Sensitivity of hazard to changes in ETSZ

Presentation to NRC

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Robin K. McGuire

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Considerations in revising ETSZ interpretations

- If m_{max} values for ETSZ are updated because of later interpretations, then seismic activity rates since 1984 should also be updated.
- Seismic activity rates in the CEUS have, in general, slightly decreased since 1984, compared with rates prior to 1984.

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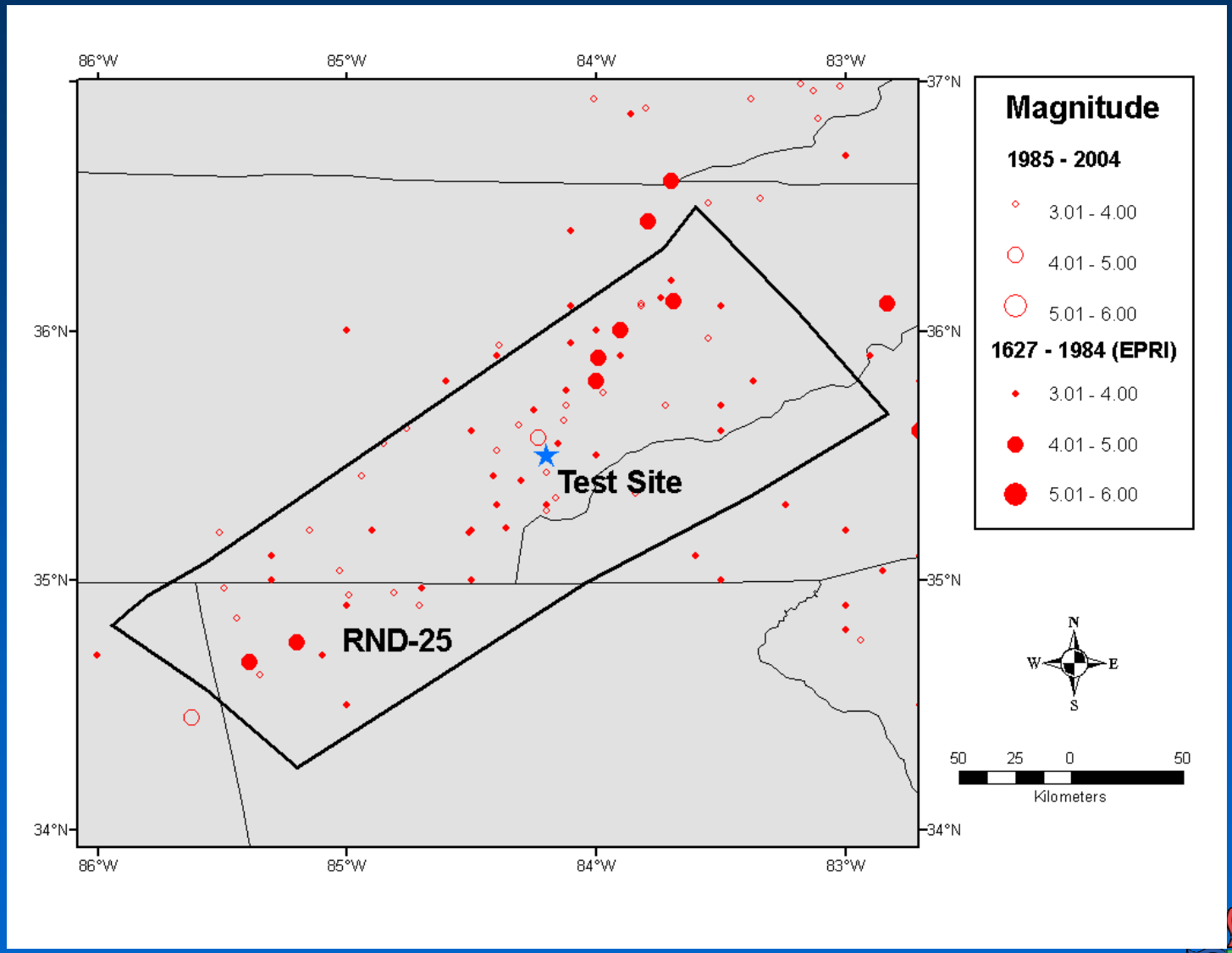
Seismicity in ETSZ and Rondout source 25



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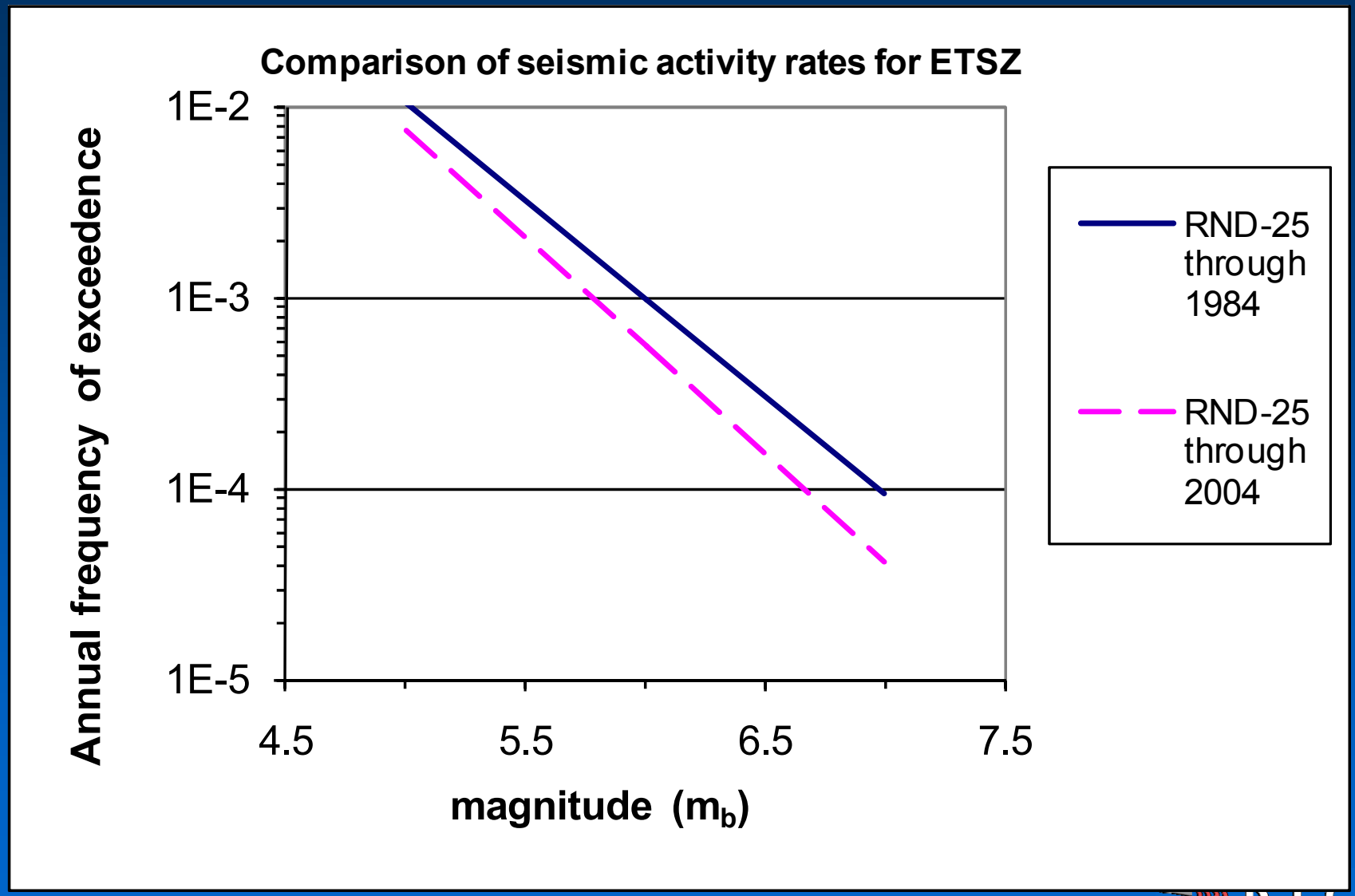
Seismic activity rates in Rondout source 25



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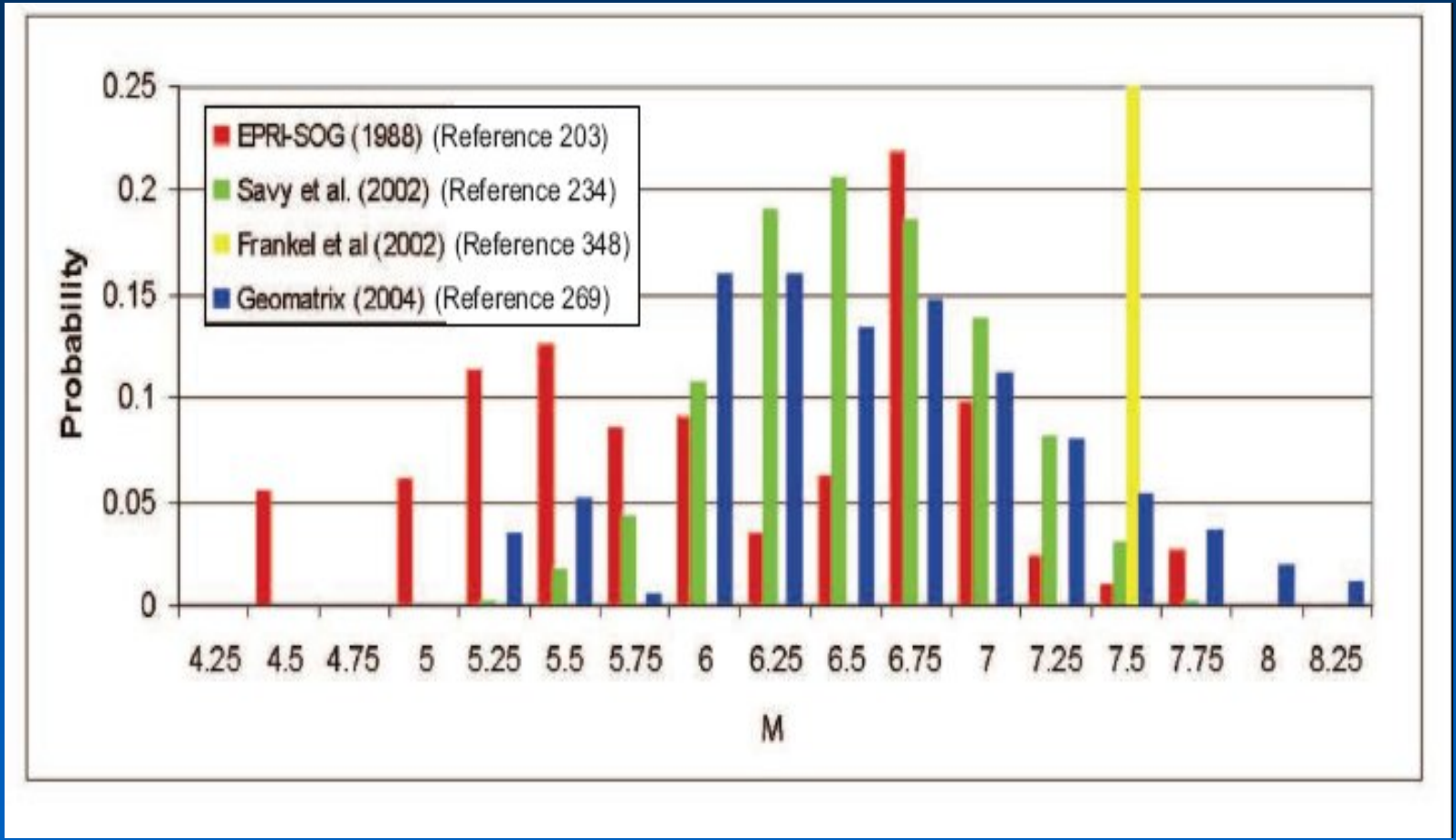
Mmax distributions from Bellefonte 2.5.2



	mean $\mathbf{M}_{max}$	mean $m_{b,max}$
EPRI-SOG	6.08	6.3
Savy (TIP)	6.55	6.7
Geomatrix	6.58	6.7

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Comparative analyses for site located in ETSZ in center of Rondout source RND-25

- Base case: EPRI-SOG rates and $m_{b,max}$ =6.3
- Sens #1: EPRI-SOG rates and $m_{b,max}$ =6.7
- Sens #2: Updated rates and $m_{b,max}$ =6.3
- Sens #3: Updated rates and $m_{b,max}$ =6.7

NOTE: EPRI 2004 equations are used but no CAV filter is applied, CAV filter would decrease these hazard results

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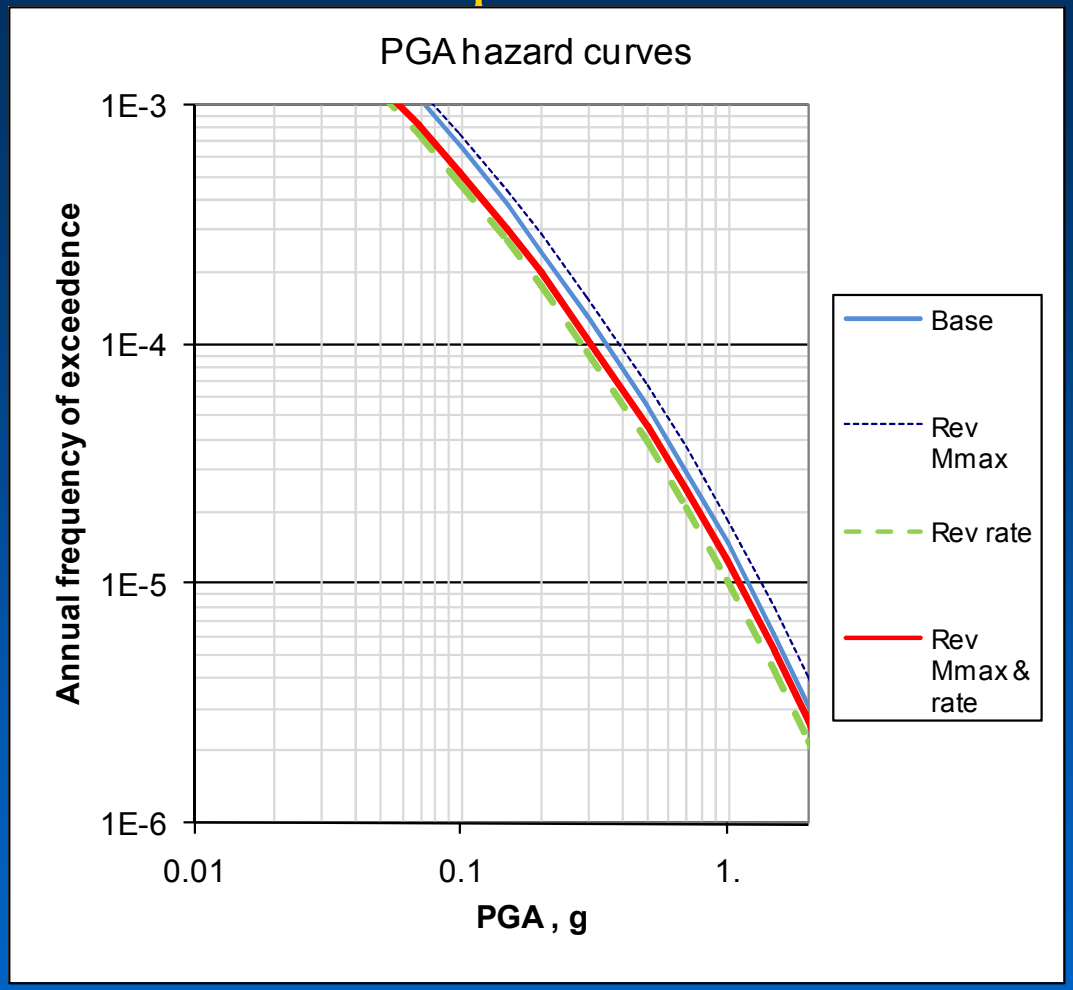
Hazard comparison for PGA



Conclusion: updating ETSZ decreases PGA hazard

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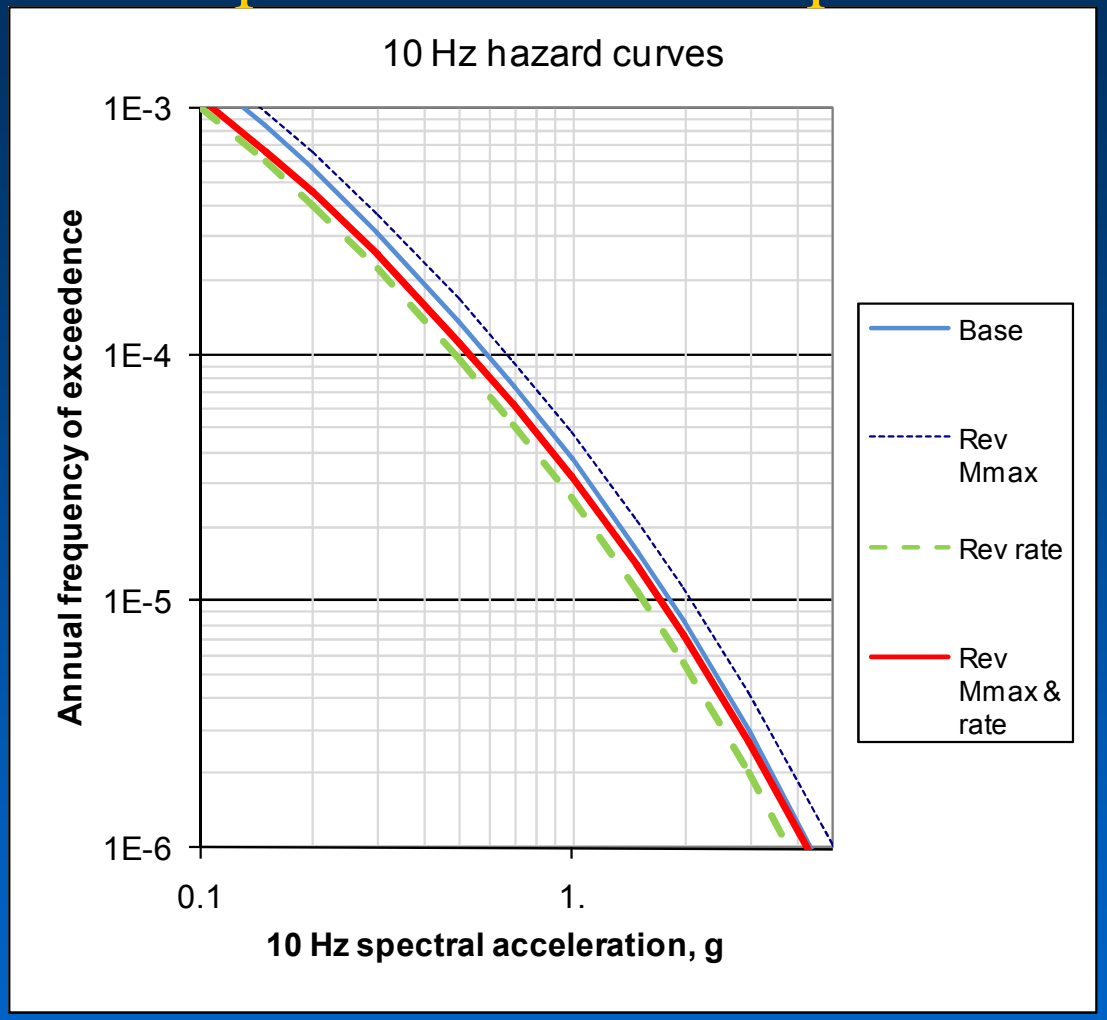
Hazard comparison for 10 Hz spectral acceleration



Conclusion: updating ETSZ decreases 10 Hz hazard

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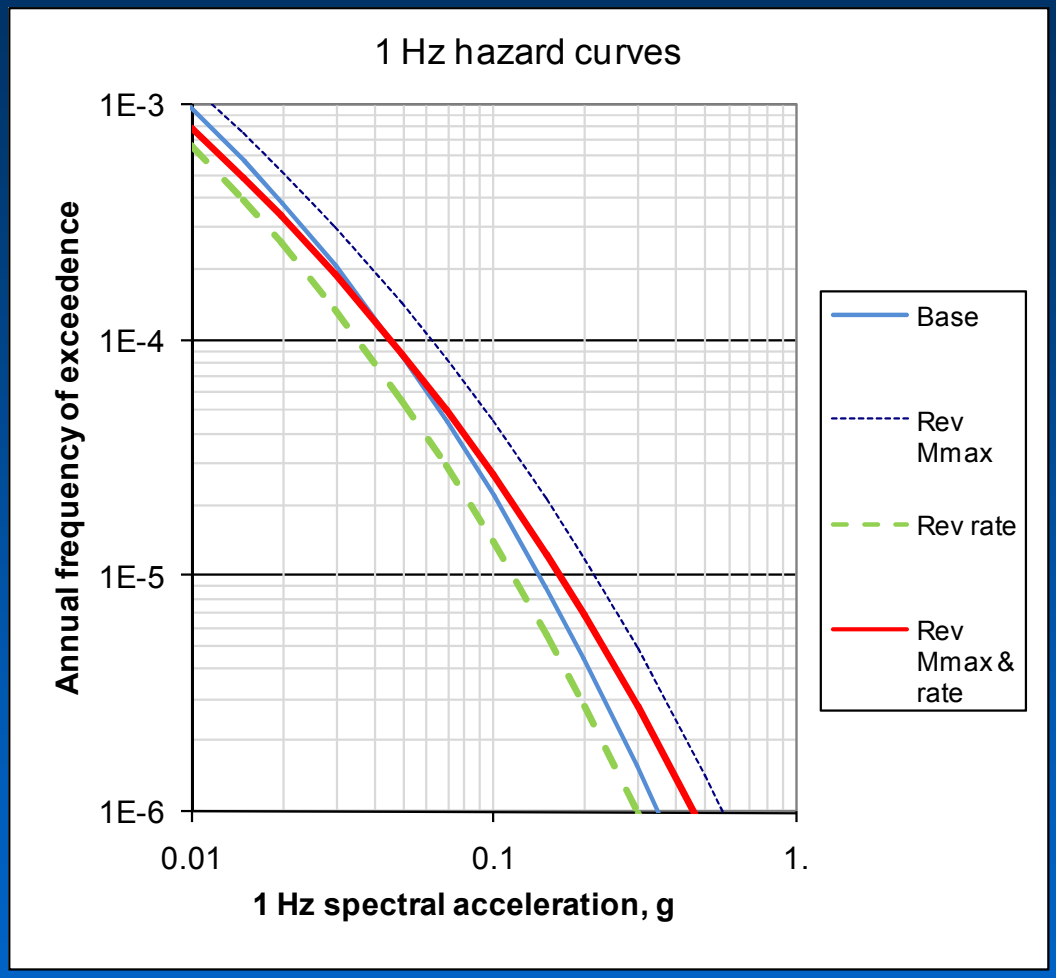
Hazard comparison for 1 Hz spectral acceleration



Conclusion: updating ETSZ leads to small increase in 1 Hz hazard below 10^{-4}

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Effect of updated ETSZ on GMRS

		1E-4	1E-5	AR	DF	GMRS	% change
Base case	PGA	0.355	1.200	3.39	1.59	0.564	---
	10 Hz	0.598	1.843	3.08	1.48	0.883	---
	1 Hz	0.046	0.143	3.12	1.49	0.068	---
Revised Mmax	PGA	0.398	1.347	3.39	1.59	0.633	12.2%
	10 Hz	0.676	2.105	3.12	1.49	1.006	14.0%
	1 Hz	0.063	0.217	3.44	1.61	0.102	49.1%
Revised rate	PGA	0.287	1.016	3.54	1.65	0.474	-16.1%
	10 Hz	0.488	1.569	3.21	1.53	0.745	-15.6%
	1 Hz	0.036	0.116	3.24	1.54	0.055	-19.0%
Revised Mmax	PGA	0.314	1.113	3.54	1.65	0.518	-8.1%
and rate	10 Hz	0.536	1.745	3.25	1.54	0.827	-6.3%
	1 Hz	0.046	0.167	3.61	1.68	0.078	13.7%

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Conclusions

1. Sensitivity to new interpretations of maximum magnitude and to updated seismicity rates in ETSZ leads to a decrease in GMRS for high frequencies, and a slight increase for low frequencies.
2. This generic sensitivity study indicates that the maximum increase expected for low frequencies will be less than 14% for sites where other sources contribute to hazard.
3. Including other sources (Charleston, New Madrid) would decrease this effect, particularly for low frequencies.
4. This is an example of how the effect of new interpretations can be resolved on a generic basis.

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Dames and Moore Interpretations

1. At Harris site a modification of Dames and Moore background source activity from 0.27 to 1.0 for the local background earthquake.
2. The overall effect of this change was less than a few percent on mean hazard.
3. Vogtle study showed similar low sensitivity to Dames and Moore interpretation.
4. Effect of alternative Dames and Moore interpretations is very minor.

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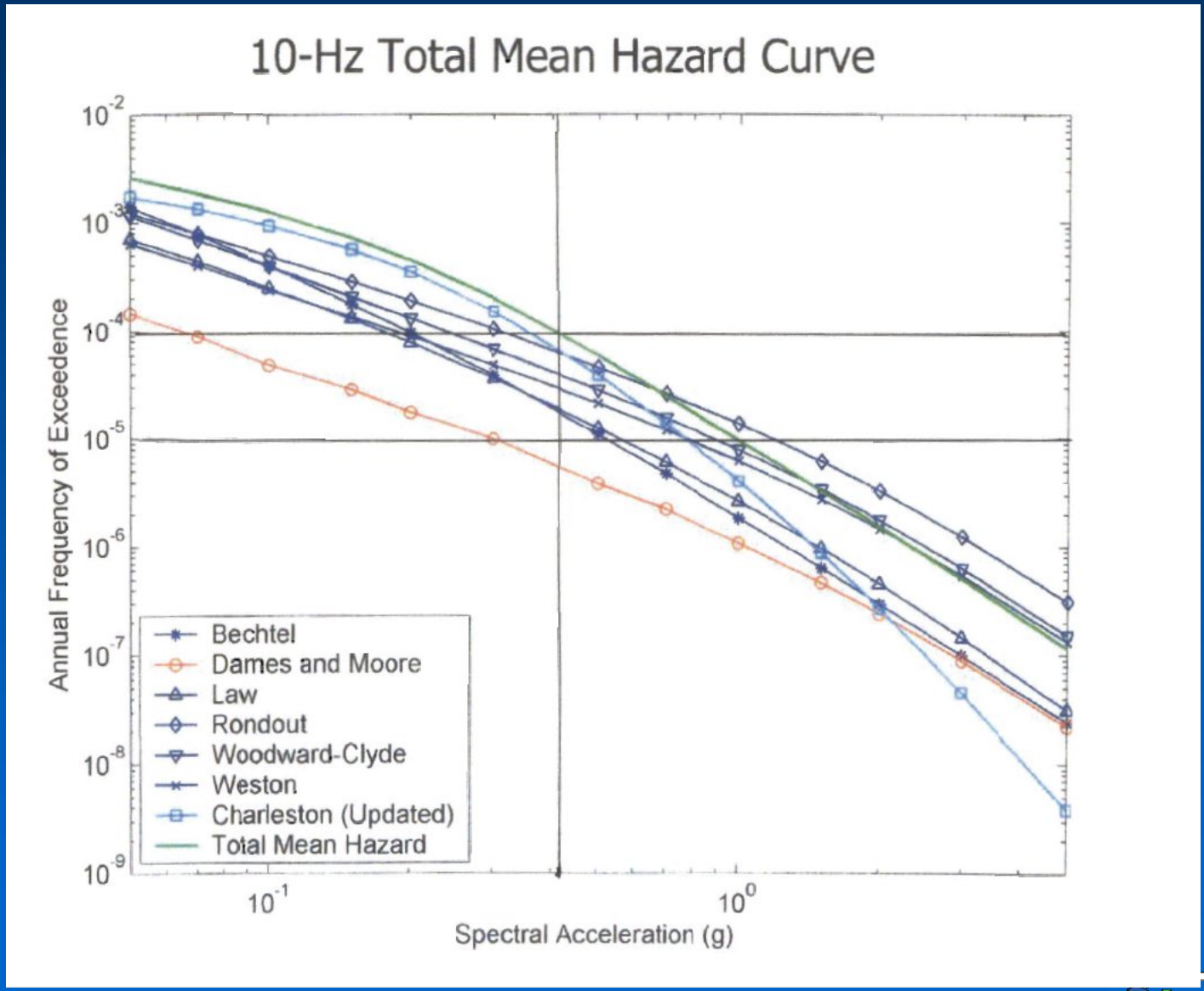
Individual hazard curves for Vogtle by EPRI-SOG team



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Effect on Vogtle hazard of removing individual EPRI-SOG teams

Table 1
Contribution to Mean
Annual Frequency of Exceedance (AFE)
for $SA_{10Hz} = 0.42g$

Contributor		Mean AFE ($x10^{-5}$)
Charleston	H_C	6.6
Rondout	H_R	6.6
Woodward-Clyde	H_{WC}	4.1
Weston	H_{We}	3.0
Law	H_L	2.6
Bechtel	H_B	2.4
Dames & Moore	H_{DM}	0.6
Total	H	9.8

Table 2
Comparison of Mean AFE
When Teams Are Deleted

	Mean AFE ($x10^{-5}$)
All 6	9.8
Delete H_{DM}	10.3
Delete H_R	9.1
Delete $H_{DM} + H_R$	9.6

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