Supplementary Table 1 : Main characteristics of the source models, ground motion models, and hazard computation for the 11 selected papers on PSHA

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| Reference | SOURCE MODEL | | | | | | GROUND MOTION MODEL (GMM) | | | HAZARD | | |
| Catalogue | Completeness & Declustering | Seismogenic source model | Determination of a & b values | Mmax | Source model logic tree | Ground-motion model | Variability ground motion | GMM logic tree | Hazard calculations | Note on uncertainties | Hazard results |
| Bottard & Ferrieux 1992 | SIRENE (I0 MSK, from 1000 on) | - | GC91 area model | W80 on I0 ≥ V  *Equation provided for earthquake recurrence* | I0\_max + 1 or 2 degrees | No | Regional intensity attenuation relationships  L87 | NO | No | MG76 code adapted by G80 ;  hazard map for France | Mentioned (lack of data) | Best estimate  Intensity |
| Dominique et André 2000  (AFPS-EPAS working group) | I0 (I0-ML LBC94), ML LDG + catalogs from neighboring countries | Declustering performed, no details | EPAS area model (AB98 modified) | W80 | MCE\* or Mmax\_obs + 0.5  Mmax\_min = 5.5 | No | A95  MS (ML-MS HTM86)  + test with TFM92, MP93, few details provided | - | No | EQRISK code (MG76) modified ;  Mmin 4.5 (ML)  ;  Hazard map for France | Some uncertainties studied but few details on the impact | Best estimate  PGA |
| Clément et al. 2004 | IRSN catalog (equivalent ML estimated from the full intensity dataset per event)  LDG (ML) | No declustering | EPAS modified  *+ Fault model Provence* | W80  ML ≥ 3.5  Monte Carlo exploration of uncertainties on magnitudes (bootstrap 20% perturbation of the catalog) | Interval for Mmax  Mmax\_min 7  Mmax\_max 7.6 | Yes, exploration with Monte Carlo | ASB96 (MS)  BT03  (MS), assumption  ML ~ MS | included | yes | CRISIS ;  Mmin 4.0  ;  1 site Tricastin | Monte Carlo exploration Depth, magnitude, Mmax;  study to understand source contributions | mean, 16th and 84th percentiles  PGA and UHS& at 104 years |
| Marin et al. 2004 | SIRENE  I0 (in-house  I0-ML correlation)  LDG (ML) | 1340 ML ≥5.5  1690 ML ≥4.9  1962 ML ≥3.5  1977 ML ≥2.5 | in-house area model  *+ Fault model Provence* | W80  I0 ≥ VII (ML 4.9) | Mmax\_obs  e.g.  Bresse 4.6  Rhine graben  6.0  Armorican Massif 5.7  Pyrenees 6.3 | No | in-house model in ML (14 events ML 2.6-5.6; vertical component of velocimeter)  (+ test with A95 ; in-house ML-MS correlation; N00) | variability ignored | no | in-house code;  Mmin 3.9; Distmax 150km | Alternative hazard maps | best estimate  PGA at  475 yrs  975 yrs  1975 yrs |
| Beauval & Scotti 2004 | IRSN historical catalogs (2 I-ML relationships)  LDG (ML) | Cumulative # of events; R85 | EPAS area model | W80  from ML3.5+  Monte Carlo sampling | 2 Mmax values tested : 6.5 or 7 | quantification of uncertainties | BT03 MS  Assumption ML~MS | Included  Truncation +3σ | no | CRISIS;  2 alternative Mmin : 3.5 or 4.5 ;  17 sites all over France | Sampling of magnitude and location uncertainties.  Impact of earthquake catalog, Mmin, truncation, Mmax |  |
| Beauval et al. 2006b | IRSN historical catalog (LBC94 I-ML relationships)  LDG (ML) | Cumulative # of events; R85 | EPAS areas model  + smoothed W96 | W80 | Test with Mmax\_observed and Mmax\_observed +0.5 | No | BT03 MS  Assumption ML~MS | Included  Truncation +2σ | no | CRISIS ;  Mmin 4.5 ;  W96 ;  2 profiles in France | Comparison of zoning and smoothing methods | PGA at 475, 104 and 105 years |
| Secanell et al. 2008 | Mix of catalogs (I0 mean of available I0, ML mean of available ML) | S72 | 2 area models (EPAS + TB00)  + smoothed (W96) | Monte Carlo sampling | Mmax\_obs + 0.5 or 1.0 | Yes, exploration with Monte Carlo | 1 model combining 2 equations: TSG07 (ML) and A95 + ASB96 (N00 ML - MS) | - | yes | CRISIS;  Hazard map for the Pyrenees |  | PGA  median, 15th and 85th percentiles |
| Chartier et al. 2017a | FPEC (equivalent Mw)  LDG (ML) |  | *Fault model*  *Upper Rhine Graben* | - | See Table II | yes | BA08;CB08; CF08; ZH06  (Mw) | included | Yes | CRISIS2015 (OM14) ;  Mmin : 5;  1 site Fessenheim | See Table II | UHS at 104 years |
| Martin et al. 2017 | FCAT (early version, Mw) | 2 sets of complete time windows (low/high population density)  + uncertainty intervals | 3 area models (2 from Geoter, 1 IRSN)  + Smoothed seismicity model  *+ Fault model Provence* | W80  from Mw3+  Monte Carlo sampling | pdf for Mmax (prior distribution + Bayesian update) | Yes, exploration with Monte Carlo | A14 ;  DC15;  ASB14;  BM14;  BSSA14;  CF15;  (Mw) | included | yes | in-house hazard code;  Hazard map for southeastern France;  VS30 800 m/s;  Mmin : 4.5 | sampling on magnitude and location uncertainties, completeness uncertainties; | PGA and 1s  Mean, median, 16th and 84th percentiles |
| Drouet et al. 2020 | FCAT (published version, Mw), merged with SHEEC at the border | GK74 time and spatial windows  4 completeness domains, with associated uncertainties  2 alternative methods for completeness evaluation | 3 area models (called Geoter, EDF, IRSN)  + smoothed seismicity model | Modified W80 – prior regional b-value  Min mag varies between 3 and 4  Monte Carlo sampling | pdf for Mmax e.g. most probable Mmax for Alps/Pyrenees 6.7; for Central Massif 5.9; for western France 6.3 | Yes, exploration with Monte Carlo, | AD17;  ASK14;  CF15;  DC15  (Mw) | included | yes | In-house hazard code  Hazard map for France  VS30 800 m/s;  Mmin : 4.5 | sampling on magnitude and location uncertainties, completeness uncertainties; | PGA  Mean, 16th and 84th percentiles |
| Beauval et al. 2020 | Either FCAT or SHEEC (Mw), separately | Cumulative # of events wrt time | 2 area models (IRSN – BC13, SHARE – WD15) | W80  from Mw3.2+ ;  Mw3.5+ ; Mw3.8+ | Mmax 6.5 or 7 | Yes, to compare source model variability with GMM variability | DC15  ASB14  BM14  BSSA14  (Mw) | Included  Truncation +4σ | yes | OpenQuake;  6 sites in France;  Distmax 250km;  VS30 760m/s;  Mmin : 4.5 | impact of earthquake catalog, GR modelling min mag, declustering, FCAT version, seismogenic model | PGA and 0.2s  Mean, 16th and 84th percentiles |

\*MCE: Maximum Credible Earthquake

&UHS: Uniform hazard spectrum

List of abbreviations : ASK14 = Abrahamson et al. (2014); ASB14 = Akkar et al. (2014); A95 = Ambraseys (1995), ASB96 = Ambraseys et al. (1996); A14 = Ameri (2014); AD17 = Ameri et al. (2017); AB98 = Autran et al. (1998); BC13 = Baize et al. (2013); BT03 = Berge-Thierry et al. (2003); BM14 = Bindi et al. (2014); BA08 = Boore & Atkinson (2008); BSSA14 = Boore et al. (2014); BD00 = Bour et al. (2000); CB08 = Campbell & Bozorgnia (2008); CF08 = Cauzzi & Faccioli (2008); CF15 = Cauzzi et al. (2015); DC15 = Drouet & Cotton (2015); GC91 = Grellet et al. (1991); G80 = Goula [1980]; GK74 = Gardner & Knopoff (1974); HTM86 = Heatonet al. (1986); L87 = Levret (1987); LBC94 = Levret et al. (1994); MG76 = McGuire (1976).; MP93 = Mohammadioun & Pecker (1993); N00 = Nicolas 2000); OM14 = Ordaz et al. (2014); R85 = Reasenberg (1985); S72 = Stepp (1972); TB00 = Terrier et al. (2000); TSG07 = Tapia et al (2007); TFM92 = Tento et al. (1992); W80 = Wiechert (1980); WD15 = Woessner et al. (2015); W96 = Woo (1996); ZH06 = Zhao et al. (2006)

Supplementary Table 2: Main characteristics of the hazard calculation for the four papers on PSHA including a fault model.

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| Article | Geographical area | Background source zone | Activity on faults | Uncertainties considered  Fault model | Segmentation | Scaling relationship for Mmax | Earthquake recurrence model | Background seismicity | uncertainties | Hazard levels |
| Clément et al. 2004 | Provence  7 faults, including a blind fault | EPAS modified | Slip rates (characteristic model) or inferred from the seismic rates in the source zone (Gutenberg-Richter) | Slip rate (0.1 and 0.01 mm/yr), depth (uniform pdf 5-10km), dip, Mmax interval | Two models : 1 long segment or several segments | M inferred from surface fault (mean values):  WC94; SS00  Mmax\_min 5.2 (Trévaresse); Mmax\_max 7.5 (Nîmes fault) | Gutenberg-Richter (*equation provided*) or characteristic (WE86): recurrence time = ratio displacement (from Mmax) / slip rate | No | Logic tree  Understand impact of source models | 1 site Tricastin  104 years  UHS |
| Marin et al. 2004 | Provence  9 faults (e.g. Cevennes made of 3 segments; Trévaresse 1 segment) | in-house area model | Recurrence time of characteristic events inferred from the seismic activity evaluated for Provence |  | Length estimated from Mmax applying WC94 | Mmax\_obs for faults (e.g. Trévaresse 5.5; Durance 5.3; also attributed to the neighbouring faults)  + alternative Mmax values based on paleoseismology (6-7 with longer recurrence times) | Characteristic  (SC84) | Yes with Mmax 5.1  Described by a GR\* model | Alternative maximum magnitudes | Provence region; seismic hazard map;  PGA at  475 yrs  975 yrs  1975 yrs |
| Chartier et al. 2017a | Upper Rhine Graben ;  3 fault systems;  Normal faults (each made of 3 segments; BDFA (JC17) | IRSN BC13 | Slip rates | Dip;  Seismogenic depth;  Slip rates ;  Which fault accommodates the deformation | Single segment fault rupture | Mmax deduced from surface fault, mean coefficients from  WC94 | Characteristic(WE86) : recurrence time inferred from seismic moment rate (slip rate) and the seismic moment of the characteristic event;  or Gutenberg-Richter (*equation provided*) assuming b=1 | Earthquakes with magnitudes < 6.0  Described by a GR\* model;  FPEC + LDG catalogs (in MW) | Understand which sources control the hazard (controlling parameters: slip rates and GMM) | 1 site, Fessenheim  Results for 10,000 years  UHS |
| Martin et al. 2017 | Provence;  10 fault segments | “Geoter” area model | Slip rates (uncertainty propagated with Monte Carlo sampling) | Slip rate | Single segment fault rupture | Mmax deduced from rupture length and surface fault, mean coefficients using  LE10/WE08/PS04 | YC85 characteristic model (Mchar and ΔMchar) | Earthquakes with magnitudes < 6.0 | Different weights depending on the return period | France hazard map |

\*GR: Gutenberg-Richter model

List of abbreviations : BC13 = Baize et al. (2013); JC17 = Jomard et al. (2017); LE10 = Leonard (2010); PS04 = Papazachos et al. (2004); SC84 = Schwartz & Coppersmith (1984); SS00 = Somerville & Saikia (2000); WC94 = Wells & Coppersmith (1994); WE86=Wesnousky (1986); WE08=Wesnousky (2008); YC85 = Youngs & Coppersmith 1985;