The HOmogenized instRUmental Seismic catalog (HORUS) of Italy from 1960 to present

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Supplemental material

Supplemental material includes additional figures and tables to better describe methods and results. Figures S1–S15 show cumulative frequency–magnitude distribution of HOmogenized instRUmental Seismic (HORUS) catalog for years from 2005 to 2019 (horus.bo.ingv.it, last accessed July 2020). Tables S1–S5 report numerical values plotted in Figures 3, 8, 9, 10, and 11, respectively.

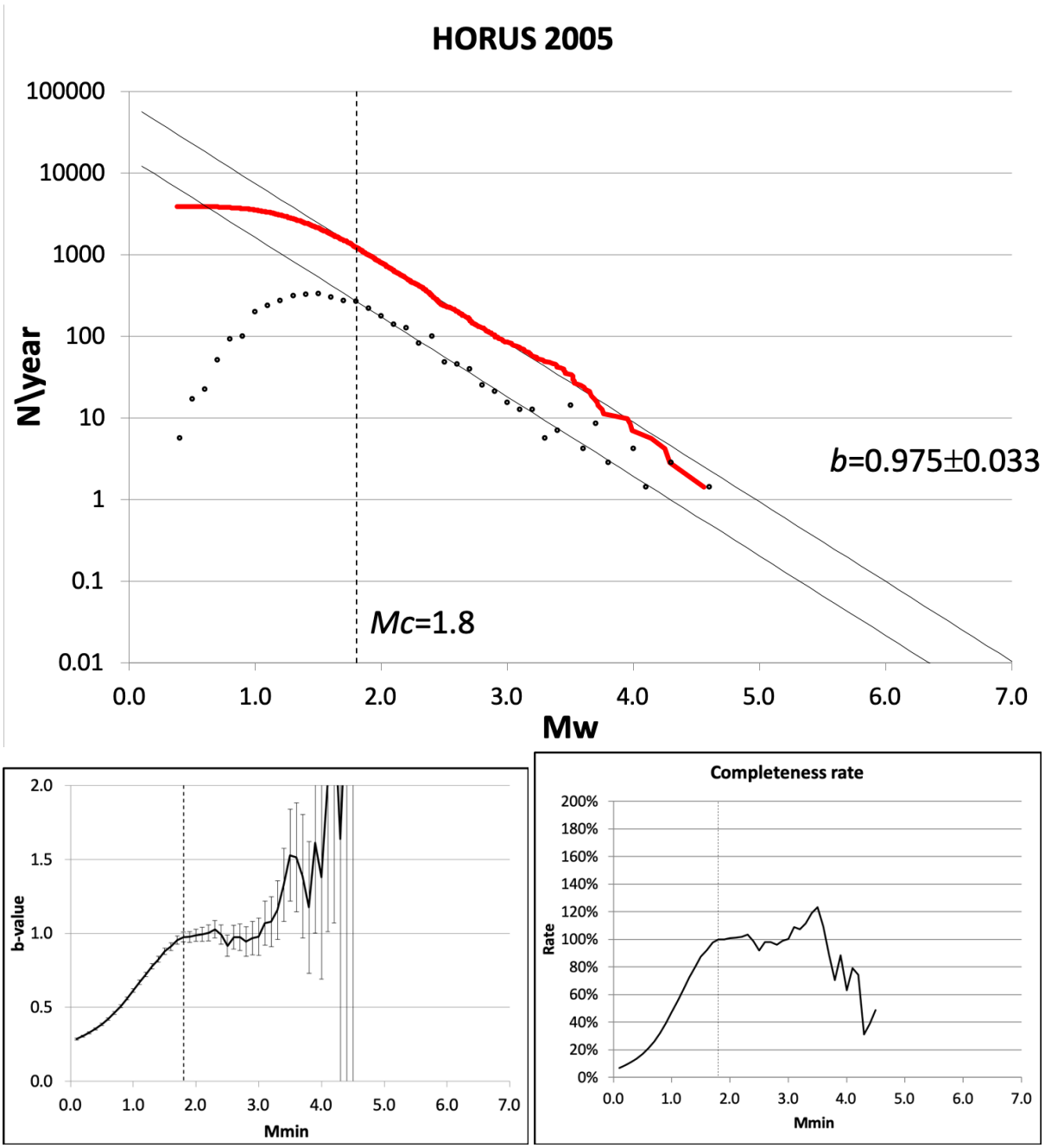

Figure S1 – Top: cumulative (red solid line) and non-cumulative (black circles) frequency-magnitude distribution of HORUS catalog for year 2005. The thin solid lines indicate the GR law computed for data with Mw not lower than the completeness threshold Mc. Bottom left: *b*-value as a function of cut-off magnitude Mmin. Bottom right: ratio between observed numbers of data with Mw≥Mmin and those predicted by the GR law. The vertical dashed lines indicate the estimated completeness magnitude threshold Mc.

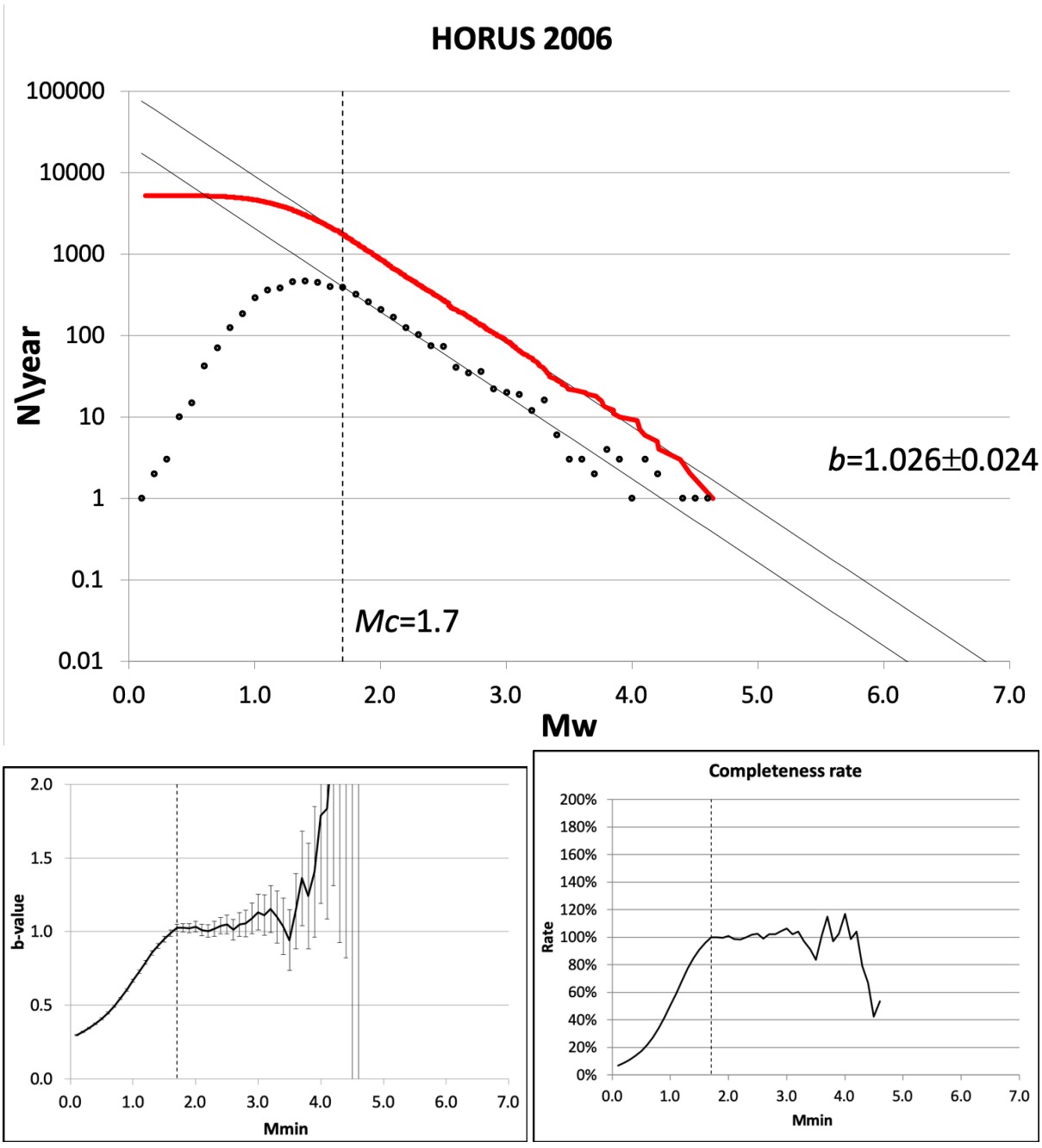

Figure S2 – Same as Fig. S1 for year 2006.

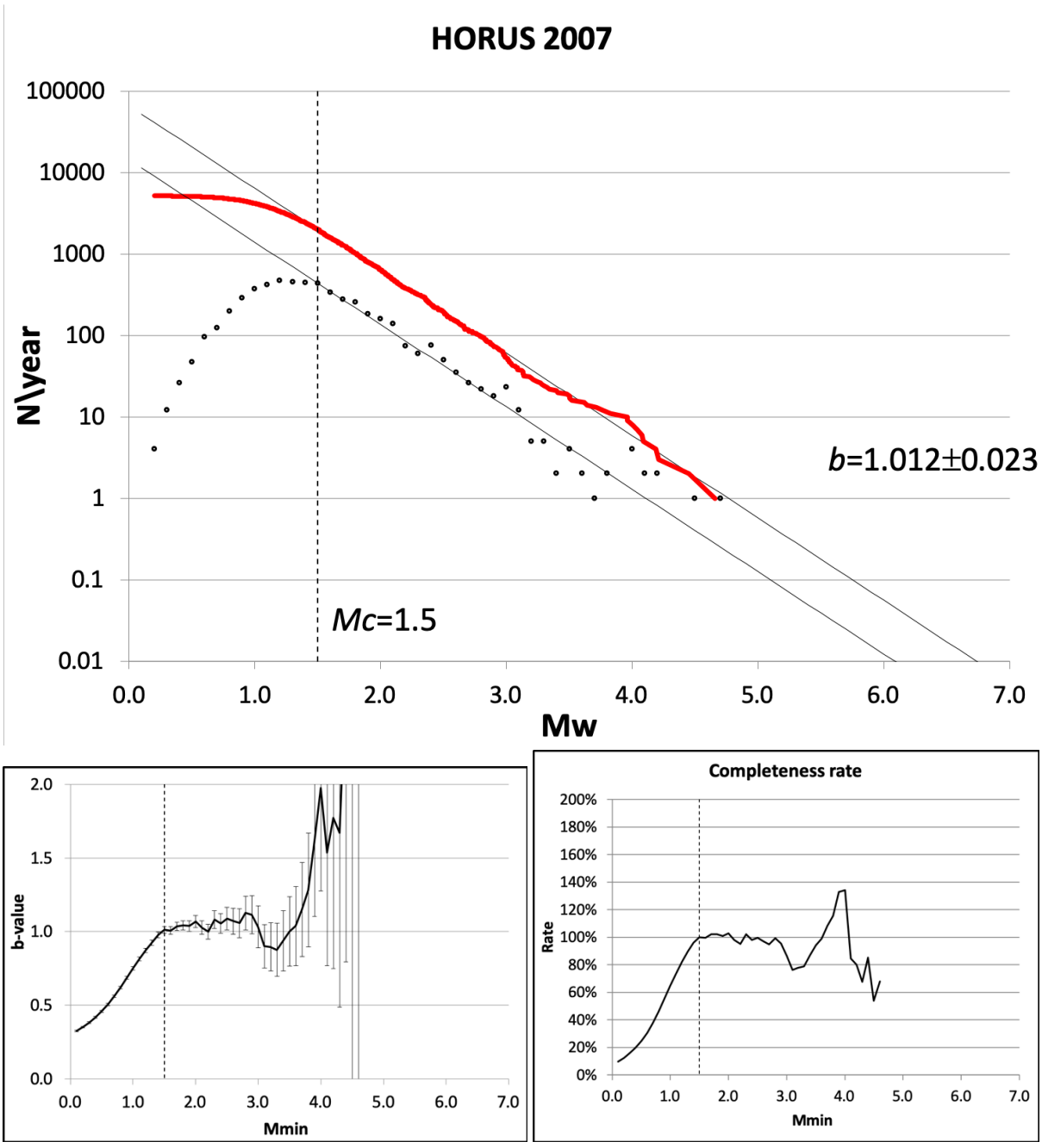

Figure S3 – Same as Fig. S1 for year 2007.

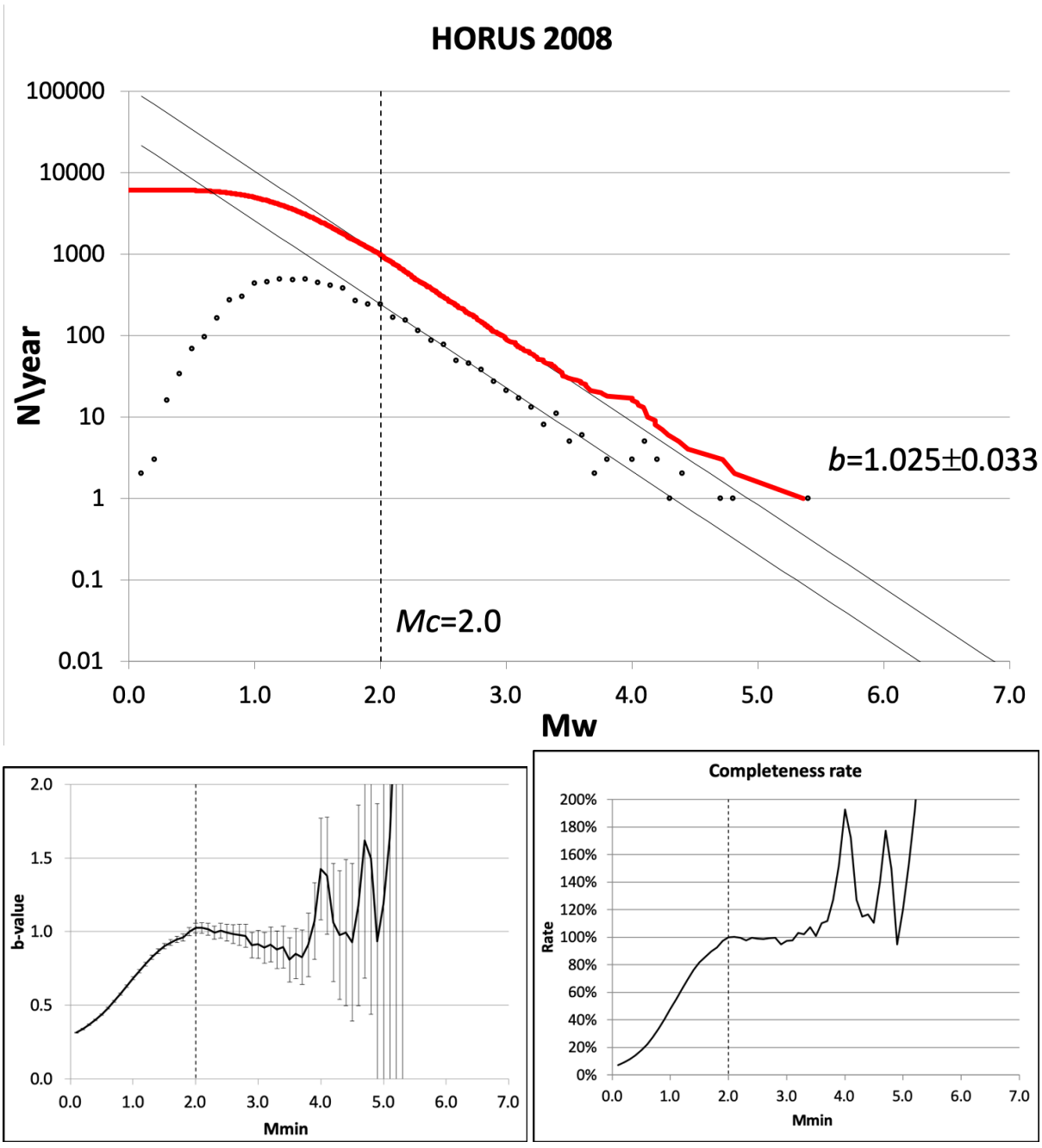

Figure S4 – Same as Fig. S1 for year 2008.

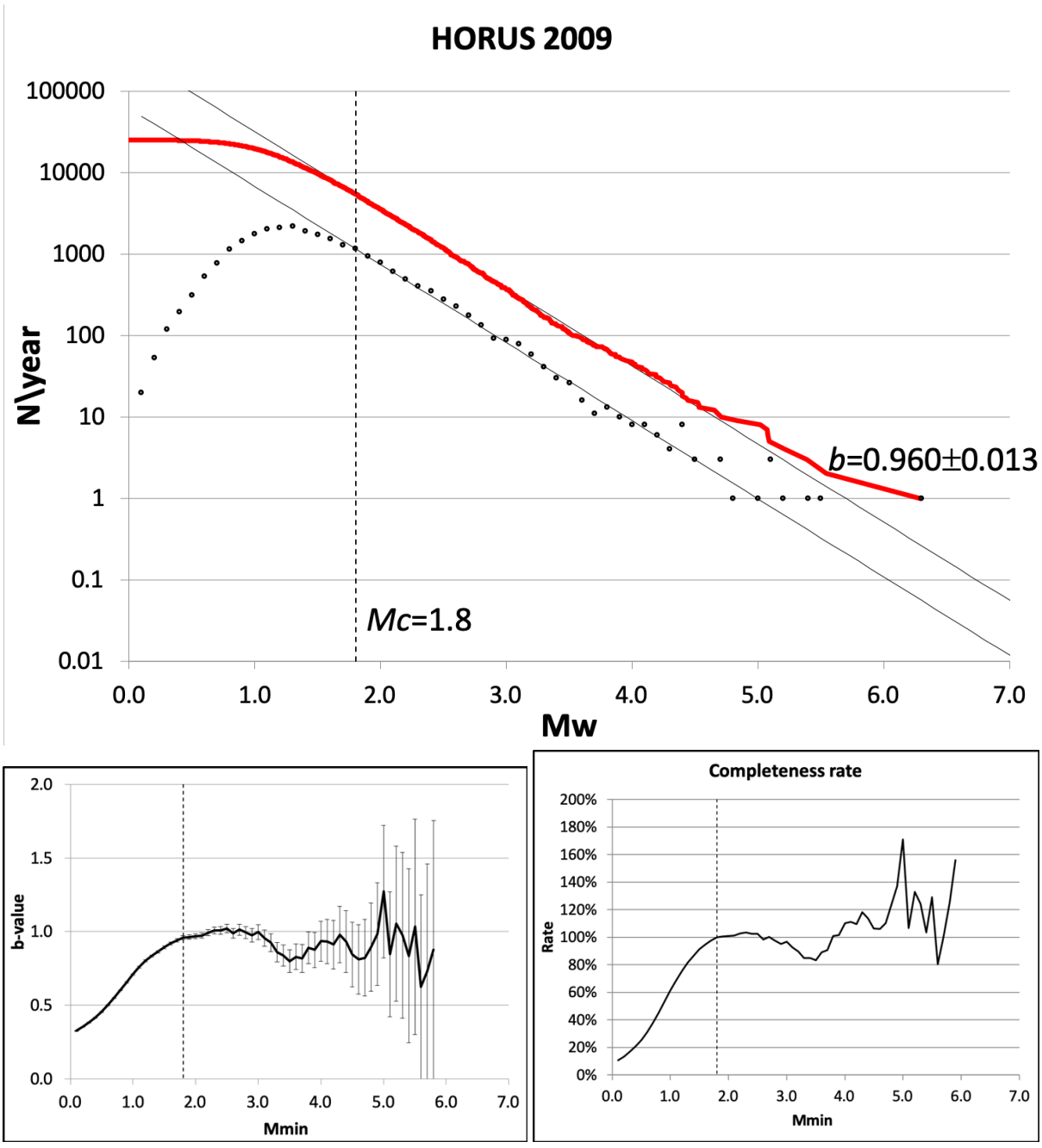

Figure S5 – Same as Fig. S1 for year 2009.

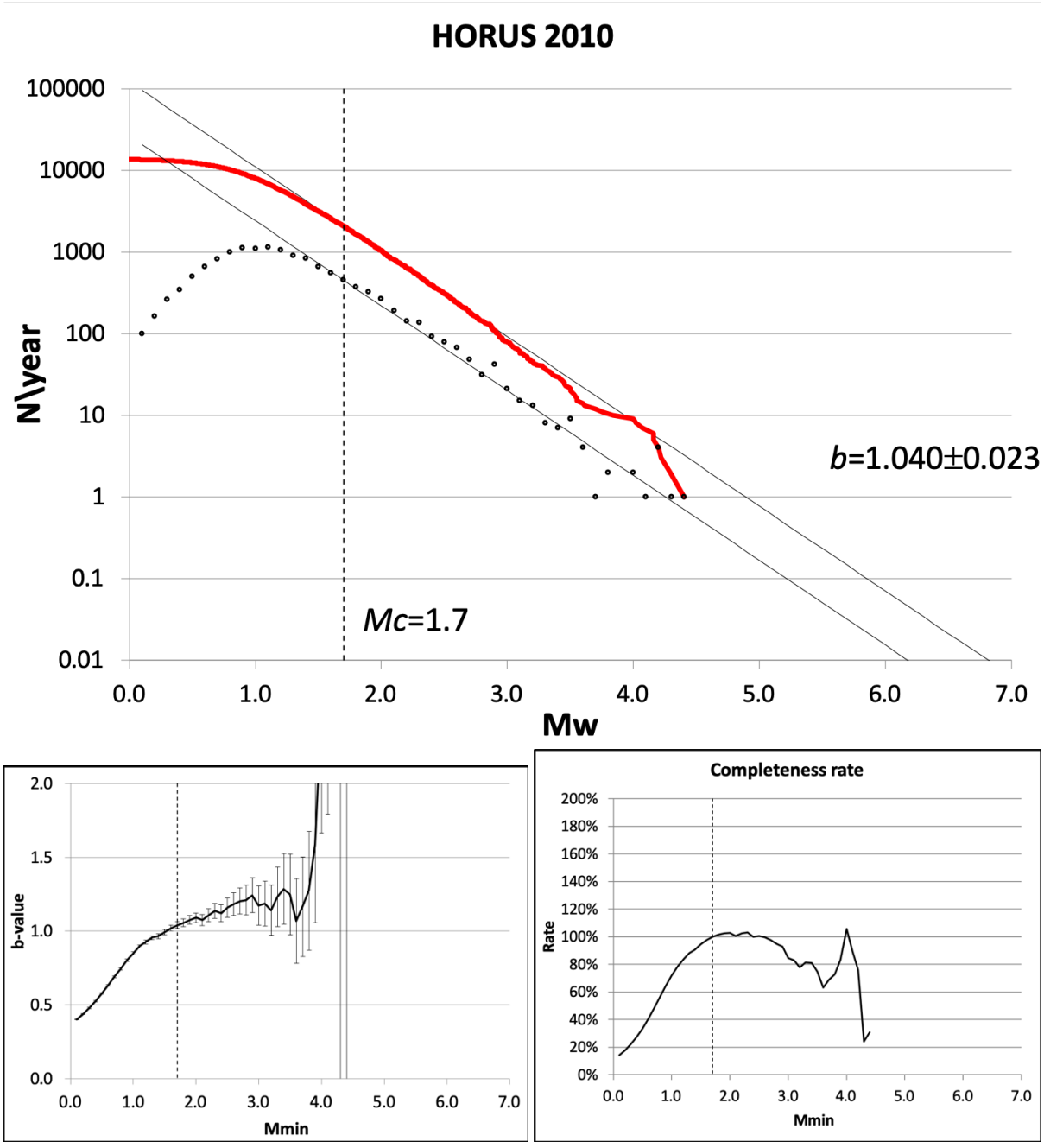

Figure S6 – Same as Fig. S1 for year 2010.

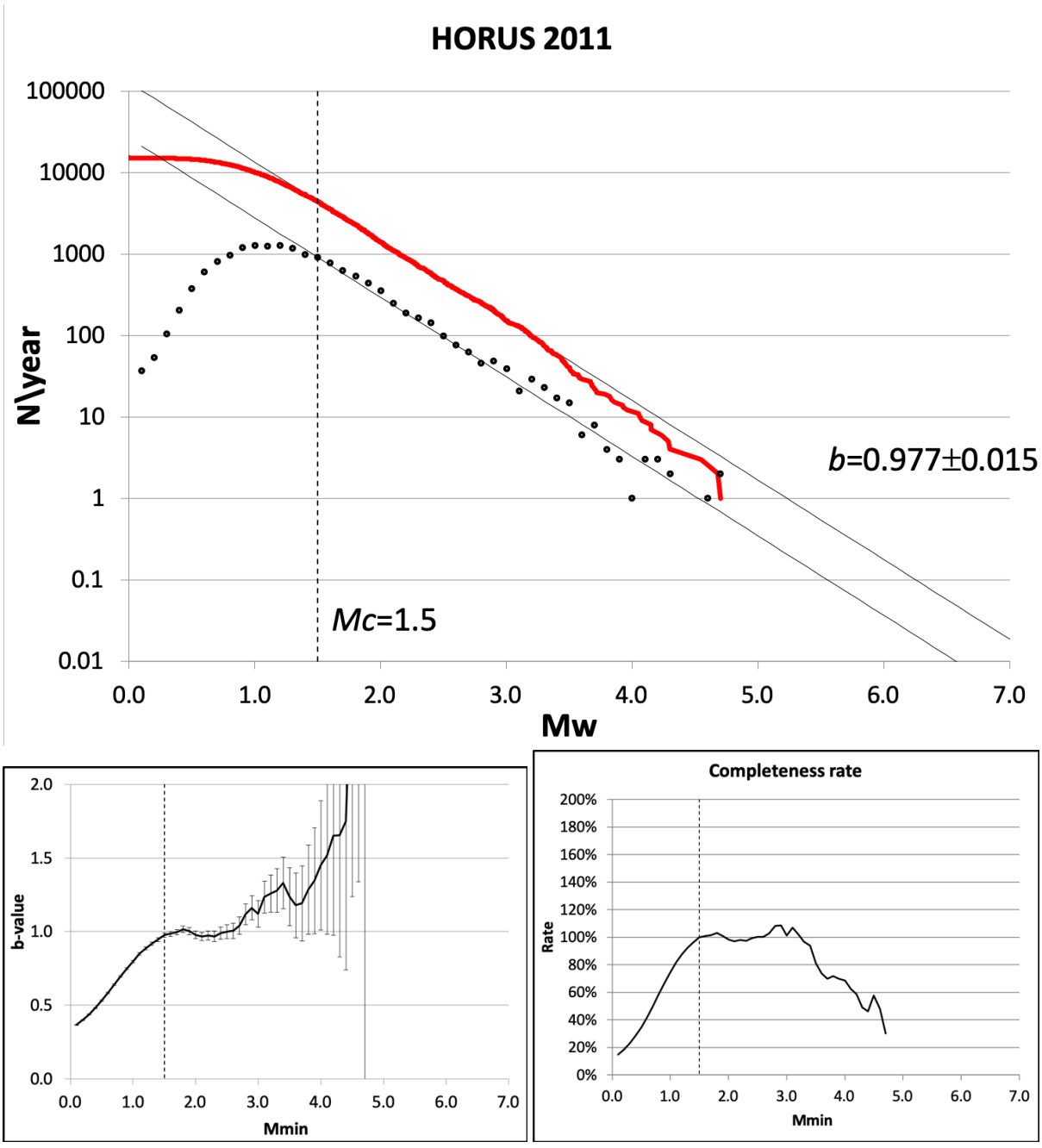

Figure S7 – Same as Fig. S1 for year 2011.

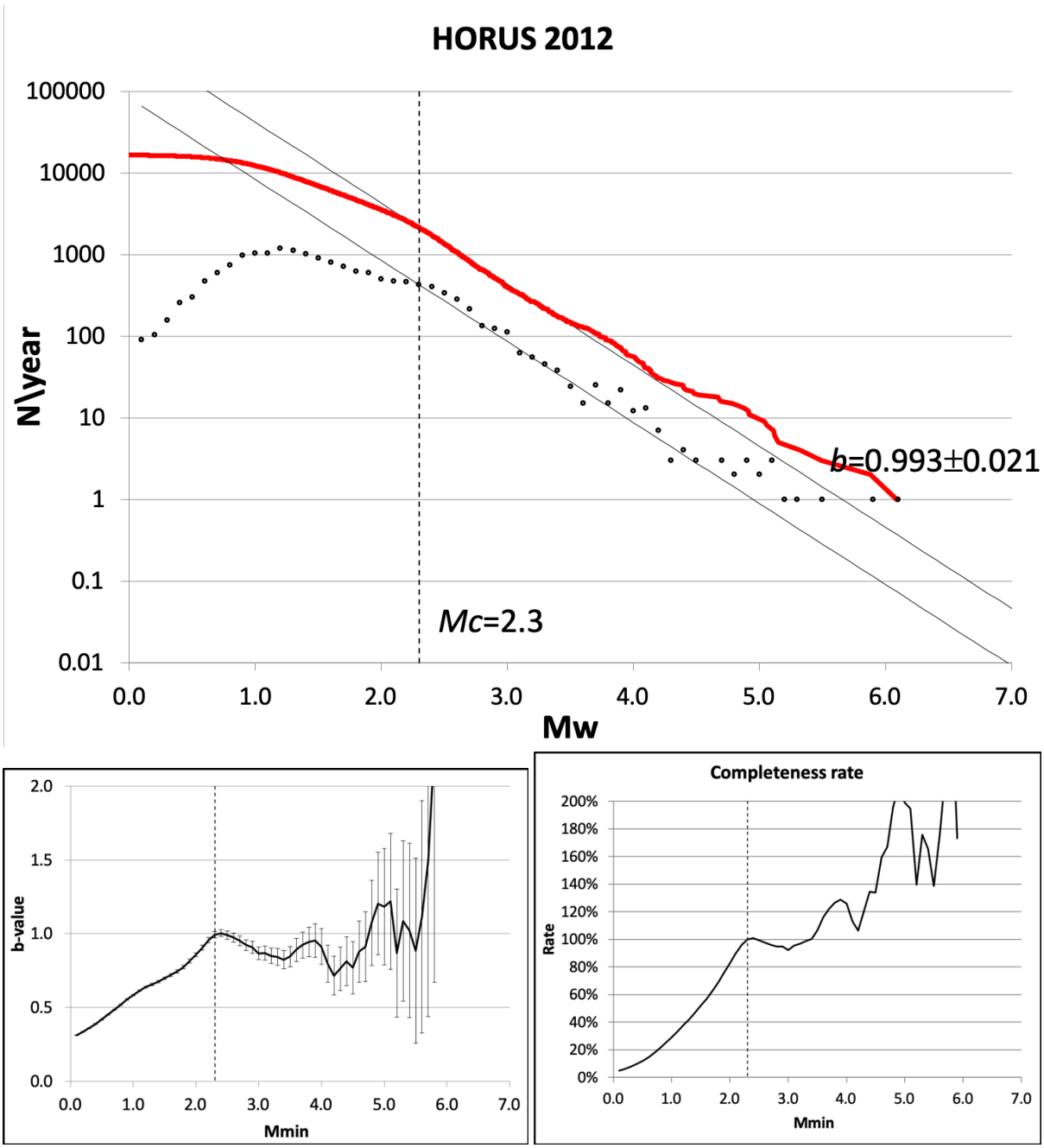

Figure S8 – Same as Fig. S1 for year 2012.

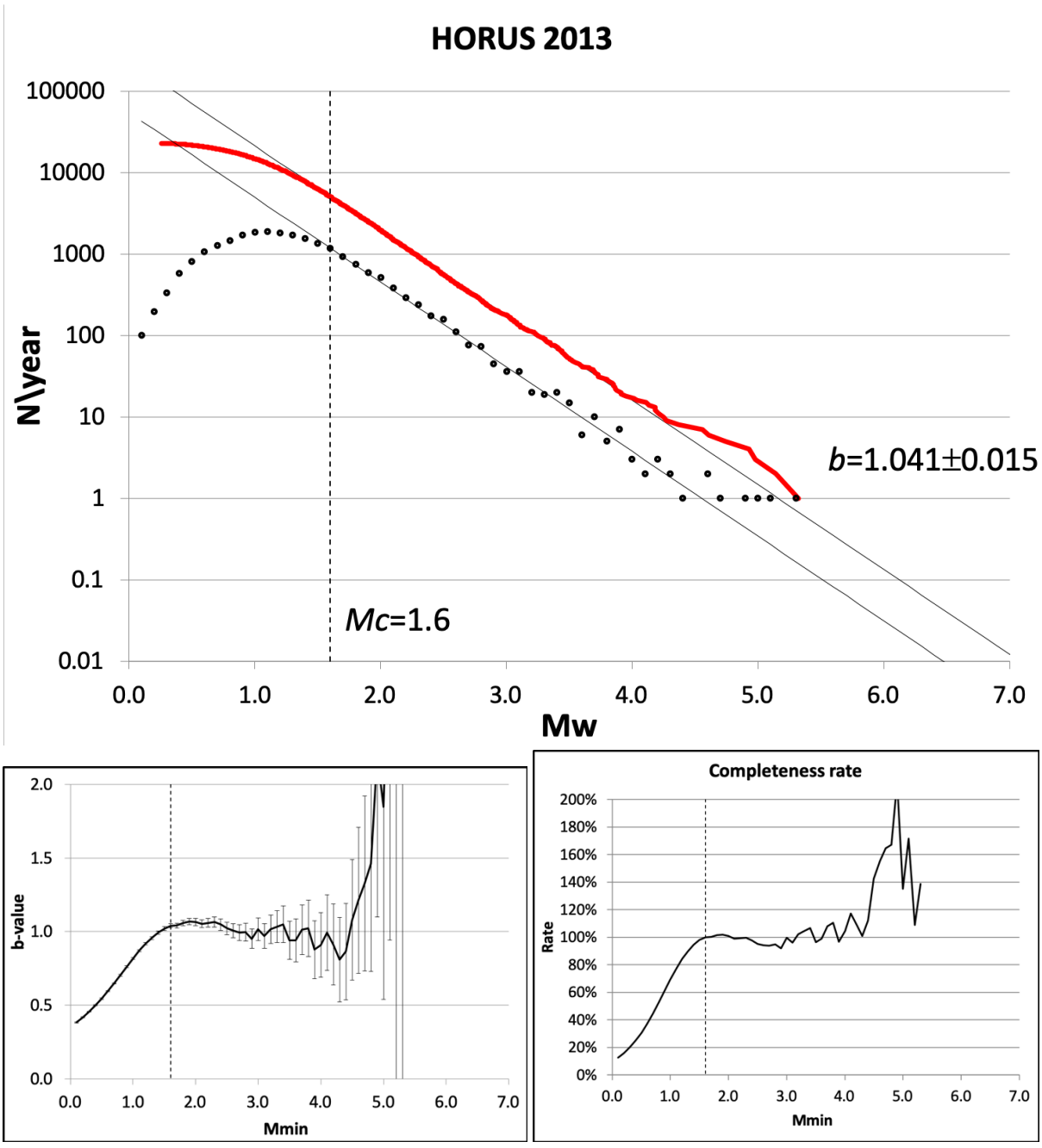

Figure S9 – Same as Fig. S1 for year 2013.

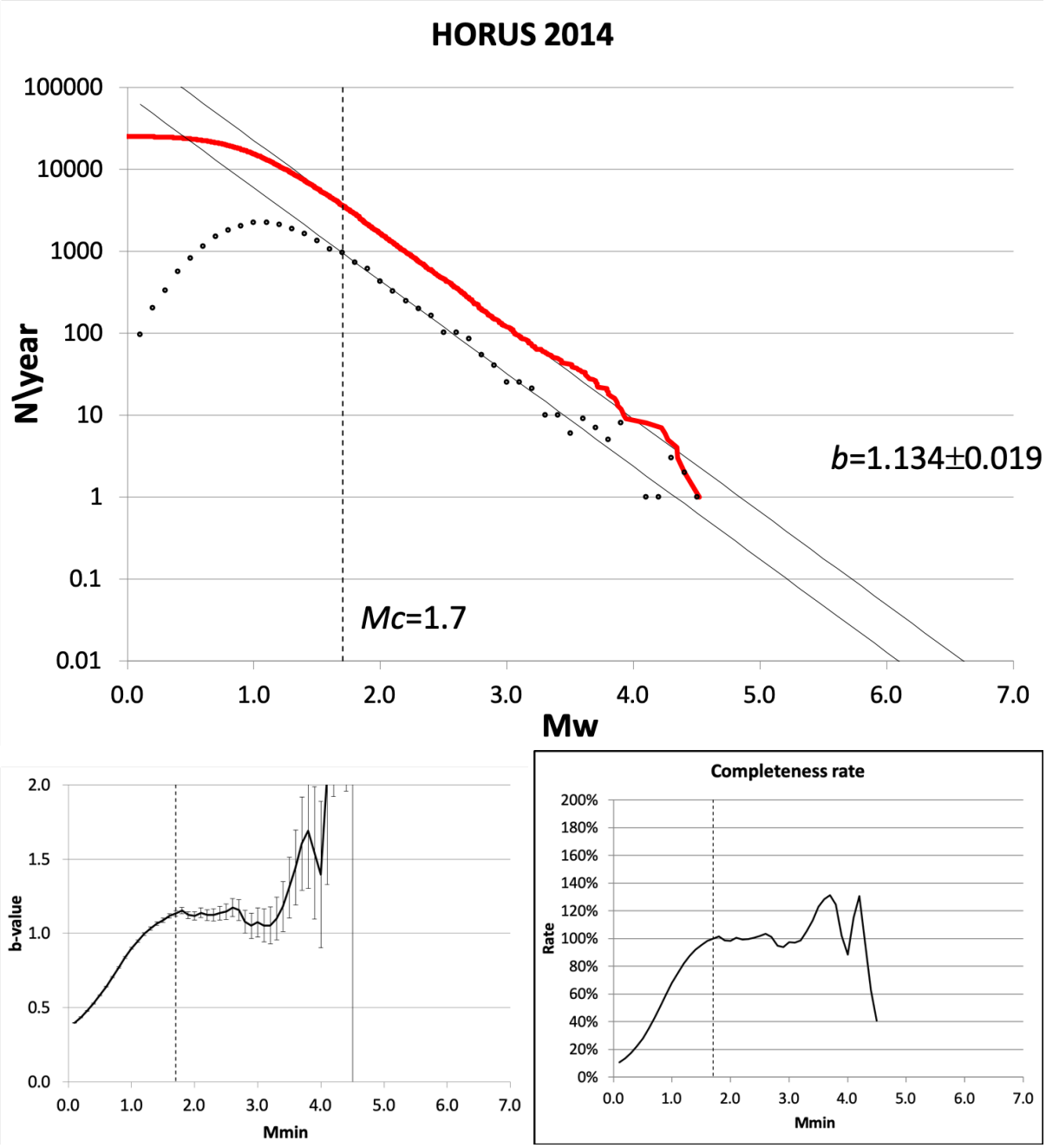

Figure S10 – Same as Fig. S1 for year 2014.

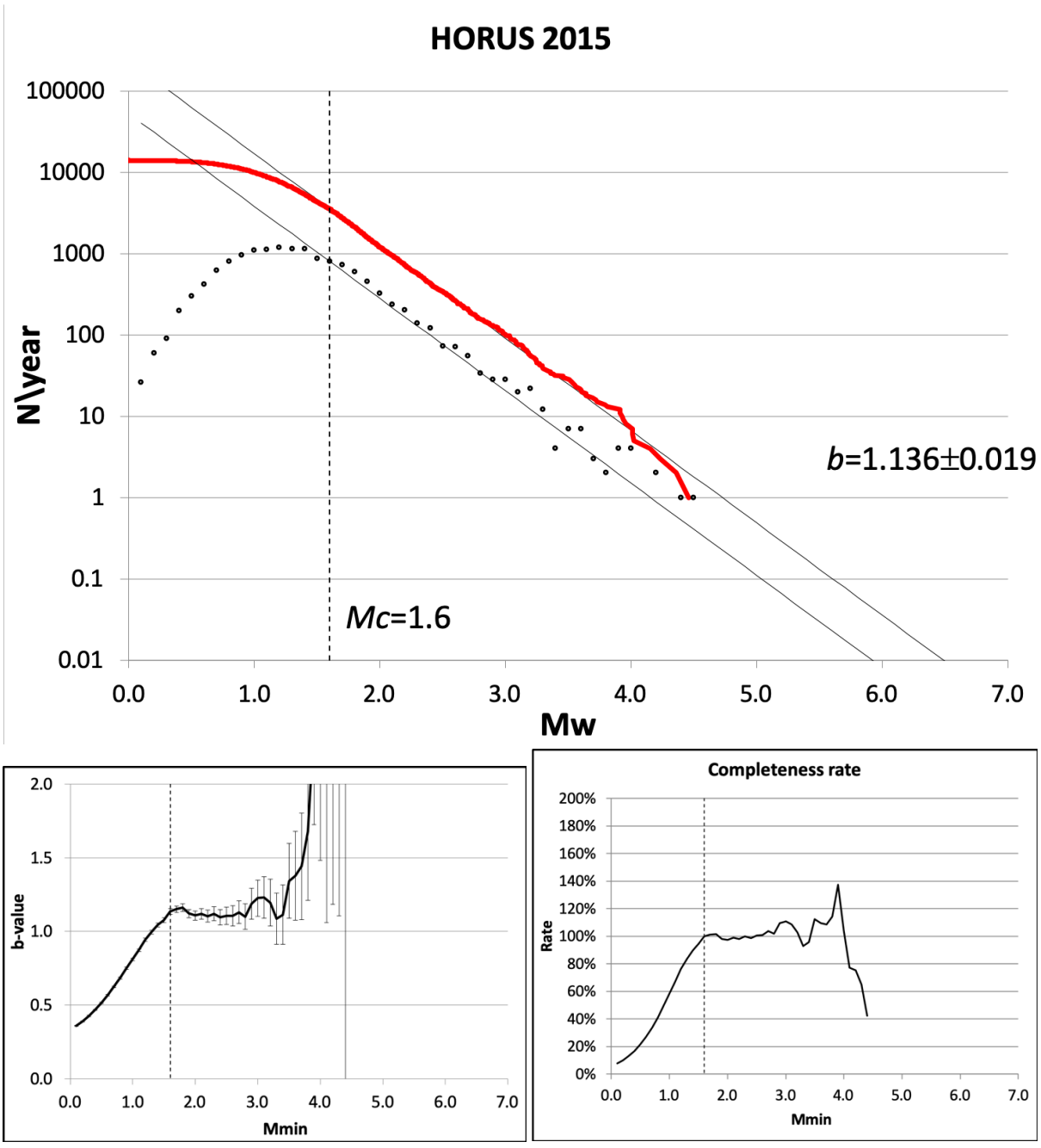

Figure S11 – Same as Fig. S1 for year 2015.

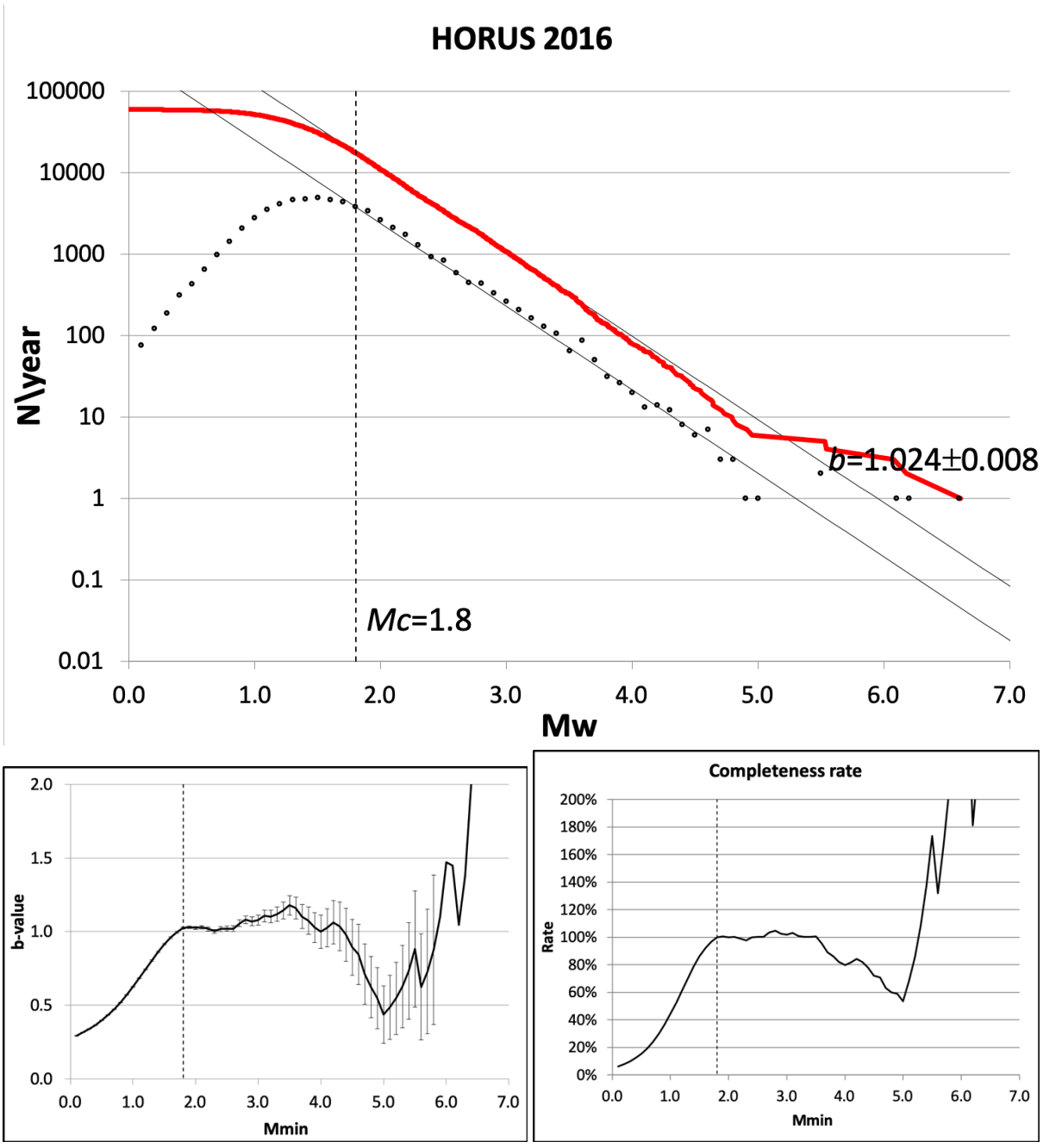

Figure S12 – Same as Fig. S1 for year 2016.

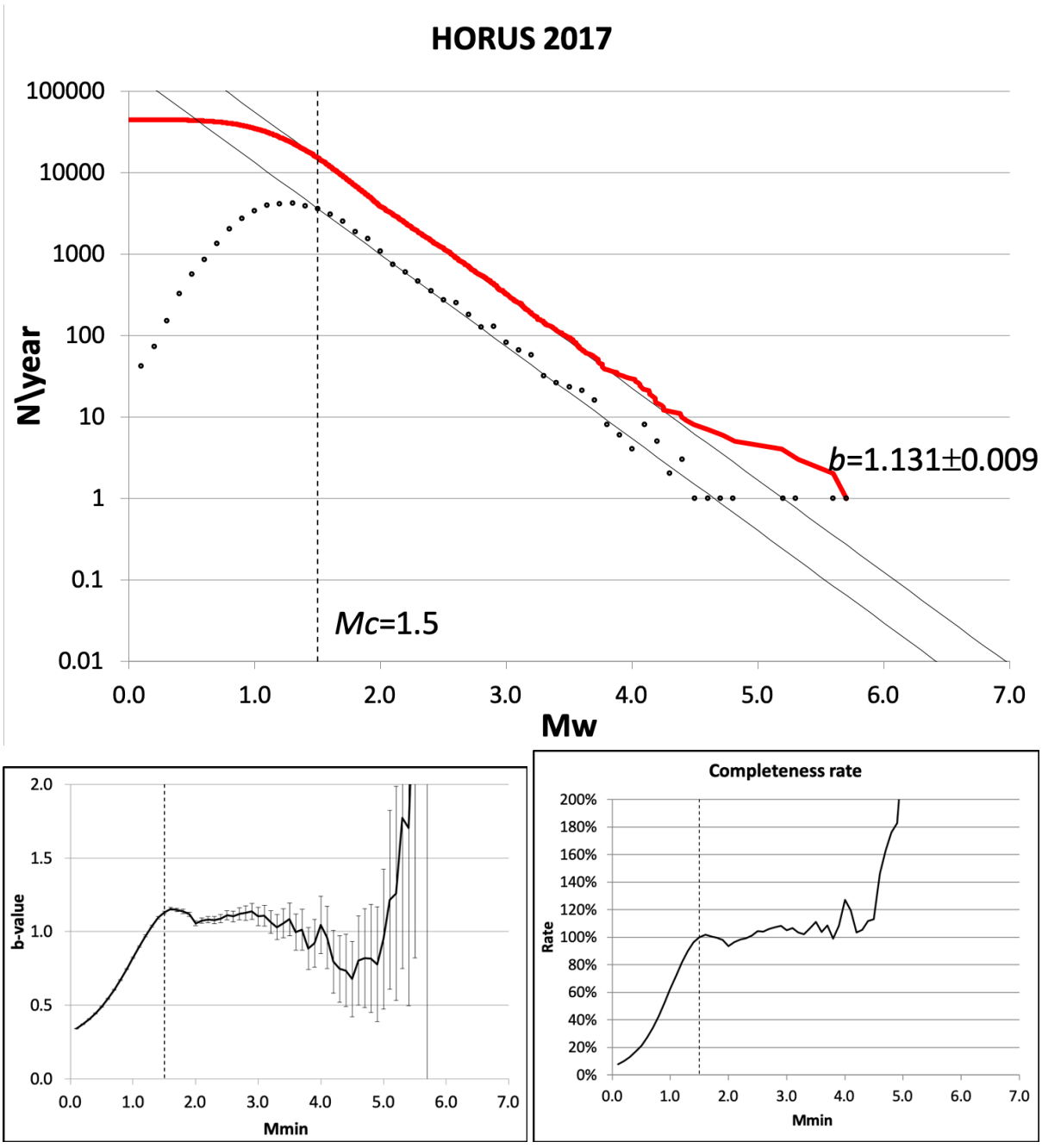

Figure S13 – Same as Fig. S1 for year 2017.

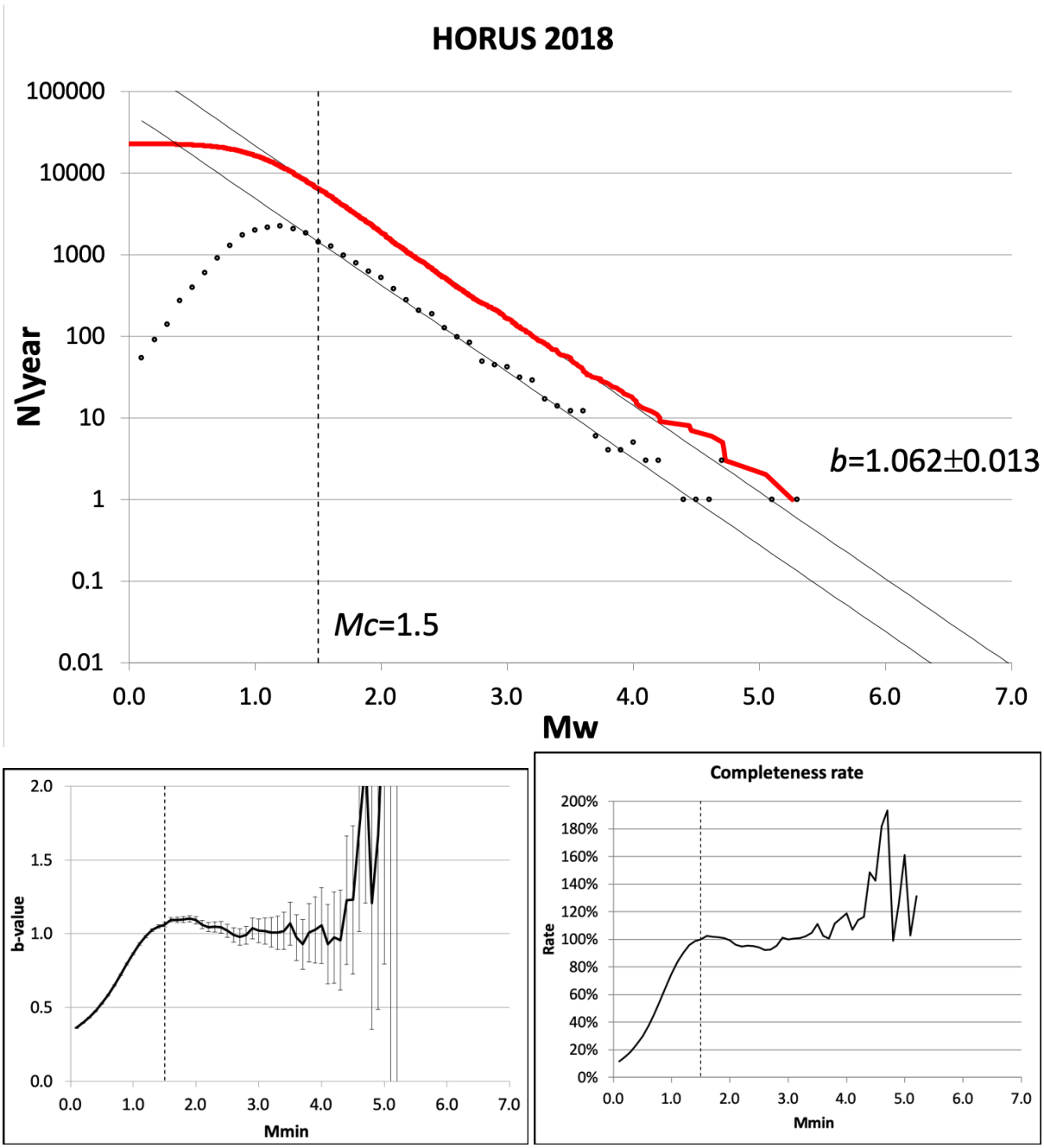

Figure S14 – Same as Fig. S1 for year 2018.

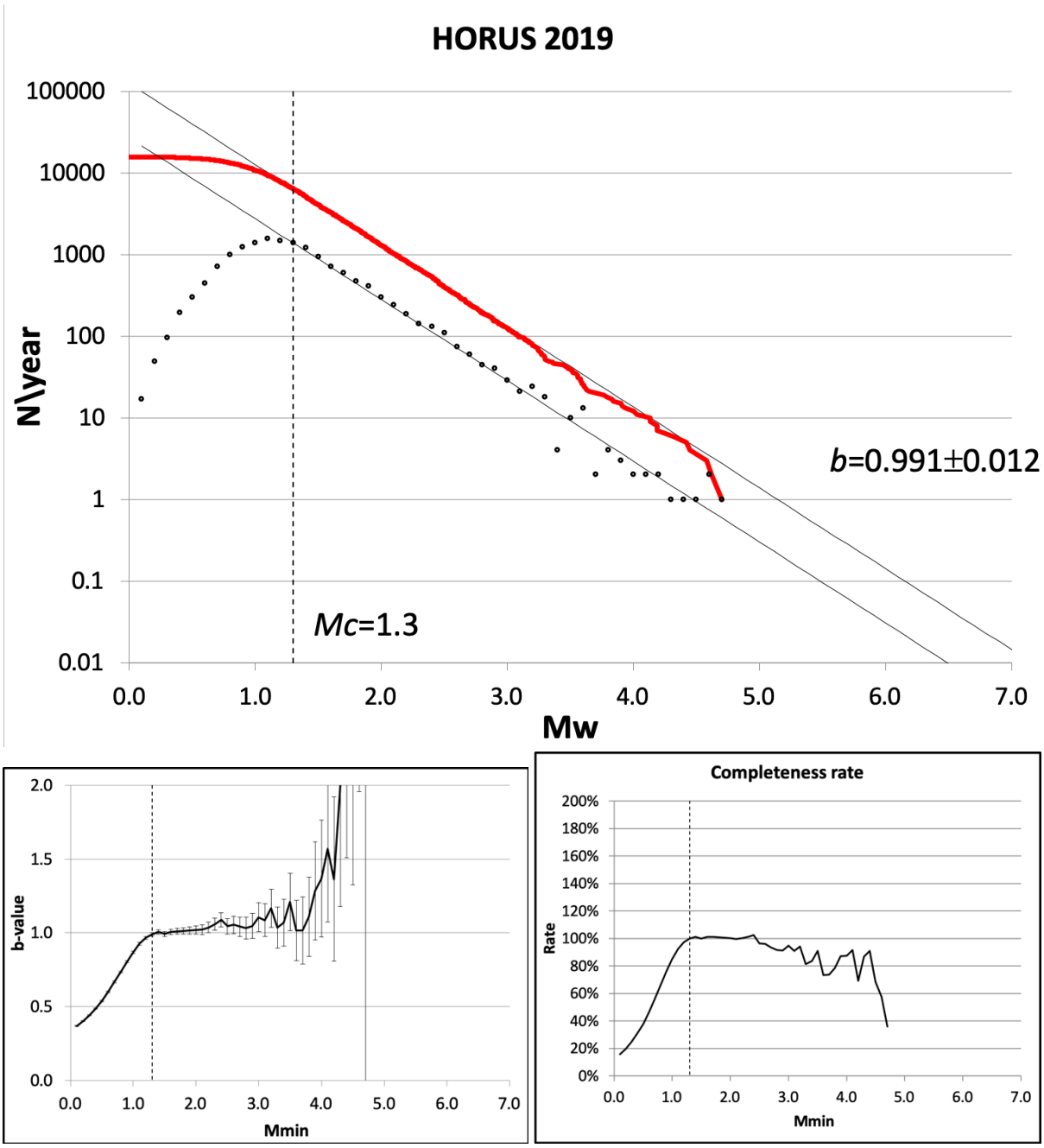

Figure S15 – Same as Fig. S1 for year 2019.

Table S1 – Average differences between ML and Md and between Mw proxies computed from ML and Md according to Gasperini et al. (2013a) with and without empirical correction to Md, in different time intervals.

Time interval	**ML_{proxy}-Md_{proxy}**	**ML_{proxy}-$(Md+0.45)_{proxy}$**	**ML-Md**
<2011	-0.002	0.772	0.459
2011	-0.030	0.743	0.506
2012	-0.169	0.604	0.387
2013	-0.800	-0.026	0.078
2014	-0.776	0.113	0.146
2015	-0.781	-0.008	0.033
2016	-0.934	-0.161	-0.063
2017	-0.670	0.103	0.227
2018	-0.689	0.013	0.248
<April 2013	-0.018	0.755	0.464
≥April 2013	-0.810	-0.038	0.080

Table S2 – Magnitude completeness thresholds, *b*-values and numbers of data in different years

Year	***Mc*(IN)**	***B*(IN)**	***Mc*(MC)**	***b* (MC)**	**N**	**$N_O \geq 2.5$**	**$N_P \geq 2.5$**
2005	1.8	0.975±0.033	1.7	0.954±0.029	2785	169	184
2006	1.7	1.026±0.024	1.6	0.991±0.021	5225	273	267
2007	1.5	1.012±0.022	1.4	0.978±0.020	5171	196	197
2008	2.0	1.025±0.032	1.6	0.925±0.020	6144	301	304
2009	1.8	0.960±0.013	1.5	0.894±0.009	25190	1201	1172
2010	1.7	1.040±0.023	1.3	0.956±0.014	13604	311	309
2011	1.5	0.977±0.015	1.2	0.886±0.010	15190	469	468
2012	2.3	0.993±0.021	1.4	0.675±0.008	16595	1365	1376
2013	1.6	1.041±0.015	1.3	0.956±0.010	23386	563	592
2014	1.7	1.134±0.019	1.3	1.033±0.011	25194	462	454
2015	1.6	1.136±0.019	1.4	1.044±0.014	14057	342	340
2016	1.8	1.024±0.008	1.7	0.995±0.007	59523	3413	3410
2017	1.5	1.131±0.009	1.5	1.131±0.009	44809	1181	1132
2018	1.5	1.062±0.013	1.4	1.049±0.012	22936	527	561
2019	1.3	0.991±0.012	1.3	0.991±0.012	15717	405	420
2005-2019	1.8	1.017±0.004	1.4	0.924±0.003	295526	11178	11105

Mc(IN) and *b*(IN) are computed by the interactive method (see text). *Mc*(MC) and *b*(MC) are computed by the corrected maximum curvature methods. *N* total number of data with Mw>0, $N_O \geq 2.5$ and $N_P \geq 2.5$ annual rates of earthquakes with Mw≥2.5, observed and predicted from the GR distribution respectively.

Table S3 – Magnitude completeness thresholds, *b*-values and numbers of data for different months of year 2009.

Year	**Mc**	***b***	**Mc(MC)**	***b* (MC)**	**N**	**$N_O \geq 2.5$**	**$N_P \geq 2.5$**
Sep08	1.6	1.294±0.104	1.5	1.157±0.085	501	12	11
Oct08	1.5	0.994±0.066	1.4	0.935±0.057	570	23	23
Nov08	1.7	0.987±0.091	1.5	0.897±0.070	369	21	19
Dec08	2.2	1.240±0.102	1.9	1.055±0.063	620	58	63
Jan	1.9	1.157±0.126	1.4	0.903±0.064	392	15	17
Feb	1.8	1.255±0.132	1.2	0.942±0.055	494	13	12
Mar	1.4	0.854±0.054	1.3	0.831±0.049	591	27	28
Apr	1.9	0.957±0.019	1.5	0.844±0.012	8940	714	694
May	1.3	1.089±0.028	1.3	1.089±0.028	3857	68	75
Jun	1.4	1.033±0.034	1.3	0.997±0.030	2645	64	66
Jul	1.7	1.055±0.054	1.3	1.016±0.033	2615	52	54
Aug	1.3	1.029±0.040	1.4	1.033±0.045	1758	42	39
Sep	1.3	1.018±0.047	1.4	1.023±0.052	1089	29	29
Oct	1.4	0.969±0.047	1.4	0.969±0.047	1255	34	37
Nov	1.5	1.041±0.067	1.3	0.960±0.051	906	23	22
Dec	2.5	1.124±0.103	1.5	0.561±0.030	648	120	120
Jan10	1.5	0.888±0.055	1.5	0.888±0.055	600	34	33
Feb10	1.8	1.086±0.100	1.6	1.009±0.076	483	23	20
Mar10	1.5	1.075±0.071	1.2	0.936±0.047	785	21	19
Apr10	1.5	1.066±0.058	1.0	0.902±0.030	1851	28	29
2009	1.8	0.960±0.013	1.5	0.894±0.009	25190	1201	1172

Mc(IN) and *b(*IN) are computed by the interactive method (see text). Mc(MC) and *b*(MC) are computed by the corrected maximum curvature methods. N total number of data with Mw>0, $N_O \geq 2.5$ and $N_P \geq 2.5$ annual rates of earthquakes with Mw≥2.5, observed and predicted from the GR distribution respectively.

Table S4 – Magnitude completeness thresholds, *b*values and numbers of data for different months of year 2012.

Year	**Mc**	***b***	**Mc(MC)**	***b* (MC)**	**N**	**$N_O \geq 2.5$**	**$N_P \geq 2.5$**
Sep11	1.8	0.881±0.053	1.3	0.741±0.031	1120	72	67
Oct11	1.5	0.883±0.045	1.4	0.849±0.040	952	52	50
Nov11	1.5	1.127±0.063	1.3	0.993±0.047	1052	26	24
Dec11	1.8	1.066±0.074	1.4	0.881±0.043	1198	37	38
Jan	1.3	0.804±0.042	1.4	0.829±0.046	864	37	40
Feb	1.5	0.902±0.064	1.4	0.885±0.057	541	24	25
Mar	1.2	0.859±0.041	1.5	0.864±0.056	807	38	33
Apr	1.3	0.975±0.048	1.2	0.944±0.043	966	34	27
May	2.3	0.893±0.027	2.6	0.840±0.036	2660	694	704
Jun	2.2	1.145±0.054	2.4	1.195±0.072	2018	200	204
Jul	1.8	1.002±0.062	1.4	0.839±0.037	1252	56	53
Aug	1.5	1.030±0.051	1.5	1.030±0.051	1380	28	38
Sep	1.5	0.975±0.046	1.4	0.949±0.041	1342	46	47
Oct	1.7	1.029±0.047	1.4	0.905±0.031	2015	74	73
Nov	1.3	0.849±0.029	1.5	0.869±0.035	1651	89	85
Dec	1.6	1.047±0.053	1.6	1.047±0.053	1099	45	44
Jan13	1.9	1.330±0.093	1.4	1.046±0.041	1270	31	33
Feb13	1.6	1.071±0.058	1.5	1.039±0.051	962	27	37
Mar13	1.6	0.979±0.058	1.6	0.979±0.058	1021	35	38
Apr10	1.4	1.000±0.042	1.1	0.910±0.029	2252	43	45
2012	1.8	0.993±0.021	1.4	0.675±0.008	16595	1365	1376

Mc(IN) and *b(*IN) are computed by the interactive method (see text). Mc(MC) and *b*(MC) are computed by the corrected maximum curvature methods. N total number of data with Mw>0, $N_O \geq 2.5$ and $N_P \geq 2.5$ annual rates of earthquakes with Mw≥2.5, observed and predicted from the GR distribution respectively.

Table S5 – Magnitude completeness thresholds, *b*values and numbers of data for different months of year 2016.

Year	**Mc**	***b***	**Mc(MC)**	***b* (MC)**	**N**	**N_O≥2.5**	**N_P≥2.5**
Sep15	1.6	1.193±0.074	1.4	1.093±0.055	1156	18	22
Oct15	1.6	1.141±0.072	1.1	0.839±0.035	930	24	24
Nov15	1.5	1.205±0.071	1.3	1.058±0.051	927	22	18
Dec15	1.3	1.072±0.055	1.5	1.065±0.070	962	21	20
Jan	2.0	1.198±0.096	1.4	0.912±0.041	1021	38	39
Feb	1.7	1.180±0.080	1.7	1.180±0.080	700	25	25
Mar	1.5	1.056±0.061	1.2	0.917±0.041	898	26	26
Apr	1.5	1.031±0.064	1.4	1.009±0.057	946	26	24
May	1.6	1.078±0.068	1.2	0.913±0.039	1041	27	27
Jun	1.5	1.060±0.062	1.4	1.012±0.053	1038	22	26
Jul	1.5	1.047±0.072	1.4	0.961±0.061	958	20	19
Aug	2.1	0.953±0.025	1.7	0.871±0.016	7084	585	595
Sep	1.7	1.255±0.028	1.4	1.152±0.018	10505	201	197
Oct	3.1	1.071±0.054	1.6	0.726±00.01	11265	1309	1735
Nov	1.9	1.228±0.018	1.9	1.228±0.018	13421	875	882
Dec	1.6	1.320±0.021	1.6	1.320±0.021	10646	259	246
Jan17	1.6	1.067±0.016	1.7	1.079±0.018	10062	489	484
Feb17	1.6	1.284±0.031	1.5	1.260±0.027	6090	134	119
Mar17	1.4	1.305±0.029	1.5	1.333±0.034	4888	75	74
Apr17	1.4	1.141±0.028	1.5	1.154±0.032	4032	114	90
2016	1.8	1.024±0.008	1.7	0.995±0.007	59507	2978	2976

Mc and b are computed by the interactive method (see text). Mc(MC) and b(MC) are computed by the corrected maximum curvature methods. *N* total number of data with Mw>0, N_O≥2.5 and N_P≥2.5 annual rates of data with Mw≥2.5, observed and predicted from the GR distribution respectively.