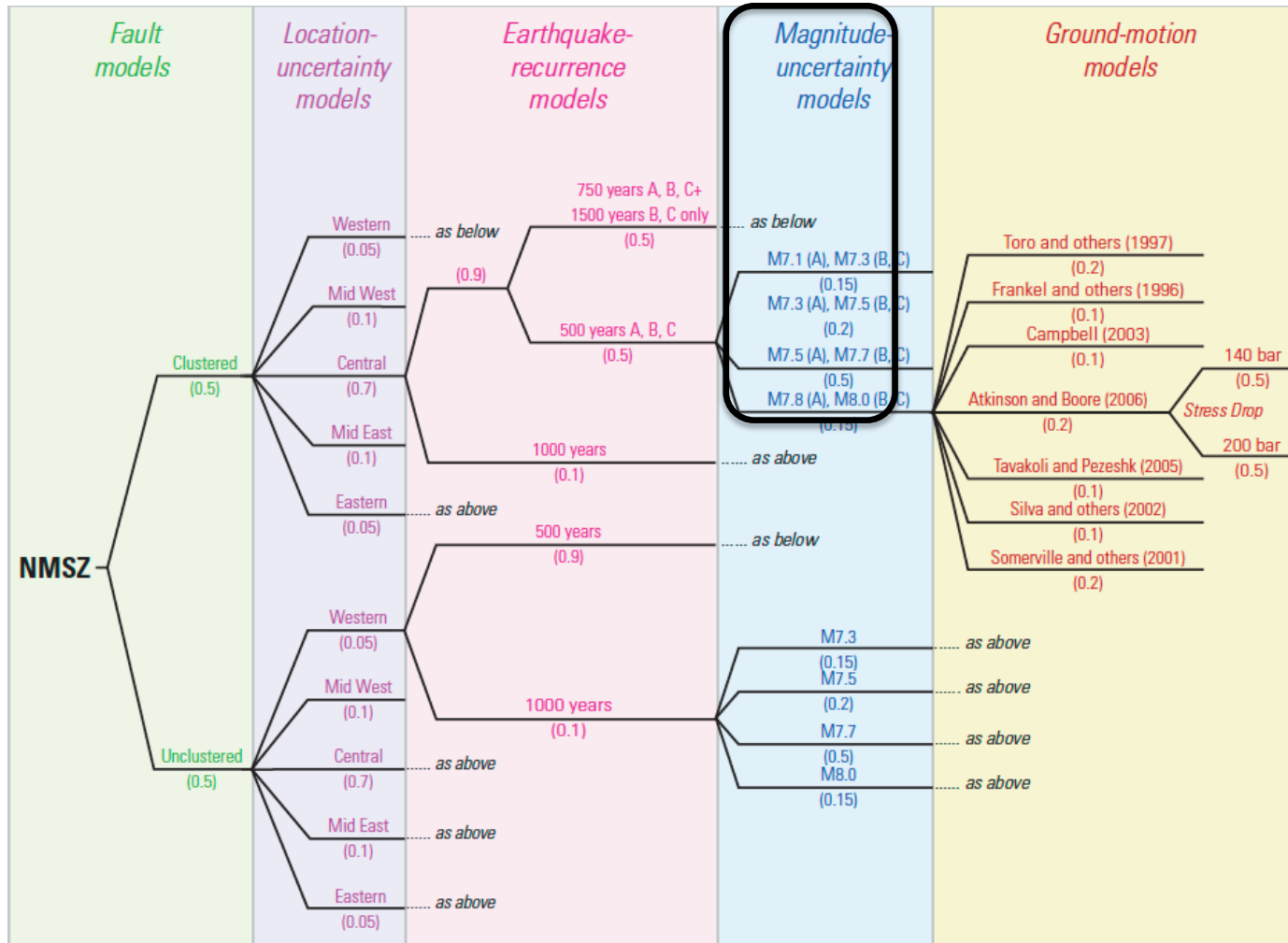# New Madrid fault sources: MAGNITUDE

CEUS workshop
2014 National Seismic Hazard Maps
February 22–23, 2012
Memphis, TN

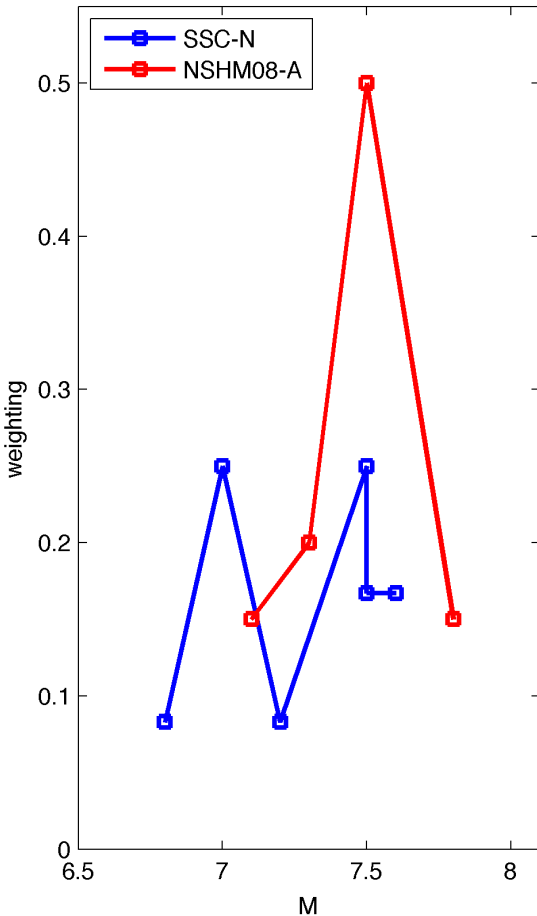# New Madrid fault source (NM): sensitivity tests to seismic hazard

- Description of 2008 National Seismic Hazard Map (NSHM) logic tree for NM
- Sensitivity tests for NM magnitudes:
  - CEUS–SSC NM magnitude distribution
  - Proposed NM magnitude distribution
  - CEUS–SSC magnitude and annual frequency distribution

Sensitivity test 2:
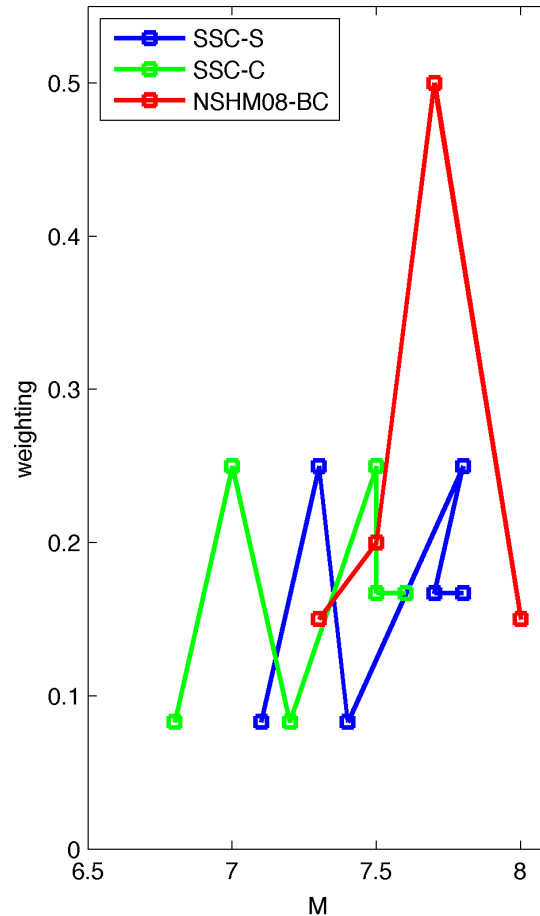# CEUS–SSC magnitude distribution

Sensitivity test 2:
CEUS–SSC NM magnitude distribution

Northern segment, NMFS

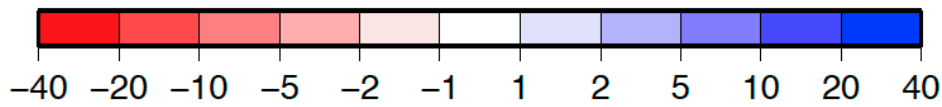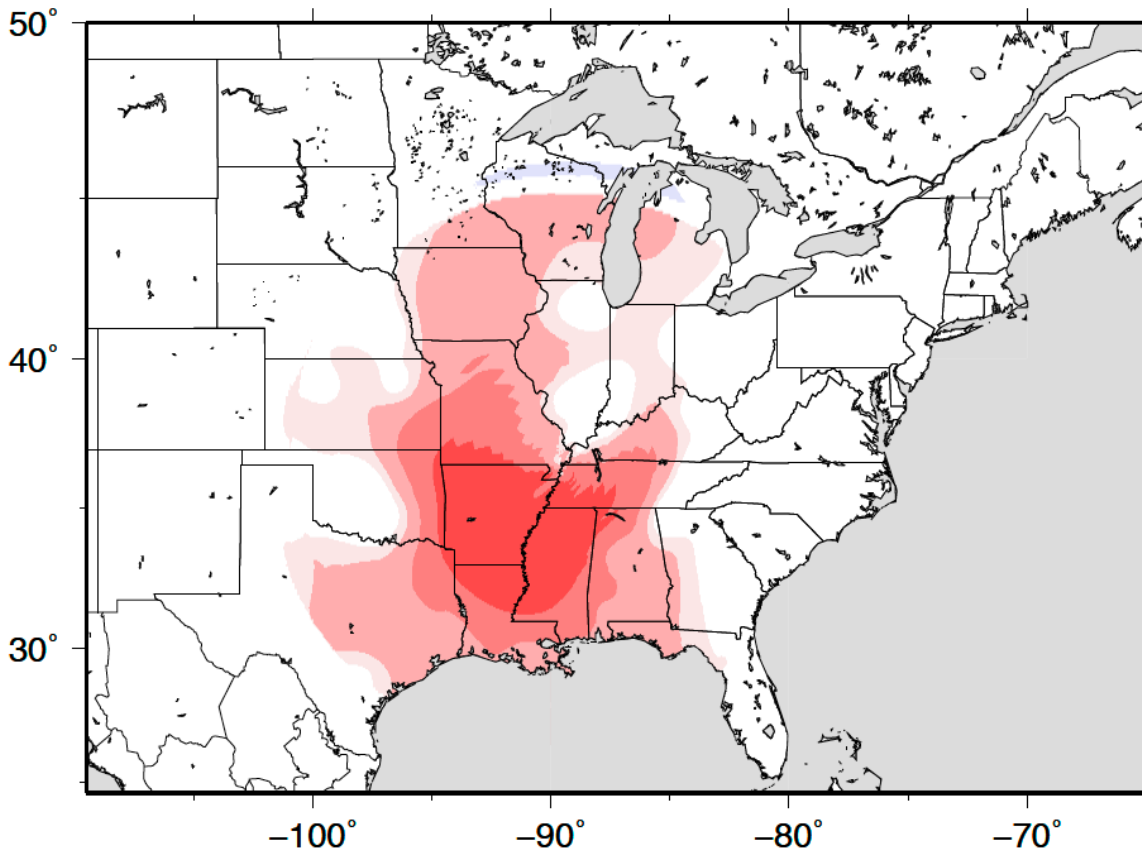Central/Southern segment, NMFS

Weighted averages:

Northern segment: 7.31 (CEUS/SSC)/ 7.45 (NSHM–2008)

Central/southern segment: 7.56/7.40 (CEUS–SSC) / 7.65 (NSHM–2008)

CEUS-SSC

NMS(S)	RFT(C)	RMN(N)	Weight
7.9	7.8	7.6	0.167
7.8	7.7	7.5	0.167
7.6	7.8	7.5	0.25
7.2	7.4	7.2	0.083
6.9	7.3	7	0.25
6.7	7.1	6.8	0.083

NSHM, 2008

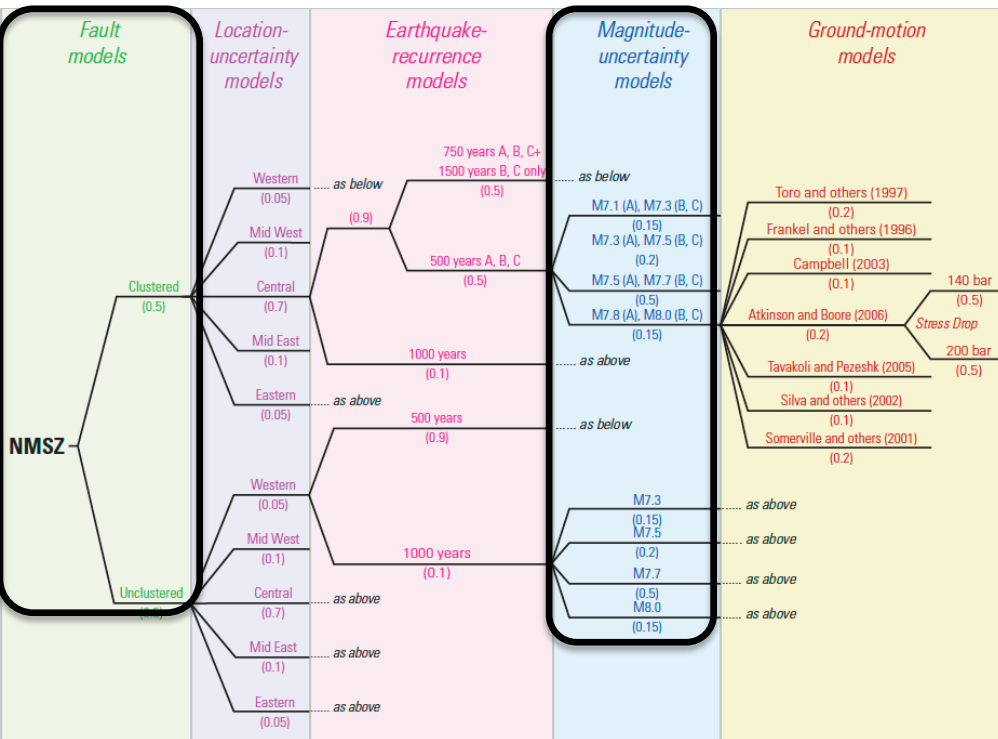| BC(C/S)	A(N)	Weight
7.3	7.1	0.15
7.5	7.3	0.2
7.7	7.5	0.5
8.0	7.8	0.15

Sensitivity test 2:
CEUS–SSC NM magnitude distribution

Percent difference (CEUS–SSC NM magnitude distribution relative to NSHM–2008)
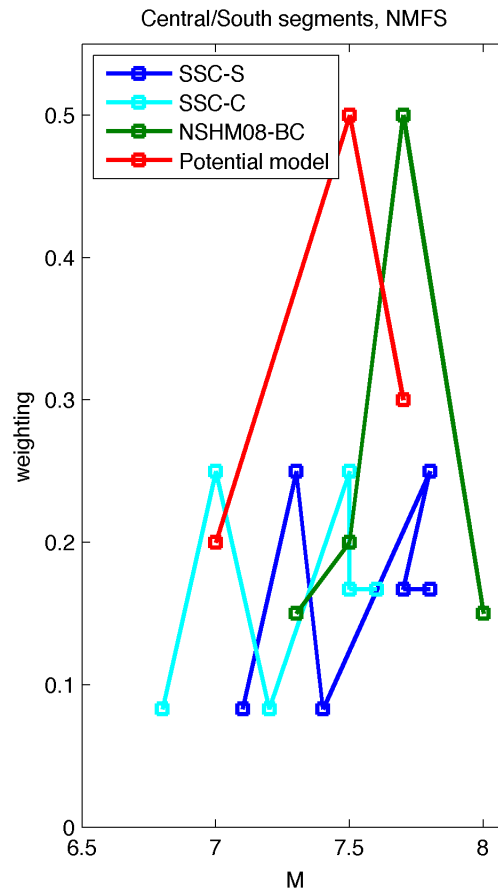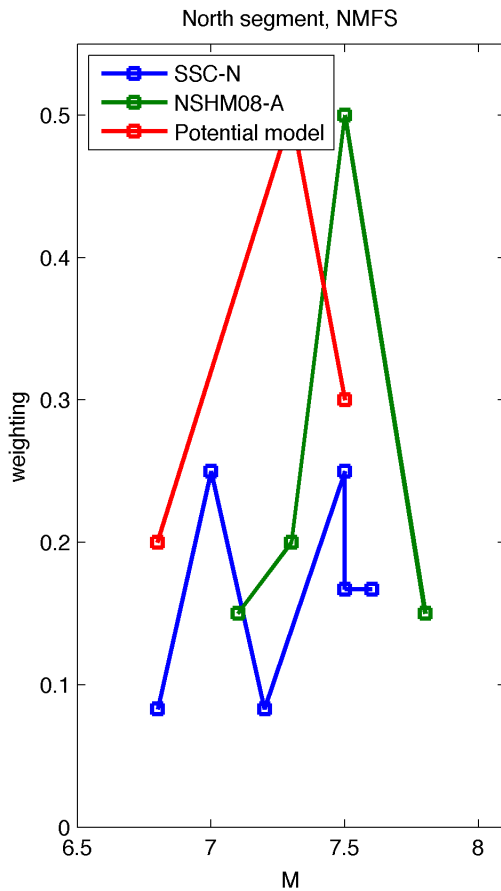
Sensitivity test 2b
NSHM proposed model for NMFS

- Modified fault model weightings: (proposed/NSHM-08)
  - Clustered, 0.7 (0.5)
  - Unclustered, 0.2 (0.5)
  - Turned-off, 0.1 (0.0)
- Modified magnitude distribution

Sensitivity test 2b
Proposed magnitude distribution

North segment, NMFS

Central/South segments, NMFS

Weighted averages:

Northern segment: 7.31 (CEUS/SSC)/ 7.45 (NSHM–2008) / 7.26 (NSHM–P)

Central/southern segment: 7.56/7.40 (CEUS–SSC) / 7.65 (NSHM–2008) / 7.46 (NSHM–P)

CEUS-SSC

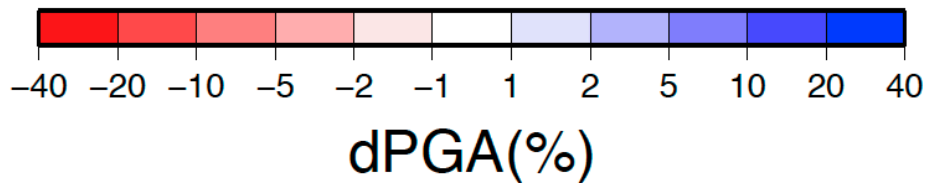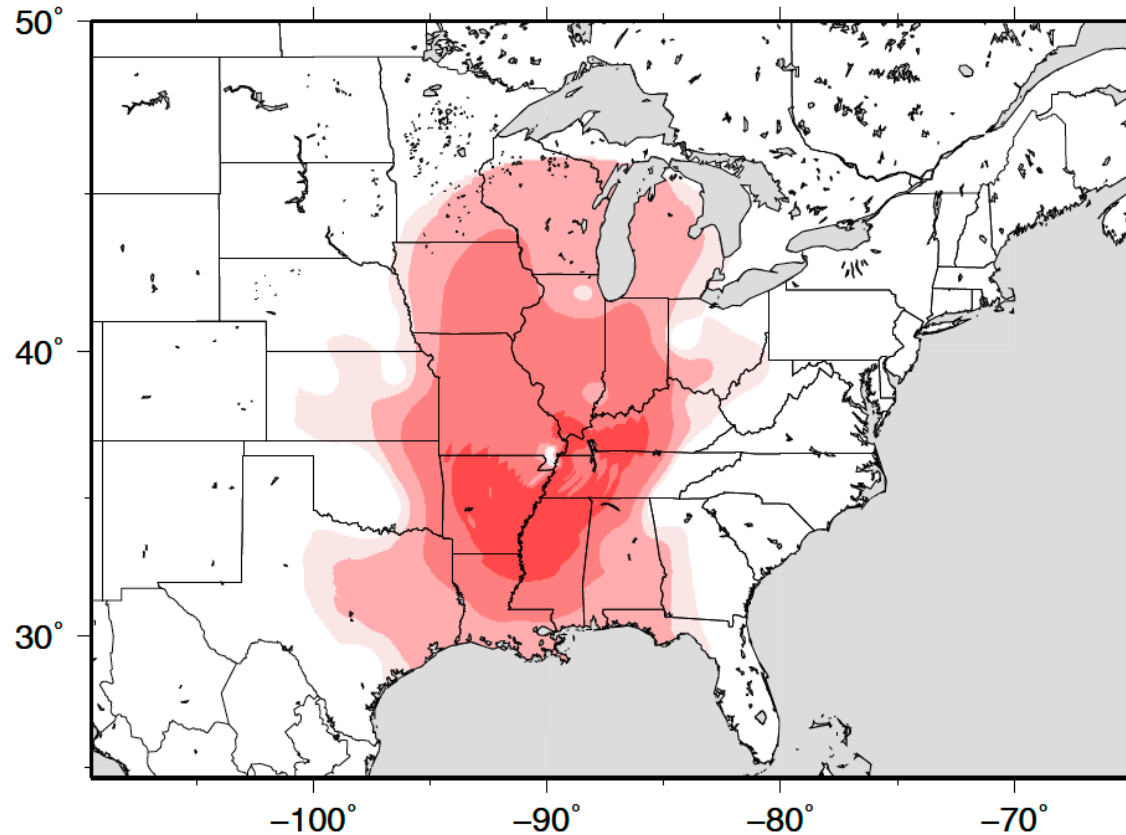| NMS(S)	RFT(C)	RMN(N)	Weight
7.9	7.8	7.6	0.167
7.8	7.7	7.5	0.167
7.6	7.8	7.5	0.25
7.2	7.4	7.2	0.083
6.9	7.3	7	0.25
6.7	7.1	6.8	0.083

NSHM, 2008

BC(C/S)	A(N)	Weight
7.3	7.1	0.15
7.5	7.3	0.2
7.7	7.5	0.5
8.0	7.8	0.15

NSHM, proposed

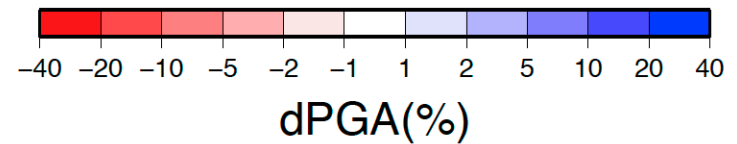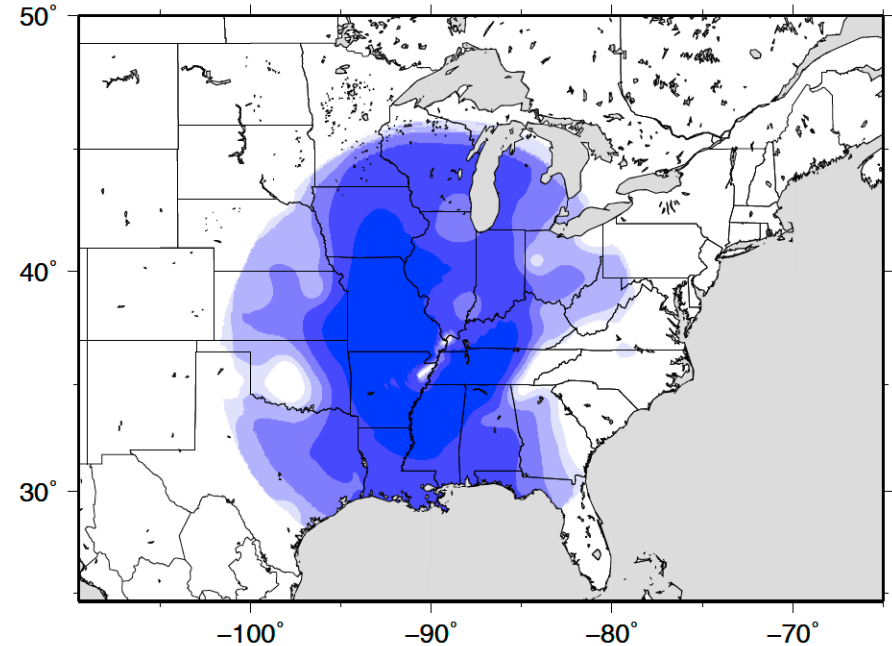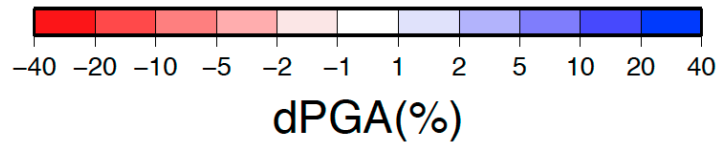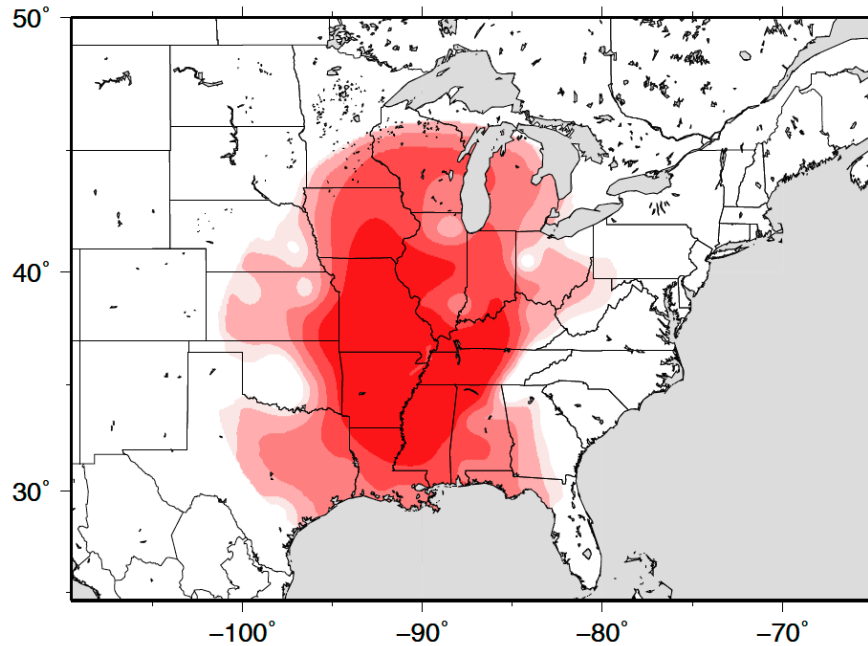| BC(C/S)	A(N)	Weight
7.0	6.8	0.2
7.5	7.3	0.5
7.7	7.5	0.3

Sensitivity test 2b:
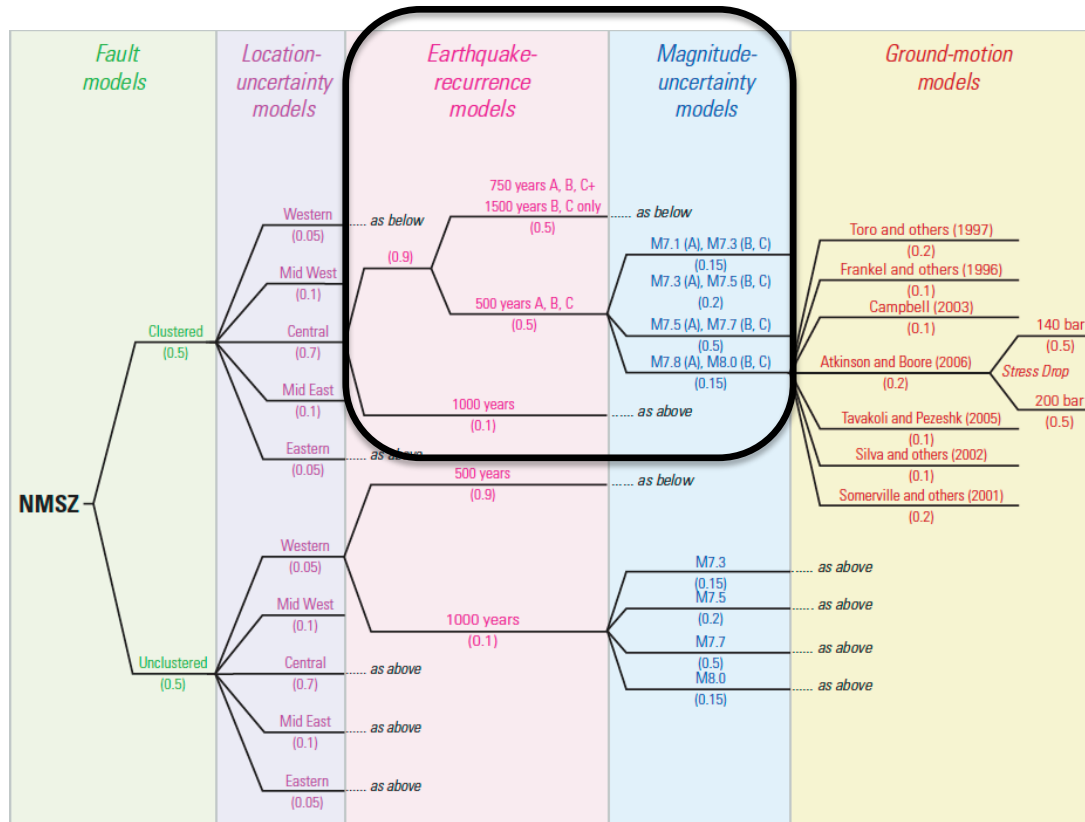# NSHM proposed model for NMFS
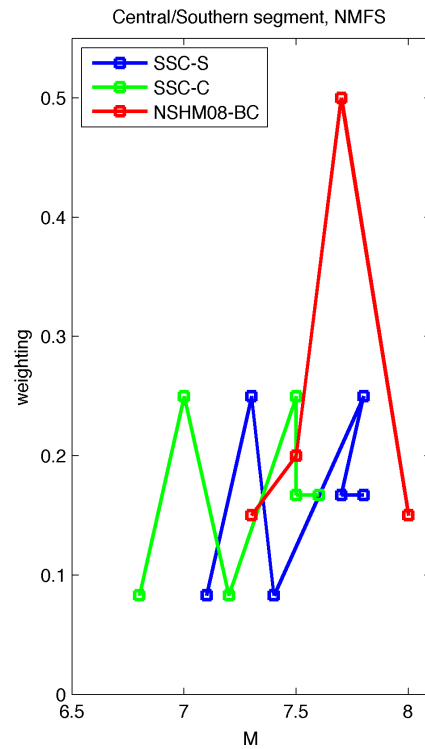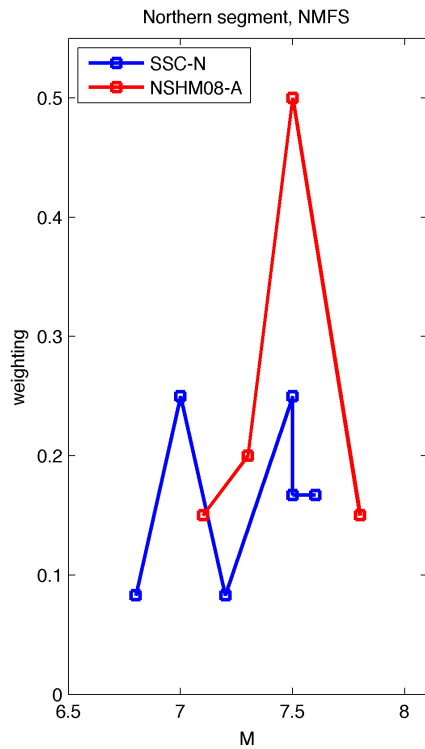

- 10–20% reduction in PGA (2%50yr)
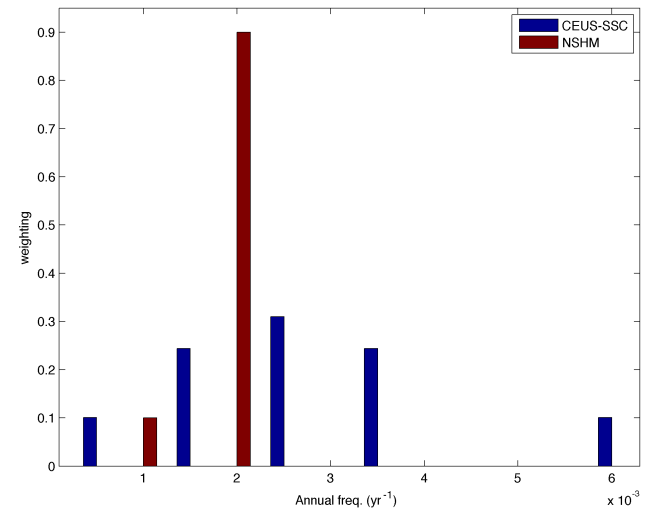
Sensitivity test 2b:
Magnitude end–members, M6.8 and M8.0

Sensitivity test 4:
CEUS–SSC magnitude & rate distribution

Sensitivity test 4:
CEUS–SSC magnitude & frequency distribution

Sensitivity test 4:
CEUS–SSC magnitude & frequency distribution

dPGA(%)