SUPPLEMENT

Truncated and Tapered Gutenberg-Richter Distributions

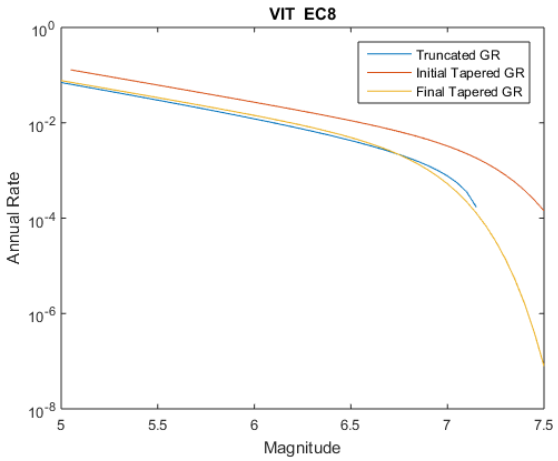
In order to apply the complex consistency test to the PSHA recurrence models investigated we must first obtain the earthquake recurrence parameters with the Tapered Gutenberg-Richter law ($\dot{N}^{Comp}$, M_T, β_{tGR} and m_c), Eq. (1) below, equivalent to those used with the double truncated Gutenberg-Richter law, Eq. (2) below.

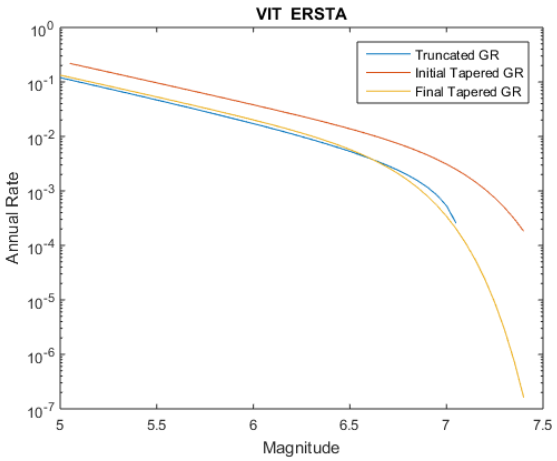
$$\dot{N}(m_T) = \dot{N}^{Comp}\left(\frac{M_T}{M_c}\right)^{-\beta_{tGR}} e^{\left(\frac{M^{Comp}-M_T}{M_c}\right)} \quad (1)$$

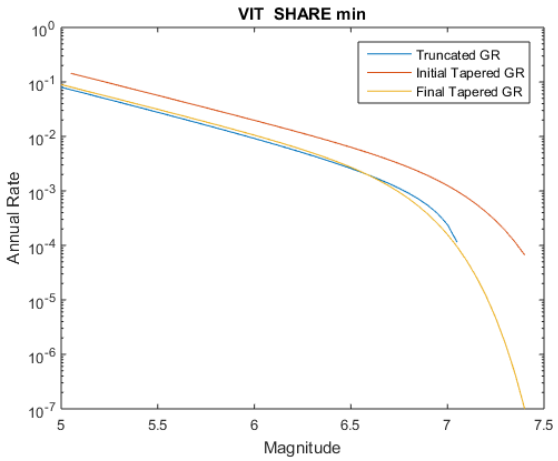
$$\dot{N}(m) = \lambda \frac{e^{-\beta(m-m_{min})} - e^{-\beta(m_{max}-m_{min})}}{1-e^{-\beta(m_{max}-m_{min})}} \quad (2)$$

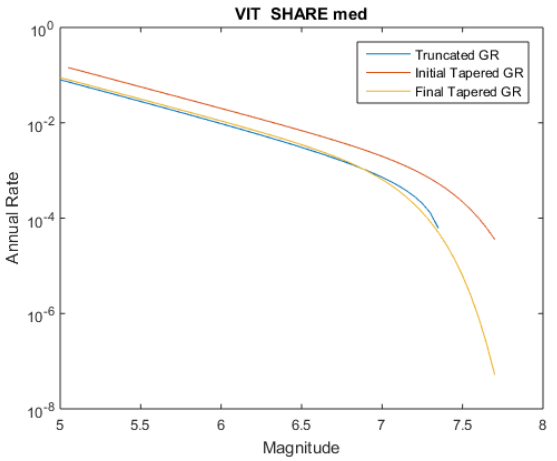
In this supplement, we will see in detail, the conversion process. In Tables Supp-1 and Supp-2 we present the expected number of earthquakes in 100 years for different classes of magnitude, between 5.0 and the maximum magnitude of each zone, every 0.5. The small differences observed are justified by the adjustment of the two laws, one is expressed by magnitude, other by seismic moment, where it was given priority to the equality between seismic moment release rates calculated by the two laws. Since the laws have slightly different algebraic forms, especially at higher magnitudes, differences in the number of earthquakes may occur, which we consider not relevant (in the adjustment made it was convenient that both laws translate the same total sum of the released seismic moment per year so that the total number of earthquakes in each zone would not be affected). The seismic moment release rate ($\dot{M}_0$) for 100 years is also shown in these tables.

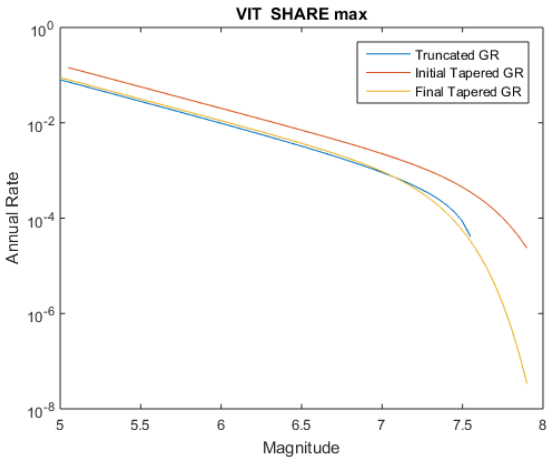
The Fig. Supp-1 and Supp-2 show the comparison of the two sets of laws for the Lower Tagus Valley and 1755 source zone respectively.

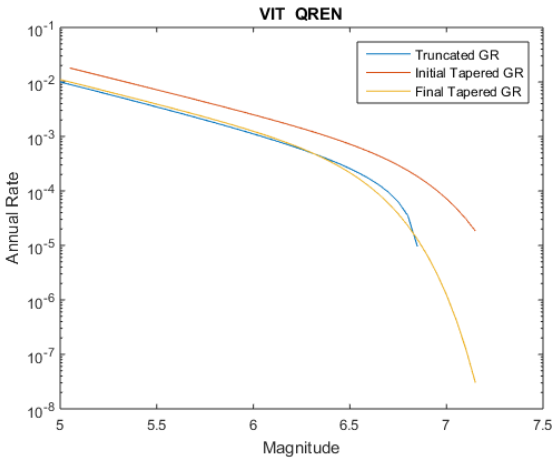

VIT EC8
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


VIT ERSTA
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


VIT SHARE min
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


VIT SHARE med
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


VIT SHARE max
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


VIT QREN
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

25

30

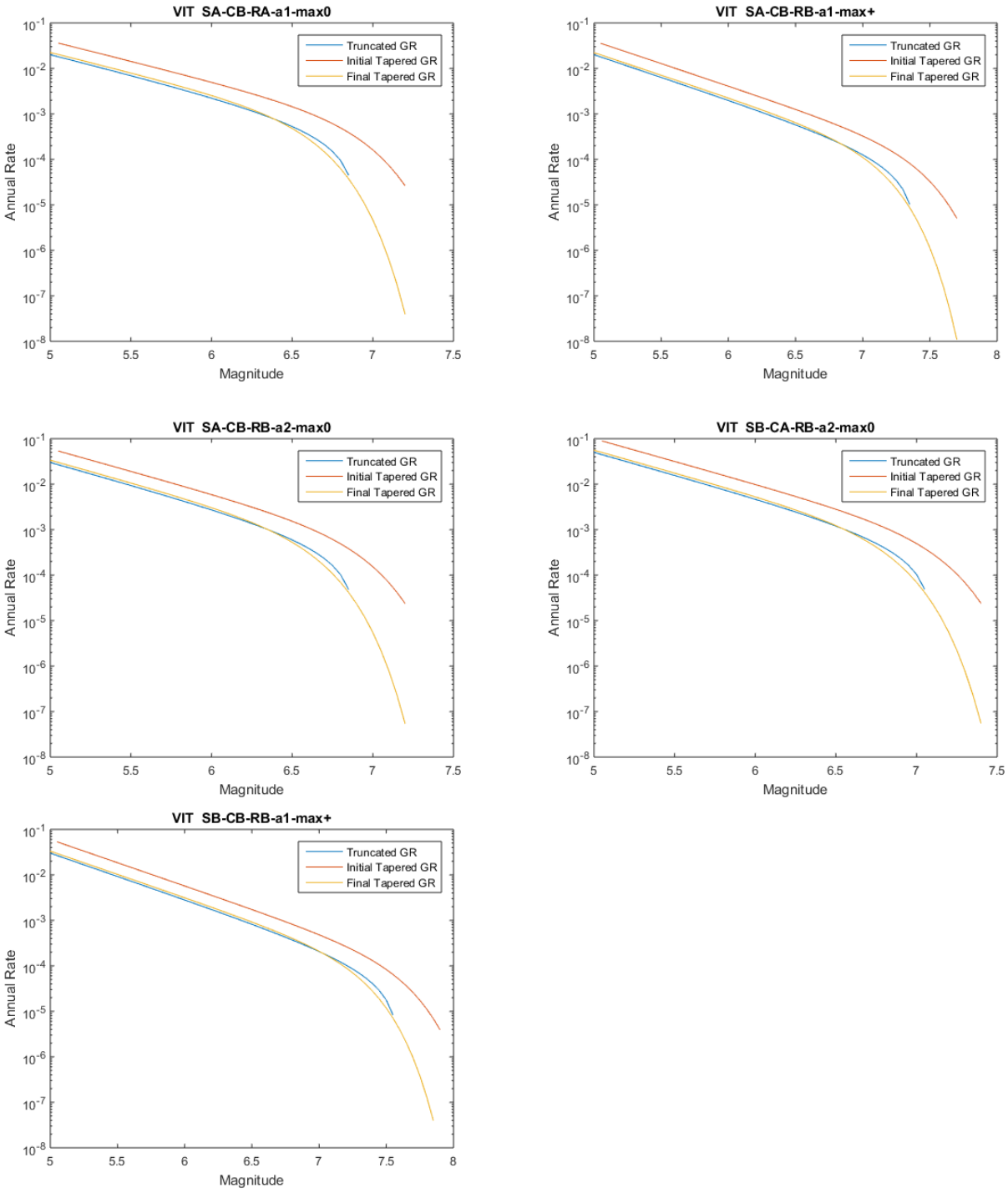
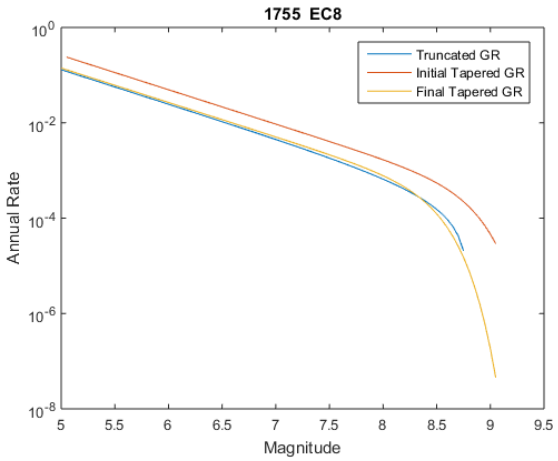
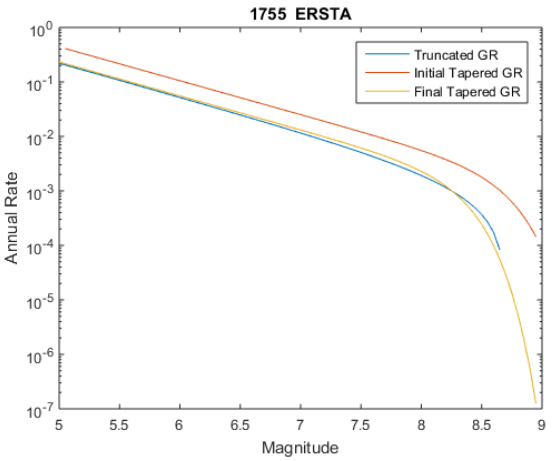
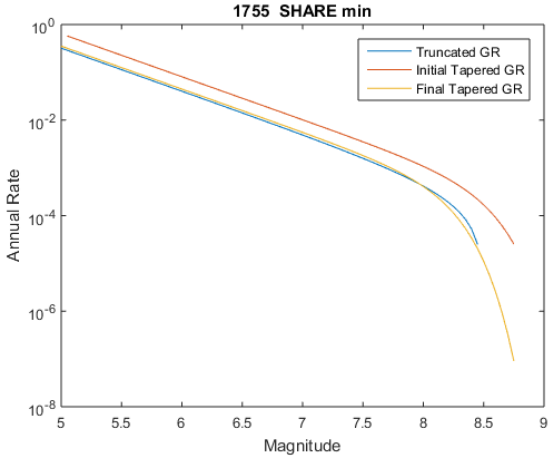
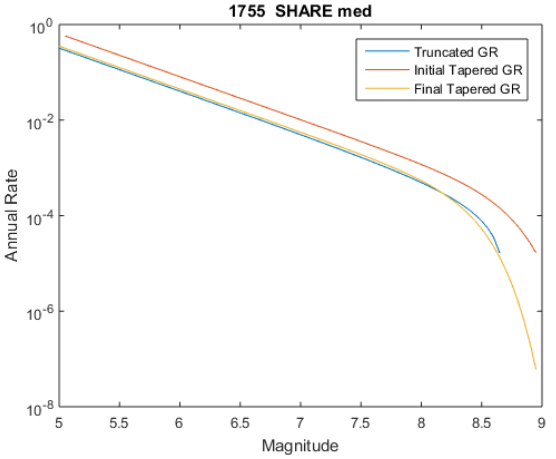


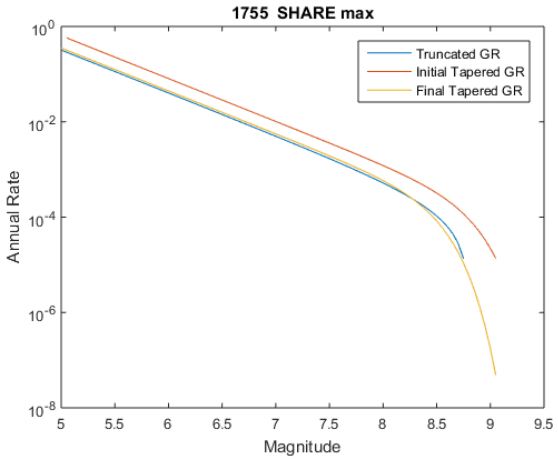
Figure Supp-1: (on this and previous page) Comparison between the truncated Gutenberg-Richter law (blue) and initial Tapered Gutenberg-Richter law (orange) and final TGR (yellow), for LTV source zone considering the referred 11 recurrence models investigated with the complex sanity test.

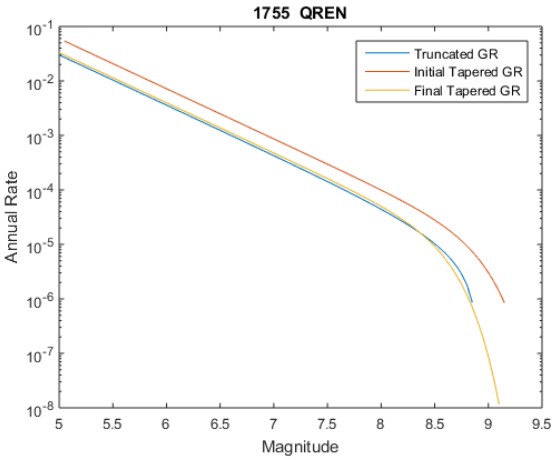

1755 EC8
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude


1755 ERSTA
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

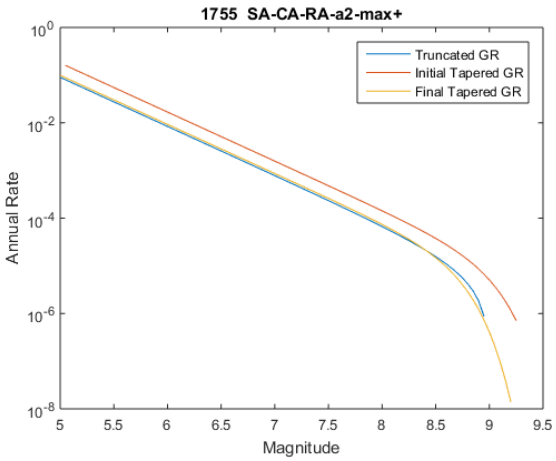

1755 SHARE min
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

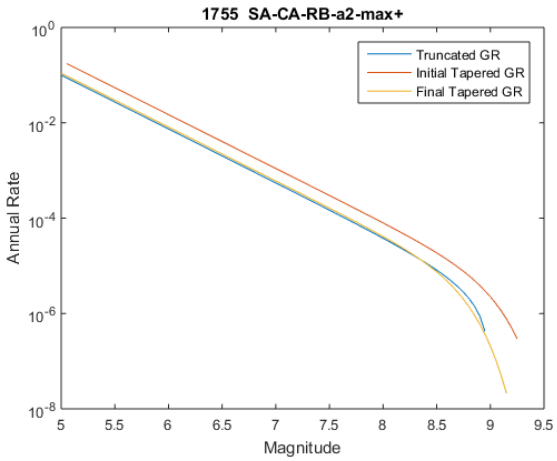

1755 SHARE med
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

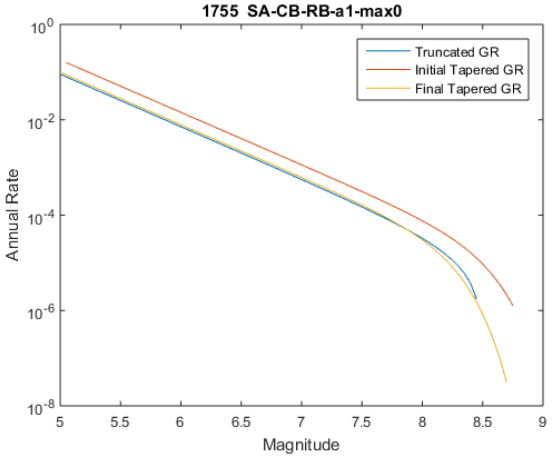

1755 SHARE max
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

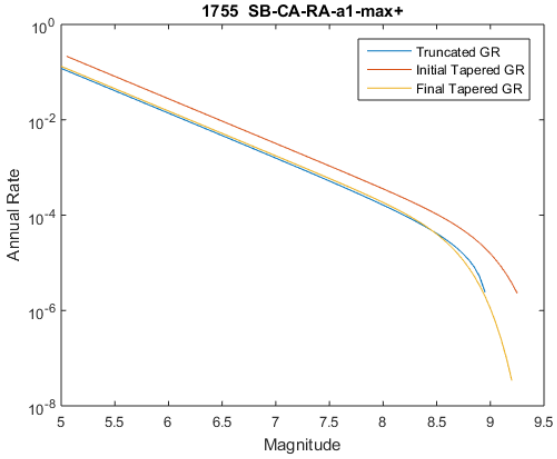

1755 QREN
Truncated GR
Initial Tapered GR
Final Tapered GR
Annual Rate
Magnitude

40









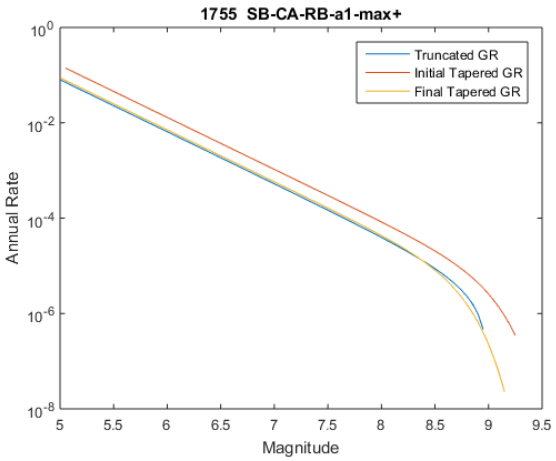


Figure Supp-2: (on this and previous page) Comparison between the truncated Gutenberg-Richter law (blue) and initial "tapered" Gutenberg-Richter law (orange) and final "tapered" (yellow), for 1755 source zone considering the referred 5 proposals.

Table Supp-1: Activity rates in EQs/century for the Lower Tagus Valley zone for each model, for magnitude 5.0 to 7.0, every 0.5. It is presented, for 100 years, the total seismic moment release rate. In blue the calculus with the truncated Gutenberg-Richter law and black the "tapered" Gutenberg-Richter law, for 100 years of catalogue duration.

Lower Tagus Valley (LTV)						
Model	**Magnitude**					$\dot{M}_o$ **(Nm/century)**
	5.0	**5.5**	**6.0**	**6.5**	**7.0**	
EC8	7.0	2.99	1.21	0.425	0.077	1.29×10^{19}
	8.6	3.77	1.58	0.511	0.039	
ERSTA	12.0	4.67	1.72	0.532	0.054	1.50×10^{19}
	14.9	5.92	2.21	0.580	0.021	
$SHARE_{min}$	8.0	2.77	0.92	0.258	0.024	7.65×10^{18}
	9.8	3.47	1.15	0.274	0.010	
$SHARE_{med}$	8.0	2.81	0.96	0.305	0.072	1.17×10^{19}
	9.8	3.47	1.20	0.368	0.057	
$SHARE_{max}$	8.0	2.82	0.98	0.323	0.091	1.56×10^{19}
	9.8	3.47	1.22	0.402	0.095	
QREN	1.0	0.35	0.11	0.026	---	6.91×10^{17}
	1.2	0.42	0.13	0.019	---	
SA-CB-RA-a1-max0	2.0	0.69	0.22	0.053	---	1.46×10^{18}
	2.2	0.77	0.25	0.047	---	
SA-CB-RB-a1-max+	2.0	0.63	0.20	0.057	0.013	2.23×10^{18}
	2.2	0.70	0.22	0.063	0.011	
SA-CB-RB-a2-max0	3.0	0.93	0.27	0.060	---	1.79×10^{18}
	3.4	1.07	0.31	0.052	---	
SB-CB-RB-a1-max+	3.0	0.92	0.28	0.082	0.021	3.86×10^{18}
	3.3	1.02	0.31	0.091	0.021	
SB-CA-RB-a2-max0	5.0	1.56	0.47	0.12	0.010	3.76×10^{18}
	5.6	1.76	0.53	0.12	0.007	

The seismic moment release rates are refereed to magnitude 5.0.

Table Supp-2: Activity rates in EQs/century for the 1755 source zone for each model, for magnitude 5.0 to 7.0, every 0.5. It is presented, for 100 years, the total seismic moment release rate. In blue the calculus with the Double Truncated Gutenberg-Richter law and black the Tapered Gutenberg-Richter law, for 100 years of catalogue duration.

1755 Source zone									
Model	**Magnitude**								$\dot{M}_o$ **(Nm/ century)**
	5.0	**5.5**	**6.0**	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**	
EC8	13.0	5.66	2.45	1.06	0.45	0.18	0.066	0.015	4.04×10^{20}
	15.7	6.85	2.98	1.30	0.563	0.236	0.082	0.010	
ERSTA	22.0	10.7	5.18	2.48	1.15	0.508	0.192	0.037	1.03×10^{21}
	26.2	12.8	6.27	3.06	1.48	0.683	0.239	0.018	
$SHARE_{min}$	32.0	11.4	4.02	1.41	0.487	0.158	0.042	0	2.20×10^{20}
	38.8	13.8	4.89	1.732	0.604	0.194	0.038	5.2×10^{-4}	
$SHARE_{med}$	32.0	11.4	4.02	1.42	0.495	0.166	0.049	0.008	2.90×10^{20}
	38.8	13.8	4.89	1.736	0.611	0.206	0.055	0.004	
$SHARE_{max}$	32.0	11.4	4.03	1.42	0.497	0.169	0.052	0.011	3.33×10^{20}
	38.8	13.8	4.89	1.737	0.613	0.230	0.061	0.007	
QREN	3.0	1.04	0.36	0.12	0.043	0.014	0.004	0.001	3.13×10^{19}
	3.6	1.25	0.43	0.15	0.052	0.017	0.005	8.2×10^{-4}	
SA-CB-RB-a1-max0	9.0	2.54	0.72	0.20	0.056	0.015	0.003	0	2.17×10^{19}
	9.9	2.79	0.79	0.22	0.062	0.016	0.003	8.0×10^{-5}	
SB-CA-RB-a1-max+	8.0	2.28	0.65	0.185	0.053	0.015	0.004	9.0×10^{-4}	3.27×10^{19}
	8.8	2.51	0.72	0.204	0.058	0.016	0.004	8.2×10^{-4}	
SA-CA-RB-a2-max+	10.0	2.7	0.74	0.20	0.055	0.015	0.004	8.0×10^{-4}	3.22×10^{19}
	10.9	3.0	0.810	0.221	0.060	0.016	0.004	7.4×10^{-4}	
SA-CA-RA-a2-max+	9.0	2.75	0.84	0.257	0.078	0.023	0.002	0	5.36×10^{19}
	9.9	3.03	0.93	0.283	0.086	0.026	0.007	1.47×10^{-3}	
SB-CA-RA-a1-max+	12.0	4.07	1.38	0.47	0.16	0.052	0.016	0.004	1.28×10^{20}
	13.3	4.52	1.534	0.521	0.176	0.059	0.019	4.05×10^{-3}	

The seismic moment release rates are refereed to magnitude 5.0.

When comparing the earthquake rates between DTGR and TGR we note, for both source zones and all recurrence models, that the number of earthquakes is higher for the TGR on all classes of magnitude, except for the largest maximum magnitude evaluated for each zone. However, the seismic moment release rates are identical on both DTGR and TGR recurrence laws.