LIST OF FIGURES

Figure 1.3-1 Map showing the study area and test sites for the CEUS SSC Project 1-15

Figure 2.3-1 CEUS SSC Project organization 2-33

Figure 2.3-2 Lines of communication among the participants of the CEUS SSC Project 2-34

Figure 2.4-1 Essential activities associated with a SSHAC Level 3 or 4 project (Coppersmith et al., 2010) 2-35

Figure 3.2-1 Areal coverage of the primary earthquake catalog sources. Top: GSC catalog (Halchuk, 2009); bottom: USGS seismic hazard mapping catalog (Petersen et al., 2008). Red line denotes boundary of study region. Blue line denotes portion of each catalog used for development of project catalog. 3-57

Figure 3.2-2 Histogram of M_L magnitudes from the GSC SHEEF catalog for the time period 1600-1899 and the region east of longitude –105° and south of latitude 53° 3-58

Figure 3.2-3 Histogram of M_L magnitudes from the GSC SHEEF catalog for the time period 1900-1929 and the region east of longitude –105° and south of latitude 53° 3-59

Figure 3.2-4 Histogram of M_L magnitudes from the GSC SHEEF catalog for the time period 1930-1979 and the region east of longitude –105° and south of latitude 53° 3-60

Figure 3.2-5 Histogram of M_L magnitudes from the GSC SHEEF catalog for the time period 1980-2007 and the region east of longitude –105° and south of latitude 53° 3-61

Figure 3.2-6 Histogram of M_L magnitudes from the revised catalog with GSC as the source for the time period 1928-1979 3-62

Figure 3.2-7 Map of the CEUS SSC Project catalog showing earthquakes of uniform moment magnitude E[M] 2.9 and larger. Colored symbols denote earthquakes not contained in the USGS seismic hazard mapping catalog. 3-63

Figure 3.3-1 Illustration of equivalence of the M* and γ^2 corrections to remove bias in earthquake recurrence relationships estimated from magnitudes with uncertainty 3-64

Figure 3.3-2 Approximate moment magnitudes from Atkinson (2004b) compared to values of M given in Table B-2 in Appendix B for earthquakes in common 3-65

Figure 3.3-3 Approximate moment magnitudes from Boatwright (1994) compared to values of M given in Table B-2 in Appendix B for earthquakes in common 3-66

Figure 3.3-4 Approximate moment magnitudes from Moulis (2002) compared to values of M given in Table B-2 in Appendix B for earthquakes in common 3-67

Figure 3.3-5 Difference between M_N reported by the GSC and M_N or $m_{Lg(f)}$ reported by the Weston Observatory catalog as a function of time 3-68

Figure 3.3-6 Spatial distribution of earthquakes with body-wave (m_b, m_{bLg}, M_N) and M magnitudes in the CEUS SSC Project catalog for the Midcontinent region. Color codes indicate the source of the body-wave magnitudes 3-69

Figure 3.3-7 m_b-M data for the earthquakes shown on Figure 3.3-6. Red curve shows the preferred offset fit $M = m_b - 0.28$. 3-70

Figure 3.3-8 Residuals from offset fit shown on Figure 3.3-7 plotted against earthquake year 3-71
Figure 3.3-9 Spatial distribution of earthquakes with body wave (m_b, m_{bLg}, M_N) and M magnitudes in the CEUS SSC Project catalog for the northeastern portion of the study region. Color codes indicate the source of the body-wave magnitudes. 3-72
Figure 3.3-10 m_b-M data for the earthquakes shown on Figure 3.3-9. Red curve shows the preferred offset fit $M = m_b - 0.42$. 3-73
Figure 3.3-11 Residuals from offset fit shown on Figure 3.3-10 plotted against earthquake year 3-74
Figure 3.3-12 Residuals for GSC data from offset fit shown on Figure 3.3-10 plotted against earthquake year 3-75
Figure 3.3-13 Residuals for WES data from offset fit shown on Figure 3.3-10 plotted against earthquake year 3-76
Figure 3.3-14 Residuals for data from sources other than GSC or WES from offset fit shown on Figure 3.3-10 plotted against earthquake year 3-77
Figure 3.3-15 Difference between body-wave magnitudes reported by LDO and those by other sources as a function of year 3-78
Figure 3.3-16 Spatial distribution of earthquakes with reported GSC body-wave magnitudes. Red and blue symbols indicate earthquakes with both m_b and M magnitudes for $m_b \geq 3.5$. Dashed line indicates the portion of the study region considered the “Northeast” for purposes of magnitude scaling. 3-79
Figure 3.3-17 M-m_b as a function of time for m_b data from the GSC shown on Figure 3.3-16 3-80
Figure 3.3-18 Plot of magnitude differences m_{bLg} – m(3 Hz) for the OKO catalog 3-81
Figure 3.3-19 Final m_b-M data set. Vertical dashed lines indicate the magnitude range used to develop the scaling relationship. Diagonal line indicates a one-to-one correlation. 3-82
Figure 3.3-20 Spatial distribution of earthquakes in the CEUS SSC Project catalog with instrumental M_L magnitudes 3-83
Figure 3.3-21 Spatial distribution of earthquakes in the CEUS SSC Project catalog with instrumental M_L magnitudes and M magnitudes 3-84
Figure 3.3-22 M_L-M data from the CEUS SSC Project catalog and robust regression fit to the data 3-85
Figure 3.3-23 Relationship between M_N and M_L for the GSC data 3-86
Figure 3.3-24 Data from the northeastern portion of the study region with M_L and M_C or M_D magnitude from catalog sources other than the GSC 3-87
Figure 3.3-25 Data from the northeastern portion of the study region with M_L and M magnitudes from sources other than the GSC 3-88
Figure 3.3-26 Spatial distribution of earthquakes in the CEUS SSC Project catalog with $M_S \geq 3$ magnitudes 3-89
Figure 3.3-27 M_S-M data from the CEUS SSC Project catalog and quadratic polynomial fit to the data 3-90
Figure 3.3-28 Spatial distribution of earthquakes in the CEUS SSC Project catalog with $M_C \geq 2.5$ magnitudes 3-91

Figure 3.3-29 Spatial distribution of earthquakes in the CEUS SSC Project catalog with $M_C \geq 2.5$ and M magnitudes 3-92
Figure 3.3-30 Spatial distribution of earthquakes in the CEUS SSC Project catalog with $M_D \geq 3$ magnitudes 3-93
Figure 3.3-31 Spatial distribution of earthquakes in the CEUS SSC Project catalog with both M_D and M magnitudes 3-94
Figure 3.3-32 M_C-M data from the CEUS SSC Project catalog and linear regression fit to the data 3-95
Figure 3.3-33 Spatial distribution of earthquakes with reported M_C and M_D magnitudes 3-96
Figure 3.3-34 Comparison of M_C and M_D magnitudes for the LDO and WES catalogs 3-97
Figure 3.3-35 Comparison of M_C with M_D for at least one of the two magnitude types reported in the OKO catalog 3-98
Figure 3.3-36 Comparison of M_C with M_D for at least one of the two magnitude types reported in the CERI catalog 3-99
Figure 3.3-37 Comparison of M_C with M_D for at least one of the two magnitude types reported in the SCSN catalog 3-100
Figure 3.3-38 Comparison of M_C with M_D for at least one of the two magnitude types reported in other catalogs for earthquakes in the Midcontinent portion of the study region 3-101
Figure 3.3-39 Relationship between M and M_C, M_D, or M_L for the Midcontinent portion of the study region 3-102
Figure 3.3-40 Comparison of M_C and M_D magnitudes with M_L magnitudes for the region between longitudes 105°W and 100°W 3-103
Figure 3.3-41 Comparison of m_b magnitudes with M_L magnitudes for the region between longitudes 105°W and 100°W 3-104
Figure 3.3-42 Comparison of m_b magnitudes with M_C and M_D magnitudes for the region between longitudes 105°W and 100°W 3-105
Figure 3.3-43 Spatial distribution of earthquake with ln(FA) in the CEUS SSC Project catalog 3-106
Figure 3.3-44 Catalog ln(FA)–M data and fitted model 3-107
Figure 3.3-45 Spatial distribution of earthquakes in the CEUS SSC Project catalog with reported values of I_0 3-108
Figure 3.3-46 I_0 and M data for earthquakes in the CEUS SSC Project catalog. Curves show locally weighted least-squares fit (Loess) to the data and the relationship published by Johnston (1996b). 3-109
Figure 3.3-47 I_0 and m_b data from the NCEER91 catalog. Plotted are the relationships between I_0 and m_b developed by EPRI (1988) (EPRI-SOG) and Sibol et al. (1987). 3-110
Figure 3.3-48 Categorical model fits of I_0 as a function and M for earthquakes in the CEUS SSC Project catalog 3-111
Figure 3.3-49 Results from proportional odds logistic model showing the probability of individual intensity classes as a function of M 3-112
Figure 3.3-50 Comparison of I_0 and m_b data from the CEUS SSC Project catalog for those earthquakes with reported values of M (M set) and the full catalog (full set). Locally weighted least-squares fits to the two data sets are shown along with the

relationship use to develop the EPRI (1988) catalog and the Sibol et al. (1987) relationship used in the NCEER91 catalog. 3-113
Figure 3.3-51 Linear fits to the data from Figure 3.3-50 for $I_0 \geq V$ 3-114
Figure 3.3-52 Comparison of I_0 and m_b data from the project, with m_b adjusted for the difference in m_b to M scaling 3-115
Figure 3.3-53 Linear fits to the data from Figure 3.3-52 for $I_0 \geq V$ 3-116
Figure 3.3-54 Composite I_0–M data set used for assessment of I_0 scaling relationship 3-117
Figure 3.3-55 Linear and inverse sigmoid models fit to the project data for $I_0 > IV$ 3-118
Figure 3.4-1 Illustration of process used to identify clusters of earthquakes (from EPRI, 1988, Vol. 1): (a) local and extended time and distance windows, (b) buffer window, and (c) contracted window 3-119
Figure 3.4-2 Identification of secondary (dependent) earthquakes inside the cluster region through Poisson thinning (from EPRI, 1988, Vol. 1) 3-120
Figure 3.4-3 Comparison of dependent event time and distance windows with results for individual clusters in the project catalog 3-121
Figure 3.5-1 Earthquake catalog and catalog completeness regions used in EPRI-SOG (EPRI, 1988) 3-122
Figure 3.5-2 CEUS SSC Project earthquake catalog and modified catalog completeness regions 3-123
Figure 3.5-3 Plot of year versus location for the CEUS SSC Project earthquake catalog. Red lines indicate the boundaries of the catalog completeness time periods. 3-124
Figure 3.5-4 (1 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-125
Figure 3.5-4 (2 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-126
Figure 3.5-4 (3 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-127
Figure 3.5-4 (4 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-128
Figure 3.5-4 (5 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-129
Figure 3.5-4 (6 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-130
Figure 3.5-4 (7 of 7) “Stepp” plots of earthquake recurrence rate as a function of time for the individual catalog completeness regions shown on Figure 3.5-2 3-131
Figure 4.1.1-1 Example logic tree from the PEGASOS project (NAGRA, 2004) showing the assessment of alternative conceptual models on the logic tree. Each node of the logic tree represents an assessment that is uncertain. Alternative branches represent the alternative models or parameter values, and the weights associated with each branch reflect the TI Team’s relative degree of belief that each branch is the correct model or parameter value. 4-40
Figure 4.1.1-2 Example logic tree from the PVHA-U (SNL, 2008) project showing the treatment of alternative conceptual models in the logic tree 4-41

Figure 4.2.1-1 Master logic tree showing the Mmax zones and seismotectonic zones alternative conceptual models for assessing the spatial and temporal characteristics of future earthquake sources in the CEUS....4-42
Figure 4.2.2-1 Example of a logic tree for RLME sources. Shown is the tree for the Marianna RLME source. 4-43
Figure 4.2.2-2 Map showing RLME sources, some with alternative source geometries (discussed in Section 6.1). 4-44
Figure 4.2.3-1 Logic tree for the Mmax zones branch of the master logic tree....4-45
Figure 4.2.3-2 Subdivision used in the Mmax zones branch of the master logic tree. Either the region is considered one zone for purposes of Mmax or the region is divided into two zones as shown: a Mesozoic-and-younger extension (MESE) zone and a non-Mesozoic-and-younger zone (NMESE). In this figure the “narrow” MESE zone is shown 4-46
Figure 4.2.3-3 Subdivision used in the Mmax zones branch of the master logic tree. Either the region is considered one zone for purposes of Mmax or the region is divided into two zones as shown: a Mesozoic-and-younger extension (MESE) zone and a non-Mesozoic-and-younger zone (NMESE). In this figure the “wide” MESE zone is shown 4-47
Figure 4.2.4-1(a) Logic tree for the seismotectonic zones branch of the master logic tree 4-48
Figure 4.2.4-1(b) Logic tree for the seismotectonic zones branch of the master logic tree 4-49
Figure 4.2.4-2 Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR), and the Paleozoic Extended Zone is narrow (PEZ-N) 4-50
Figure 4.2.4-3 Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG), and the Paleozoic Extended Zone is narrow (PEZ-N)....4-51
Figure 4.2.4-4 Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR), and the Paleozoic Extended Crust is wide (PEZ-W) 4-52
Figure 4.2.4-5 Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG), and the Paleozoic Extended Crust is wide (PEZ-W) 4-53
Figure 5.2.1-1 Diagrammatic illustration of the Bayesian Mmax approach showing (a) the prior distribution, (b) the likelihood function, and (c) the posterior distribution. The posterior distribution is represented by a discrete distribution (d) for implementation in hazard analysis. 5-72
Figure 5.2.1-2 Diagrammatic illustration of the Bayesian Mmax approach showing (a) the prior distribution, (b) the likelihood function, and (c) the posterior distribution. The posterior distribution is represented by a discrete distribution (d) for implementation in hazard analysis. 5-73
Figure 5.2.1-3 Median values of $m_{\max-obs}$ as a function of maximum magnitude, m^u, and sample size N, the number of earthquakes $\geq$ M 4.5....5-74
Figure 5.2.1-4 Histograms of $m_{\max-obs}$ for extended and non-extended superdomains 5-75

Figure 5.2.1-5 Histograms of $m_{\max-obs}$ for Mesozoic-and-younger extended (MESE) superdomains and for older extended and non-extended (NMESE) superdomains 5-76

Figure 5.2.1-6 Histograms of $m_{\max-obs}$ for Mesozoic-and-younger extended (MESE) superdomains and for older extended and non-extended (NMESE) superdomains using age of most recent extension for the age classification 5-77

Figure 5.2.1-7 Histograms of $m_{\max-obs}$ for Mesozoic-and-younger extended (MESE) superdomains and for older extended and non-extended (NMESE) superdomains using final sets indicated by asterisks in Tables 5.2.1-1 and 5.2.1-2 5-78

Figure 5.2.1-8 Histograms of $m_{\max-obs}$ for combined (COMB) superdomains using final sets indicated by asterisks in Table 5.2.1-3 5-79

Figure 5.2.1-9 Bias adjustments from $m_{\max-obs}$ to m^u for the three sets of superdomain analysis results presented in Table 5.2.1-4.....5-80

Figure 5.2.1-10 Results of simulations of estimates of Mmax using the Bayesian approach for earthquake catalogs ranging in size from 1 to 1,000 earthquakes. True Mmax is set at the mean of the prior distribution.....5-81

Figure 5.2.1-11 Comparison of the Kijko (2004) estimates of m^u for given values of $m_{\max-obs}$ and *N,* the number of earthquakes of magnitude $\geq$ 4.5. Also shown is the median value of $m_{\max-obs}$ for given m^u obtained using Equation 5.2.1-2.....5-82

Figure 5.2.1-12 Behavior of the cumulative probability function for m^u (Equation 5.2.1-9) for the K-S-B estimator and a value of $m_{\max-obs}$ equal to 6.....5-83

Figure 5.2.1-13 Example Mmax distribution assessed for the Mesozoic-and-younger extended Mmax zone for the case where the zone is “narrow” (MESE-N). Distributions are shown for the Kijko approach and for the Bayesian approach using either the Mesozoic-and-younger extended prior distribution or the composite prior distribution. The final composite Mmax distribution, which incorporates the relative weights, is shown by the red probability distribution. 5-84

Figure 5.2.1-14 Example Mmax distribution assessed for the Northern Appalachian seismotectonic zone (NAP). Distributions are shown for the Kijko approach and for the Bayesian approach using either the Mesozoic-and-younger extended prior distribution or the composite prior distribution. Note that the Kijko results are shown in this example for illustration, even though they have zero weight. The final composite Mmax distribution, which incorporates the relative weights, is shown by the red probability distribution. 5-85

Figure 5.3.2-1 Likelihood function for rate per unit area in a Poisson process, for multiple values of the earthquake count *N*: (a) arithmetic scale, and (b) logarithmic scale used to illustrate decreasing COV as N increases.....5-86

Figure 5.3.2-2 Likelihood function for *b*-value of an exponential magnitude distribution, for multiple values of the earthquake count *N*. The value of *b* is normalized by the maximum-likelihood estimate, which is derived from Equation 5.3.2-5. 5-87

Figure 5.3.2-3 Histogram of magnitudes in the earthquake catalog used in this section. The minimum magnitude shown (M 2.9) is the lowest magnitude used in these recurrence calculations. 5-88

Figure 5.3.2-4 Objectively determined values of the penalty function for ln(rate) for Case A magnitude weights. Source zones are sorted from smallest to largest. See list of abbreviations for full source-zone names. 5-89
Figure 5.3.2-5 Objectively determined values of the penalty function for beta for Case A magnitude weights 5-90
Figure 5.3.2-6 Objectively determined values of the penalty function for ln(rate) for Case B magnitude weights 5-91
Figure 5.3.2-7 Objectively determined values of the penalty function for beta for Case B magnitude weights. Source zones are sorted from smallest to largest. 5-92
Figure 5.3.2-8 Objectively determined values of the penalty function for ln(rate) for Case E magnitude weights 5-93
Figure 5.3.2-9 Objectively determined values of the penalty function for beta for Case E magnitude weights. Source zones are sorted from smallest to largest. 5-94
Figure 5.3.2-10 Mean map of rate and *b*-value for ECC-AM calculated using Case A magnitude weights 5-95
Figure 5.3.2-11 Mean map of rate and *b*-value for ECC-GC calculated using Case A magnitude weights 5-96
Figure 5.3.2-12 Mean map of rate and *b*-value for ECC-AM calculated using Case B magnitude weights 5-97
Figure 5.3.2-13 Mean map of rate and *b*-value for ECC-GC calculated using Case B magnitude weights 5-98
Figure 5.3.2-14 Mean map of rate and *b*-value for ECC-AM calculated using Case E magnitude weights 5-99
Figure 5.3.2-15 Mean map of rate and *b*-value for ECC-GC calculated using Case E magnitude weights 5-100
Figure 5.3.2-16 Sensitivity of seismic hazard at Manchester site to the strength of the prior on b 5-101
Figure 5.3.2-17 Sensitivity of seismic hazard at Topeka site to the strength of the prior on b 5-102
Figure 5.3.2-18 Sensitivity of seismic hazard at Manchester site to the choice of magnitude weights 5-103
Figure 5.3.2-19 Sensitivity of seismic hazard at Topeka site to the choice of magnitude weights 5-104
Figure 5.3.2-20 Sensitivity of seismic hazard from source NAP at Manchester site to the eight alternative recurrence maps for Case B magnitude weights 5-105
Figure 5.3.2-21 Sensitivity of seismic hazard from source MID-C–A at Topeka site to the eight alternative recurrence maps for Case B magnitude weights 5-106
Figure 5.3.2-22 Mean recurrence-parameter map for the study region under the highest weighted source-zone configuration in the master logic tree. See Sections 6.3 and 7.5 for all mean maps. 5-107
Figure 5.3.2-23 Map of the uncertainty in the estimated recurrence parameters, expressed as the coefficient of variation of the rate (left) and the standard deviation of the *b*-value (right) for the study region, under the highest weighted source-zone configuration in the master logic tree. See Appendix J for all maps of uncertainty. 5-108

Figure 5.3.2-24 First of eight equally likely realizations of the recurrence-parameter map for the study region under the highest weighted source-zone configuration in the master logic tree. See Appendix J for maps of all realizations for all source-zone configurations. 5-109
Figure 5.3.2-25 Eighth of eight equally likely realizations of the recurrence-parameter map for the study region under the highest weighted source-zone configuration in the master logic tree. See Appendix J for maps of all realizations for all source-zone configurations. 5-110
Figure 5.3.2-26 Map of geographic areas considered in the exploration of model results 5-111
Figure 5.3.2-27 Comparison of model-predicted earthquake counts for the USGS Eastern Tennessee area using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure. 5-112
Figure 5.3.2-28 Comparison of model-predicted earthquake counts for the USGS Eastern Tennessee area using Case B magnitude weights 5-113
Figure 5.3.2-29 Comparison of model-predicted earthquake counts for the USGS Eastern Tennessee area using Case E magnitude weights 5-114
Figure 5.3.2-30 Comparison of model-predicted earthquake counts for the central New England area using Case A magnitude weights 5-115
Figure 5.3.2-31 Comparison of model-predicted earthquake counts for the central New England area using Case B magnitude weights 5-116
Figure 5.3.2-32 Comparison of model-predicted earthquake counts for the central New England area using Case E magnitude weights 5-117
Figure 5.3.2-33 Comparison of model-predicted earthquake counts for the Nemaha Ridge area using Case A magnitude weights 5-118
Figure 5.3.2-34 Comparison of model-predicted earthquake counts for the Nemaha Ridge area using Case B magnitude weights 5-119
Figure 5.3.2-35 Comparison of model-predicted earthquake counts for the Nemaha Ridge area using Case E magnitude weights 5-120
Figure 5.3.2-36 Comparison of model-predicted earthquake counts for the Miami, FL, area using Case A magnitude weights 5-121
Figure 5.3.2-37 Comparison of model-predicted earthquake counts for the Miami, FL, area using Case B magnitude weights 5-122
Figure 5.3.2-38 Comparison of model-predicted earthquake counts for the Miami, FL, area using Case E magnitude weights 5-123
Figure 5.3.2-39 Comparison of model-predicted earthquake counts for the St. Paul, MN, area using Case A magnitude weights 5-124
Figure 5.3.2-40 Comparison of model-predicted earthquake counts for the St. Paul, MN, area using Case B magnitude weights 5-125
Figure 5.3.2-41 Comparison of model-predicted earthquake counts for the St. Paul, MN, area using Case E magnitude weights 5-126
Figure 5.3.2-42 Recurrence parameters for the ECC-AM, MID-C–A, and NAP seismotectonic source zones and Case A magnitude weights computed using an objective adaptive kernel approach 5-127

Figure 5.3.3-1 Likelihood distribution for rate parameter λ derived using Equation 5.3.3-1 for N = 2 and T = 2,000 years. Top: normalized probability density function for λ. Bottom: resulting cumulative distribution function. Dashed lines show the cumulative probability levels for the Miller and Rice (1983) discrete approximation of a continuous probability distribution. 5-128
Figure 5.3.3-2 Uncertainty distributions for the age of Charleston RLMEs 5-129
Figure 5.4.4-1 Spatial distribution of earthquakes in the CEUS SSC Project catalog. Solid lines indicate the boundaries of the seismotectonic source zones (narrow interpretation) 5-130
Figure 5.4.4-2 Spatial distribution of earthquakes in the CEUS SSC Project catalog with good quality depth determinations used for assessing crustal thickness. Solid lines indicate the boundaries of the seismotectonic source zones (narrow interpretation).....5-131
Figure 5.4.4-3 Distribution of better-quality focal depths in Mmax source zones.....5-132
Figure 5.4.4-4 (1 of 3) Distribution of better-quality focal depths in seismotectonic source zones....5-133
Figure 5.4.4-4 (2 of 3) Distribution of better-quality focal depths in seismotectonic source zones....5-134
Figure 5.4.4-4 (3 of 3) Distribution of better-quality focal depths in seismotectonic source zones....5-135
Figure 6.1-1 Map showing the RLME sources characterized in the CEUS SSC model. Detailed alternatives to the source geometries are shown on figures associated with each RLME discussion.....6-111
Figure 6.1-2a Map showing the RLME sources and seismicity from the CEUS SSC earthquake catalog. Some of the RLMEs occur in regions of elevated seismicity, but others do not. 6-112
Figure 6.1-2b Close-up of the Wabash Valley and New Madrid/Reelfoot Rift RLME sources and seismicity from the CEUS SSC earthquake catalog. Some of the RLMEs occur in regions of elevated seismicity, but others do not. 6-113
Figure 6.1.1-1 Logic tree for the Charlevoix RLME source 6-114
Figure 6.1.1-2 Seismicity and tectonic features of the Charlevoix RLME 6-115
Figure 6.1.1-3 Magnetic and gravity anomaly maps of the Charlevoix RLME 6-116
Figure 6.1.2-1a Logic tree for the Charleston RLME source 6-117
Figure 6.1.2-1b Logic tree for the Charleston RLME source 6-118
Figure 6.1.2-2 Charleston RLME source zones with (a) total magnetic anomaly and (b) residual isostatic gravity data 6-119
Figure 6.1.2-3 Postulated faults and tectonic features in the Charleston region 6-120
Figure 6.1.2-4 Postulated faults and tectonic features in the local Charleston area 6-121
Figure 6.1.2-5a Postulated faults and tectonic features in the Charleston region with Charleston RLME source zones 6-122
Figure 6.1.2-5b Postulated faults and tectonic features in the local Charleston area with Charleston RLME source zones 6-123
Figure 6.1.2-6 Schematic diagram showing contemporary, maximum, and minimum constraining age sample locations 6-124

Figure 6.1.2-7 Charleston space-time diagram of earthquakes interpreted from paleoliquefaction, contemporary-ages-only scenario 6-125
Figure 6.1.2-8 Charleston space-time diagram of earthquakes interpreted from paleoliquefaction, all-ages scenario 6-126
Figure 6.1.2-9 Distribution of liquefaction from earthquake A, contemporary-ages-only scenario 6-127
Figure 6.1.2-10 Distribution of liquefaction from earthquake B, contemporary-ages-only scenario 6-128
Figure 6.1.2-11 Distribution of liquefaction from earthquake C, contemporary-ages-only scenario 6-129
Figure 6.1.2-12 Distribution of liquefaction from earthquake D, contemporary-ages-only scenario 6-130
Figure 6.1.2-13 Distribution of liquefaction from earthquake E, contemporary-ages-only scenario 6-131
Figure 6.1.2-14 Distribution of liquefaction from earthquake A, all-ages scenario 6-132
Figure 6.1.2-15 Distribution of liquefaction from earthquake B, all-ages scenario 6-133
Figure 6.1.2-16 Distribution of liquefaction from earthquake C, all-ages scenario 6-134
Figure 6.1.2-17 Distribution of liquefaction from earthquake D, all-ages scenario 6-135
Figure 6.1.2-18 Distribution of liquefaction from earthquake E, all-ages scenario 6-136
Figure 6.1.2-19 Uncertainty distributions for the age of Charleston RLMEs 6-137
Figure 6.1.3-1 Logic tree for the Cheraw fault RLME source 6-138
Figure 6.1.3-2 Map (c) and hillshade relief images (a, b, and d) showing location of mapped Cheraw fault, possible northeast extension, and paleoseismic locality 6-139
Figure 6.1.3-3 Cheraw RLME source relative to (a) total magnetic anomaly and (b) residual isostatic gravity data 6-140
Figure 6.1.4-1 Meers fault location 6-141
Figure 6.1.4-2 Logic tree for the Meers fault source 6-142
Figure 6.1.5-1 Logic tree for the NMFS RLME source 6-143
Figure 6.1.5-2 Map showing seismicity and major subsurface structural features in the New Madrid region 6-144
Figure 6.1.5-3 Map showing geomorphic and near-surface tectonic features in the New Madrid region and locations of NMFS RLME fault sources 6-145
Figure 6.1.5-4 Rupture segments (a) and models (b) for the New Madrid faults from Johnston and Schweig (1996) and (c) the NMFS RLME fault sources 6-146
Figure 6.1.5-5 Map of NMSZ showing estimated ages and measured sizes of liquefaction features 6-147
Figure 6.1.5-6 Earthquake chronology for NMSZ from dating and correlation of liquefaction features at sites (listed at top) along N-S transect across region 6-148
Figure 6.1.5-7 Probability distributions for the age of the AD 900 and AD 1450 NMFS RLMEs 6-149
Figure 6.1.5-8 Liquefaction fields for the 1811-1812, AD 1450, and AD 900 earthquakes as interpreted from spatial distribution and stratigraphy of sand blows 6-150

Figure 6.1.6-1a Logic tree for the Reelfoot Rift–Eastern Rift Margin South RLME source. Two options for the southern extent of the ERM-S are considered: ERM-SCC includes the Crittenden County fault zone, and ERM-SRP includes the postulated zone of deformation based on fault picks identified in a high-resolution seismic profile along the Mississippi River. 6-151

Figure 6.1.6-1b Logic tree for the Reelfoot Rift–Eastern Rift Margin North RLME source..... 6-152

Figure 6.1.6-2 Map showing structural features and paleoseismic investigation sites along the eastern margin of the Reelfoot rift. The inset map shows the locations of inferred basement faults that border and cross the Reelfoot rift (Csontos et al., 2008) and the inferred Joiner Ridge–Meeman-Shelby fault (JR-MSF; Odum et al., 2010). 6-153

Figure 6.1.6-3 Maps showing surficial geology and locations of subsurface investigations at (a) Meeman-Shelby Forest State Park locality and (b) Union City site (MSF and UC on Figure 6.1.6-2). Modified from Cox et al. (2006) and Odum et al. (2010). 6-154

Figure 6.1.6-4 Figure showing the timing of events along the eastern Reelfoot rift margin. Modified from Cox (2009). 6-155

Figure 6.1.7-1 Logic tree for the Reelfoot rift–Marianna RLME source 6-156

Figure 6.1.7-2 Map showing tectonic features and locations of paleoliquefaction sites in the vicinity of Marianna, Arkansas 6-157

Figure 6.1.7-3 Map showing liquefaction features near Daytona Beach lineament southwest of Marianna, Arkansas 6-158

Figure 6.1.8-1 Logic tree for the Commerce Fault Zone RLME source 6-159

Figure 6.1.8-2 Map showing tectonic features, seismicity, and paleoseismic localities along the Commerce Fault Zone RLME source 6-160

Figure 6.1.8-3 Location of the Commerce geophysical lineament and Commerce Fault Zone RLME source relative to the (a) regional magnetic anomaly map and (b) regional gravity anomaly map 6-161

Figure 6.1.8-4 Space-time diagram showing constraints on the location and timing of late Pleistocene and Holocene paleoearthquakes that may be associated with the Commerce Fault Zone RLME source 6-162

Figure 6.1.9-1 Logic tree for the Wabash Valley RLME source 6-163

Figure 6.1.9-2 Map showing seismicity, subsurface structural features, paleoearthquake energy centers, and postulated neotectonic deformation in the Wabash Valley region of southern Illinois and southern Indiana 6-164

Figure 6.1.9-3 Wabash Valley RLME source relative to (a) magnetic anomaly, and (b) residual isostatic gravity data 6-165

Figure 6.2-1 Map showing the two Mmax zones for the “narrow” interpretation of the Mesozoic-and-younger extended zone 6-166

Figure 6.2-2 Map showing the two Mmax zones for the “wide” interpretation of the Mesozoic-and-younger extended zone 6-167

Figure 6.3.1-1 Distributions for $m_{max\text{-}obs}$ for the Mmax distributed seismicity source zones .. 6-168

Figure 6.3.2-1 Mmax distributions for the study region treated as a single Mmax zone 6-169

Figure 6.3.2-2 Mmax distributions for the MESE-N Mmax zone 6-170

Figure 6.3.2-3 Mmax distributions for the MESE-W Mmax zone 6-171
Figure 6.3.2-4 Mmax distributions for the NMESE-N Mmax zone 6-172
Figure 6.3.2-5 Mmax distributions for the NMESE-W Mmax zone 6-173
Figure 6.4.1-1 Mean map of rate and b-value for the study region under the source-zone configuration, with no separation of Mesozoic extended and non-extended; Case A magnitude weights 6-174
Figure 6.4.1-2 Mean map of rate and b-value for the study region under the source-zone configuration, with no separation of Mesozoic extended and non-extended; Case B magnitude weights 6-175
Figure 6.4.1-3 Mean map of rate and b-value for the study region under the source-zone configuration, with no separation of Mesozoic extended and non-extended; Case E magnitude weights 6-176
Figure 6.4.1-4 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, narrow geometry for MESE; Case A magnitude weights 6-177
Figure 6.4.1-5 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, narrow geometry for MESE; Case B magnitude weights 6-178
Figure 6.4.1-6 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, narrow geometry for MESE; Case E magnitude weights 6-179
Figure 6.4.1-7 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, wide geometry for MESE; Case A magnitude weights 6-180
Figure 6.4.1-8 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, wide geometry for MESE; Case B magnitude weights 6-181
Figure 6.4.1-9 Mean map of rate and b-value for the study region under the source-zone configuration, with separation of Mesozoic extended and non-extended, wide geometry for MESE; Case E magnitude weights 6-182
Figure 6.4.2-1 Comparison of model-predicted earthquake counts for study region using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-183
Figure 6.4.2-2 Comparison of model-predicted earthquake counts for study region using Case B magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-184
Figure 6.4.2-3 Comparison of model-predicted earthquake counts for study region using Case E magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-185
Figure 6.4.2-4 Comparison of model-predicted earthquake counts for MESE-N using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-186
Figure 6.4.2-5 Comparison of model-predicted earthquake counts for MESE-N using Case B magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-187

Figure 6.4.2-6 Comparison of model-predicted earthquake counts for MESE-N using Case E magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-188
Figure 6.4.2-7 Comparison of model-predicted earthquake counts for MESE-W using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-189
Figure 6.4.2-8 Comparison of model-predicted earthquake counts for MESE-W using Case B magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-190
Figure 6.4.2-9 Comparison of model-predicted earthquake counts for MESE-W using Case E magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-191
Figure 6.4.2-10 Comparison of model-predicted earthquake counts for NMESE-N using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-192
Figure 6.4.2-11 Comparison of model-predicted earthquake counts for NMESE-N using Case B magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-193
Figure 6.4.2-12 Comparison of model-predicted earthquake counts for NMESE-N using Case E magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-194
Figure 6.4.2-13 Comparison of model-predicted earthquake counts for NMESE-W using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-195
Figure 6.4.2-14 Comparison of model-predicted earthquake counts for NMESE-W using Case B magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-196
Figure 6.4.2-15 Comparison of model-predicted earthquake counts for NMESE-W using Case E magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure.....6-197
Figure 7.1-1 Seismotectonic zones shown in the case where the Rough Creek graben is not part of the Reelfoot rift (RR) and the Paleozoic Extended Crust is narrow (PEZ-N) 7-83
Figure 7.1-2 Seismotectonic zones shown in the case where the Rough Creek graben is part of the Reelfoot rift (RR_RCG) and the Paleozoic Extended Crust is narrow (PEZ-N).....7-84
Figure 7.1-3 Seismotectonic zones shown in the case where the Rough Creek graben is not part of the Reelfoot rift (RR) and the Paleozoic Extended Crust is wide (PEZ-W).....7-85
Figure 7.1-4 Seismotectonic zones shown in the case where the Rough Creek graben is part of the Reelfoot rift (RR_RCG) and the Paleozoic Extended Crust is wide (PEZ-W).....7-86
Figure 7.1-5 Example of comparing seismotectonic zones with magnetic map developed as part of the CEUS SSC Project.....7-87
Figure 7.1-6 Example of comparing seismotectonic zones with isostatic gravity map developed as part of the CEUS SSC Project 7-88

Figure 7.1-7 Map of seismicity based on the earthquake catalog developed for the CEUS SSC Project....7-89
Figure 7.1-8 Map showing example comparison of seismotectonic zones with seismicity. Note the non-uniform spatial distribution of seismicity within the zones. Spatial smoothing of *a*- and *b*-values accounts for these spatial variations....7-90
Figure 7.3-1 Logic tree for the seismotectonic zones branch of the master logic tree....7-91
Figure 7.3.1-1 Significant earthquakes and paleoseismology of the SLR seismotectonic zone....7-92
Figure 7.3.1-2 Tectonic features of the SLR seismotectonic zone....7-93
Figure 7.3.1-3 Magnetic and gravity anomaly maps of the SLR seismotectonic zone....7-94
Figure 7.3.2-1 Significant earthquakes and paleoseismic study area in the region of the GMH seismotectonic zone....7-95
Figure 7.3.2-2 Igneous rocks attributed to the GMH seismotectonic zone....7-96
Figure 7.3.2-3 Relocated hypocentral depths and crustal depth of the GMH seismotectonic zone....7-97
Figure 7.3.2-4 Magnetic and gravity anomaly maps of the GMH seismotectonic zone....7-98
Figure 7.3.3-1 Seismicity of the NAP seismotectonic zone....7-99
Figure 7.3.3-2 Magnetic and gravity anomaly maps of the NAP seismotectonic zone....7-100
Figure 7.3.4-1 Seismicity and tectonic features of the PEZ seismotectonic zone....7-101
Figure 7.3.4-2 Magnetic and gravity anomaly maps of the PEZ seismotectonic zone....7-102
Figure 7.3.5-1 Map showing seismicity, subsurface Paleozoic and basement structures, and postulated energy centers for prehistoric earthquakes....7-103
Figure 7.3.5-2 Map showing alternative boundaries for Precambrian (proto-Illinois basin) rift basins....7-104
Figure 7.3.5-3 Maps showing the IBEB source zone boundaries, seismicity, and prehistoric earthquake centers relative to (a) regional magnetic anomalies and (b) regional gravity anomalies....7-105
Figure 7.3.6-1 Map of seismicity and geomorphic features and faults showing evidence for Quaternary neotectonic deformation and reactivation. Inset map shows basement structures associated with the Reelfoot rift....7-106
Figure 7.3.6-2 Maps showing geophysical anomalies in the Reelfoot rift region....7-107
Figure 7.3.7-1 Mesozoic basins within the ECC-AM zone....7-108
Figure 7.3.7-2 Seismicity within the ECC-AM and AHEX zones....7-109
Figure 7.3.7-3 Magnetic and gravity data for ECC-AM and AHEX zones....7-110
Figure 7.3.7-4 Estimated locations of the 1755 M 6.1 Cape Ann earthquake....7-111
Figure 7.3.8-1 Correlation of interpreted transitional crust with the East Coast magnetic anomaly....7-112
Figure 7.3.9-1 The ECC-GC seismotectonic zone....7-113
Figure 7.3.10-1 The GHEX seismotectonic zone....7-114
Figure 7.3.11-1 The OKA seismotectonic zone and regional gravity and magnetic data....7-115
Figure 7.3.12-1 Simplified tectonic map showing the distribution of principal basement faults, rifts, and sutures in the Midcontinent....7-116

Figure 7.3.12-2 Maps showing major basement structural features relative to (a) regional magnetic anomalies and (b) regional gravity anomalies 7-117
Figure 7.3.12-3 Seismic zones and maximum observed earthquakes in the MidC zone 7-118
Figure 7.3.12-4 Alternative MidC source zone configurations 7-119
Figure 7.4.1-1 (1 of 3) Distributions for $m_{\max-obs}$ for the seismotectonic distributed seismicity source zones 7-120
Figure 7.4.1-1 (2 of 3) Distributions for $m_{\max-obs}$ for the seismotectonic distributed seismicity source zones 7-121
Figure 7.4.1-1 (3 of 3) Distributions for $m_{\max-obs}$ for the seismotectonic distributed seismicity source zones 7-122
Figure 7.4.2-1 Mmax distributions for the AHEX seismotectonic zone 7-123
Figure 7.4.2-2 Mmax distributions for the ECC_AM seismotectonic zone 7-124
Figure 7.4.2-3 Mmax distributions for the ECC_GC seismotectonic zone 7-125
Figure 7.4.2-4 Mmax distributions for the GHEX seismotectonic zone 7-126
Figure 7.4.2-5 Mmax distributions for the GMH seismotectonic zone 7-127
Figure 7.4.2-6 Mmax distributions for the IBEB seismotectonic zone 7-128
Figure 7.4.2-7 Mmax distributions for the MidC-A seismotectonic zone 7-129
Figure 7.4.2-8 Mmax distributions for the MidC-B seismotectonic zone 7-130
Figure 7.4.2-9 Mmax distributions for the MidC-C seismotectonic zone 7-131
Figure 7.4.2-10 Mmax distributions for the MidC-D seismotectonic zone 7-132
Figure 7.4.2-11 Mmax distributions for the NAP seismotectonic zone 7-133
Figure 7.4.2-12 Mmax distributions for the OKA seismotectonic zone 7-134
Figure 7.4.2-13 Mmax distributions for the PEZ_N seismotectonic zone 7-135
Figure 7.4.2-14 Mmax distributions for the PEZ_W seismotectonic zone 7-136
Figure 7.4.2-15 Mmax distributions for the RR seismotectonic zone 7-137
Figure 7.4.2-16 Mmax distributions for the RR_RCG seismotectonic zone 7-138
Figure 7.4.2-17 Mmax distributions for the SLR seismotectonic zone 7-139
Figure 7.5.1-1 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case A magnitude weights 7-140
Figure 7.5.1-2 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case B magnitude weights 7-141
Figure 7.5.1-3 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case E magnitude weights 7-142
Figure 7.5.1-4 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case A magnitude weights 7-143

Figure 7.5.1-5 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case B magnitude weights....7-144
Figure 7.5.1-6 Mean map of rate and *b*-value for the study region under the source-zone configuration with narrow interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case E magnitude weights....7-145
Figure 7.5.1-7 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case A magnitude weights....7-146
Figure 7.5.1-8 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case B magnitude weights....7-147
Figure 7.5.1-9 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Midcontinent; Case E magnitude weights....7-148
Figure 7.5.1-10 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case A magnitude weights....7-149
Figure 7.5.1-11 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case B magnitude weights....7-150
Figure 7.5.1-12 Mean map of rate and *b*-value for the study region under the source-zone configuration with wide interpretation of PEZ, Rough Creek graben associated with Reelfoot rift; Case E magnitude weights....7-151
Figure 7.5.2-1 Comparison of model-predicted earthquake counts for AHEX using Case A magnitude weights. No earthquake counts are shown because this source zone contains no seismicity. 7-152
Figure 7.5.2-2 Comparison of model-predicted earthquake counts for AHEX using Case B magnitude weights. No earthquake counts are shown because this source zone contains no seismicity.. 7-153
Figure 7.5.2-3 Comparison of model-predicted earthquake counts for AHEX using Case E magnitude weights. No earthquake counts are shown because this source zone contains no seismicity. 7-154
Figure 7.5.2-4 Comparison of model-predicted earthquake counts for ECC_AM using Case A magnitude weights. The error bars represent the 16%–84% uncertainty associated with the data, computed using the Weichert (1980) procedure. 7-155
Figure 7.5.2-5 Comparison of model-predicted earthquake counts for ECC_AM using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-156
Figure 7.5.2-6 Comparison of model-predicted earthquake counts for ECC_AM using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-157
Figure 7.5.2-7 Comparison of model-predicted earthquake counts for ECC_GC using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-158
Figure 7.5.2-8 Comparison of model-predicted earthquake counts for ECC_GC using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-159
Figure 7.5.2-9 Comparison of model-predicted earthquake counts for ECC_GC using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-160

Figure 7.5.2-10 Comparison of model-predicted earthquake counts for GHEX using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-161
Figure 7.5.2-11 Comparison of model-predicted earthquake counts for GHEX using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-162
Figure 7.5.2-12 Comparison of model-predicted earthquake counts for GHEX using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-163
Figure 7.5.2-13 Comparison of model-predicted earthquake counts for GMH using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-164
Figure 7.5.2-14 Comparison of model-predicted earthquake counts for GMH using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-165
Figure 7.5.2-15 Comparison of model-predicted earthquake counts for GMH using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-166
Figure 7.5.2-16 Comparison of model-predicted earthquake counts for IBEB using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-167
Figure 7.5.2-17 Comparison of model-predicted earthquake counts for IBEB using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-168
Figure 7.5.2-18 Comparison of model-predicted earthquake counts for IBEB using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-169
Figure 7.5.2-19 Comparison of model-predicted earthquake counts for MidC-A using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-170
Figure 7.5.2-20 Comparison of model-predicted earthquake counts for MidC-A using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-171
Figure 7.5.2-21 Comparison of model-predicted earthquake counts for MidC-A using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-172
Figure 7.5.2-22 Comparison of model-predicted earthquake counts for MidC–B using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-173
Figure 7.5.2-23 Comparison of model-predicted earthquake counts for MidC-B using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-174
Figure 7.5.2-24 Comparison of model-predicted earthquake counts for MidC–B using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-175
Figure 7.5.2-25 Comparison of model-predicted earthquake counts for MidC–C using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-176
Figure 7.5.2-26 Comparison of model-predicted earthquake counts for MidC–C using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-177
Figure 7.5.2-27 Comparison of model-predicted earthquake counts for MidC–C using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-178
Figure 7.5.2-28 Comparison of model-predicted earthquake counts for MidC–D using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-179
Figure 7.5.2-29 Comparison of model-predicted earthquake counts for MidC–D using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-180
Figure 7.5.2-30 Comparison of model-predicted earthquake counts for MidC–D using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-181
Figure 7.5.2-31 Comparison of model-predicted earthquake counts for NAP using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-182

Figure 7.5.2-32 Comparison of model-predicted earthquake counts for NAP using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-183
Figure 7.5.2-33 Comparison of model-predicted earthquake counts for NAP using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-184
Figure 7.5.2-34 Comparison of model-predicted earthquake counts for OKA using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-185
Figure 7.5.2-35 Comparison of model-predicted earthquake counts for OKA using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-186
Figure 7.5.2-36 Comparison of model-predicted earthquake counts for OKA using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-187
Figure 7.5.2-37 Comparison of model-predicted earthquake counts for PEZ_N using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-188
Figure 7.5.2-38 Comparison of model-predicted earthquake counts for PEZ_N using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-189
Figure 7.5.2-39 Comparison of model-predicted earthquake counts for PEZ_N using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-190
Figure 7.5.2-40 Comparison of model-predicted earthquake counts for PEZ_W using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-191
Figure 7.5.2-41 Comparison of model-predicted earthquake counts for PEZ_W using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-192
Figure 7.5.2-42 Comparison of model-predicted earthquake counts for PEZ_W using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-193
Figure 7.5.2-43 Comparison of model-predicted earthquake counts for RR using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-194
Figure 7.5.2-44 Comparison of model-predicted earthquake counts for RR using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-195
Figure 7.5.2-45 Comparison of model-predicted earthquake counts for RR using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-196
Figure 7.5.2-46 Comparison of model-predicted earthquake counts for RR_RCG using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-197
Figure 7.5.2-47 Comparison of model-predicted earthquake counts for RR_RCG using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-198
Figure 7.5.2-48 Comparison of model-predicted earthquake counts for RR_RCG using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-199
Figure 7.5.2-49 Comparison of model-predicted earthquake counts for SLR using Case A magnitude weights. Error bars as in Figure 7.5.2-4. 7-200
Figure 7.5.2-50 Comparison of model-predicted earthquake counts for SLR using Case B magnitude weights. Error bars as in Figure 7.5.2-4. 7-201
Figure 7.5.2-51 Comparison of model-predicted earthquake counts for SLR using Case E magnitude weights. Error bars as in Figure 7.5.2-4. 7-202
Figure 8.1-1 Map showing the study area and seven test sites for the CEUS SSC Project 8-28
Figure 8.1-2 Mean VS profile for shallow soil site 8-29
Figure 8.1-3 Mean VS profile for deep soil site 8-30

Figure 8.1-4 Mean amplification factors for shallow soil site 8-31
Figure 8.1-5 Mean amplification factors for deep soil site 8-32
Figure 8.2-1a Central Illinois 10 Hz rock hazard: mean and fractile total hazard 8-33
Figure 8.2-1b Central Illinois 1 Hz rock hazard: mean and fractile total hazard 8-34
Figure 8.2-1c Central Illinois PGA rock hazard: mean and fractile total hazard 8-35
Figure 8.2-1d Central Illinois 10 Hz rock hazard: total and contribution by RLME and background 8-36
Figure 8.2-1e Central Illinois 1 Hz rock hazard: total and contribution by RLME and background 8-37
Figure 8.2-1f Central Illinois PGA rock hazard: total and contribution by RLME and background 8-38
Figure 8.2-1g Central Illinois 10 Hz rock hazard: contribution by background source 8-39
Figure 8.2-1h Central Illinois 1 Hz rock hazard: contribution by background source 8-40
Figure 8.2-1i Central Illinois PGA rock hazard: contribution by background source 8-41
Figure 8.2-1j Central Illinois 10 Hz rock hazard: comparison of three source models 8-42
Figure 8.2-1k Central Illinois 1 Hz rock hazard: comparison of three source models 8-43
Figure 8.2-1l Central Illinois PGA rock hazard: comparison of three source models 8-44
Figure 8.2-1m Central Illinois 10 Hz shallow soil hazard: total and total and contribution by RLME and background 8-45
Figure 8.2-1n Central Illinois 1 Hz shallow soil hazard: total and contribution by RLME and background 8-46
Figure 8.2-1o Central Illinois PGA shallow soil hazard: total and contribution by RLME and background 8-47
Figure 8.2-1p Central Illinois 10 Hz deep soil hazard: total and contribution by RLME and background 8-48
Figure 8.2-1q Central Illinois 1 Hz deep soil hazard: total and contribution by RLME and background 8-49
Figure 8.2-1r Central Illinois PGA deep soil hazard: total and contribution by RLME and background 8-50
Figure 8.2-1s Central Illinois 10 Hz hazard: comparison of three site conditions 8-51
Figure 8.2-1t Central Illinois 1 Hz hazard: comparison of three site conditions 8-52
Figure 8.2-1u Central Illinois PGA hazard: comparison of three site conditions 8-53
Figure 8.2-1v Central Illinois 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-54
Figure 8.2-1w Central Illinois 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-55
Figure 8.2-1x Central Illinois 10 Hz rock hazard: sensitivity to Mmax for source IBEB 8-56
Figure 8.2-1y Central Illinois 1 Hz rock hazard: sensitivity to Mmax for source IBEB 8-57
Figure 8.2-1z Central Illinois 10 Hz rock hazard: sensitivity to smoothing options 8-58
Figure 8.2-1aa Central Illinois 1 Hz rock hazard: sensitivity to smoothing options 8-59
Figure 8.2-1bb Central Illinois 10 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case A 8-60

Figure 8.2-1cc Central Illinois 10 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case B 8-61
Figure 8.2-1dd Central Illinois 10 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case E 8-62
Figure 8.2-1ee Central Illinois 1 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case A 8-63
Figure 8.2-1ff Central Illinois 1 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case B 8-64
Figure 8.2-1gg Central Illinois 1 Hz rock hazard: sensitivity to eight realizations for source IBEB, Case E 8-65
Figure 8.2-2a Chattanooga 10 Hz rock hazard: mean and fractile total hazard 8-66
Figure 8.2-2b Chattanooga 1 Hz rock hazard: mean and fractile total hazard 8-67
Figure 8.2-2c Chattanooga PGA rock hazard: mean and fractile total hazard 8-68
Figure 8.2-2d Chattanooga 10 Hz rock hazard: total and contribution by RLME and background 8-69
Figure 8.2-2e Chattanooga 1 Hz rock hazard: total and contribution by RLME and background 8-70
Figure 8.2-2f Chattanooga PGA rock hazard: total and contribution by RLME and background 8-71
Figure 8.2-2g Chattanooga 10 Hz rock hazard: contribution by background source 8-72
Figure 8.2-2h Chattanooga 1 Hz rock hazard: contribution by background source 8-73
Figure 8.2-2i Chattanooga PGA rock hazard: contribution by background source 8-74
Figure 8.2-2j Chattanooga 10 Hz rock hazard: comparison of three source models 8-75
Figure 8.2-2k Chattanooga is 1 Hz rock hazard: comparison of three source models 8-76
Figure 8.2-2l Chattanooga PGA rock hazard: comparison of three source models 8-77
Figure 8.2-2m Chattanooga 10 Hz shallow soil hazard: total and contribution by RLME and background 8-78
Figure 8.2-2n Chattanooga 1 Hz shallow soil hazard: total and contribution by RLME and background 8-79
Figure 8.2-2o Chattanooga PGA shallow soil hazard: total and contribution by RLME and background 8-80
Figure 8.2-2p Chattanooga 10 Hz deep soil hazard: total and contribution by RLME and background 8-81
Figure 8.2-2q Chattanooga 1 Hz deep soil hazard: total and contribution by RLME and background 8-82
Figure 8.2-2r Chattanooga PGA deep soil hazard: total and contribution by RLME and background 8-83
Figure 8.2-2s Chattanooga 10 Hz hazard: comparison of three site conditions 8-84
Figure 8.2-2t Chattanooga 1 Hz hazard: comparison of three site conditions 8-85
Figure 8.2-2u Chattanooga PGA hazard: comparison of three site conditions 8-86
Figure 8.2-2v Chattanooga 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-87

Figure 8.2-2w Chattanooga 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones....8-88
Figure 8.2-2x Chattanooga 10 Hz rock hazard: sensitivity to Mmax for source PEZ-N....8-89
Figure 8.2-2y Chattanooga 1 Hz rock hazard: sensitivity to Mmax for source PEZ-N....8-90
Figure 8.2-2z Chattanooga 10 Hz rock hazard: sensitivity to smoothing options....8-91
Figure 8.2-2aa Chattanooga 1 Hz rock hazard: sensitivity to smoothing options....8-92
Figure 8.2-2bb Chattanooga 10 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case A....8-93
Figure 8.2-2cc Chattanooga 10 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case B....8-94
Figure 8.2-2dd Chattanooga 10 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case E....8-95
Figure 8.2-2ee Chattanooga 1 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case A....8-96
Figure 8.2-2ff Chattanooga 1 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case B....8-97
Figure 8.2-2gg Chattanooga 1 Hz rock hazard: sensitivity to eight realizations for source PEZ-N, Case E....8-98
Figure 8.2-3a Houston 10 Hz rock hazard: mean and fractile total hazard....8-99
Figure 8.2-3b Houston 1 Hz rock hazard: mean and fractile total hazard....8-100
Figure 8.2-3c Houston PGA rock hazard: mean and fractile total hazard....8-101
Figure 8.2-3d Houston 10 Hz rock hazard: total and contribution by RLME and background....8-102
Figure 8.2-3e Houston 1 Hz rock hazard: total and contribution by RLME and background....8-103
Figure 8.2-3f Houston PGA rock hazard: total and contribution by RLME and background....8-104
Figure 8.2-3g Houston 10 Hz rock hazard: contribution by background source....8-105
Figure 8.2-3h Houston 1 Hz rock hazard: contribution by background source....8-106
Figure 8.2-3i Houston PGA rock hazard: contribution by background source....8-107
Figure 8.2-3j Houston 10 Hz rock hazard: comparison of three source models....8-108
Figure 8.2-3k Houston is 1 Hz rock hazard: comparison of three source models....8-109
Figure 8.2-3l Houston PGA rock hazard: comparison of three source models....8-110
Figure 8.2-3m Houston 10 Hz shallow soil hazard: total and contribution by RLME and background....8-111
Figure 8.2-3n Houston 1 Hz shallow soil hazard: total and contribution by RLME and background....8-112
Figure 8.2-3o Houston PGA shallow soil hazard: total and contribution by RLME and background....8-113
Figure 8.2-3p Houston 10 Hz deep soil hazard: total and contribution by RLME and background....8-114
Figure 8.2-3q Houston 1 Hz deep soil hazard: total and contribution by RLME and background....8-115

Figure 8.2-3r Houston PGA deep soil hazard: total and contribution by RLME and background 8-116
Figure 8.2-3s Houston 10 Hz hazard: comparison of three site conditions..... 8-117
Figure 8.2-3t Houston 1 Hz hazard: comparison of three site conditions 8-118
Figure 8.2-3u Houston PGA hazard: comparison of three site conditions 8-119
Figure 8.2-3v Houston 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-120
Figure 8.2-3w Houston 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-121
Figure 8.2-3x Houston 10 Hz rock hazard: sensitivity to Mmax for source GHEX..... 8-122
Figure 8.2-3y Houston 1 Hz rock hazard: sensitivity to Mmax for source GHEX..... 8-123
Figure 8.2-3z Houston 10 Hz rock hazard: sensitivity to smoothing options..... 8-124
Figure 8.2-3aa Houston 1 Hz rock hazard: sensitivity to smoothing options 8-125
Figure 8.2-3bb Houston 10 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case A 8-126
Figure 8.2-3cc Houston 10 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case B 8-127
Figure 8.2-3dd Houston 10 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case E 8-128
Figure 8.2-3ee Houston 1 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case A 8-129
Figure 8.2-3ff Houston 1 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case B 8-130
Figure 8.2-3gg Houston 1 Hz rock hazard: sensitivity to eight realizations for source GHEX, Case E 8-131
Figure 8.2-4a Jackson 10 Hz rock hazard: mean and fractile total hazard 8-132
Figure 8.2-4b Jackson 1 Hz rock hazard: mean and fractile total hazard 8-133
Figure 8.2-4c Jackson PGA rock hazard: mean and fractile total hazard 8-134
Figure 8.2-4d Jackson 10 Hz rock hazard: total and contribution by RLME and background 8-135
Figure 8.2-4e Jackson 1 Hz rock hazard: total and contribution by RLME and background 8-136
Figure 8.2-4f Jackson PGA rock hazard: total and contribution by RLME and background .. 8-137
Figure 8.2-4g Jackson 10 Hz rock hazard: contribution by background source 8-138
Figure 8.2-4h Jackson 1 Hz rock hazard: contribution by background source 8-139
Figure 8.2-4i Jackson PGA rock hazard: contribution by background source 8-140
Figure 8.2-4j Jackson 10 Hz rock hazard: comparison of three source models 8-141
Figure 8.2-4k Jackson is 1 Hz rock hazard: comparison of three source models..... 8-142
Figure 8.2-4l Jackson PGA rock hazard: comparison of three source models 8-143
Figure 8.2-4m Jackson 10 Hz shallow soil hazard: total and contribution by RLME and background 8-144
Figure 8.2-4n Jackson 1 Hz shallow soil hazard: total and contribution by RLME and background 8-145

Figure 8.2-4o Jackson PGA shallow soil hazard: total and contribution by RLME and background 8-146
Figure 8.2-4p Jackson 10 Hz deep soil hazard: total and contribution by RLME and background 8-147
Figure 8.2-4q Jackson 1 Hz deep soil hazard: total and contribution by RLME and background 8-148
Figure 8.2-4r Jackson PGA deep soil hazard: total and contribution by RLME and background 8-149
Figure 8.2-4s Jackson 10 Hz hazard: comparison of three site conditions 8-150
Figure 8.2-4t Jackson 1 Hz hazard: comparison of three site conditions 8-151
Figure 8.2-4u Jackson PGA hazard: comparison of three site conditions 8-152
Figure 8.2-4v Jackson 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-153
Figure 8.2-4w Jackson 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-154
Figure 8.2-4x Jackson 10 Hz rock hazard: sensitivity to Mmax for source ECC-GC 8-155
Figure 8.2-4y Jackson 1 Hz rock hazard: sensitivity to Mmax for source ECC-GC 8-156
Figure 8.2-4z Jackson 10 Hz rock hazard: sensitivity to smoothing options 8-157
Figure 8.2-4aa Jackson 1 Hz rock hazard: sensitivity to smoothing options 8-158
Figure 8.2-4bb Jackson 10 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case A 8-159
Figure 8.2-4cc Jackson 10 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case B 8-160
Figure 8.2-4dd Jackson 10 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case E 8-161
Figure 8.2-4ee Jackson 1 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case A 8-162
Figure 8.2-4ff Jackson 1 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case B 8-163
Figure 8.2-4gg Jackson 1 Hz rock hazard: sensitivity to eight realizations for source ECC-GC, Case E 8-164
Figure 8.2-5a Manchester 10 Hz rock hazard: mean and fractile total hazard 8-165
Figure 8.2-5b Manchester 1 Hz rock hazard: mean and fractile total hazard 8-166
Figure 8.2-5c Manchester PGA rock hazard: mean and fractile total hazard 8-167
Figure 8.2-5d Manchester 10 Hz rock hazard: total and contribution by RLME and background 8-168
Figure 8.2-5e Manchester 1 Hz rock hazard: total and contribution by RLME and background 8-169
Figure 8.2-5f Manchester PGA rock hazard: total and contribution by RLME and background 8-170
Figure 8.2-5g Manchester 10 Hz rock hazard: contribution by background source 8-171
Figure 8.2-5h Manchester 1 Hz rock hazard: contribution by background source 8-172
Figure 8.2-5i Manchester PGA rock hazard: contribution by background source 8-173
Figure 8.2-5j Manchester 10 Hz rock hazard: comparison of three source models 8-174

Figure 8.2-5k Manchester is 1 Hz rock hazard: comparison of three source models 8-175
Figure 8.2-5l Manchester PGA rock hazard: comparison of three source models..... 8-176
Figure 8.2-5m Manchester 10 Hz shallow soil hazard: total and contribution by RLME and background 8-177
Figure 8.2-5n Manchester 1 Hz shallow soil hazard: total and contribution by RLME and background 8-178
Figure 8.2-5o Manchester PGA shallow soil hazard: total and contribution by RLME and background 8-179
Figure 8.2-5p Manchester 10 Hz deep soil hazard: total and contribution by RLME and background 8-180
Figure 8.2-5q Manchester 1 Hz deep soil hazard: total and contribution by RLME and background 8-181
Figure 8.2-5r Manchester PGA deep soil hazard: total and contribution by RLME and background 8-182
Figure 8.2-5s Manchester 10 Hz hazard: comparison of three site conditions 8-183
Figure 8.2-5t Manchester 1 Hz hazard: comparison of three site conditions 8-184
Figure 8.2-5u Manchester PGA hazard: comparison of three site conditions..... 8-185
Figure 8.2-5v Manchester 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones..... 8-186
Figure 8.2-5w Manchester 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones..... 8-187
Figure 8.2-5x Manchester 10 Hz rock hazard: sensitivity to Mmax for source NAP 8-188
Figure 8.2-5y Manchester 1 Hz rock hazard: sensitivity to Mmax for source NAP 8-189
Figure 8.2-5z Manchester 10 Hz rock hazard: sensitivity to smoothing options 8-190
Figure 8.2-5aa Manchester 1 Hz rock hazard: sensitivity to smoothing options 8-191
Figure 8.2-5bb Manchester 10 Hz rock hazard: sensitivity to eight realizations for source NAP, Case A 8-192
Figure 8.2-5cc Manchester 10 Hz rock hazard: sensitivity to eight realizations for source NAP, Case B 8-193
Figure 8.2-5dd Manchester 10 Hz rock hazard: sensitivity to eight realizations for source NAP, Case E 8-194
Figure 8.2-5ee Manchester 1 Hz rock hazard: sensitivity to eight realizations for source NAP, Case A 8-195
Figure 8.2-5ff Manchester 1 Hz rock hazard: sensitivity to eight realizations for source NAP, Case B 8-196
Figure 8.2-5gg Manchester 1 Hz rock hazard: sensitivity to eight realizations for source NAP, Case E 8-197
Figure 8.2-6a Savannah 10 Hz rock hazard: mean and fractile total hazard 8-198
Figure 8.2-6b Savannah 1 Hz rock hazard: mean and fractile total hazard 8-199
Figure 8.2-6c Savannah PGA rock hazard: mean and fractile total hazard 8-200
Figure 8.2-6d Savannah 10 Hz rock hazard: total and contribution by RLME and background 8-201

Figure 8.2-6e Savannah 1 Hz rock hazard: total and contribution by RLME and background 8-202
Figure 8.2-6f Savannah PGA rock hazard: total and contribution by RLME and background 8-203
Figure 8.2-6g Savannah 10 Hz rock hazard: contribution by background source 8-204
Figure 8.2-6h Savannah 1 Hz rock hazard: contribution by background source 8-205
Figure 8.2-6i Savannah PGA rock hazard: contribution by background source 8-206
Figure 8.2-6j Savannah 10 Hz rock hazard: comparison of three source models 8-207
Figure 8.2-6k Savannah is 1 Hz rock hazard: comparison of three source models 8-208
Figure 8.2-6l Savannah PGA rock hazard: comparison of three source models 8-209
Figure 8.2-6m Savannah 10 Hz shallow soil hazard: total and contribution by RLME and background 8-210
Figure 8.2-6n Savannah 1 Hz shallow soil hazard: total and contribution by RLME and background 8-211
Figure 8.2-6o Savannah PGA shallow soil hazard: total and contribution by RLME and background 8-212
Figure 8.2-6p Savannah 10 Hz deep soil hazard: total and contribution by RLME and background 8-213
Figure 8.2-6q Savannah 1 Hz deep soil hazard: total and contribution by RLME and background 8-214
Figure 8.2-6r Savannah PGA deep soil hazard: total and contribution by RLME and background 8-215
Figure 8.2-6s Savannah 10 Hz hazard: comparison of three site conditions 8-216
Figure 8.2-6t Savannah 1 Hz hazard: comparison of three site conditions 8-217
Figure 8.2-6u Savannah PGA hazard: comparison of three site conditions 8-218
Figure 8.2-6v Savannah 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-219
Figure 8.2-6w Savannah 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-220
Figure 8.2-6x Savannah 10 Hz rock hazard: sensitivity to Mmax for source ECC-AM 8-221
Figure 8.2-6y Savannah 1 Hz rock hazard: sensitivity to Mmax for source ECC-AM 8-222
Figure 8.2-6z Savannah 10 Hz rock hazard: sensitivity to smoothing options 8-223
Figure 8.2-6aa Savannah 1 Hz rock hazard: sensitivity to smoothing options 8-224
Figure 8.2-6bb Savannah 10 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case A 8-225
Figure 8.2-6cc Savannah 10 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case B 8-226
Figure 8.2-6dd Savannah 10 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case E 8-227
Figure 8.2-6ee Savannah 1 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case A 8-228
Figure 8.2-6ff Savannah 1 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case B 8-229

Figure 8.2-6gg Savannah 1 Hz rock hazard: sensitivity to eight realizations for source ECC-AM, Case E 8-230
Figure 8.2-7a Topeka 10 Hz rock hazard: mean and fractile total hazard 8-231
Figure 8.2-7b Topeka 1 Hz rock hazard: mean and fractile total hazard 8-232
Figure 8.2-7c Topeka PGA rock hazard: mean and fractile total hazard 8-233
Figure 8.2-7d Topeka 10 Hz rock hazard: total and contribution by RLME and background 8-234
Figure 8.2-7e Topeka 1 Hz rock hazard: total and contribution by RLME and background... 8-235
Figure 8.2-7f Topeka PGA rock hazard: total and contribution by RLME and background ... 8-236
Figure 8.2-7g Topeka 10 Hz rock hazard: contribution by background source..... 8-237
Figure 8.2-7h Topeka 1 Hz rock hazard: contribution by background source..... 8-238
Figure 8.2-7i Topeka PGA rock hazard: contribution by background source 8-239
Figure 8.2-7j Topeka 10 Hz rock hazard: comparison of three source models..... 8-240
Figure 8.2-7k Topeka is 1 Hz rock hazard: comparison of three source models 8-241
Figure 8.2-7l Topeka PGA rock hazard: comparison of three source models 8-242
Figure 8.2-7m Topeka 10 Hz shallow soil hazard: total and contribution by RLME and background 8-243
Figure 8.2-7n Topeka 1 Hz shallow soil hazard: total and contribution by RLME and background 8-244
Figure 8.2-7o Topeka PGA shallow soil hazard: total and contribution by RLME and background 8-245
Figure 8.2-7p Topeka 10 Hz deep soil hazard: total and contribution by RLME and background 8-246
Figure 8.2-7q Topeka 1 Hz deep soil hazard: total and contribution by RLME and background 8-247
Figure 8.2-7r Topeka PGA deep soil hazard: total and contribution by RLME and background 8-248
Figure 8.2-7s Topeka 10 Hz hazard: comparison of three site conditions 8-249
Figure 8.2-7t Topeka 1 Hz hazard: comparison of three site conditions..... 8-250
Figure 8.2-7u Topeka PGA hazard: comparison of three site conditions 8-251
Figure 8.2-7v Topeka 10 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones 8-252
Figure 8.2-7w Topeka 1 Hz rock hazard: sensitivity to seismotectonic vs. Mmax zones..... 8-253
Figure 8.2-7x Topeka 10 Hz rock hazard: sensitivity to Mmax for source MidC-A 8-254
Figure 8.2-7y Topeka 1 Hz rock hazard: sensitivity to Mmax for source MidC-A 8-255
Figure 8.2-7z Topeka 10 Hz rock hazard: sensitivity to smoothing options 8-256
Figure 8.2-7aa Topeka 1 Hz rock hazard: sensitivity to smoothing options..... 8-257
Figure 8.2-7bb Topeka 10 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case A 8-258
Figure 8.2-7cc Topeka 10 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case B 8-259

Figure 8.2-7dd Topeka 10 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case E 8-260
Figure 8.2-7ee Topeka 1 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case A 8-261
Figure 8.2-7ff Topeka 1 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case B 8-262
Figure 8.2-7gg Topeka 1 Hz rock hazard: sensitivity to eight realizations for source MidC-A, Case E 8-263
Figure 9.3-1 1 Hz sensitivity to rupture orientation at Savannah for the Charleston regional source....9-24
Figure 9.3-2 10 Hz sensitivity to rupture orientation at Savannah for the Charleston regional source....9-25
Figure 9.3-3 1 Hz sensitivity to seismogenic thickness at Manchester for the Charlevoix area source 9-26
Figure 9.3-4 10 Hz sensitivity to seismogenic thickness at Manchester for the Charlevoix area source 9-27
Figure 9.3-5 1 Hz sensitivity to rupture orientation (dip) at Manchester for the Charlevoix area source 9-28
Figure 9.3-6 10 Hz sensitivity to rupture orientation (dip) at Manchester for the Charlevoix area source 9-29
Figure 9.3-7 1 Hz sensitivity to seismogenic thickness at Topeka for the Cheraw fault source 9-30
Figure 9.3-8 10 Hz sensitivity to seismogenic thickness at Topeka for the Cheraw fault source 9-31
Figure 9.3-9 1 Hz sensitivity to rupture orientation (dip) at Topeka for the Cheraw fault source 9-32
Figure 9.3-10 10 Hz sensitivity to rupture orientation at Topeka for the Cheraw fault source 9-33
Figure 9.3-11 1 Hz sensitivity to seismogenic thickness at Jackson for the Commerce area source 9-34
Figure 9.3-12 10 Hz sensitivity to seismogenic thickness at Jackson for the Commerce area source 9-35
Figure 9.3-13 1 Hz sensitivity to seismogenic thickness at Jackson for the ERM-N area source 9-36
Figure 9.3-14 10 Hz sensitivity to seismogenic thickness at Jackson for the ERM-N area source 9-37
Figure 9.3-15 1 Hz sensitivity to seismogenic thickness at Jackson for the ERM-S area source 9-38
Figure 9.3-16 10 Hz sensitivity to seismogenic thickness at Jackson for the ERM-S area source 9-39
Figure 9.3-17 1 Hz sensitivity to seismogenic thickness at Jackson for the Marianna area source 9-40
Figure 9.3-18 10 Hz sensitivity to seismogenic thickness at Jackson for the Marianna area source 9-41

Figure 9.3-19 1 Hz sensitivity to seismogenic thickness at Topeka for the Meers fault and OKA area sources 9-42
Figure 9.3-20 1 Hz sensitivity to seismogenic thickness at Houston for the Meers fault and OKA area sources 9-43
Figure 9.3-21 10 Hz sensitivity to seismogenic thickness at Topeka for the Meers fault and OKA area sources 9-44
Figure 9.3-22 10 Hz sensitivity to seismogenic thickness at Houston for the Meers fault and OKA area sources 9-45
Figure 9.3-23 1 Hz sensitivity to rupture orientation at Houston for the OKA area source 9-46
Figure 9.3-24 10 Hz sensitivity to rupture orientation at Houston for the OKA area source 9-47
Figure 9.3-25 1 Hz sensitivity to rupture orientation (dip) at Topeka for the OKA area source 9-48
Figure 9.3-26 1 Hz sensitivity to rupture orientation (dip) at Houston for the OKA area source 9-49
Figure 9.3-27 10 Hz sensitivity to rupture orientation (dip) at Topeka for the OKA area source 9-50
Figure 9.3-28 10 Hz sensitivity to rupture orientation (dip) at Houston for the OKA area source 9-51
Figure 9.3-29 1 Hz sensitivity to rupture orientation (dip) at Topeka for the Meers fault source 9-52
Figure 9.3-30 1 Hz sensitivity to rupture orientation (dip) at Houston for the Meers fault source 9-53
Figure 9.3-31 10 Hz sensitivity to rupture orientation (dip) at Topeka for the Meers fault source 9-54
Figure 9.3-32 10 Hz sensitivity to rupture orientation (dip) at Houston for the Meers fault source 9-55
Figure 9.3-33 1 Hz sensitivity to seismogenic thickness at Jackson for the NMFS fault sources 9-56
Figure 9.3-34 10 Hz sensitivity to seismogenic thickness at Jackson for the NMFS fault sources 9-57
Figure 9.3-35 1 Hz sensitivity to seismogenic thickness at Central Illinois for the Wabash Valley area source 9-58
Figure 9.3-36 10 Hz sensitivity to seismogenic thickness at Central Illinois for the Wabash Valley area source 9-59
Figure 9.3-37 1 Hz sensitivity to rupture orientation (dip) at Central Illinois for the Wabash Valley area source 9-60
Figure 9.3-38 10 Hz sensitivity to rupture orientation (dip) at Central Illinois for the Wabash Valley area source 9-61
Figure 9.3-39 1 Hz sensitivity to fault ruptures vs. point source for the Central Illinois site from the Mid C–A background source 9-62
Figure 9.3-40 10 Hz sensitivity to fault ruptures vs. point source for the Central Illinois site from the Mid C–A background source 9-63
Figure 9.4-1 COV_{MH} from EPRI (1989) team sources vs. ground motion amplitude for seven test sites: PGA (top), 10 Hz SA (middle), and 1 Hz SA (bottom) 9-64

Figure 9.4-2 COV_{MH} from EPRI (1989) team sources vs. seismic hazard (i.e., annual frequency of exceedance) for seven test sites: PGA (top), 10 Hz SA (middle), and 1 9-Hz SA (bottom) 9-65
Figure 9.4-3 COV_{MH} from seismic source experts (PEGASOS project) vs. amplitude (top) and annual frequency (bottom) 9-66
Figure 9.4-4 COV_K and COV_{MH} from Charleston alternatives for PGA, plotted vs. PGA amplitude (top) and hazard (bottom). COV_{MH} is the total COV of mean hazard; see Table 9.4-2 for other labels for curves. 9-67
Figure 9.4-5 COV_K and COV_{MH} from Charleston alternatives for 10 Hz, plotted vs. 10 Hz amplitude (top) and hazard (bottom). COV_{MH} is the total COV of mean hazard; see Table 9.4-2 for other labels for curves. 9-68
Figure 9.4-6 COV_K and COV_{MH} from Charleston alternatives for 1 Hz, plotted vs. 1 Hz amplitude (top) and hazard (bottom). COV_{MH} is the total COV of mean hazard; see Table 9.4-2 for other labels for curves.. 9-69
Figure 9.4-7 COV_K and COV_{MH} of total hazard from New Madrid for 1 Hz, plotted vs. 1 Hz amplitude (top) and hazard (bottom). COV_{MH} is the total COV; see the text for other labels for curves. 9-70
Figure 9.4-8 PGA hazard curves for Manchester test site 9-71
Figure 9.4-9 COV_{MH} of PGA hazard at Manchester site from ground motion equation vs. PGA....9-72
Figure 9.4-10 COV of PGA hazard at Manchester site from ground motion equation vs. hazard 9-73
Figure 9.4-11 COV of 10 Hz hazard at Manchester site from ground motion equations vs. hazard....9-74
Figure 9.4-12 COV of 1 Hz hazard at Manchester site from ground motion equations vs. hazard 9-75
Figure 9.4-13 1 Hz spectral acceleration hazard curves for Manchester test site 9-76
Figure 9.4-14 COV_{MH} of PGA hazard at Chattanooga from ground motion equation vs. hazard 9-77
Figure 9.4-15 COV_{MH} of 10 Hz hazard at Chattanooga from ground motion equation vs. hazard 9-78
Figure 9.4-16 COV_{MH} of 1 Hz hazard at Chattanooga site from ground motion equation vs. hazard....9-79
Figure 9.4-17 PGA hazard curves for Savannah test site....9-80
Figure 9.4-18 COV_{MH} of PGA hazard at Savannah site from ground motion equations vs. hazard 9-81
Figure 9.4-19 COV_{MH} of 10 Hz hazard at Savannah site from ground motion equations vs. hazard....9-82
Figure 9.4-20 COV_{MH} of 1 Hz hazard at Savannah site from ground motion equations vs. hazard 9-83
Figure 9.4-21 PGA hazard curves for Columbia site 9-84
Figure 9.4-22 COV_{MH} of PGA hazard at Columbia from ground motion equations vs. hazard 9-85

Figure 9.4-23 COV_{MH} of 10 Hz hazard at Columbia from ground motion equations vs. hazard 9-86
Figure 9.4-24 COV_{MH} of 1 Hz hazard at Columbia from ground motion equations vs. hazard 9-87
Figure 9.4-25 COV_{MH} of PGA hazard at Chattanooga (New Madrid only) vs. hazard 9-88
Figure 9.4-26 COV_{MH} of 10 Hz hazard at Chattanooga (New Madrid only) vs. hazard..... 9-89
Figure 9.4-27 COV_{MH} of 1 Hz hazard at Chattanooga (New Madrid only) vs. hazard..... 9-90
Figure 9.4-28 COV_{MH} for PGA and 1 Hz SA vs. ground motion amplitude resulting from alternative ground motion experts, PEGASOS project..... 9-91
Figure 9.4-29 COV_{MH} for PGA and 1 Hz SA vs. mean hazard from alternative ground motion experts, PEGASOS project 9-92
Figure 9.4-30 COV_{HAZ} from ground motion equations vs. mean hazard for Chattanooga 9-93
Figure 9.4-31 COV_{MH} from ground motion equations vs. mean hazard for Central Illinois 9-94
Figure 9.4-32 COV_{MH} from soil experts vs. PGA and 1 Hz SA, PEGASOS project 9-95
Figure 9.4-33 COV_{MH} from soil experts vs. mean hazard for PGA and 1 Hz SA, PEGASOS project..... 9-96
Figure 9.4-34 COV_{MH} resulting from site response models vs. mean hazard for four sites, 1 Hz (top) and 10 Hz (bottom)..... 9-97
Figure 11-1 Geologic time scale (Walker and Geissman, 2009) 11-10
Figure A-1 GEBCO elevation data for the CEUS study area (BODC, 2009). A-22
Figure A-2 CEUS SSC independent earthquake catalog A-24
Figure A-3 Bedrock geology and extended crust after Kanter (1994)..... A-26
Figure A-4 Crustal provinces after Rohs and Van Schmus (2007) A-28
Figure A-5 Geologic map of North America A-31
Figure A-6 Locations of geologic cross sections in the CEUS A-33
Figure A-7 Precambrian crustal boundary after Van Schmus et al. (1996) A-35
Figure A-8a Precambrian geology and features after Reed (1993) A-37
Figure A-8b Explanation of Precambrian geology and features after Reed (1993) A-38
Figure A-9 Precambrian provinces after Van Schmus et al. (2007)..... A-40
Figure A-10 Precambrian units after Whitmeyer and Karlstrom (2007) A-42
Figure A-11 Surficial materials in the conterminous United States after Soller et al. (2009)..... A-44
Figure A-12 Basement and sediment thickness in the USGS Crustal Database for North America. Symbol size represents overlying sediment thickness (km); symbol color represents basement thickness (km). A-46
Figure A-13 Top of basement P-wave seismic velocity in the USGS Crustal Database for North America A-47
Figure A-14 Sediment thickness for North America and neighboring regions A-49
Figure A-15 Physiographic divisions of the conterminous United States after Fenneman and Johnson (1946) A-51
Figure A-16 CEUS SSC free-air gravity anomaly grid. Shaded relief with 315-degree azimuth and 30-degree inclination applied..... A-54

Figure A-17 CEUS SSC free-air gravity anomaly grid. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-55
Figure A-18 CEUS SSC complete Bouguer gravity anomaly grid with free-air gravity anomaly in marine areas. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-56
Figure A-19 CEUS SSC complete Bouguer gravity anomaly grid with free-air gravity anomaly in marine areas. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-57
Figure A-20 CEUS SSC residual isostatic gravity anomaly grid. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-58
Figure A-21 CEUS SSC residual isostatic gravity anomaly grid Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-59
Figure A-22 CEUS SSC regional isostatic gravity anomaly grid A-60
Figure A-23 CEUS SSC first vertical derivative of residual isostatic gravity anomaly grid A-61
Figure A-24 CEUS SSC first vertical derivative of Bouguer gravity anomaly grid with free-air anomaly in marine areas A-62
Figure A-25 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid low pass filtered at 240 km A-63
Figure A-26 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid high pass filtered at 240 km. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-64
Figure A-27 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid high pass filtered at 240 km. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-65
Figure A-28 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid high pass filtered at 120 km. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-66
Figure A-29 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid high pass filtered at 120 km. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-67
Figure A-30 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid upward continued to 40 km A-68
Figure A-31 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid minus the complete Bouguer (with marine free-air) gravity anomaly upward continued to 40 km. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-69
Figure A-32 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid minus the complete Bouguer (with marine free-air) gravity anomaly upward continued to 40 km. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-70
Figure A-33 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid upward continued to 100 km A-71
Figure A-34 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid minus the complete Bouguer (with marine free-air) gravity anomaly anomaly

upward continued to 100 km. Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-72
Figure A-35 CEUS SSC complete Bouguer (with marine free-air) gravity anomaly grid minus the complete Bouguer (with marine free-air) gravity anomaly upward continued to 100 km. Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-73
Figure A-36 CEUS SSC horizontal derivative of residual isostatic gravity anomaly grid A-74
Figure A-37 CEUS SSC horizontal derivative of first vertical derivative of residual isostatic gravity anomaly grid A-75
Figure A-38 Corrected heat flow values from the SMU Geothermal Laboratory Regional Heat Flow Database (2008) A-77
Figure A-39 CEUS SSC total intensity magnetic anomaly grid (Ravat et al., 2009). Shaded relief with 315-degree azimuth and 30-degree inclination applied. A-80
Figure A-40 CEUS SSC total intensity magnetic anomaly grid (Ravat et al., 2009). Shaded relief with 180-degree azimuth and 30-degree inclination applied. A-81
Figure A-41 CEUS SSC differentially reduced to pole magnetic anomaly grid (Ravat, 2009). Shaded relief with 315-degree azimuth and 30-degree inclination applied A-82
Figure A-42 CEUS SSC differentially reduced to pole magnetic anomaly grid (Ravat, 2009). Shaded relief with 180-degree azimuth and 30-degree inclination applied A-83
Figure A-43 CEUS SSC tilt derivative of differentially reduced to pole magnetic anomaly grid (degrees) (Ravat, 2009) A-84
Figure A-44 CEUS SSC horizontal derivative of tilt derivative of differentially reduced to pole magnetic anomaly grid (radians) (Ravat, 2009) A-85
Figure A-45 CEUS SSC tilt derivative of differentially reduced to pole magnetic anomaly grid (Ravat, 2009) A-86
Figure A-46 CEUS SSC amplitude of analytic signal magnetic anomaly grid (Ravat, 2009) A-87
Figure A-47 CEUS SSC paleoliquefaction database A-89
Figure A-48 CEUS SSC compilation of seismic reflection and seismic refraction lines A-91
Figure A-49 USGS National Seismic Hazard Maps (Petersen et al., 2008) A-93
Figure A-50 USGS NSHM ground motion hazard at spectral acceleration of 1 hz with 2% probability of exceedance in 50 years (Petersen et al., 2008) A-94
Figure A-51 USGS NSHM ground motion hazard at spectral acceleration of 1 hz with 5% probability of exceedance in 50 years (Petersen et al., 2008) A-95
Figure A-52 USGS NSHM ground motion hazard at spectral acceleration of 1 hz with 10% probability of exceedance in 50 years (Petersen et al., 2008) A-96
Figure A-53 USGS NSHM ground motion hazard at spectral acceleration of 3 hz with 2% probability of exceedance in 50 years (Petersen et al., 2008) A-97
Figure A-54 USGS NSHM ground motion hazard at spectral acceleration of 3 hz with 5% probability of exceedance in 50 years (Petersen et al., 2008) A-98
Figure A-55 USGS NSHM ground motion hazard at spectral acceleration of 3 hz with 10% probability of exceedance in 50 years (Petersen et al., 2008) A-99
Figure A-56 USGS NSHM ground motion hazard at spectral acceleration of 5 hz with 2% probability of exceedance in 50 years (Petersen et al., 2008) A-100

Figure A-57 USGS NSHM ground motion hazard at spectral acceleration of 5 hz with 5% probability of exceedance in 50 years (Petersen et al., 2008) A-101
Figure A-58 USGS NSHM ground motion hazard at spectral acceleration of 5 hz with 10% probability of exceedance in 50 years (Petersen et al., 2008) A-102
Figure A-59 USGS NSHM peak ground acceleration with 2% probability of exceedance in 50 years (Petersen et al., 2008) A-103
Figure A-60 USGS NSHM peak ground acceleration with 5% probability of exceedance in 50 years (Petersen et al., 2008) A-104
Figure A-61 USGS NSHM peak ground acceleration with 10% probability of exceedance in 50 years (Petersen et al., 2008) A-105
Figure A-62 Deformation of the North American Plate interior using GPS station data (Calais et al., 2006) A-107
Figure A-63 Stress measurement update for the CEUS (Hurd, 2010) A-110
Figure A-64 CEUS SSC Project study area boundary A-112
Figure A-65 USGS Quaternary fault and fold database (USGS, 2006) A-114
Figure A-66 Quaternary features compilation for the CEUS (Crone and Wheeler, 2000; Wheeler, 2005; USGS, 2010) A-116
Figure A-67 CEUS Mesozoic rift basins after Benson (1992) A-118
Figure A-68 CEUS Mesozoic rift basins after Dennis et al. (2004) A-120
Figure A-69 CEUS Mesozoic rift basins after Schlische (1993) A-122
Figure A-70 CEUS Mesozoic rift basins after Withjack et al. (1998) A-124
Figure A-71 RLME zones for the CEUS A-126
Figure A-72 Mesozoic and non-Mesozoic zones for the CEUS, wide interpretation A-128
Figure A-73 Mesozoic and non-Mesozoic zones for the CEUS, narrow interpretation A-129
Figure A-74 CEUS seismotectonic zones model A A-130
Figure A-75 CEUS seismotectonic zones model B A-131
Figure A-76 CEUS seismotectonic zones model C A-132
Figure A-77 CEUS seismotectonic zones model D A-133
Figure E-1 Map of CEUS showing locations of regional data sets included in the CEUS SSC Project paleoliquefaction database, including New Madrid seismic zone and surrounding region; Marianna, Arkansas, area; St. Louis region; Wabash Valley seismic zone and surrounding region; Arkansas-Louisiana-Mississippi region; Charleston seismic zone; Atlantic Coastal region and the Central Virginia seismic zone; Newburyport, Massachusetts, and surrounding region; and Charlevoix seismic zone and surrounding region. E-68
Figure E-2 Diagram illustrating size parameters of liquefaction features, including sand blow thickness, width, and length; dike width; and sill thickness, as well as some of the diagnostic characteristics of these features. E-69
Figure E-3 Diagram illustrating sampling strategy for dating of liquefaction features as well as age data, such as 14C maximum and 14C minimum, used to calculate preferred age estimates and related uncertainties of liquefaction features. E-70
Figure E-4 GIS map of New Madrid seismic zone and surrounding region showing portions of rivers searched for earthquake-induced liquefaction features by M.

Tuttle, R. Van Arsdale, and J. Vaughn and collaborators (see explanation); information contributed for this report. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-71

Figure E-5 GIS map of New Madrid seismic zone and surrounding region showing locations of liquefaction features for which there are and are not radiocarbon data. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-72

Figure E-6 GIS map of New Madrid seismic zone and surrounding region showing locations of liquefaction features that are thought to be historical or prehistoric in age or whose ages are poorly constrained. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-73

Figure E-7 GIS map of New Madrid seismic zone and surrounding region showing preferred age estimates of liquefaction features; features whose ages are poorly constrained are excluded. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-74

Figure E-8 GIS map of New Madrid seismic zone and surrounding region showing measured thicknesses of sand blows. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-75

Figure E-9 GIS map of New Madrid seismic zone and surrounding region showing preferred age estimates and measured thicknesses of sand blows. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-76

Figure E-10 GIS map of New Madrid seismic zone and surrounding region showing measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-77

Figure E-11 GIS map of New Madrid seismic zone and surrounding region showing preferred age estimates and measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-78

Figure E-12 GIS map of New Madrid seismic zone and surrounding region illustrating preferred age estimates and measured thicknesses of sand blows as well as preferred age estimates and measured widths of sand dikes for sites where sand blows do not occur. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-79

Figure E-13 GIS map of Marianna, Arkansas, area showing seismicity and locations of paleoliquefaction features relative to mapped traces of Eastern Reelfoot rift margin fault, White River fault zone, Big Creek fault zone, Marianna escarpment, and Daytona Beach lineament. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-80

Figure E-14 (A) Trench log and (B) ground-penetrating radar profile, showing vertical sections of sand blows and sand dikes at Daytona Beach SE2 site along the Daytona Beach lineament southwest of Marianna, Arkansas. Vertical scale of GPR profile is exaggerated (modified from Al-Shukri et al., 2009). E-81

Figure E-15 GIS map of Marianna, Arkansas, area showing locations of liquefaction features for which there are and are not radiocarbon data. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-82

Figure E-16 GIS map of Marianna, Arkansas, area showing locations of liquefaction features that are thought to be historical or prehistoric in age or whose ages are poorly constrained. To date, no liquefaction features thought to have formed during

1811-1812 earthquakes have been found in area. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-83

Figure E-17 GIS map of Marianna, Arkansas, area showing preferred age estimates of liquefaction features; features whose ages are poorly constrained are excluded. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-84

Figure E-18 GIS map of Marianna, Arkansas, area showing measured thicknesses of sand blows. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-85

Figure E-19 GIS map of Marianna, Arkansas, area showing preferred age estimates and measured thicknesses of sand blows. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-86

Figure E-20 GIS map of Marianna, Arkansas, area showing measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-87

Figure E-21 GIS map of Marianna, Arkansas, area showing preferred age estimates and measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-88

Figure E-22 GIS map of St. Louis, Missouri, region showing seismicity and portions of rivers searched for earthquake-induced liquefaction features by Tuttle and collaborators; information contributed for this report. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-89

Figure E-23 GIS map of St. Louis, Missouri, region showing locations of liquefaction features, including several soft-sediment deformation structures, for which there are and are not radiocarbon data. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-90

Figure E-24 GIS map of St. Louis, Missouri, region showing locations of liquefaction features that are thought to be historical or prehistoric in age or whose ages are poorly constrained. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-91

Figure E-25 GIS map of St. Louis, Missouri, region showing preferred age estimates of liquefaction features; features whose ages are poorly constrained, including several that are prehistoric in age, are not shown. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-92

Figure E-26 GIS map of St. Louis, Missouri, region showing measured thicknesses of sand blows at similar scale as used in Figure E-8 of sand blows in New Madrid seismic zone. Note that few sand blows have been found in St. Louis region. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-93

Figure E-27 GIS map of St. Louis, Missouri, region showing preferred age estimates and measured thicknesses of sand blows. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-94

Figure E-28 GIS map of St. Louis, Missouri, region showing measured widths of sand dikes at similar scale as that used in Figure E-10 for sand dikes in New Madrid seismic zone. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-95

Figure E-29 GIS map of St. Louis, Missouri, region showing measured widths of sand dikes at similar scale as that used in Figures E-42 and E-48 for sand dikes in the Newburyport and Charlevoix regions, respectively. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-96

Figure E-30 GIS map of St. Louis, Missouri, region showing preferred age estimates and measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-97

Figure E-31 GIS map of Wabash Valley seismic zone and surrounding region showing portions of rivers searched for earthquake-induced liquefaction features (digitized from McNulty and Obermeier, 1999). Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-98

Figure E-32 GIS map of Wabash Valley seismic zone and surrounding region showing measured widths of sand dikes at similar scale as that used in Figures E-10 and E-11 for sand dikes in New Madrid seismic zone. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-99

Figure E-33 GIS map of Wabash Valley region of Indiana and Illinois showing preferred age estimates and paleoearthquake interpretation. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-100

Figure E-34 GIS map of Arkansas-Louisiana-Mississippi (ALM) region showing paleoliquefaction study locations. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-101

Figure E-35 GIS map of Charleston, South Carolina, region showing locations of paleoliquefaction features for which there are and are not radiocarbon dates. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-102

Figure E-36 GIS map of Charleston, South Carolina, region showing locations of historical and prehistoric liquefaction features. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-103

Figure E-37 Map of Atlantic coast region showing areas searched for paleoliquefaction features by Gelinas et al. (1998) and Amick, Gelinas, et al. (1990). Rectangles indicate 7.5-minute quadrangles in which sites were investigated for presence of paleoliquefaction features. The number of sites investigated is shown within that quadrangle, if known. Orange and yellow indicate quadrangles in which paleoliquefaction features were recognized. E-104

Figure E-38 Map of Central Virginia seismic zone region showing portions of rivers searched for earthquake-induced liquefaction features by Obermeier and McNulty (1998). E-105

Figure E-39 GIS map of Newburyport, Massachusetts, and surrounding region showing seismicity and portions of rivers searched for earthquake-induced liquefaction features (Gelinas et al., 1998; Tuttle, 2007, 2009). Solid black line crossing map represents Massachusetts–New Hampshire border. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-106

Figure E-40 GIS map of Newburyport, Massachusetts, and surrounding region showing locations of liquefaction features for which there are and are not radiocarbon dates. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-107

Figure E-41 GIS map of Newburyport, Massachusetts, and surrounding region showing locations of liquefaction features that are thought to be historical or prehistoric in age or whose ages are poorly constrained. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-108

Figure E-42 GIS map of Newburyport, Massachusetts, and surrounding region showing measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-109

Figure E-43 GIS map of Newburyport, Massachusetts, and surrounding region showing preferred age estimates and measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-110

Figure E-44 Map of Charlevoix seismic zone and adjacent St. Lawrence Lowlands showing mapped faults and portions of rivers along which reconnaissance and searches for earthquake-induced liquefaction features were performed. Charlevoix seismic zone is defined by concentration of earthquakes and locations of historical earthquakes northeast of Quebec City. Devonian impact structure in vicinity of Charlevoix seismic zone is outlined by black dashed line. Taconic thrust faults are indicated by solid black lines with sawteeth on upper plate; Iapetan rift faults are shown by solid black lines with hachure marks on downthrown side (modified from Tuttle and Atkinson, 2010). E-111

Figure E-45 GIS map of Charlevoix seismic zone and surrounding region showing locations of liquefaction features, including several soft-sediment deformation structures, for which there are and are not radiocarbon data. Note the location of 1988 M 5.9 Saguenay earthquake northwest of the Charlevoix seismic zone. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-112

Figure E-46 GIS map of Charlevoix seismic zone and surrounding region showing locations of liquefaction features that are modern, historical, or prehistoric in age, or whose ages are poorly constrained. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-113

Figure E-47 GIS map of Charlevoix seismic zone and surrounding region showing preferred age estimates of liquefaction features; features whose ages are poorly constrained are excluded. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-114

Figure E-48 GIS map of Charlevoix seismic zone and surrounding region showing measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-115

Figure E-49 GIS map of Charlevoix seismic zone and surrounding region showing preferred age estimates and measured widths of sand dikes. Map projection is USA Contiguous Albers Equal Area Conic, North America Datum 1983. ..... E-116

Figure E-50 Photograph of moderate-sized sand blow (12 m long, 7 m wide, and 14 cm thick) that formed about 40 km from epicenter of 2001 M 7.7 Bhuj, India, earthquake (from Tuttle, Hengesh, et al., 2002), combined with schematic vertical section illustrating structural and stratigraphic relations of sand blow, sand dike, and source layer (modified from Sims and Garvin, 1995). E-117

Figure E-51 Tree trunks buried and killed by sand blows, vented during 1811-1812 New Madrid earthquakes (from Fuller, 1912). E-118

Figure E-52 Large sand-blow crater that formed during 2002 M 7.7 Bhuj, India, earthquake. Backpack for scale. Photograph: M. Tuttle (2001). E-119

Figure E-53 Sand-blow crater that formed during 1886 Charleston, South Carolina, earthquake. Photograph: J.K. Hillers (from USGS Photograph Library). E-120

Figure E-54 Photograph of sand blow and related sand dikes exposed in trench wall and floor in New Madrid seismic zone. Buried soil horizon is displaced downward approximately 1 m across two dikes. Clasts of soil horizon occur within dikes and overlying sand blow. Degree of soil development above and within sand blow suggests that it is at least several hundred years old and formed prior to 1811-1812 New Madrid earthquakes. Organic sample (location marked by red flag) from crater fill will provide close minimum age constraint for formation of sand blow. For scale, each colored intervals on shovel handle represents 10 cm. Photograph: M. Tuttle..... E-121

Figure E-55 Sand dikes, ranging up to 35 cm wide, originate in pebbly sand layer and intrude overlying diamicton, These features were exposed in cutbank along Cahokia Creek about 25 km northeast of downtown St. Louis (from Tuttle, 2000)..... E-122

Figure E-56 Photograph of small diapirs of medium sand intruding base of overlying deposit of interbedded clayey silt and very fine sand, and clasts of clayey silt in underlying medium sand, observed along Ouelle River in Charlevoix seismic zone. Sand diapirs and clasts probably formed during basal erosion and foundering of clayey silt due to liquefaction of the underlying sandy deposit. Red portion of shovel handle represents 10 cm (modified from Tuttle and Atkinson, 2010)..... E-123

Figures E-57 (A) Load cast formed in laminated sediments of Van Norman Lake during 1952 Kern County, California, earthquake. Photograph: J. Sims (from Sims, 1975). (B) Load cast, pseudonodules, and related folds formed in laminated sediment exposed along Malbaie River in Charlevoix seismic zone. Sand dikes crosscutting these same laminated sediments occur at a nearby site. For scale, each painted interval of the shovel handle represents 10 cm (modified from Tuttle and Atkinson, 2010). E-124

Figure E-58 Log of sand blow and uppermost portions of related sand dikes exposed in trench wall at Dodd site in New Madrid seismic zone. Sand dikes were also observed in opposite wall and trench floor. Sand blow buries pre-event A horizon, and a subsequent A horizon has developed in top of sand blow. Radiocarbon dating of samples collected above and below sand blow brackets its age between 490 and 660 yr BP. Artifact assemblage indicates that sand blow formed during late Mississippian (300–550 yr BP or AD 1400–1670) (modified from Tuttle, Collier, et al., 1999). E-125

Figures E-59 (A) Photograph of earthquake-induced liquefaction features found in association with cultural horizon and pit exposed in trench wall near Blytheville, Arkansas, in New Madrid seismic zone. Photograph: M. Tuttle. (B) Trench log of features shown in (A). Sand dike formed in thick Native American occupation horizon containing artifacts of early Mississippian cultural period (950–1,150 yr BP). Cultural pit dug into top of sand dike contains artifacts and charcoal used to constrain minimum age of liquefaction features (modified from Tuttle and Schweig, 1995). E-126

Figure E-60 In situ tree trunks such as this one buried and killed by sand blow in New Madrid seismic zone offer opportunity to date paleoearthquakes to the year and season of occurrence. Photograph: M. Tuttle. E-127

Figure E-61 Portion of dendrocalibration curve illustrating conversion of radiocarbon age to calibrated date in calendar years. In example, 2-sigma radiocarbon age of 2,280–2,520 BP is converted to calibrated date of 770–380 BC (from Tuttle, 1999). E-128

Figure E-62 Empirical relation developed between A horizon thickness of sand blows and years of soil development in New Madrid region. Horizontal bars reflect uncertainties in age estimates of liquefaction features; diamonds mark midpoints of possible age ranges (from Tuttle et al., 2000)..... E-129

Figure E-63 Diagram illustrating earthquake chronology for New Madrid seismic zone for past 5,500 years based on dating and correlation of liquefaction features at sites (listed at top) across region from north to south. Vertical bars represent age estimates of individual sand blows, and horizontal bars represent event times of 138 yr BP (AD 1811-1812); 500 yr BP ± 150 yr; 1,050 yr BP ± 100 yr; and 4,300 yr BP ± 200 yr (modified from Tuttle, Schweig, et al., 2002; Tuttle et al., 2005). E-130

Figure E-64 Diagram illustrating earthquake chronology for New Madrid seismic zone for past 2,000 years, similar to upper portion of diagram shown in Figure E-63. As in Figure E-63, vertical bars represent age estimates of individual sand blows, and horizontal bars represent event times. Analysis performed during CEUS SSC Project derived two possible uncertainty ranges for timing of paleoearthquakes, illustrated by the darker and lighter portions of the colored horizontal bars, respectively: 503 yr BP ± 8 yr or 465 yr BP ± 65 yr, and 1,110 yr BP ± 40 yr or 1055 ± 95 yr (modified from Tuttle, Schweig, et al., 2002)..... E-131

Figure E-65 Maps showing spatial distributions and sizes of sand blows and sand dikes attributed to 500 and 1,050 yr BP events. Locations and sizes of liquefaction features that formed during AD 1811-1812 (138 yr BP) New Madrid earthquake sequence shown for comparison (modified from Tuttle, Schweig, et al., 2002). E-132

Figure E-66 Liquefaction fields for 138 yr BP (AD 1811-1812); 500 yr BP (AD 1450); and 1,050 yr BP (AD 900) events as interpreted from spatial distribution and stratigraphy of sand blows (modified from Tuttle, Schweig, et al., 2002). Ellipses define areas where similar-age sand blows have been mapped. Overlapping ellipses indicate areas where sand blows are composed of multiple units that formed during sequence of earthquakes. Dashed ellipse outlines area where historical sand blows are composed of four depositional units. Magnitudes of earthquakes in 500 yr BP and 1,050 yr BP are inferred from comparison with 1811-1812 liquefaction fields. Magnitude estimates of December (D), January (J), and February (F) main shocks and large aftershocks taken from several sources; rupture scenario from Johnston and Schweig (1996; modified from Tuttle, Schweig, et al., 2002). E-133

Figure E-67 Empirical relation between earthquake magnitude and epicentral distance to farthest known sand blows induced by instrumentally recorded earthquakes (modified from Castilla and Audemard, 2007)..... E-134

Figure E-68 Distances to farthest known liquefaction features indicate that 500 and 1,050 yr BP New Madrid events were at least of M 6.7 and 6.9, respectively, when plotted on Ambraseys (1988) relation between earthquake magnitude and epicentral distance to farthest surface expression of liquefaction. Similarity in size distribution of historical and prehistoric sand blows, however, suggests that paleoearthquakes were comparable in magnitude to 1811-1812 events or M ~7.6 (modified from Tuttle, 2001). E-135

Figure H-1-1 Region covered by the CEUS SSC model..... H-44

Figure H-2-1 Master logic tree for the CEUS SSC model H-45
Figure H-3-1 Logic tree for the Mmax zones branch of the master logic tree H-46
Figure H-3-2 Mesozoic extended (MESE-W) and non-extended (NMESE-W) Mmax zones for the “wide” interpretation H-47
Figure H-3-3 Mesozoic extended (MESE-N) and non-extended (NMESE-N) Mmax zones for the “narrow” interpretation H-48
Figure H-4-1(a) Logic tree for the seismotectonic zones branch of the master logic tree H-49
Figure H-4-1(b) Logic tree for the seismotectonic zones branch of the master logic tree H-50
Figure H-4-2 Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR) and the Paleozoic Extended zone is narrow (PEZ-N) H-51
Figure H-4-3 Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG) and the Paleozoic Extended zone is narrow (PEZ-N) H-52
Figure H-4-4 Seismotectonic zones shown in the case where the Rough Creek Graben is not part of the Reelfoot Rift (RR) and the Paleozoic Extended zone is wide (PEZ-W) H-53
Figure H-4-5 Seismotectonic zones shown in the case where the Rough Creek Graben is part of the Reelfoot Rift (RR-RCG) and the Paleozoic Extended zone is wide (PEZ-W) H-54
Figure H-5-1 Logic tree for the RLME source branch of the master logic tree H-55
Figure H-5-2 Location of RLME sources in the CEUS SSC model H-56
Figure H-5.1-1 Logic tree for Charlevoix RLME source H-57
Figure H-5.1-2 Charlevoix RLME source geometry H-58
Figure H-5.2-1(a) Logic tree for Charleston RLME source H-59
Figure H-5.2-1(b) Logic tree for Charleston RLME source H-60
Figure H-5.2-2 Charleston RLME alternative source geometries H-61
Figure H-5.3-1 Logic tree for Cheraw RLME source H-62
Figure H-5.3-2 Cheraw RLME source geometry H-63
Figure H-5.4-1 Logic tree for Meers RLME source H-64
Figure H-5.4-2 Meers RLME source geometries H-65
Figure H-5.5-1 Logic tree for NMFS RLME source H-66
Figure H-5.5-2 New Madrid South (NMS) fault alternative RMLE source geometries: Blytheville Arch-Bootheel Lineament (BA-BL) and Blytheville Arch-Blytheville fault zone (BA-BFZ) H-67
Figure H-5.5-3 New Madrid North (NMN) fault alternative RMLE source geometries: New Madrid North (NMN_S) and New Madrid North plus extension (NMN_L) H-68
Figure H-5.5-4 Reelfoot Thrust (RFT) fault alternative RMLE source geometries: Reelfoot thrust (RFT_S) and Reelfoot thrust plus extensions (RFT_L) H-69
Figure H-5.6-1 Logic tree for ERM-S RLME source H-70
Figure H-5.6-2 Logic tree for ERM-N RLME source H-71
Figure H-5.6-3 ERM-S RLME source geometries H-72

Figure H-5.6-4 ERM-N RLME source geometry H-73
Figure H-5.7-1 Logic tree for Marianna RLME source H-74
Figure H-5.7-2 Marianna RLME source geometry H-75
Figure H-5.8-1 Logic tree for Commerce Fault Zone RLME source H-76
Figure H-5.8-2 Commerce RLME source geometry H-77
Figure H-5.9-1 Logic tree for Wabash Valley RLME source H-78
Figure H-5.9-2 Wabash Valley RLME source geometry H-79
Figure J-1 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 1 ..... J-2
Figure J-2 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 2 ..... J-3
Figure J-3 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 3 ..... J-4
Figure J-4 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 4 ..... J-5
Figure J-5 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 5 ..... J-6
Figure J-6 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 6 ..... J-7
Figure J-7 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 7 ..... J-8
Figure J-8 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 8 ..... J-9
Figure J-9 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case A magnitude weights J-10
Figure J-10 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 1 ..... J-11
Figure J-11 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 2 ..... J-12
Figure J-12 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 3 ..... J-13

Figure J-13 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 4 ..... J-14
Figure J-14 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 5 ..... J-15
Figure J-15 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 6 ..... J-16
Figure J-16 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 7 ..... J-17
Figure J-17 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 8 ..... J-18
Figure J-18 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case B magnitude weights..... J-19
Figure J-19 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 1 ..... J-20
Figure J-20 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 2 ..... J-21
Figure J-21 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 3 ..... J-22
Figure J-22 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 4 ..... J-23
Figure J-23 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 5 ..... J-24
Figure J-24 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 6 ..... J-25
Figure J-25 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 7 ..... J-26
Figure J-26 Map of the rate and *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 8 ..... J-27
Figure J-27 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with no separation of Mesozoic extended and non-extended; Case E magnitude weights..... J-28

Figure J-28 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 1 ..... J-29
Figure J-29 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 2 ..... J-30
Figure J-30 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 3 ..... J-31
Figure J-31 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 4 ..... J-32
Figure J-32 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 5 ..... J-33
Figure J-33 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 6 ..... J-34
Figure J-34 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 7 ..... J-35
Figure J-35 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 8 ..... J-36
Figure J-36 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights..... J-37
Figure J-37 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 1 ..... J-38
Figure J-38 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 2 ..... J-39
Figure J-39 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 3 ..... J-40
Figure J-40 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 4 ..... J-41
Figure J-41 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 5 ..... J-42
Figure J-42 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 6 ..... J-43

Figure J-43 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 7 ..... J-44
Figure J-44 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 8 ..... J-45
Figure J-45 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights..... J-46
Figure J-46 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 1 ..... J-47
Figure J-47 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 2 ..... J-48
Figure J-48 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 3 ..... J-49
Figure J-49 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 4 ..... J-50
Figure J-50 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 5 ..... J-51
Figure J-51 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 6 ..... J-52
Figure J-52 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 7 ..... J-53
Figure J-53 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 8 ..... J-54
Figure J-54 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights..... J-55
Figure J-55 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 1 ..... J-56
Figure J-56 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 2 ..... J-57
Figure J-57 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 3 ..... J-58

Figure J-58 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 4 ..... J-59
Figure J-59 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 5 ..... J-60
Figure J-60 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 6 ..... J-61
Figure J-61 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 7 ..... J-62
Figure J-62 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights: Realization 8 ..... J-63
Figure J-63 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case A magnitude weights..... J-64
Figure J-64 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 1 ..... J-65
Figure J-65 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 2 ..... J-66
Figure J-66 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 3 ..... J-67
Figure J-67 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 4 ..... J-68
Figure J-68 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 5 ..... J-69
Figure J-69 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 6 ..... J-70
Figure J-70 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 7 ..... J-71
Figure J-71 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights: Realization 8 ..... J-72
Figure J-72 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case B magnitude weights..... J-73

Figure J-73 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 1 ..... J-74
Figure J-74 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 2 ..... J-75
Figure J-75 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 3 ..... J-76
Figure J-76 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 4 ..... J-77
Figure J-77 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 5 ..... J-78
Figure J-78 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 6 ..... J-79
Figure J-79 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 7 ..... J-80
Figure J-80 Map of the rate and *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights: Realization 8 ..... J-81
Figure J-81 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the Mmax zonation, with separation of Mesozoic extended and non-extended; Case E magnitude weights..... J-82
Figure J-82 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 1 ..... J-83
Figure J-83 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 2 ..... J-84
Figure J-84 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 3 ..... J-85
Figure J-85 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 4 ..... J-86
Figure J-86 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 5 ..... J-87
Figure J-87 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 6 ..... J-88

Figure J-88 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 7 ..... J-89
Figure J-89 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 8 ..... J-90
Figure J-90 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights J-91
Figure J-91 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 1 ..... J-92
Figure J-92 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 2 ..... J-93
Figure J-93 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 3 ..... J-94
Figure J-94 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 4 ..... J-95
Figure J-95 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 5 ..... J-96
Figure J-96 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 6 ..... J-97
Figure J-97 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 7 ..... J-98
Figure J-98 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 8 ..... J-99
Figure J-99 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights J-100
Figure J-100 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 1 ..... J-101
Figure J-101 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 2 ..... J-102
Figure J-102 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 3 ..... J-103

Figure J-103 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 4 ..... J-104
Figure J-104 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 5 ..... J-105
Figure J-105 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 6 ..... J-106
Figure J-106 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 7 ..... J-107
Figure J-107 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 8 ..... J-108
Figure J-108 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights J-109
Figure J-109 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 1 ..... J-110
Figure J-110 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 2 ..... J-111
Figure J-111 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 3 ..... J-112
Figure J-112 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 4 ..... J-113
Figure J-113 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 5 ..... J-114
Figure J-114 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 6 ..... J-115
Figure J-115 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 7 ..... J-116
Figure J-116 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights: Realization 8 ..... J-117
Figure J-117 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case A magnitude weights J-118

Figure J-118 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 1 ..... J-119
Figure J-119 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 2 ..... J-120
Figure J-120 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 3 ..... J-121
Figure J-121 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 4 ..... J-122
Figure J-122 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 5 ..... J-123
Figure J-123 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 6 ..... J-124
Figure J-124 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 7 ..... J-125
Figure J-125 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights: Realization 8 ..... J-126
Figure J-126 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case B magnitude weights J-127
Figure J-127 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 1 ..... J-128
Figure J-128 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 2 ..... J-129
Figure J-129 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 3 ..... J-130
Figure J-130 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 4 ..... J-131
Figure J-131 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 5 ..... J-132
Figure J-132 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 6 ..... J-133

Figure J-133 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 7 ..... J-134
Figure J-134 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights: Realization 8 ..... J-135
Figure J-135 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with narrow interpretation of PEZ; Case E magnitude weights J-136
Figure J-136 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 1 ... J-137
Figure J-137 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 2 ... J-138
Figure J-138 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 3 ... J-139
Figure J-139 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 4 ... J-140
Figure J-140 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 5 ... J-141
Figure J-141 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 6 ... J-142
Figure J-142 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 7 ... J-143
Figure J-143 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 8 ... J-144
Figure J-144 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights J-145
Figure J-145 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 1 ... J-146
Figure J-146 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 2 ... J-147
Figure J-147 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 3 ... J-148
Figure J-148 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 4 ... J-149
Figure J-149 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 5 ... J-150
Figure J-150 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 6 ... J-151
Figure J-151 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 7 ... J-152
Figure J-152 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 8 ... J-153

Figure J-153 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights J-154
Figure J-154 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 1 ... J-155
Figure J-155 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 2 ... J-156
Figure J-156 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 3 ... J-157
Figure J-157 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 4 ... J-158
Figure J-158 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 5 ... J-159
Figure J-159 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 6 ... J-160
Figure J-160 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 7 ... J-161
Figure J-161 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 8 ... J-162
Figure J-162 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights J-163
Figure J-163 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 1 ... J-164
Figure J-164 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 2 ... J-165
Figure J-165 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 3 ... J-166
Figure J-166 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 4 ... J-167
Figure J-167 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 5 ... J-168
Figure J-168 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 6 ... J-169
Figure J-169 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 7 ... J-170
Figure J-170 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights: Realization 8 ... J-171
Figure J-171 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case A magnitude weights J-172
Figure J-172 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 1 ... J-173

Figure J-173 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 2 ... J-174
Figure J-174 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 3 ... J-175
Figure J-175 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 4 ... J-176
Figure J-176 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 5 ... J-177
Figure J-177 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 6 ... J-178
Figure J-178 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 7 ... J-179
Figure J-179 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights: Realization 8 ... J-180
Figure J-180 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case B magnitude weights J-181
Figure J-181 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 1 ... J-182
Figure J-182 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 2 ... J-183
Figure J-183 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 3 ... J-184
Figure J-184 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 4 ... J-185
Figure J-185 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 5 ... J-186
Figure J-186 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 6 ... J-187
Figure J-187 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 7 ... J-188
Figure J-188 Map of the rate and *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights: Realization 8 ... J-189
Figure J-189 Map of the coefficient of variation of the rate and the standard deviation of the *b*-value for the study region under the seismotectonic zonation, with wide interpretation of PEZ; Case E magnitude weights J-190
Figure K-1 Comparison of relationships between number of reporting stations and moment magnitude presented in Johnston et al. (1994) and Johnston (1996b). K-41
Figure K-2 Comparison of relationships between isoseismal areas and moment magnitude presented in Johnston et al. (1994) and Johnston (1996b). K-42