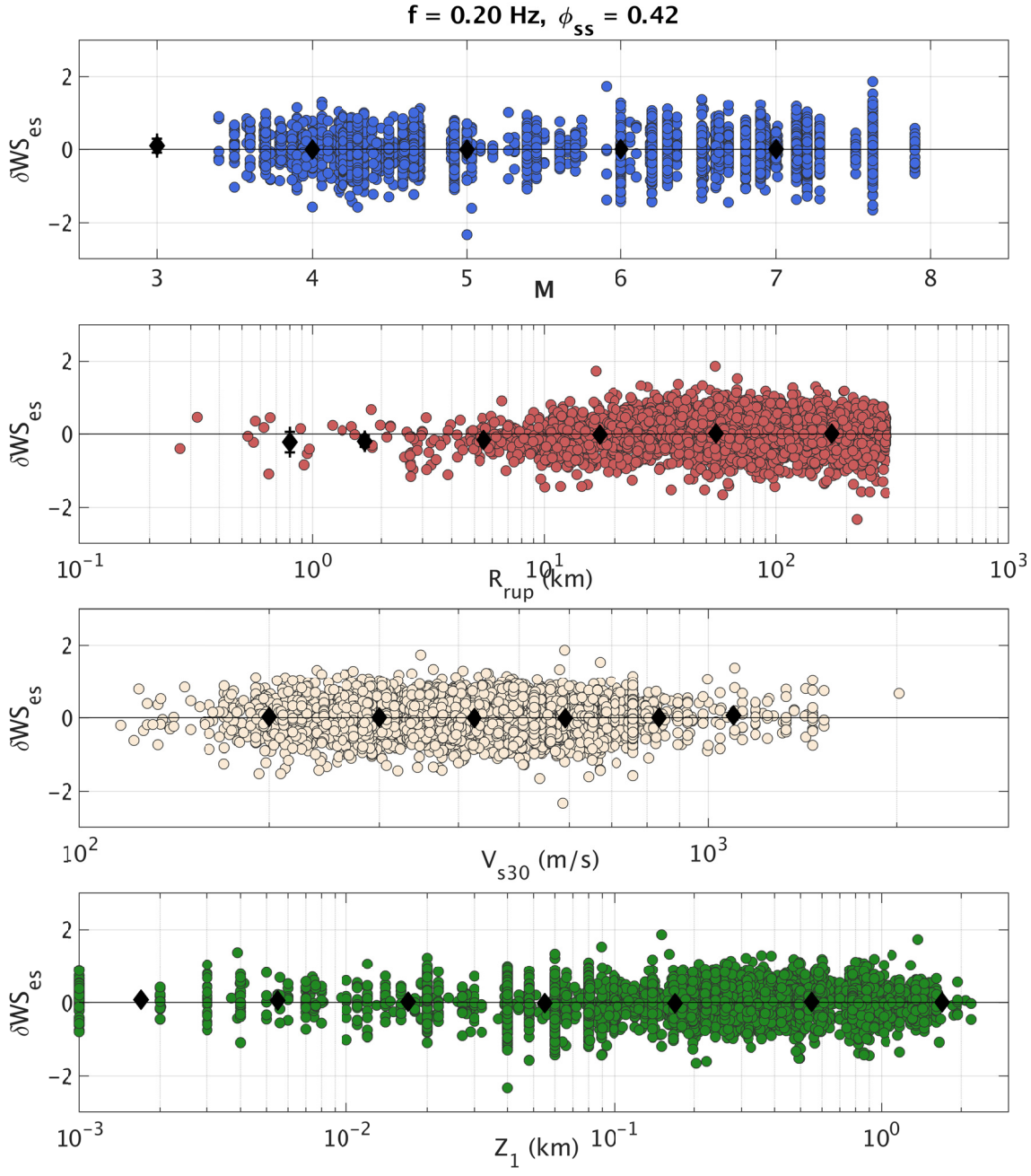

Figure A.19 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 0.2$ Hz.

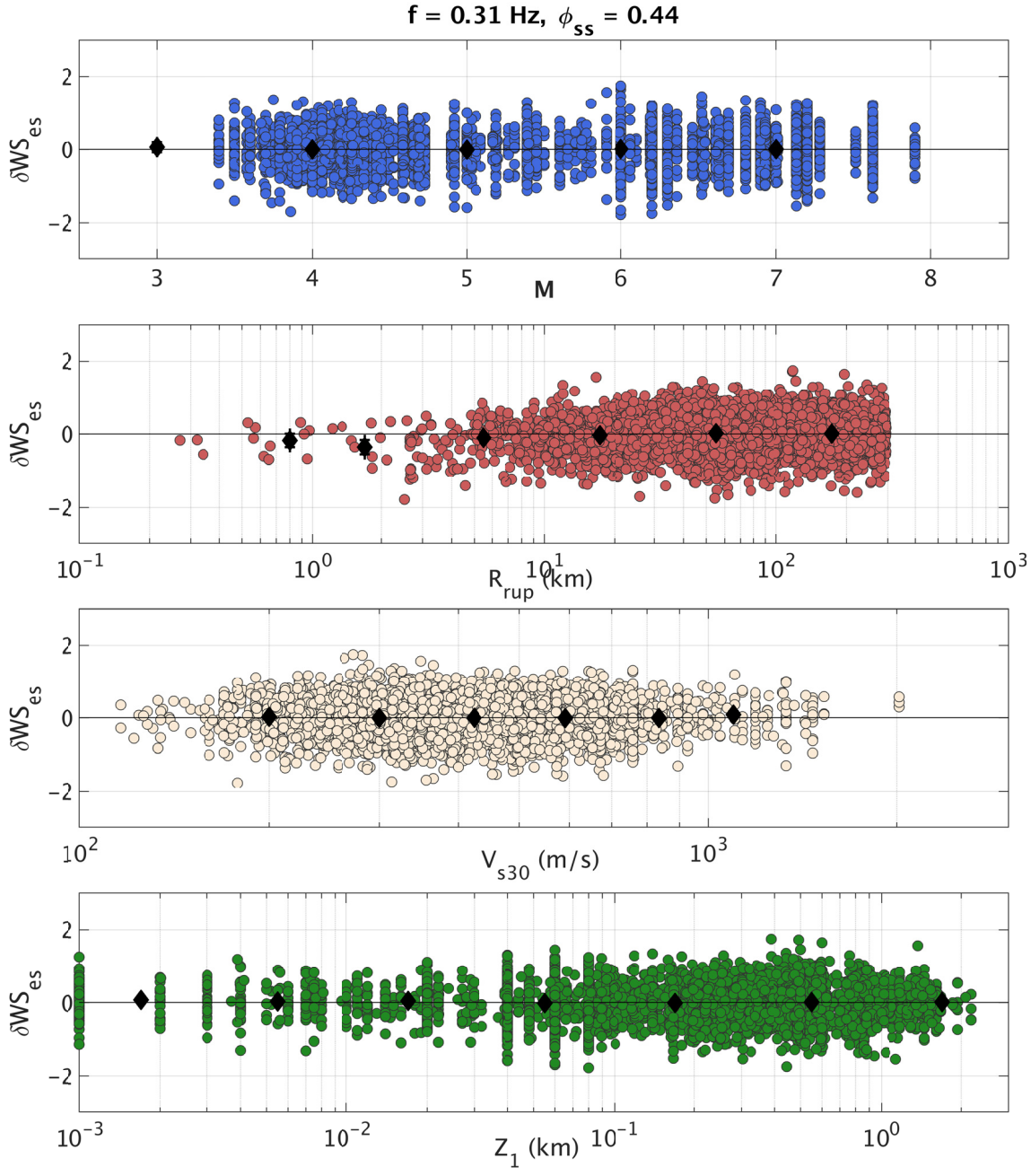

Figure A.20 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 0.3 Hz.

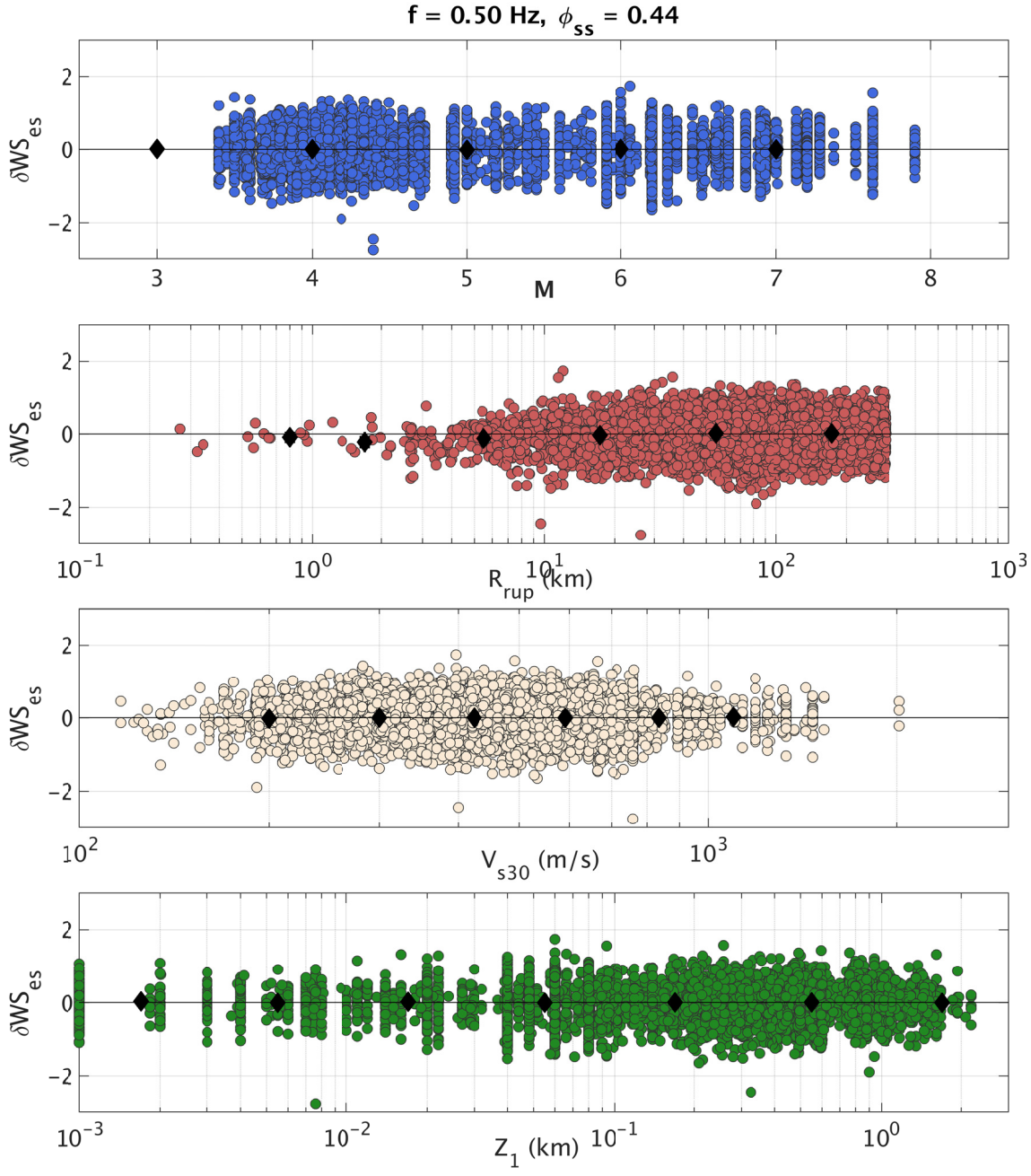

Figure A.21 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 0.5$ Hz.

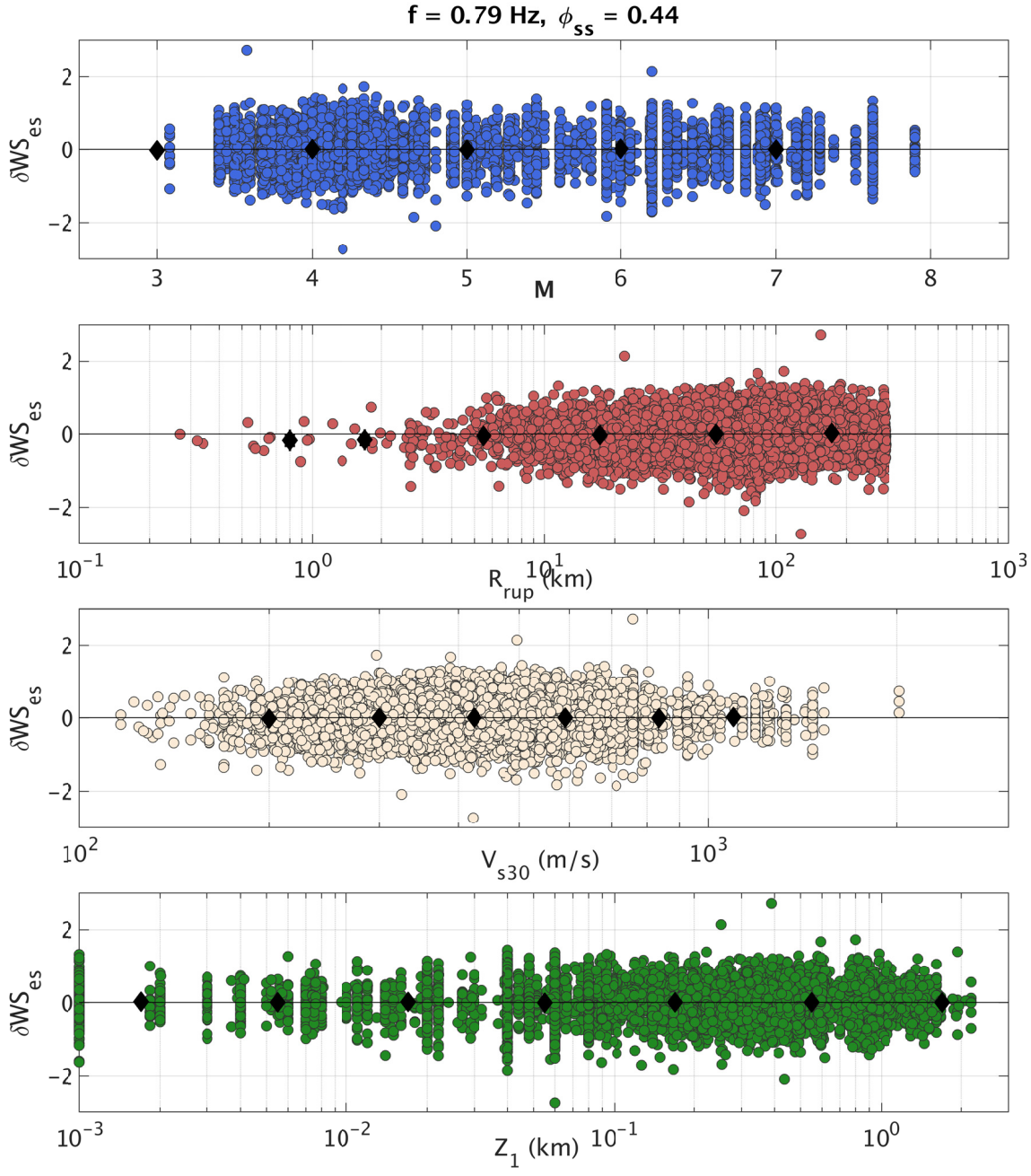

Figure A.22 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 0.8 Hz.

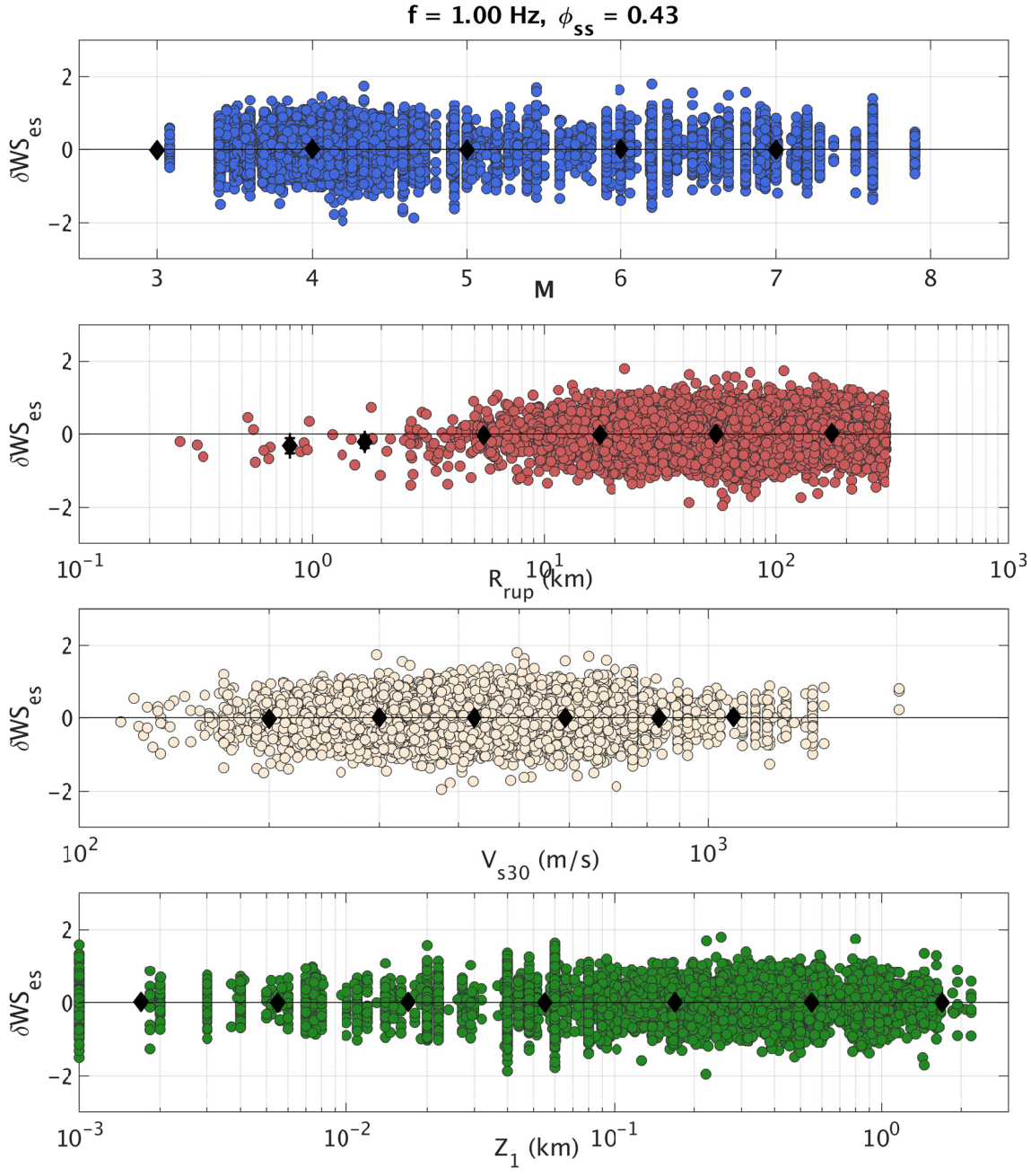

Figure A.23 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 1$ Hz.

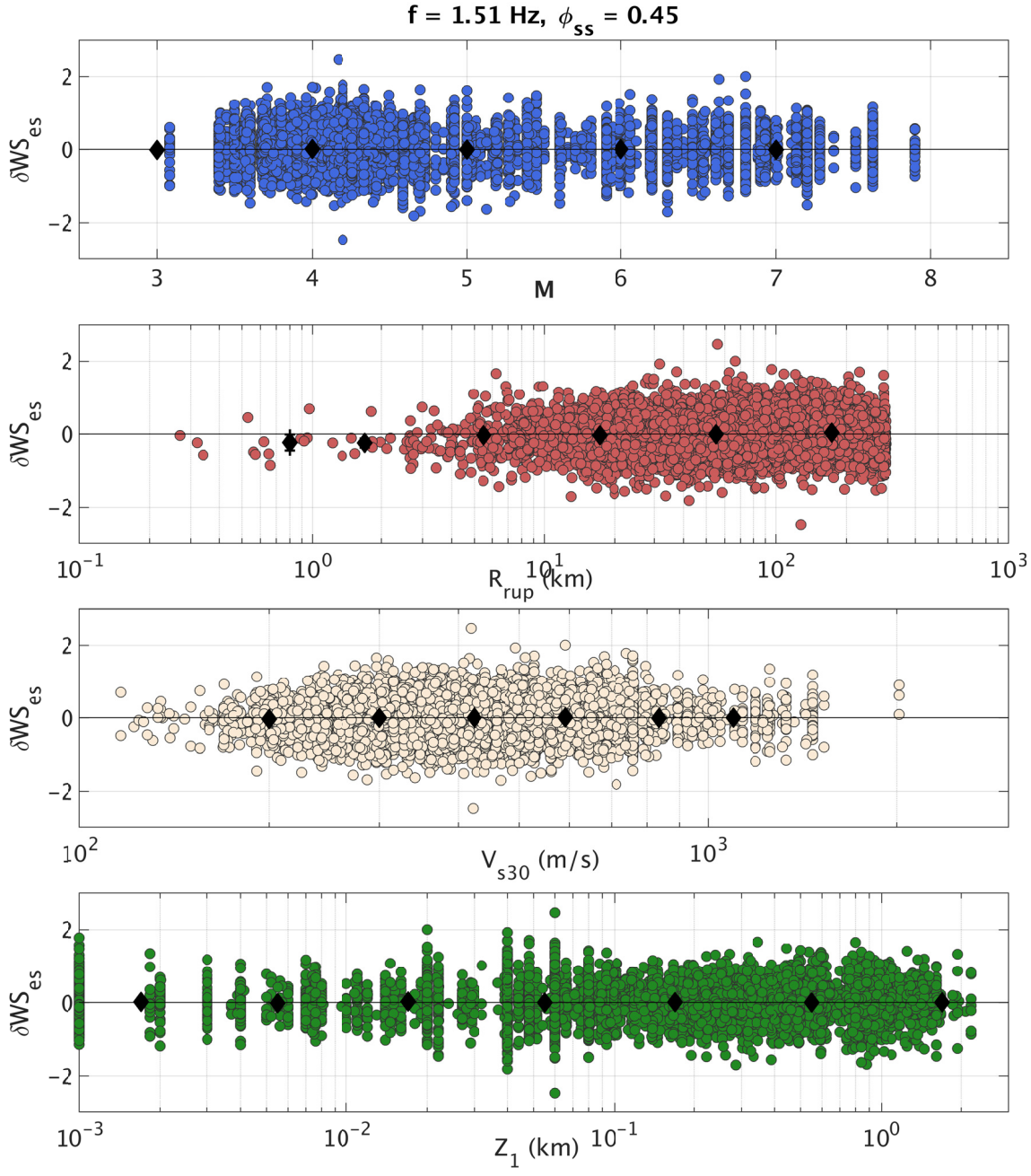

Figure A.24 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 1.5 Hz.

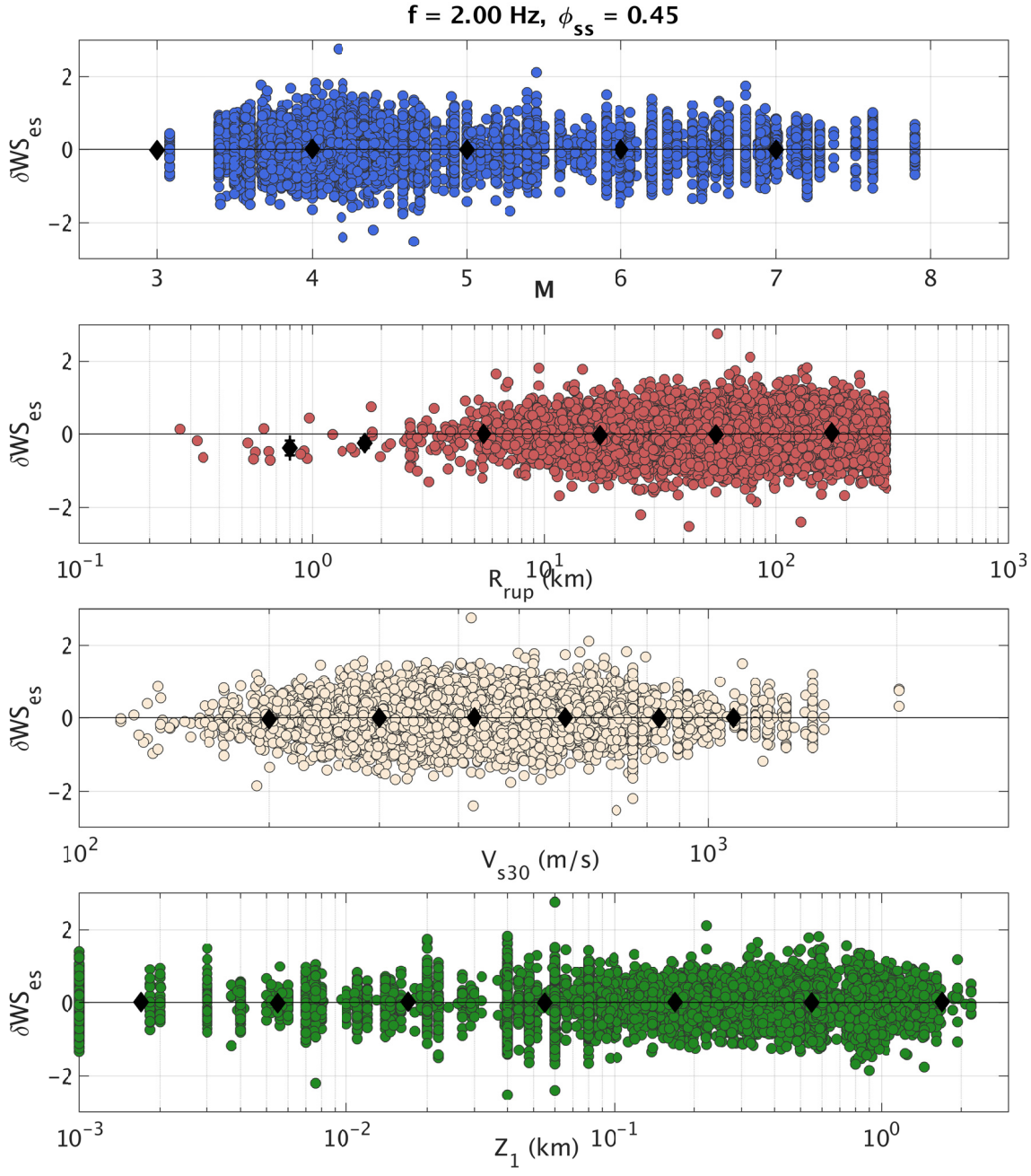

Figure A.25 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 2$ Hz.

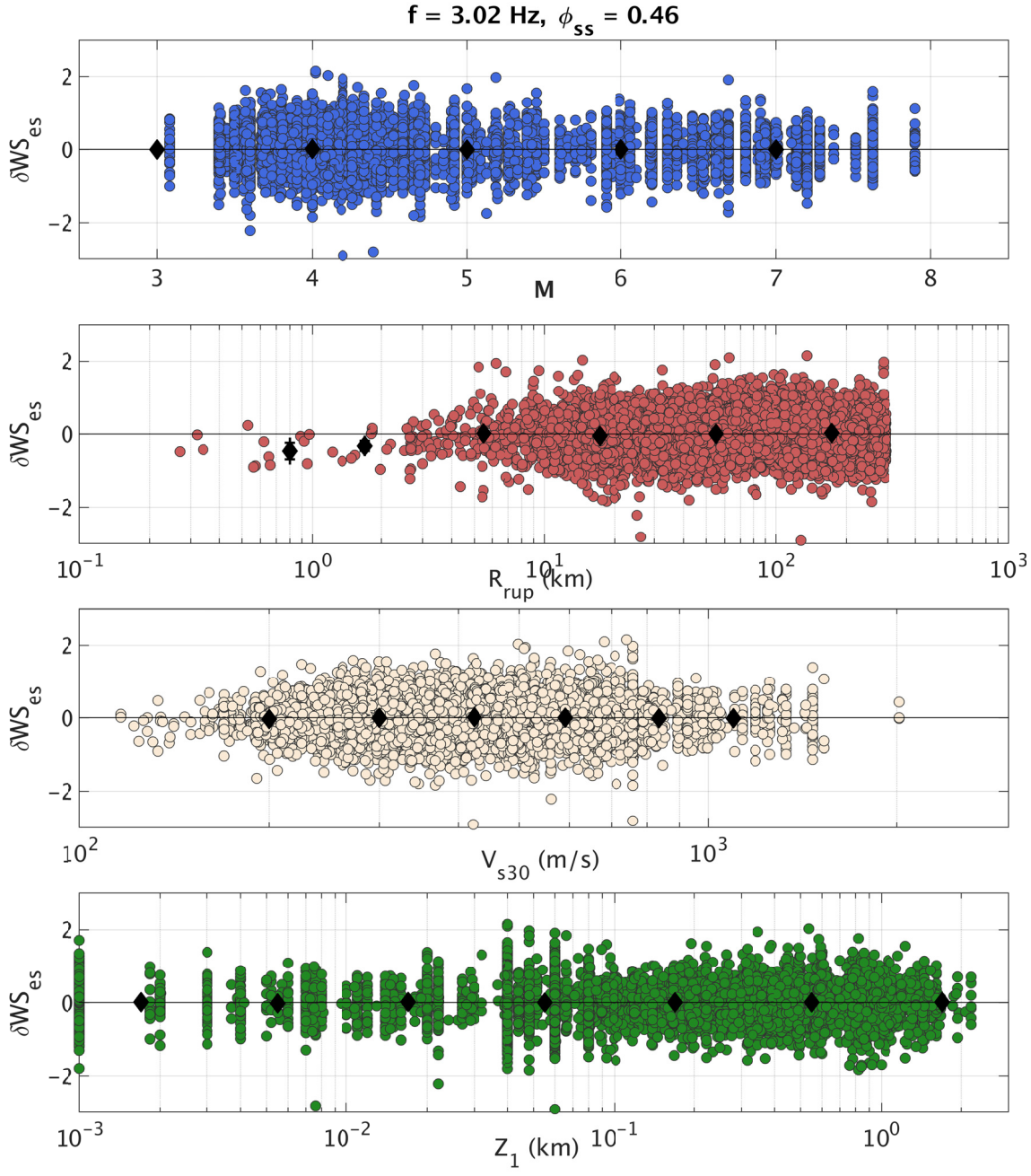

Figure A.26 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 3$ Hz.

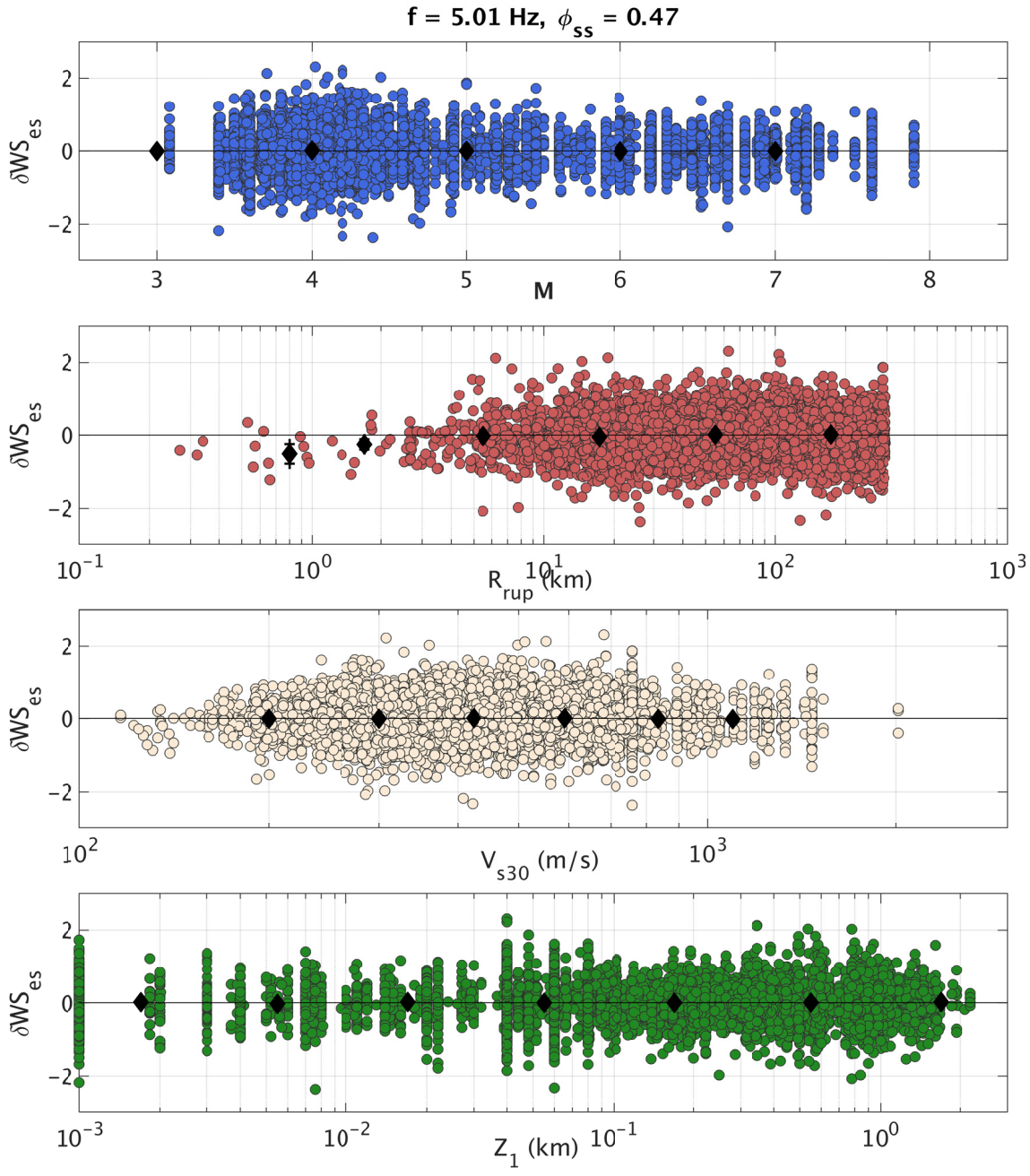

Figure A.27 **Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 5$ Hz.**

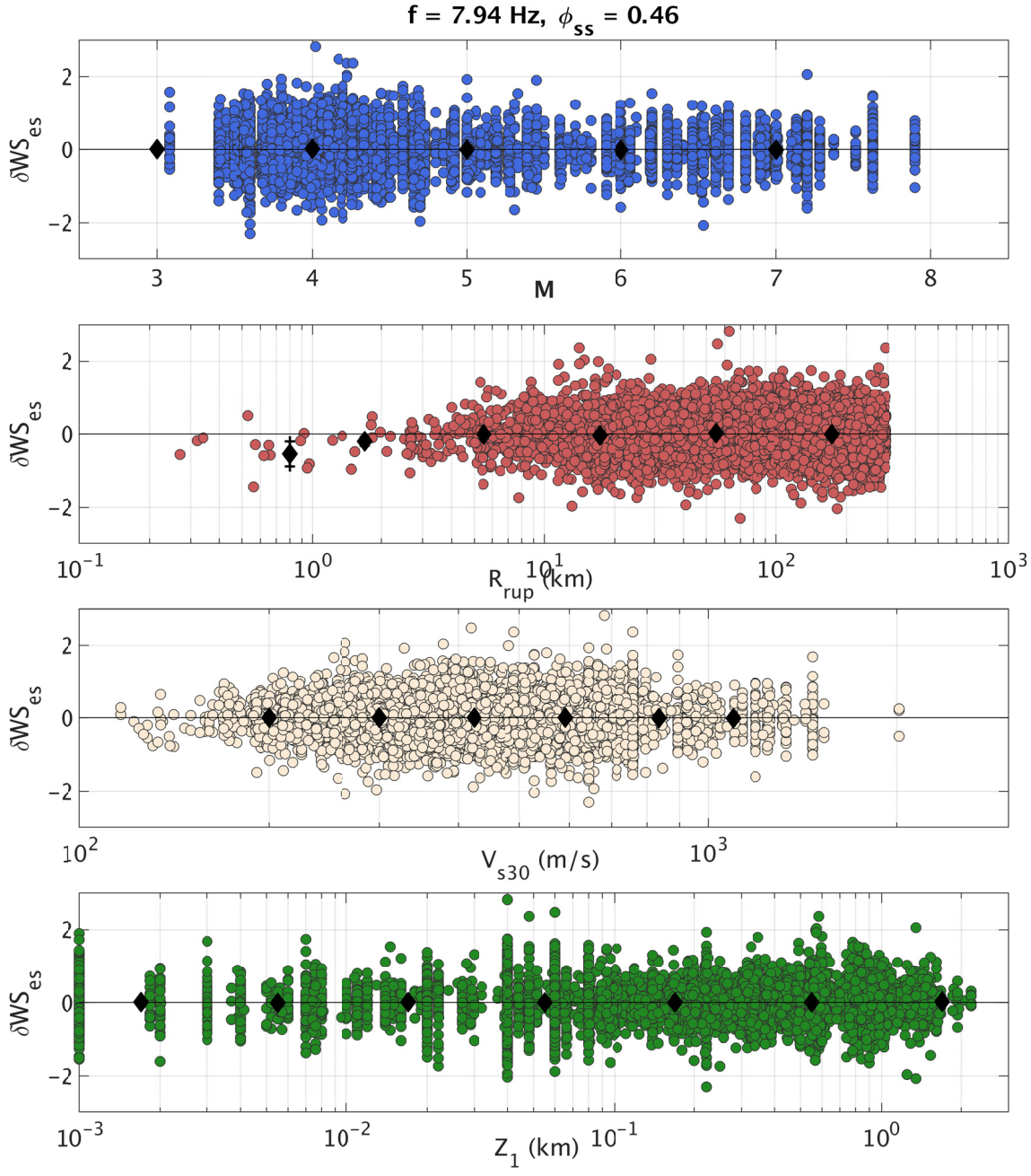

Figure A.28 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 8$ Hz.

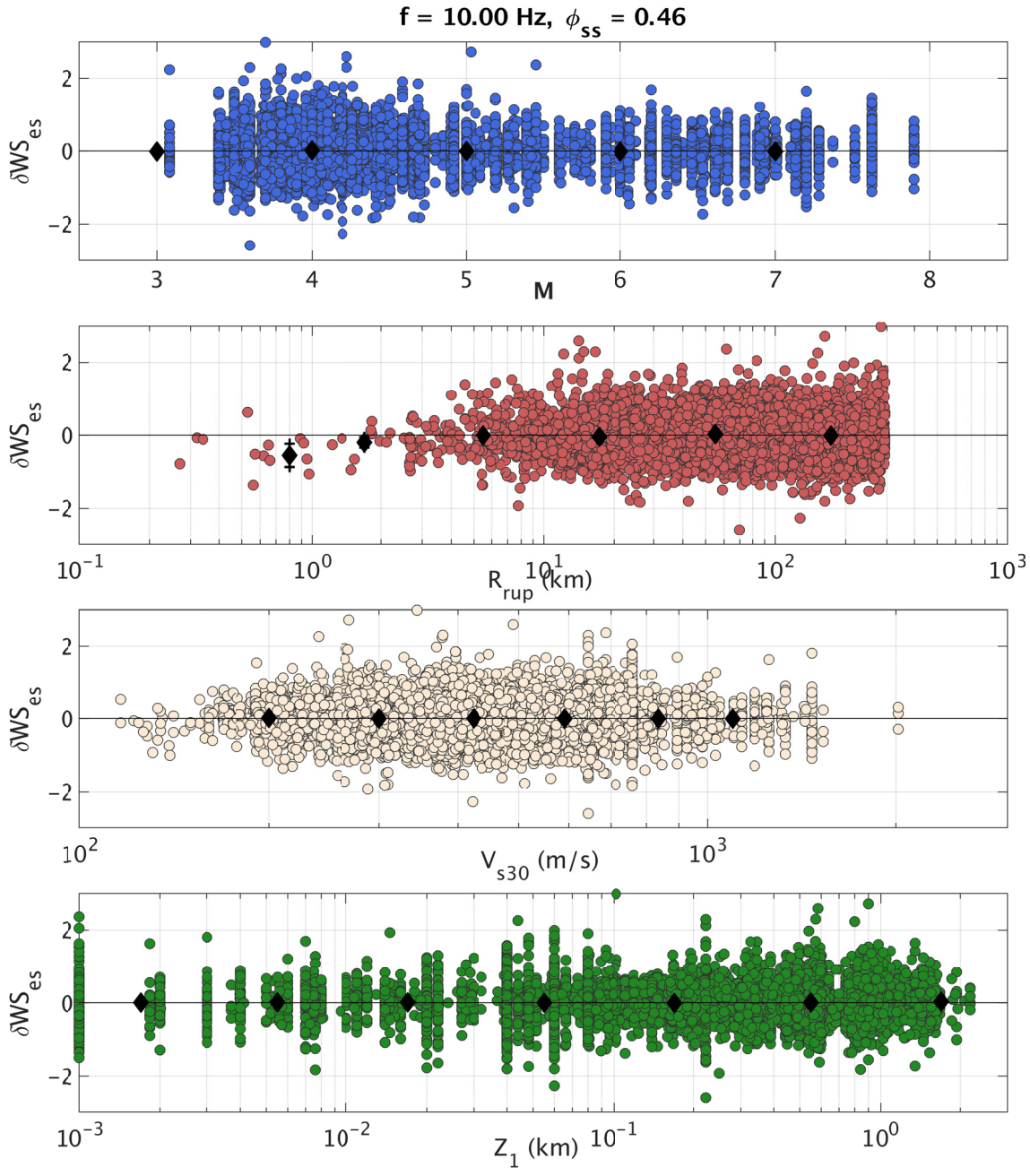

Figure A.29 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 10 Hz.

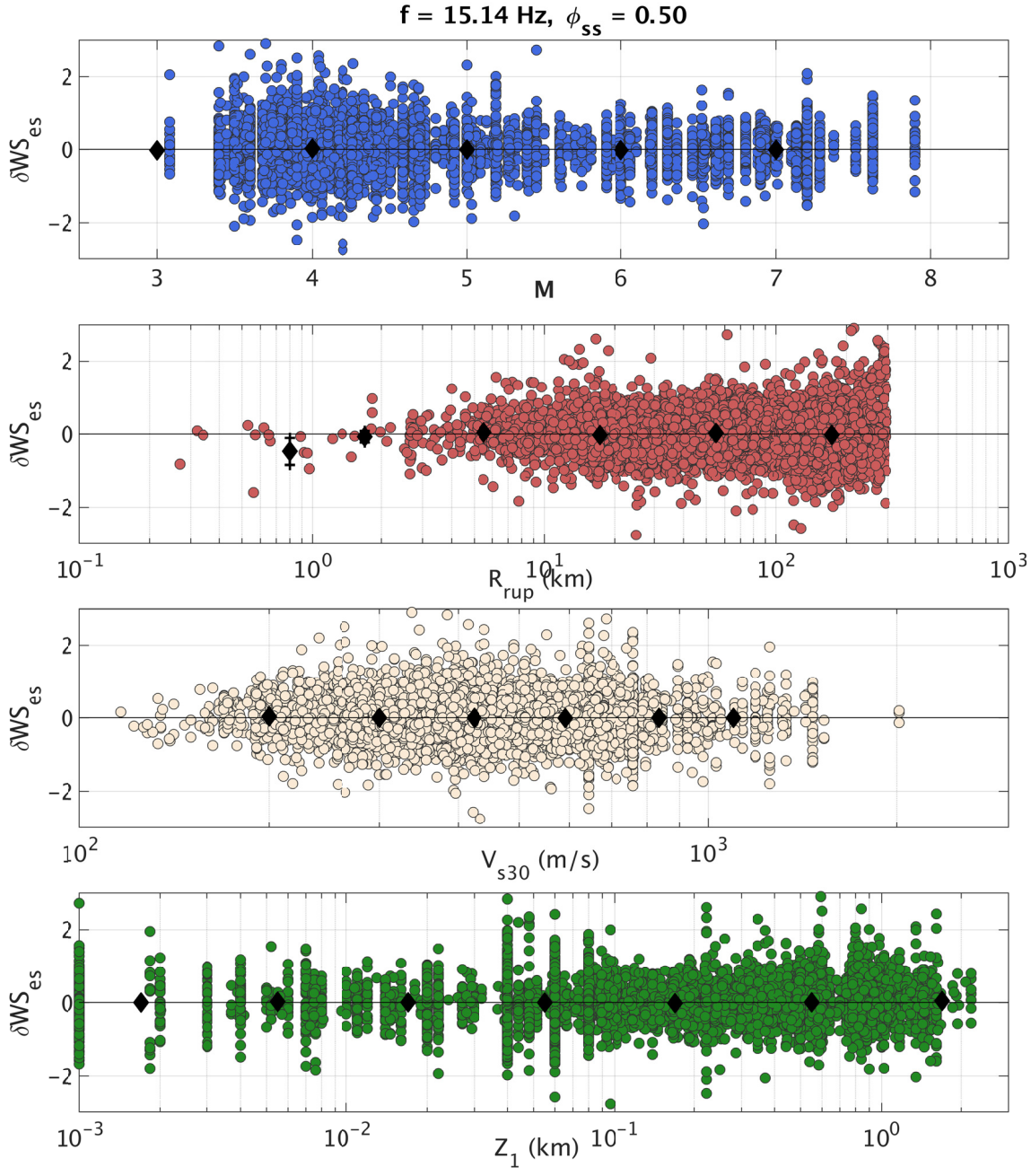

Figure A.30 **Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 15 Hz.**

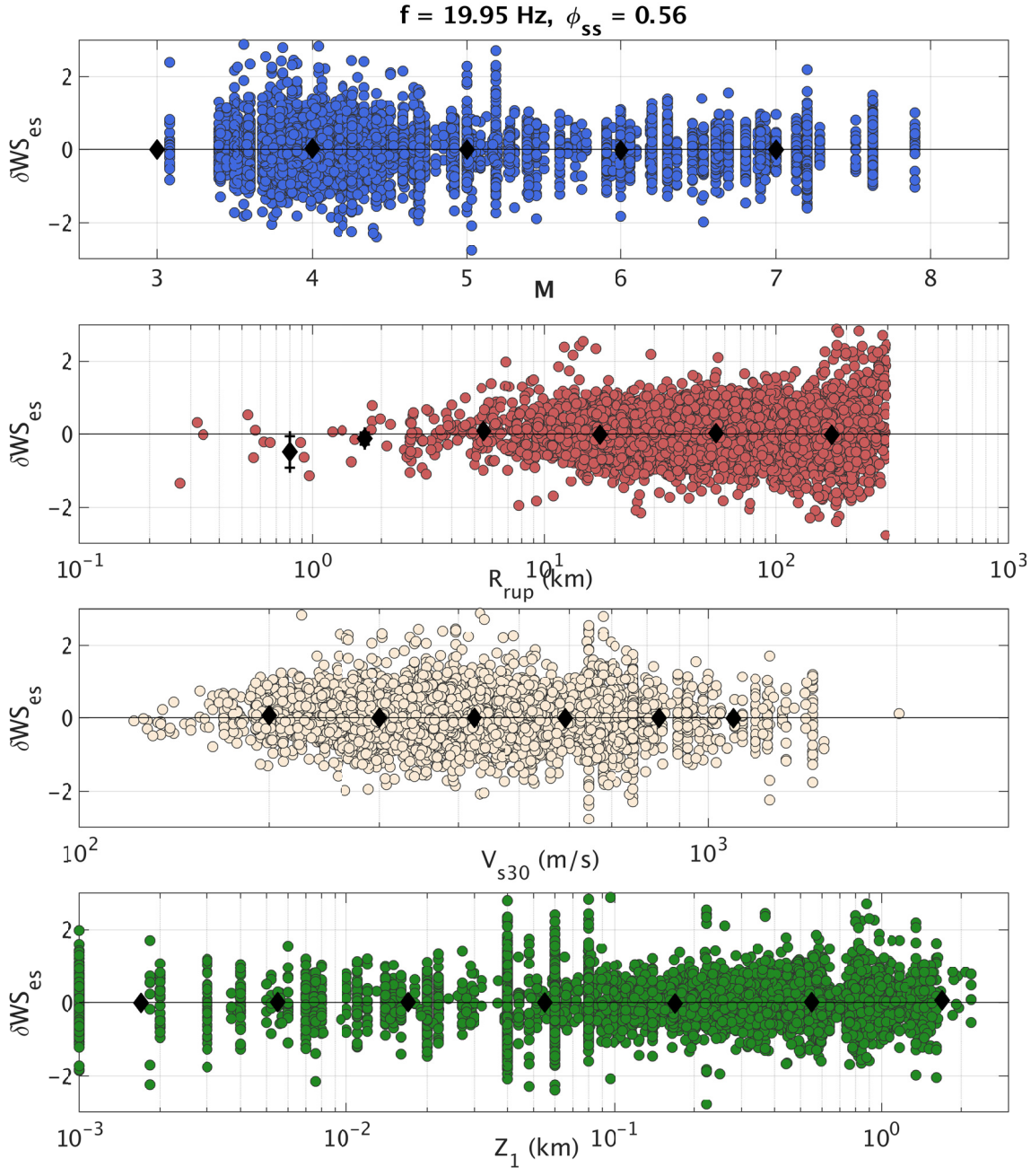

Figure A.31 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for $f = 20$ Hz.

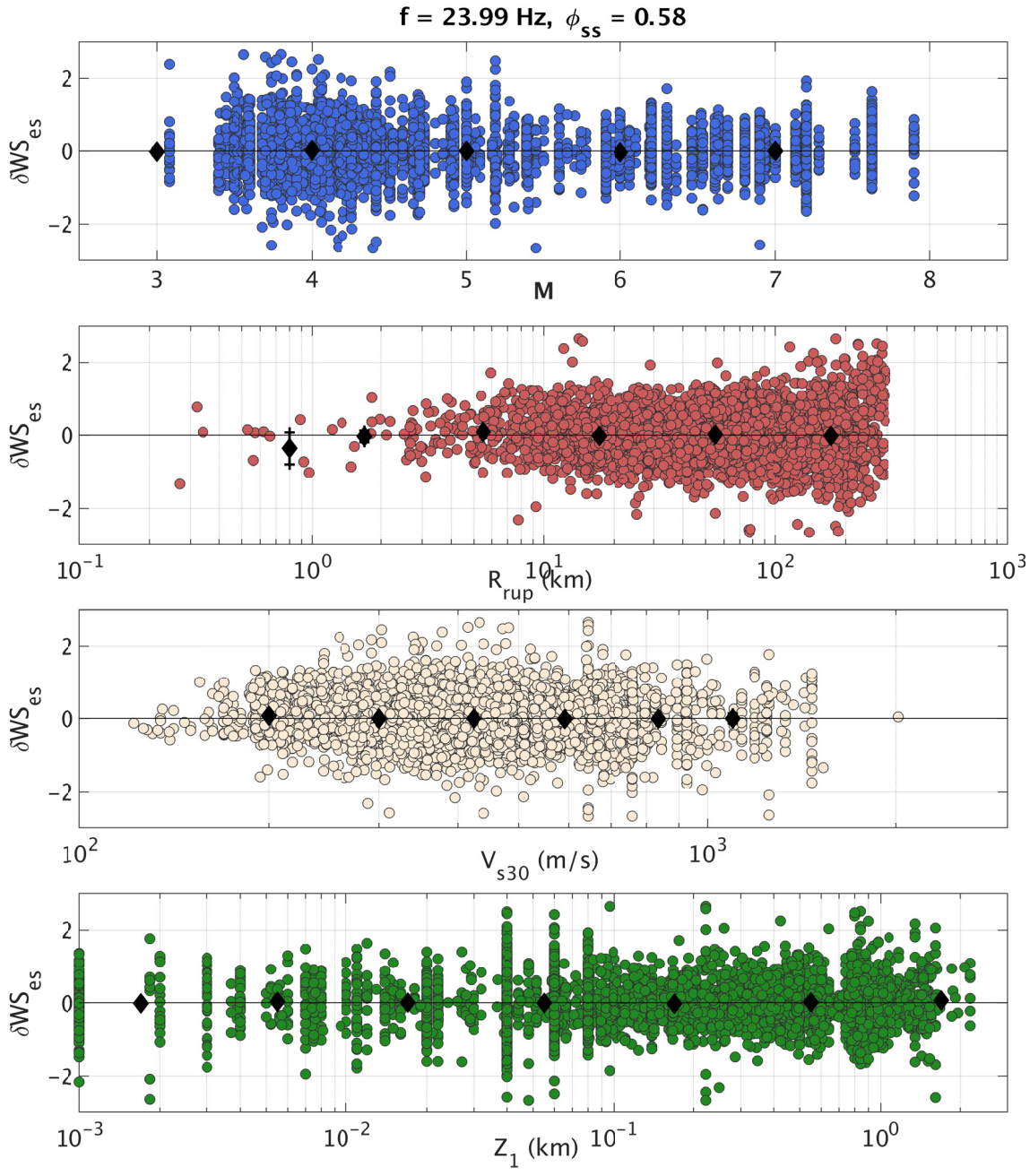

Figure A.32 Within-site residuals (δWS_{es}) versus M, R_{rup}, V_{s30}, and Z_1 for f = 24 Hz.

A.3 WITHIN-SITE RESIDUALS BINNED BY M

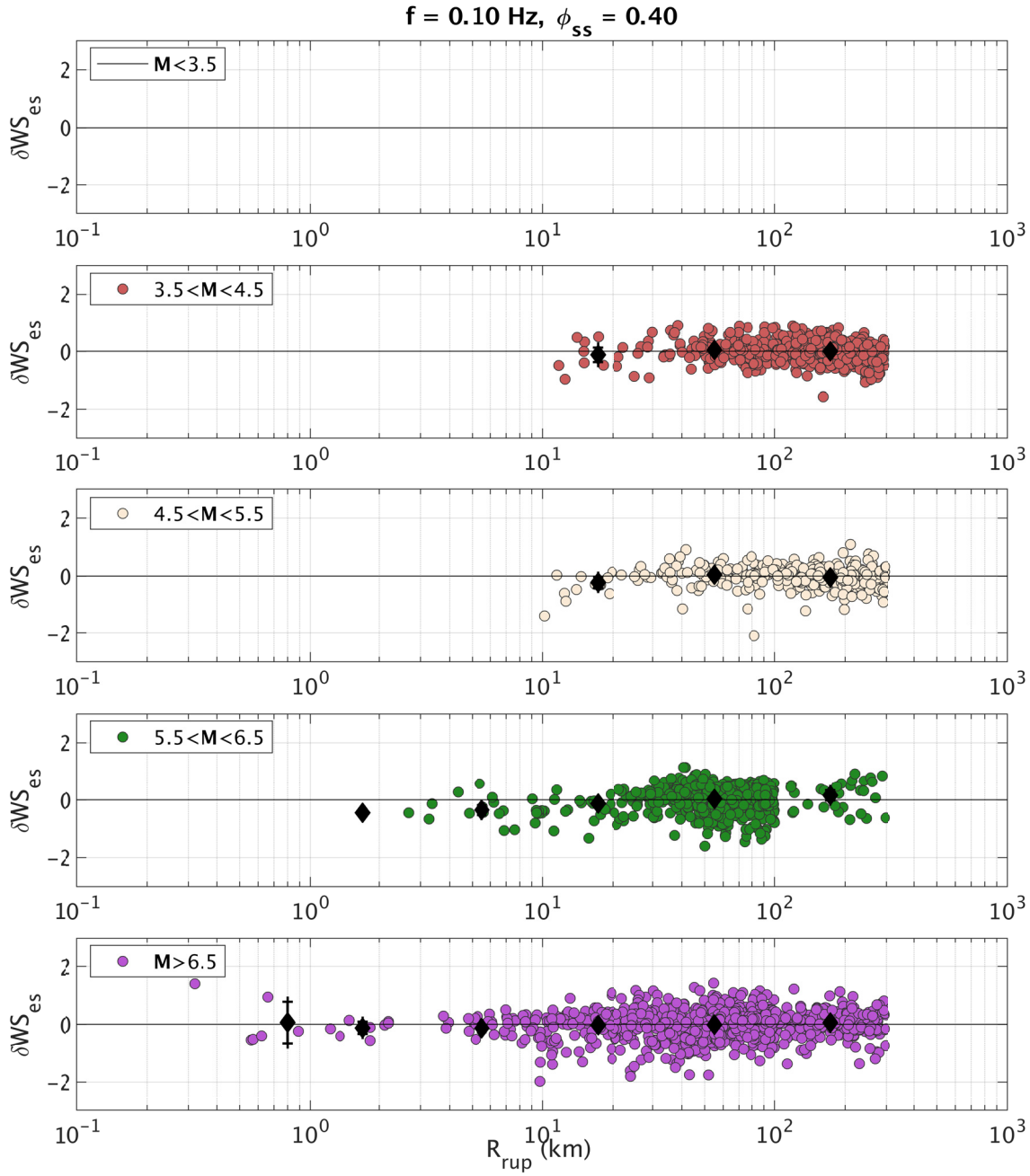

Figure A.33 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 0.1 Hz.

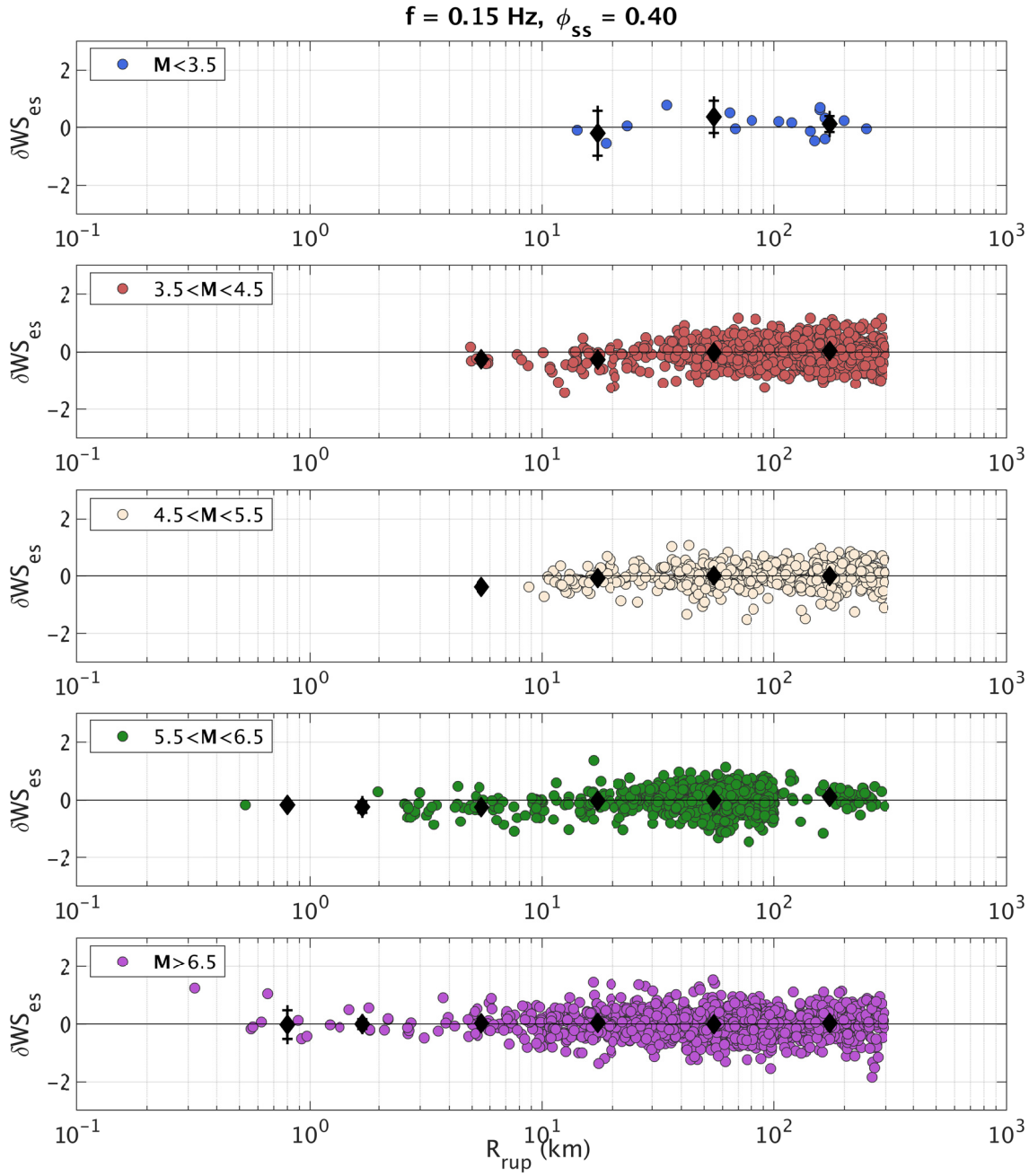

Figure A.34 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 0.15$ Hz.

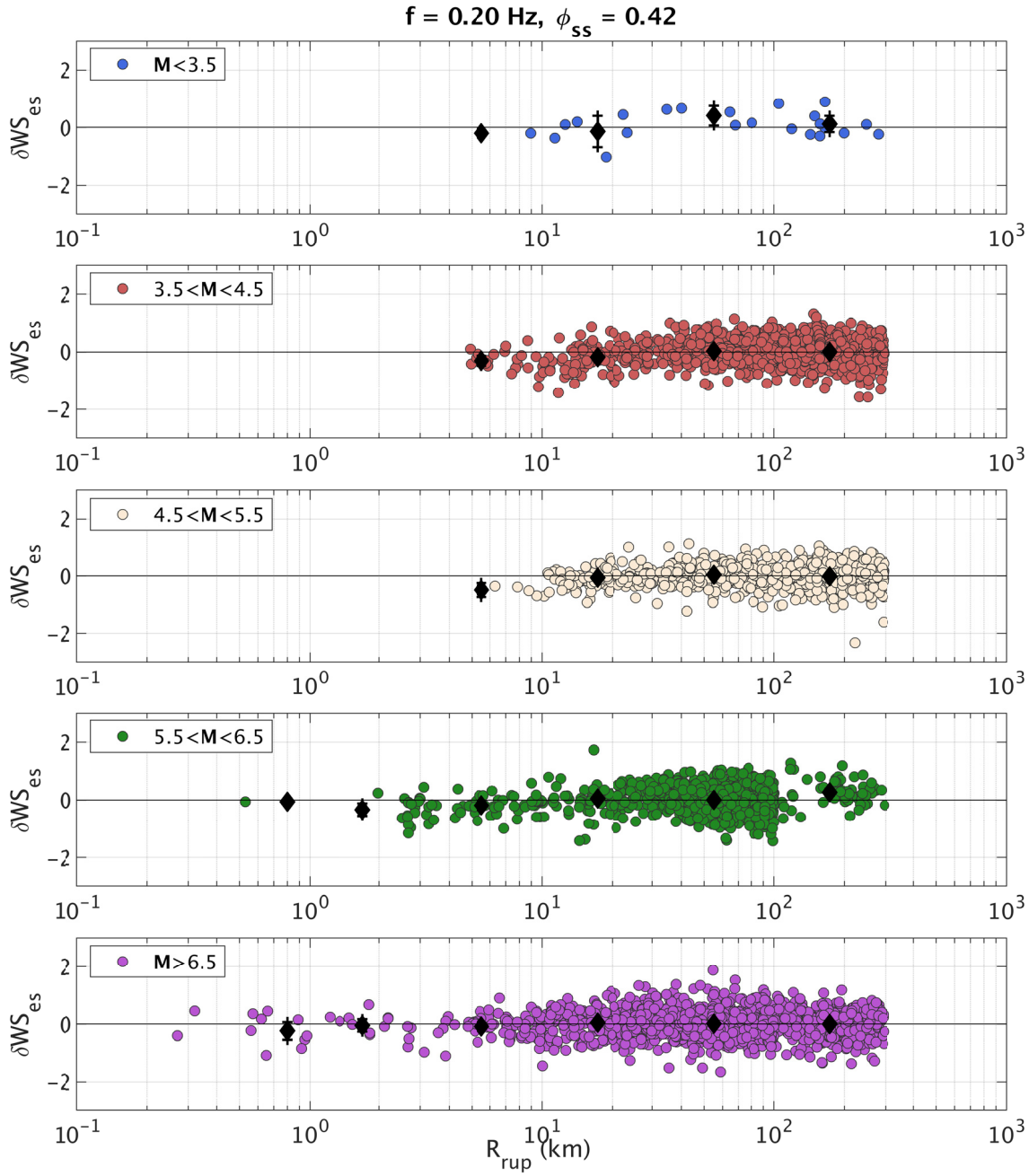

Figure A.35 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 0.2$ Hz.

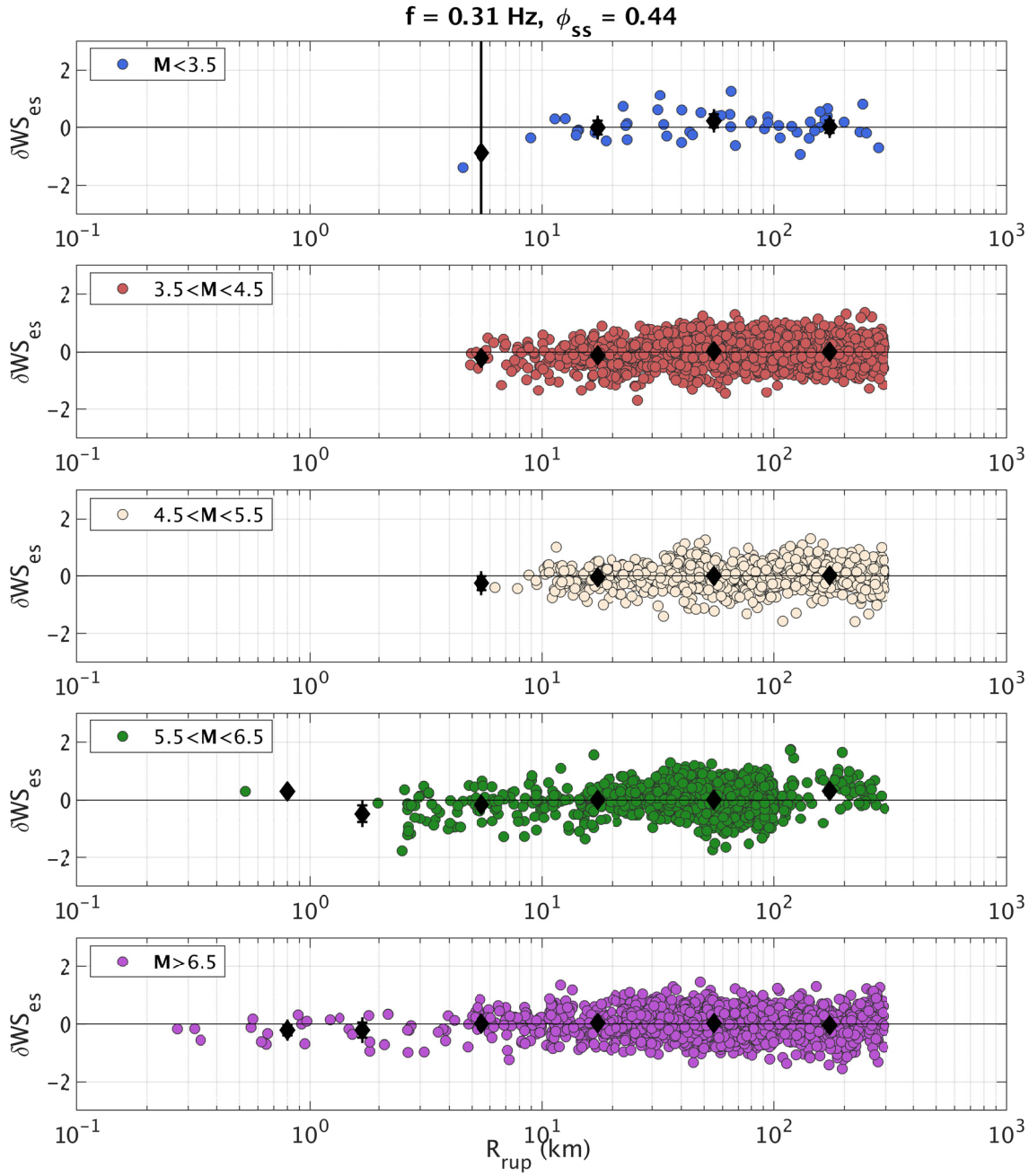

Figure A.36 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 0.3 Hz.

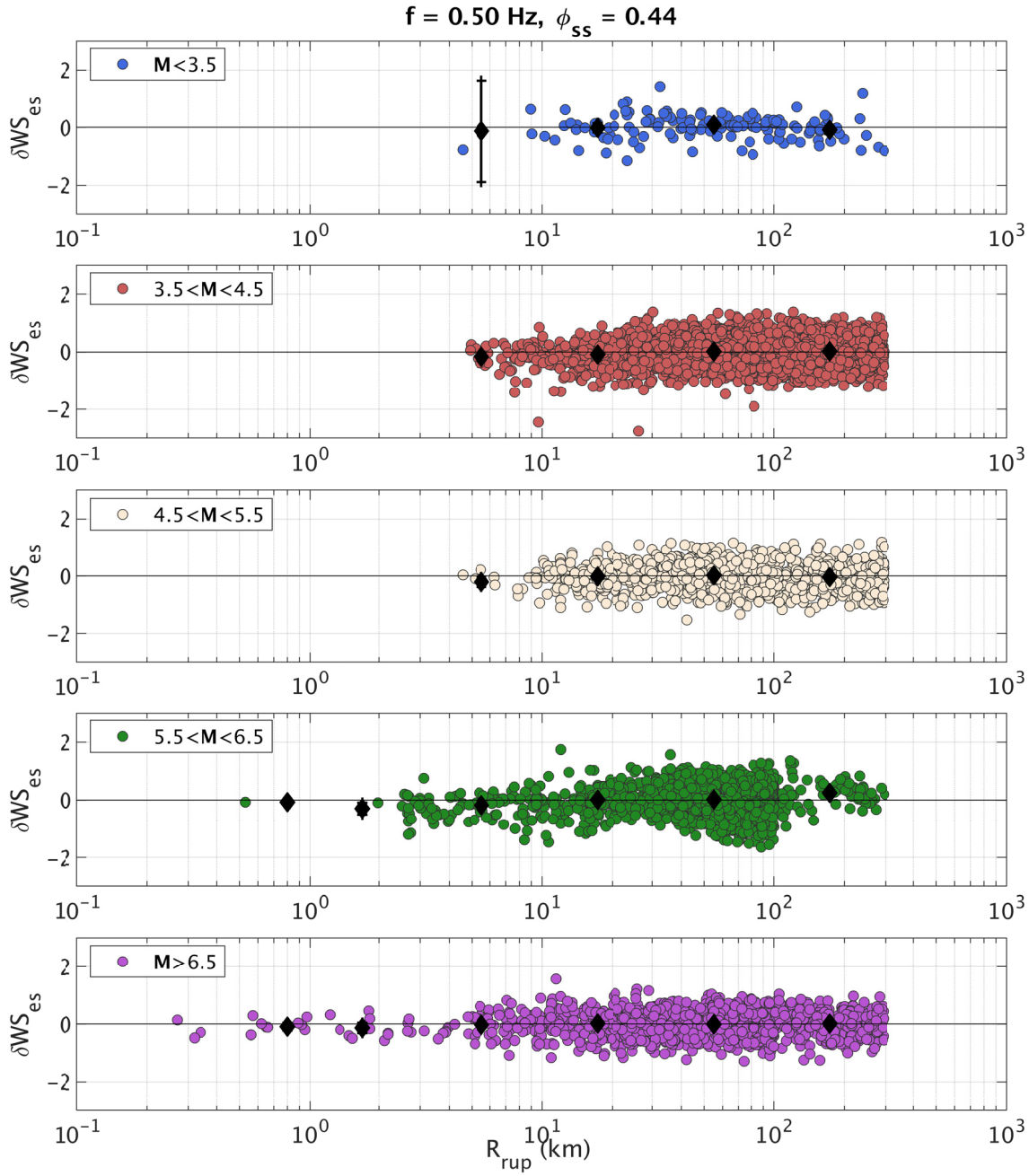

Figure A.37 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 0.5 Hz.

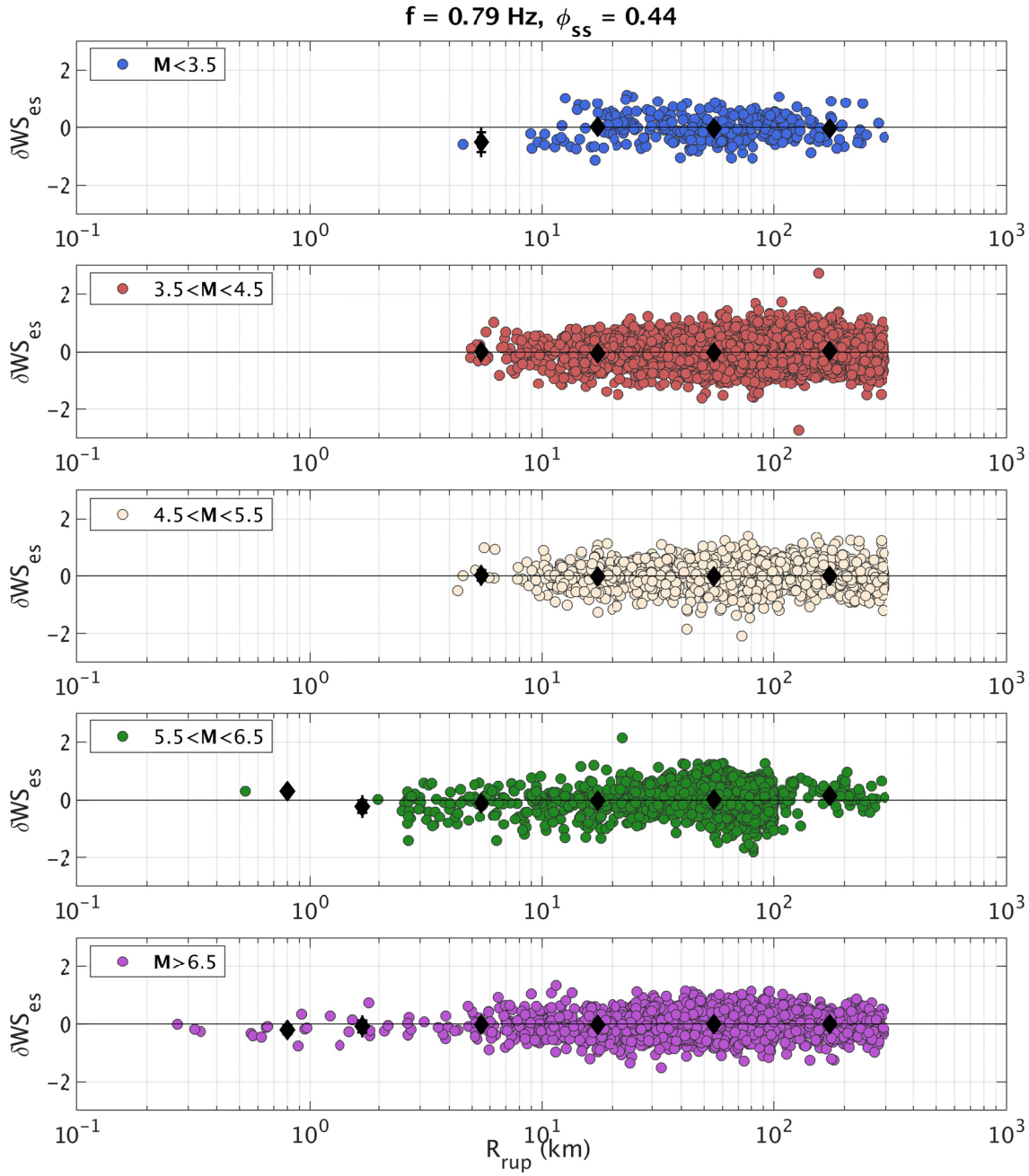

Figure A.38 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 0.8 Hz.

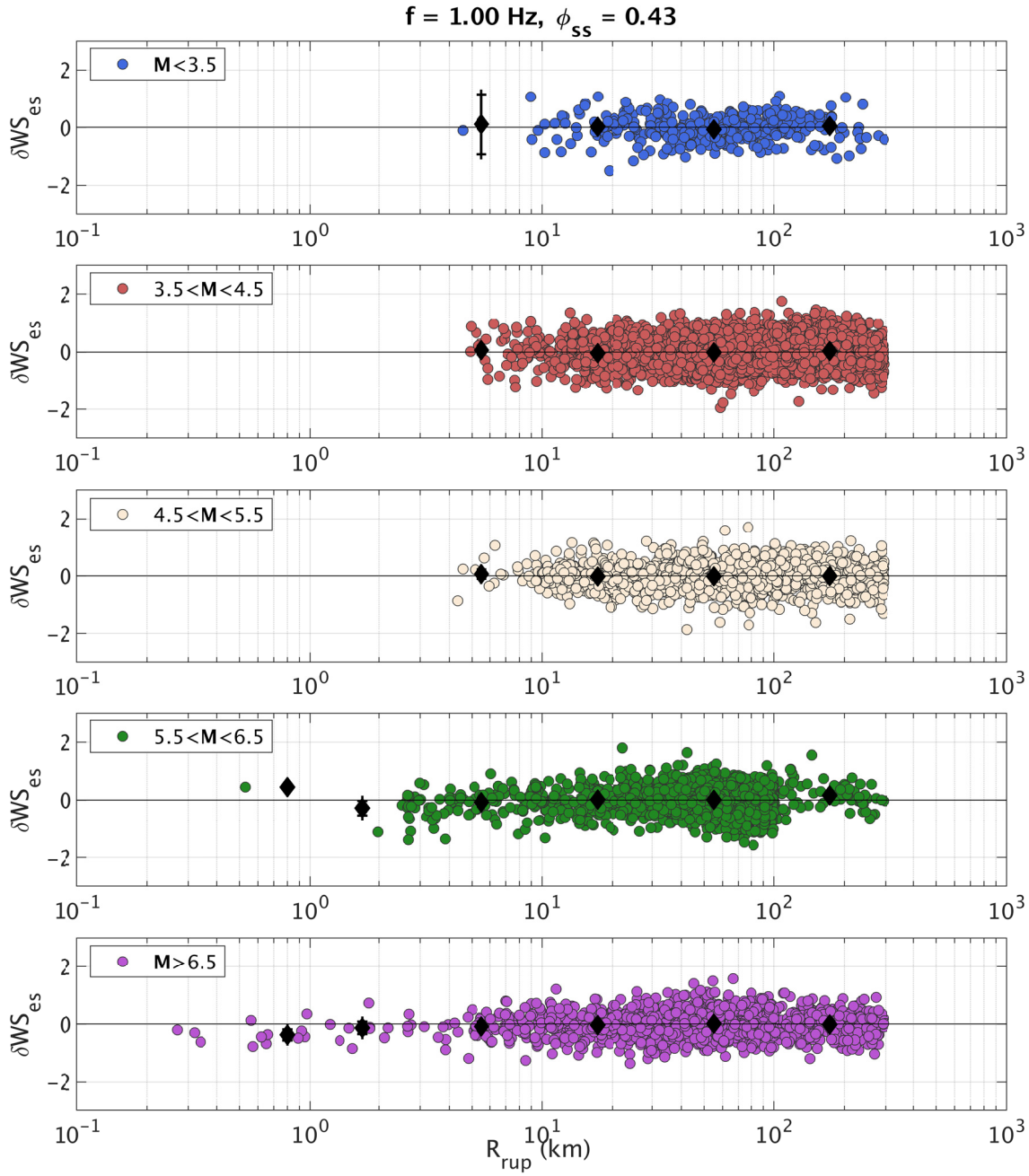

Figure A.39 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 1$ Hz.

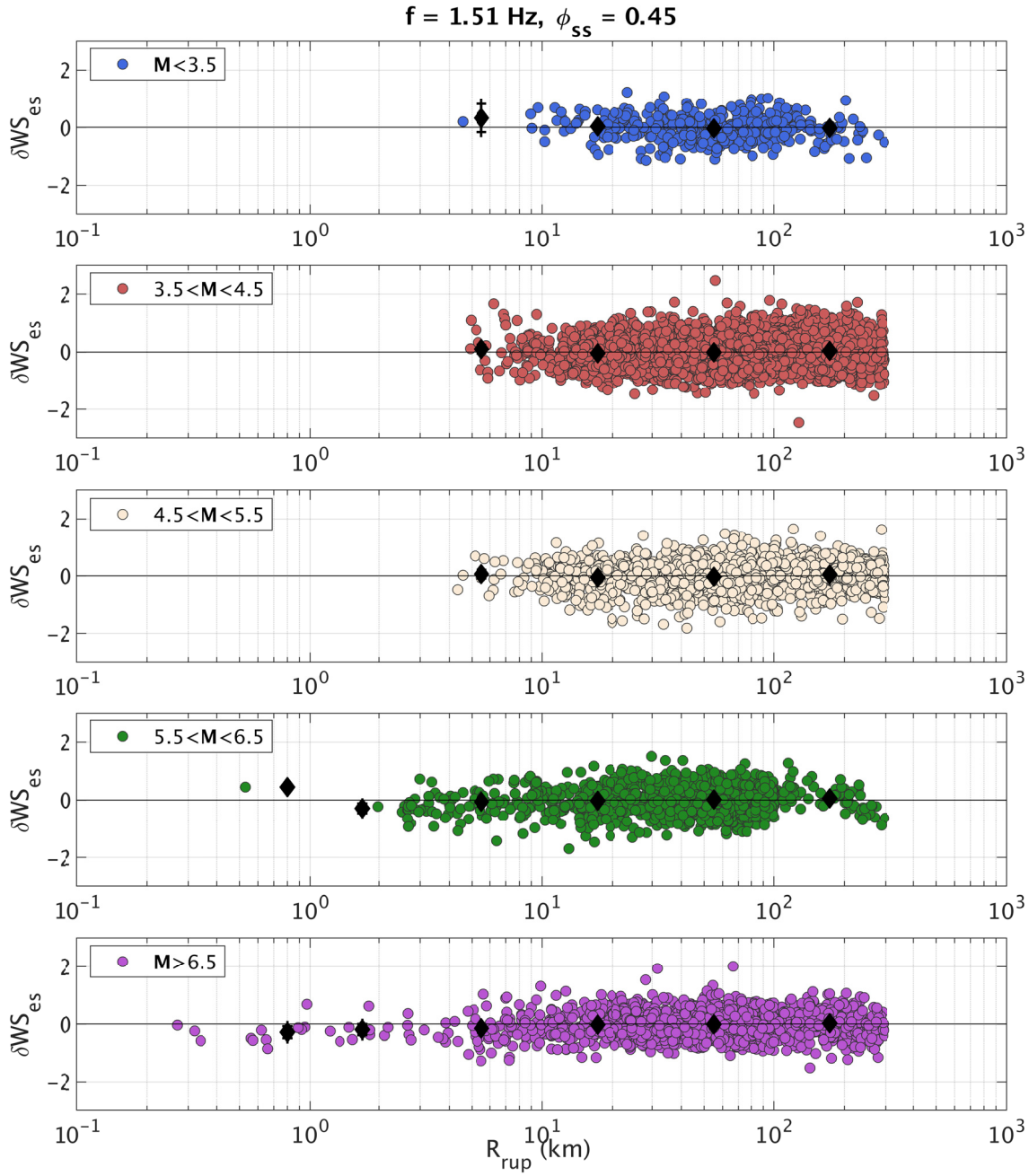

Figure A.40 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 1.5 Hz.

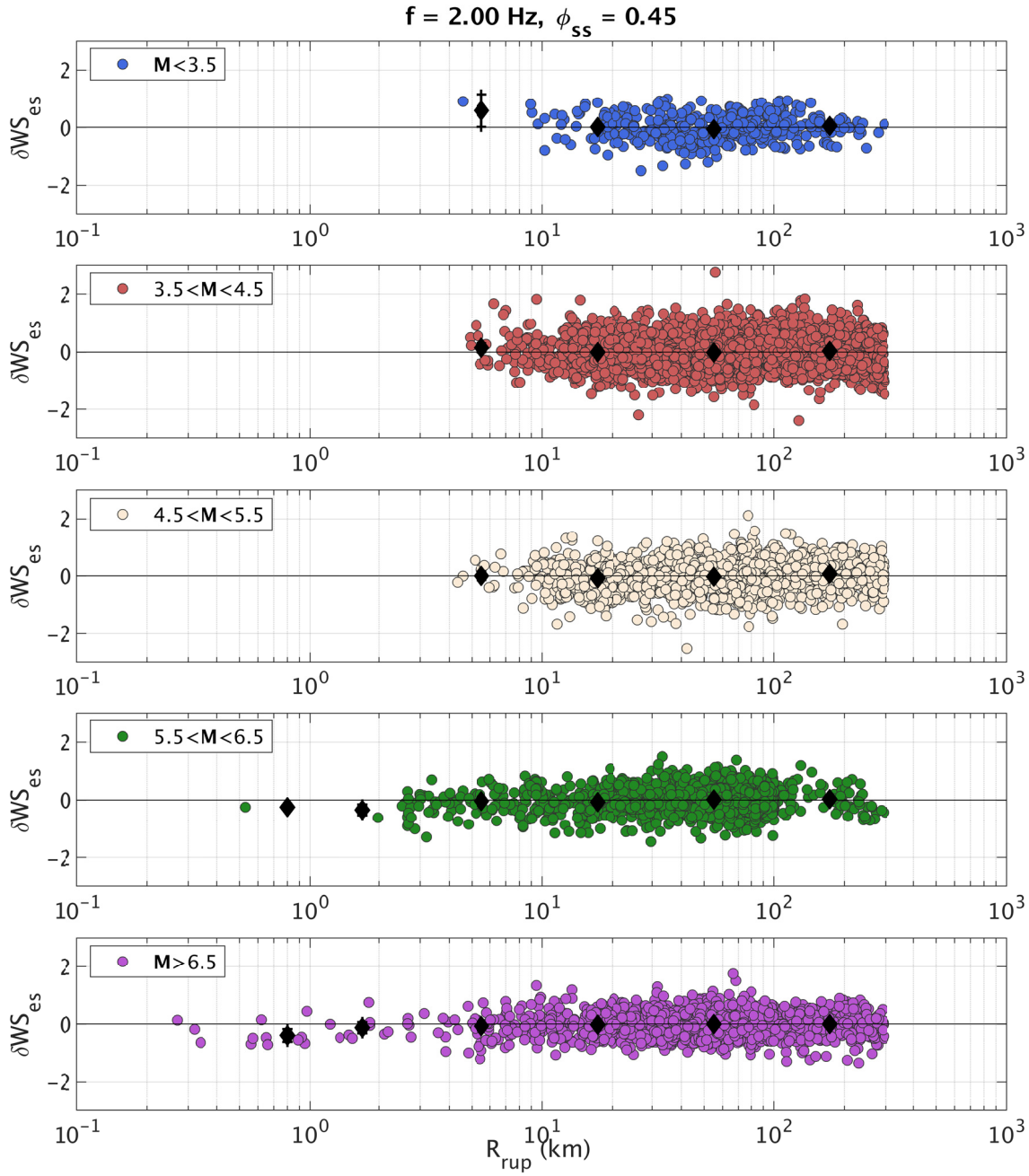

Figure A.41 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 2$ Hz.

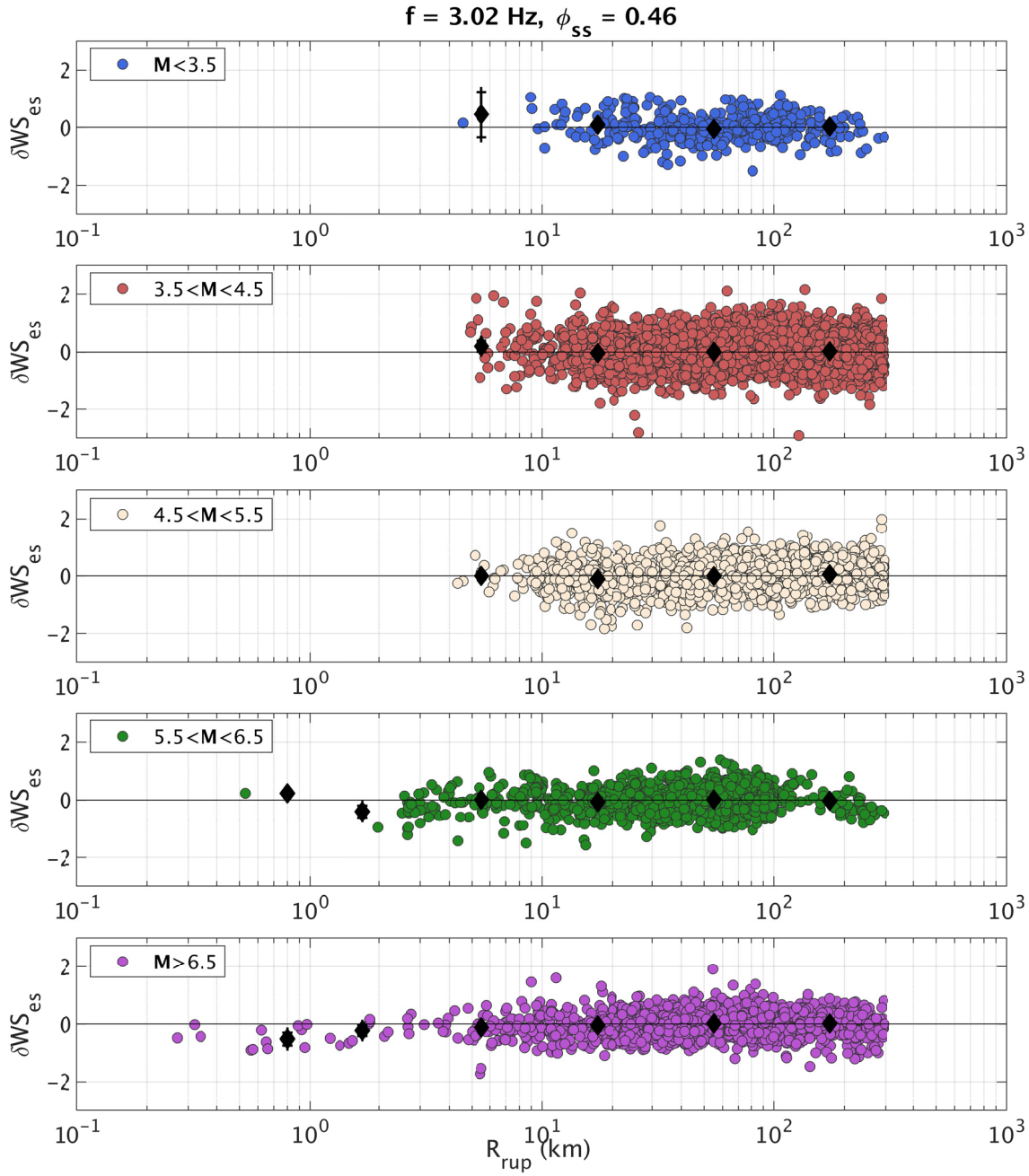

Figure A.42 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 3$ Hz.

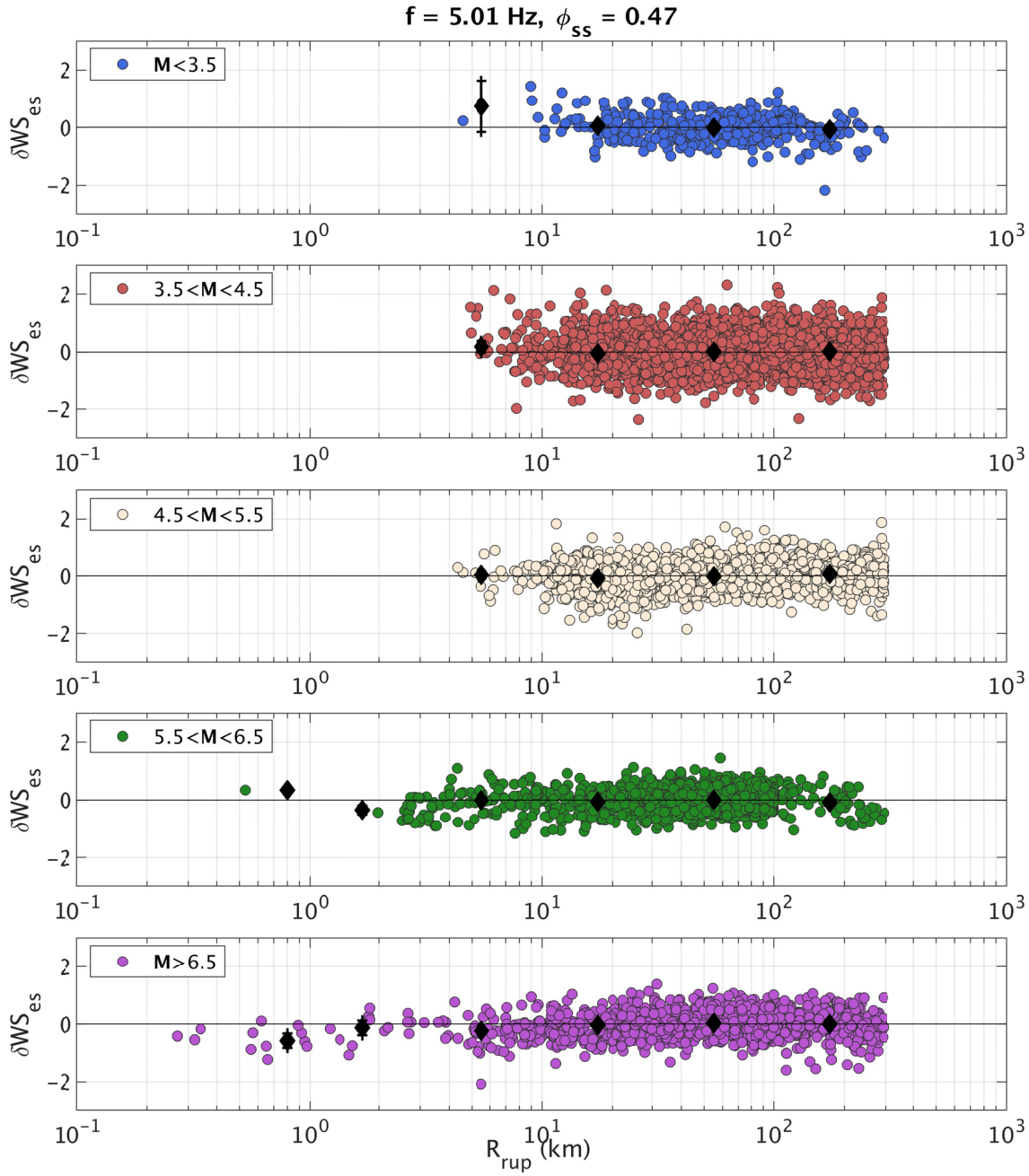

Figure A.43 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 5$ Hz.

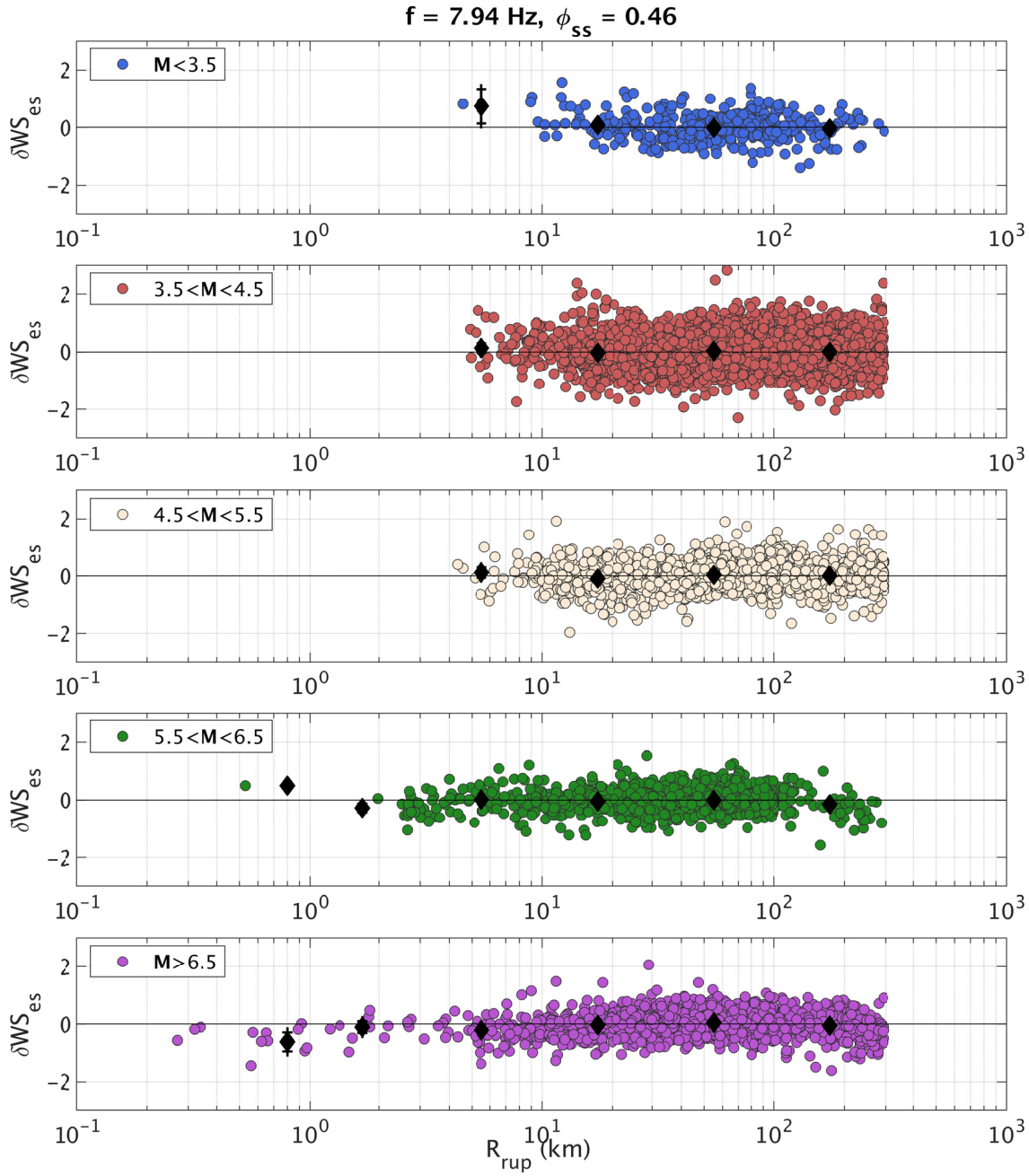

Figure A.44 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 8$ Hz.

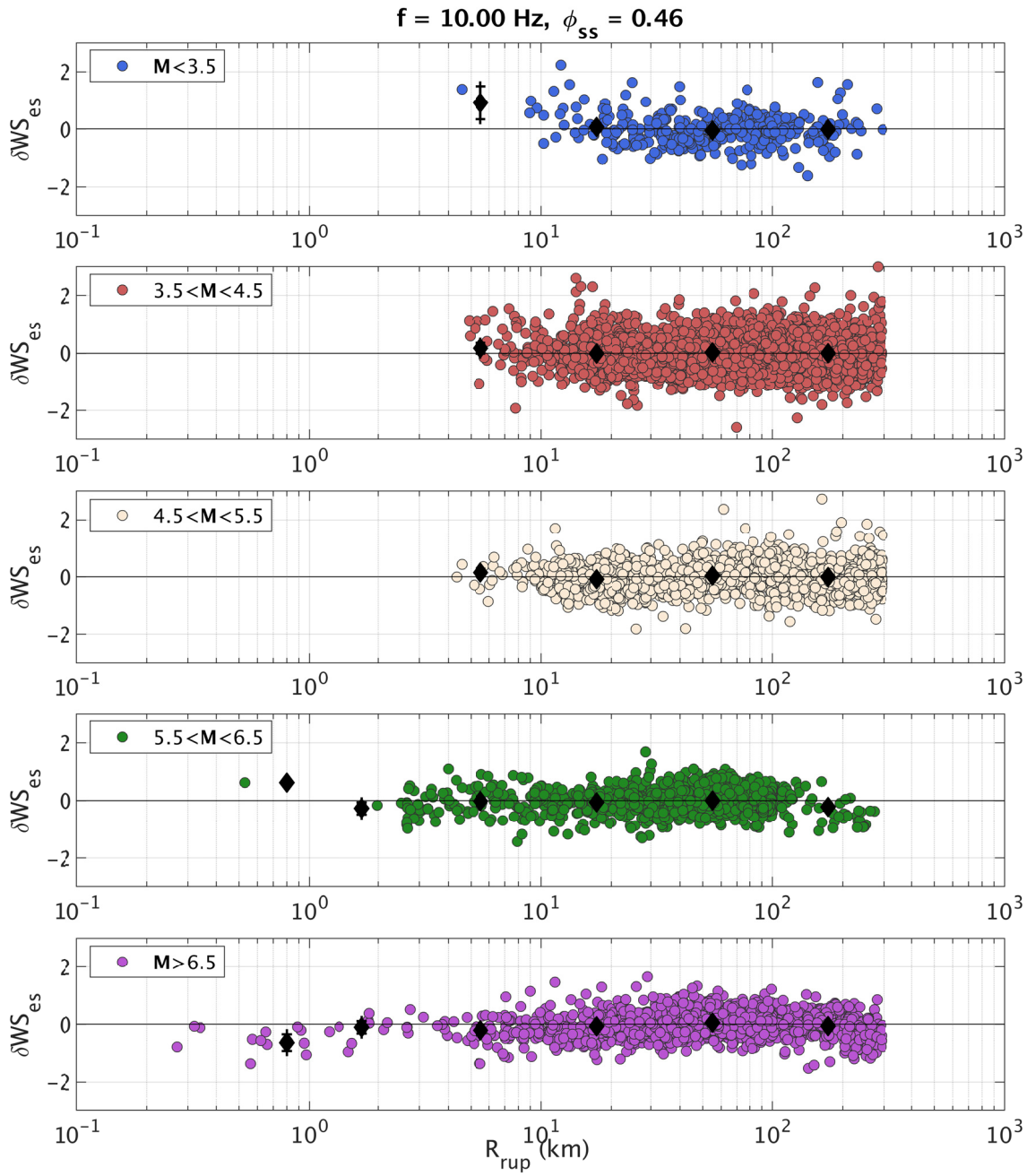

Figure A.45 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 10$ Hz.

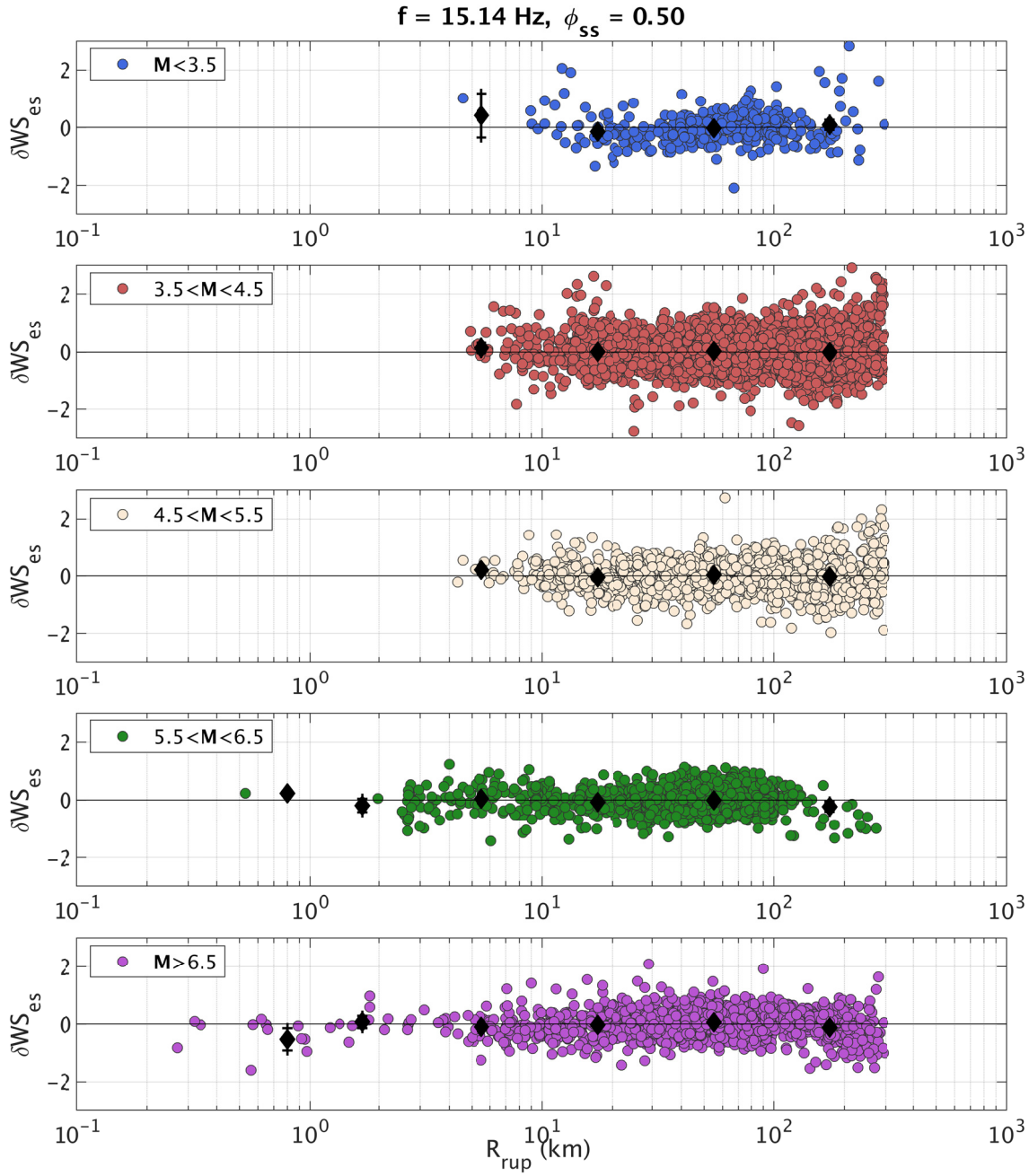

Figure A.46 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 15$ Hz.

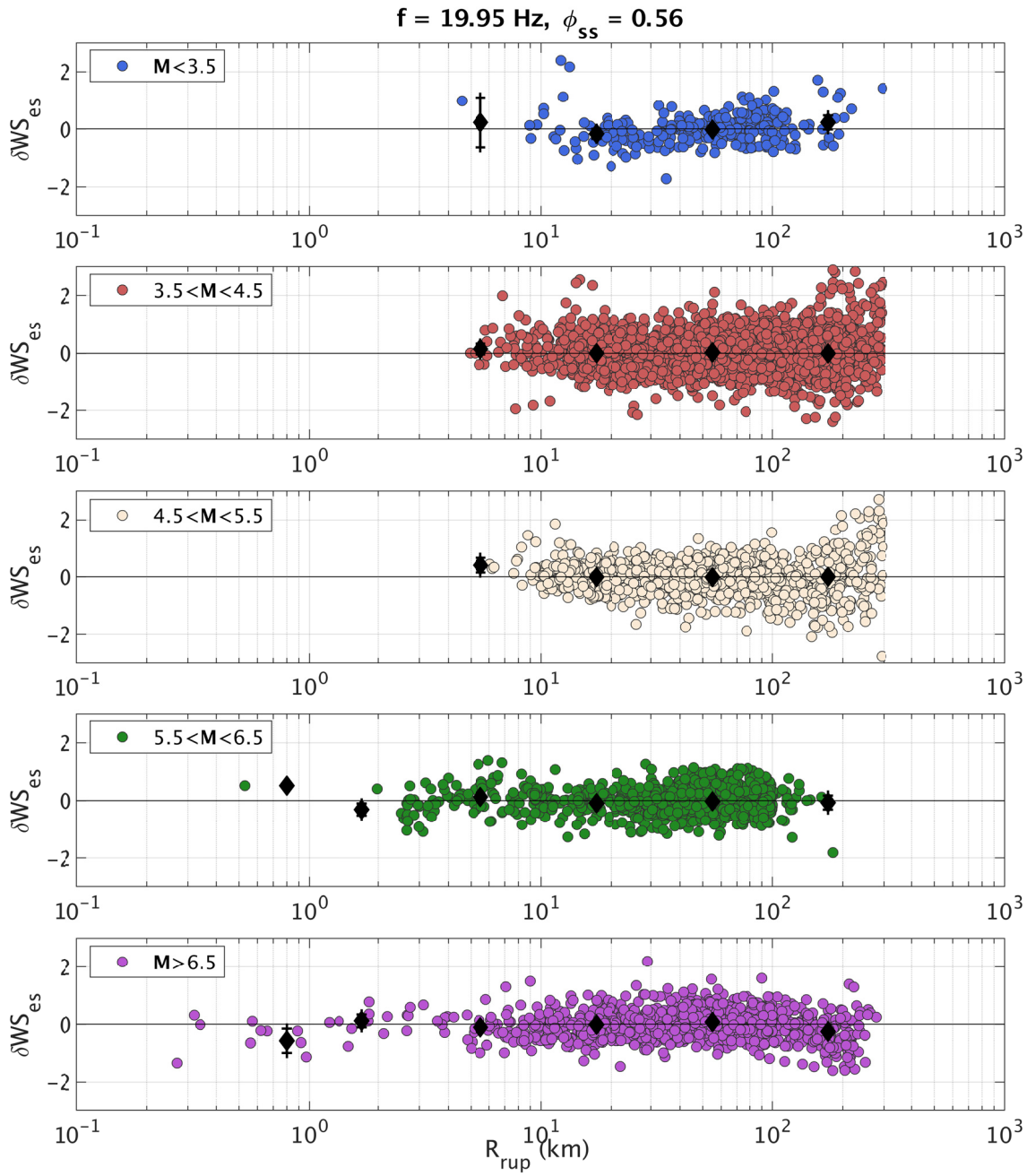

Figure A.47 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for $f = 20$ Hz.

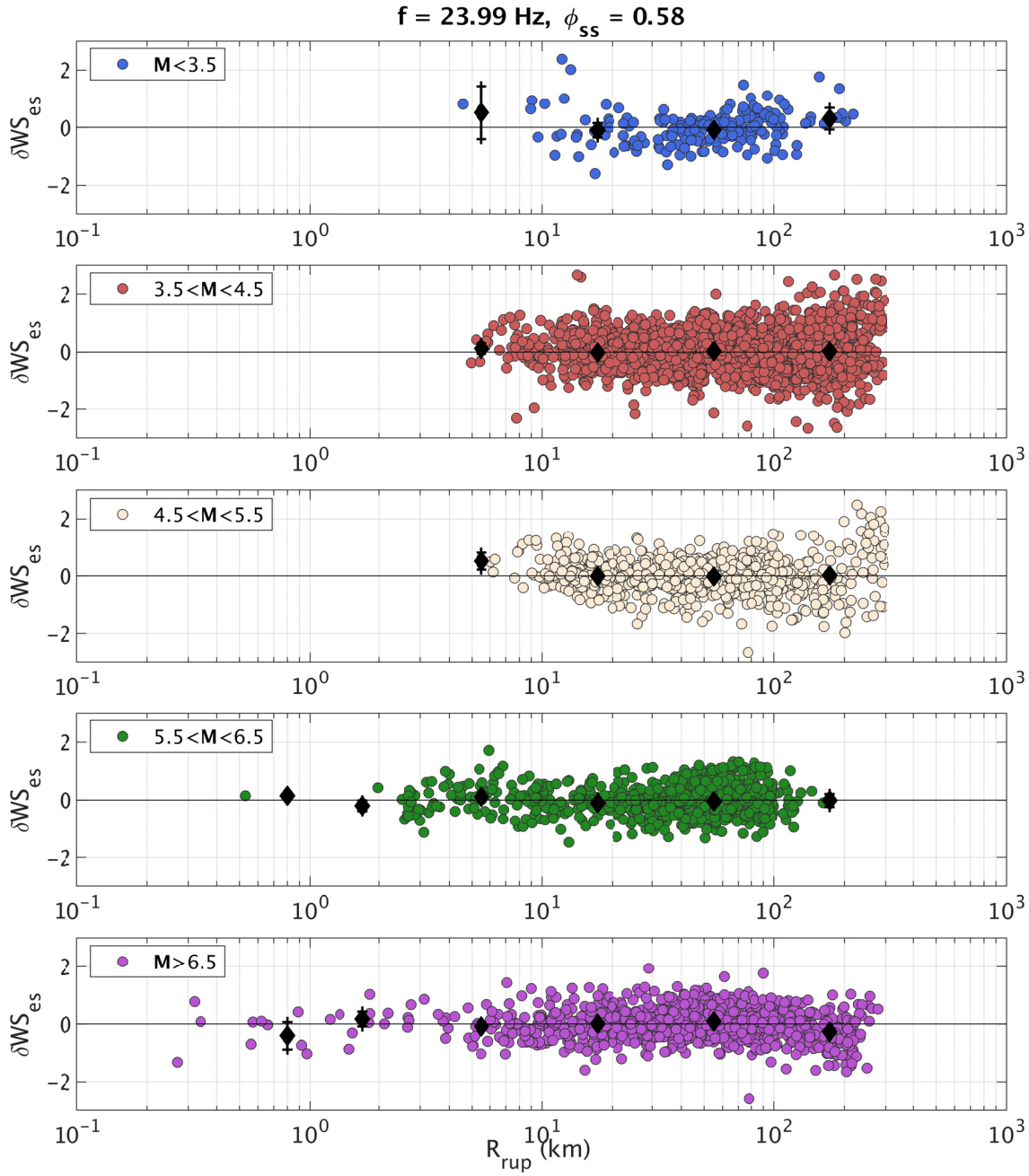

Figure A.48 Within-site residuals (δWS_{es}) versus R_{rup}, binned by M, for f = 24 Hz.