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NRC / INDUSTRY PUBLIC MEETING

Pre-COL Geotechnical and Seismic Design Status

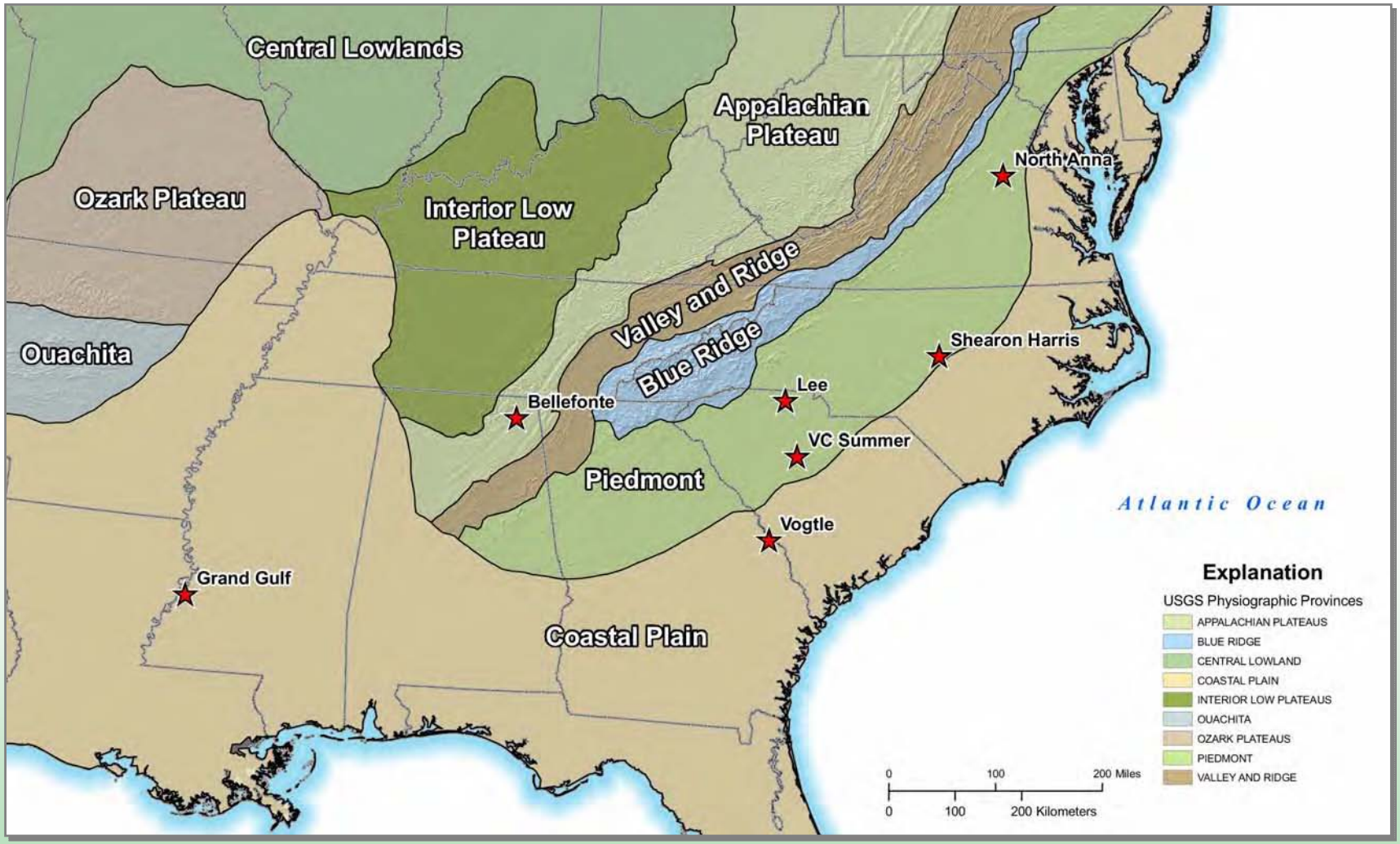
Geologic and Seismic Overview of the Southeastern US

William Lettis

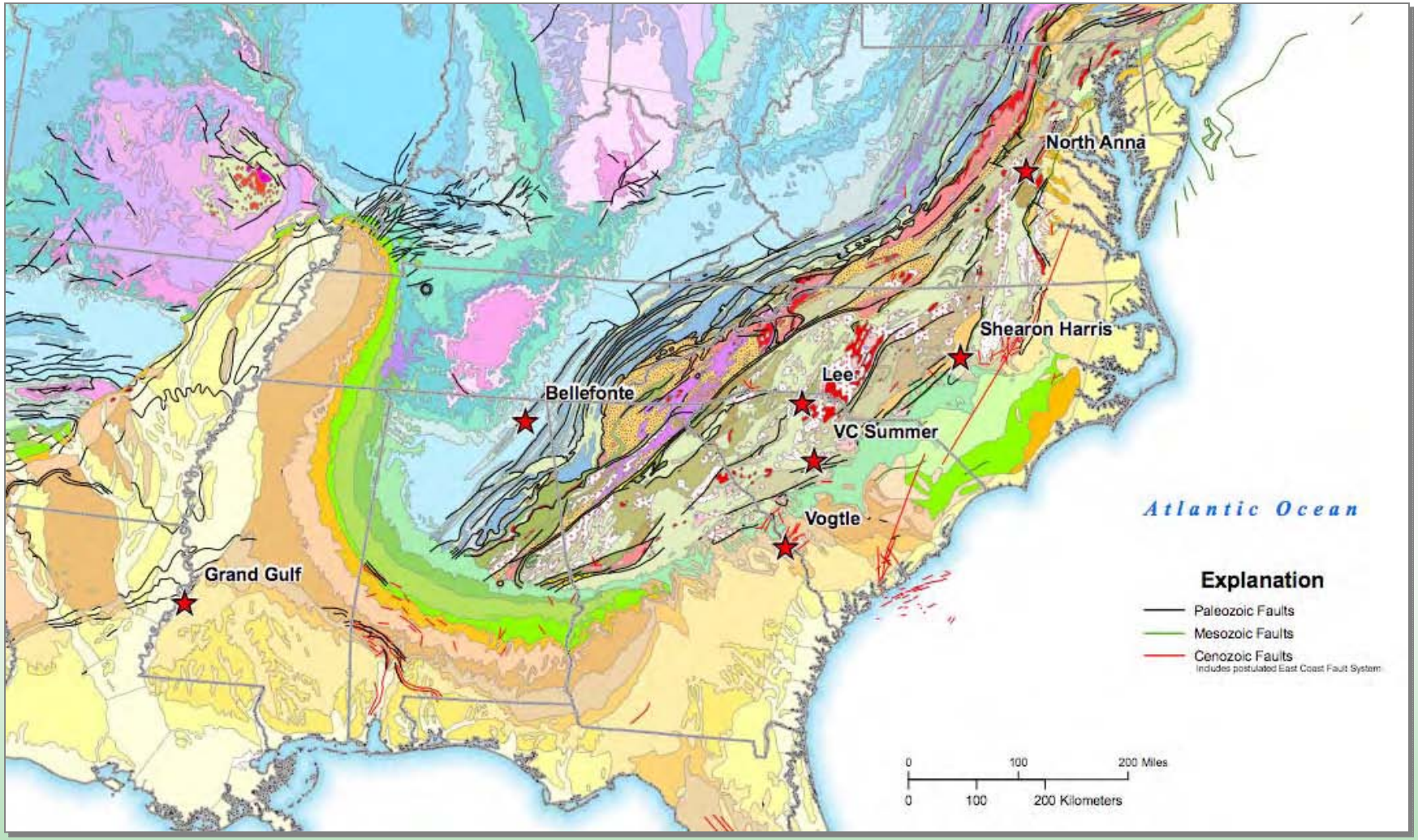
William Lettis & Associates, Inc.

March 1, 2007

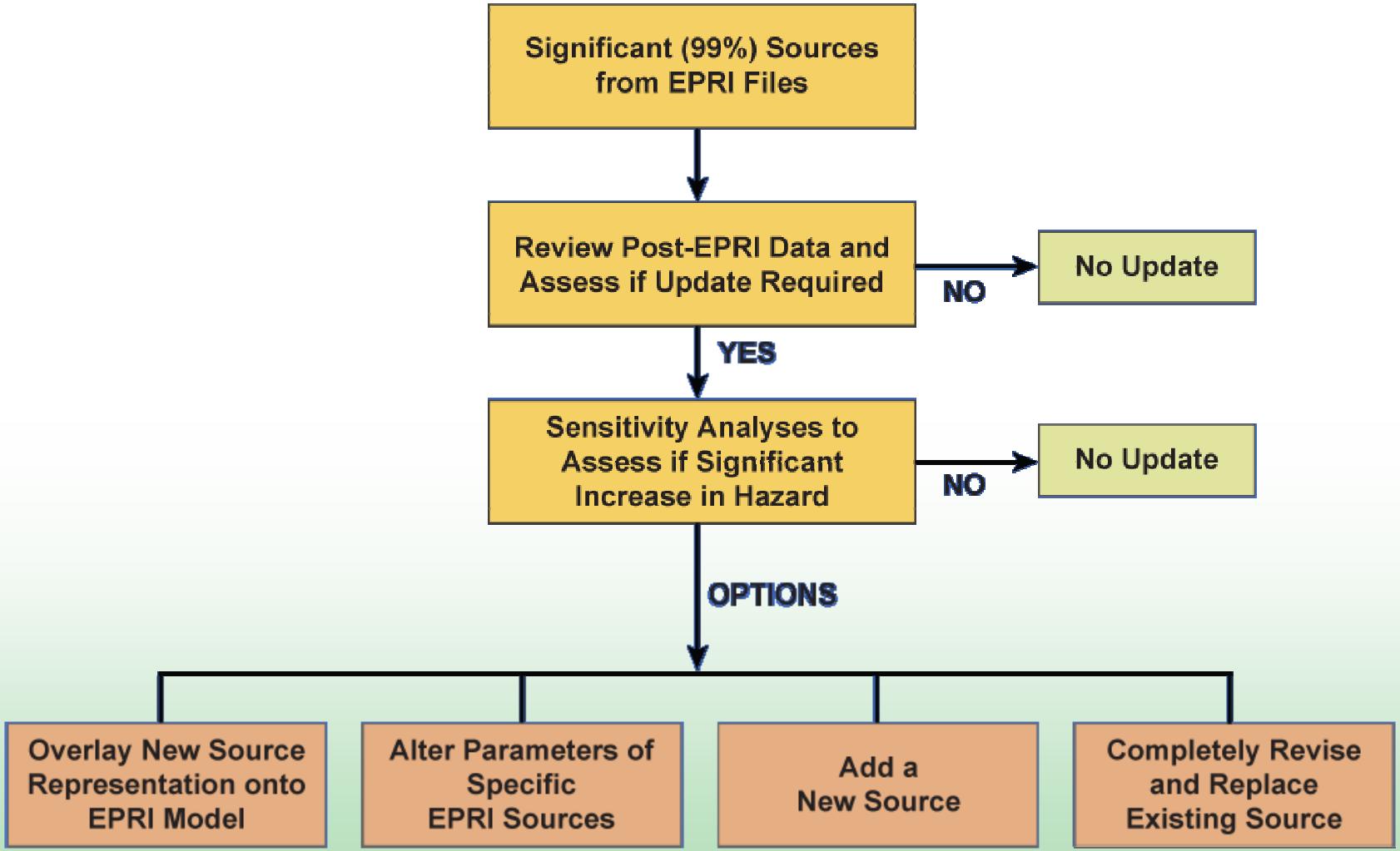
Physiographic Provinces

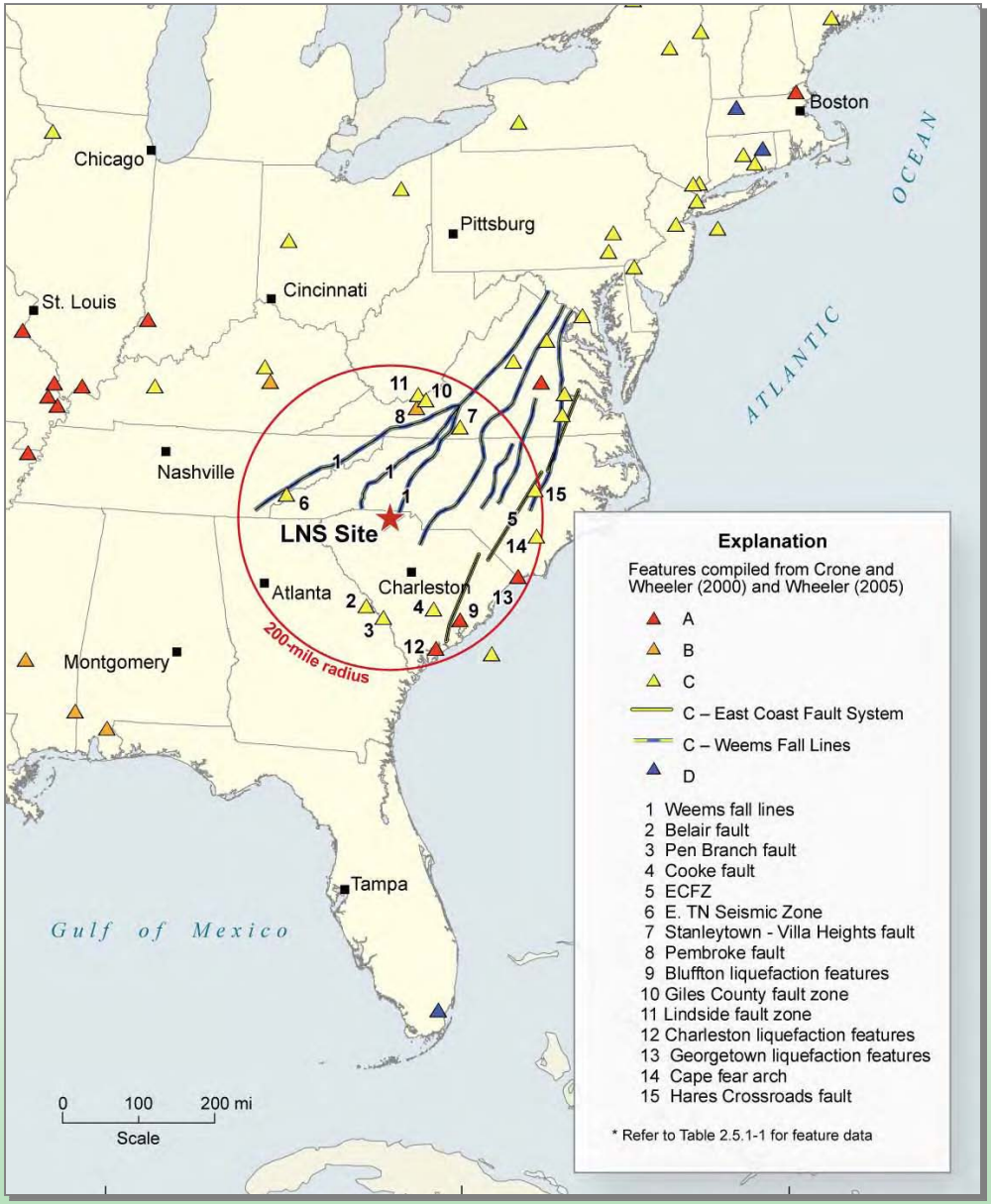


Geology of the SEUS



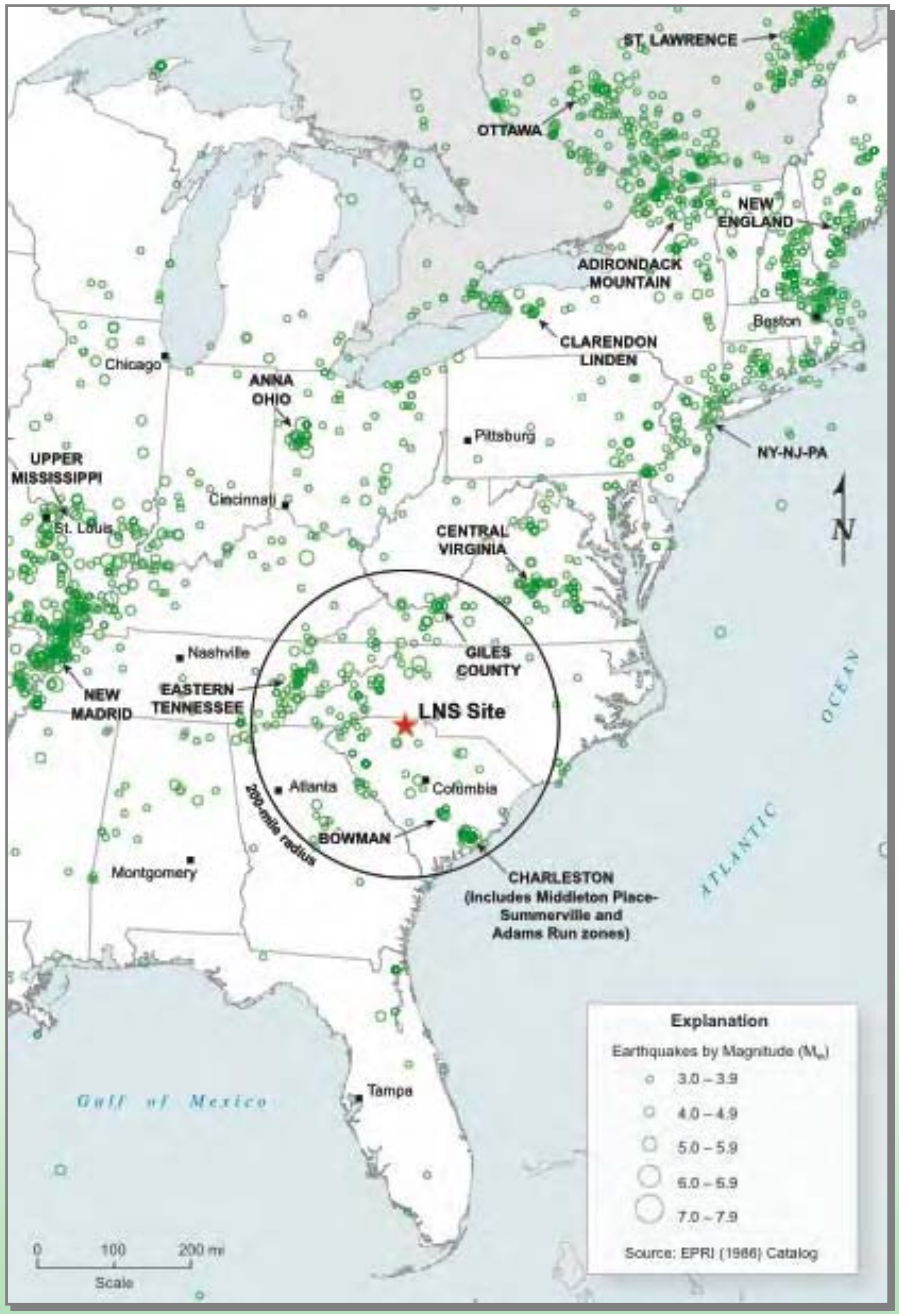
Review of EPRI Sources



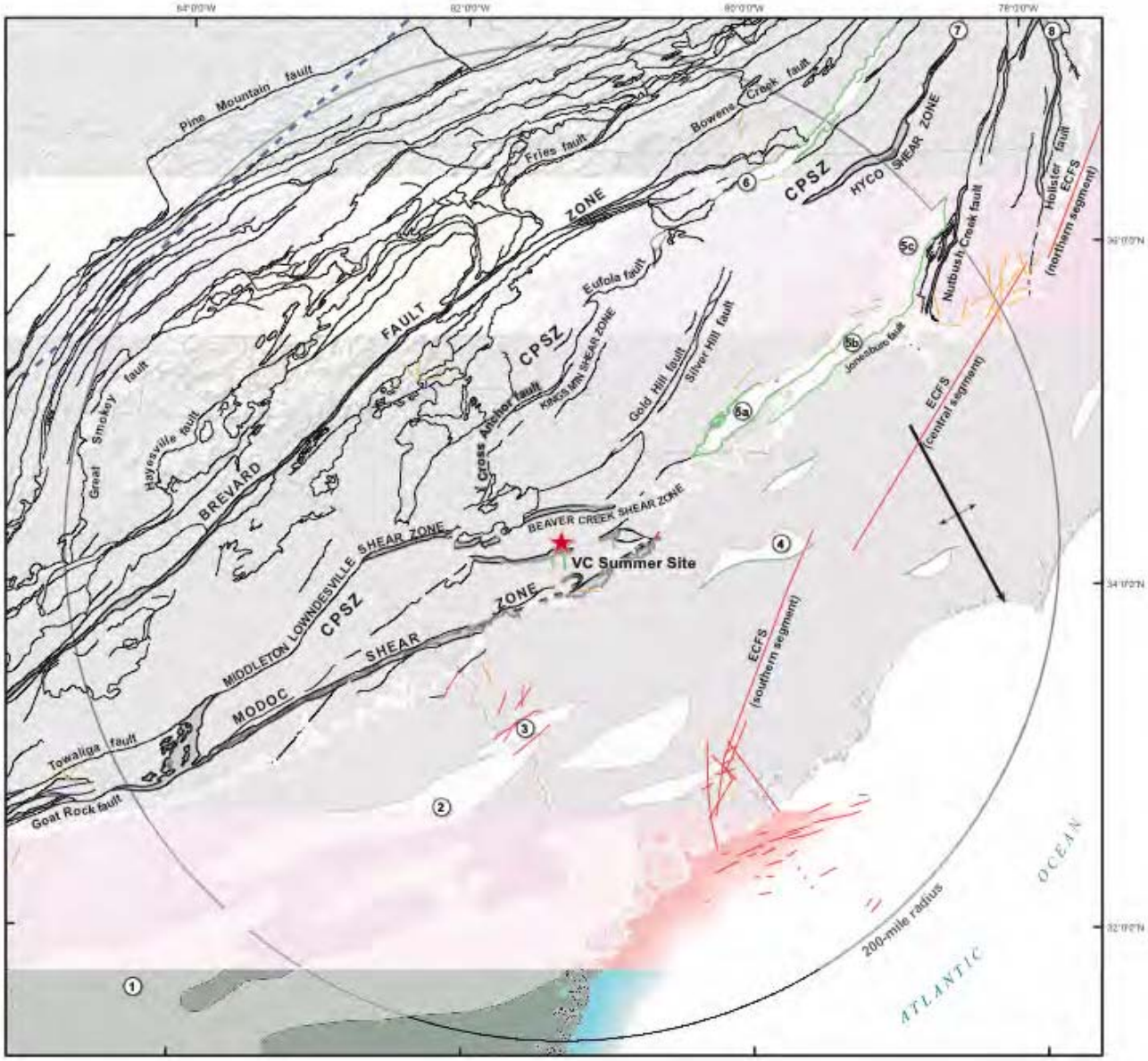


Potential Quaternary Tectonic Features

From Crone and Wheeler (2000) and Wheeler (2005)

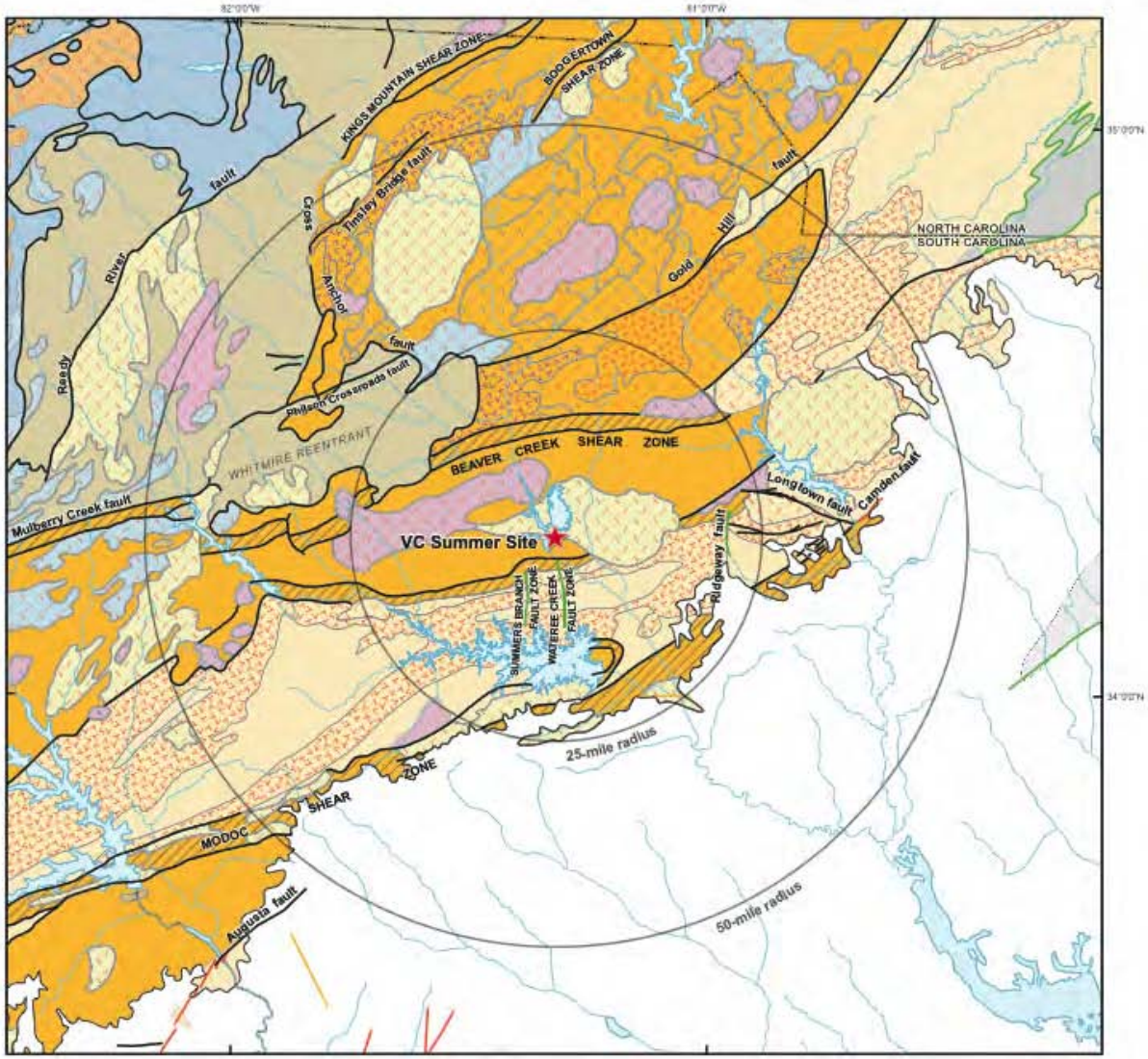


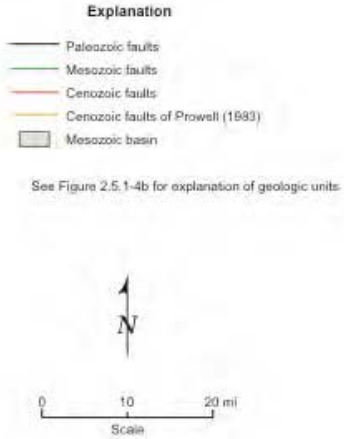
Seismicity and Seismic Zones in CEUS

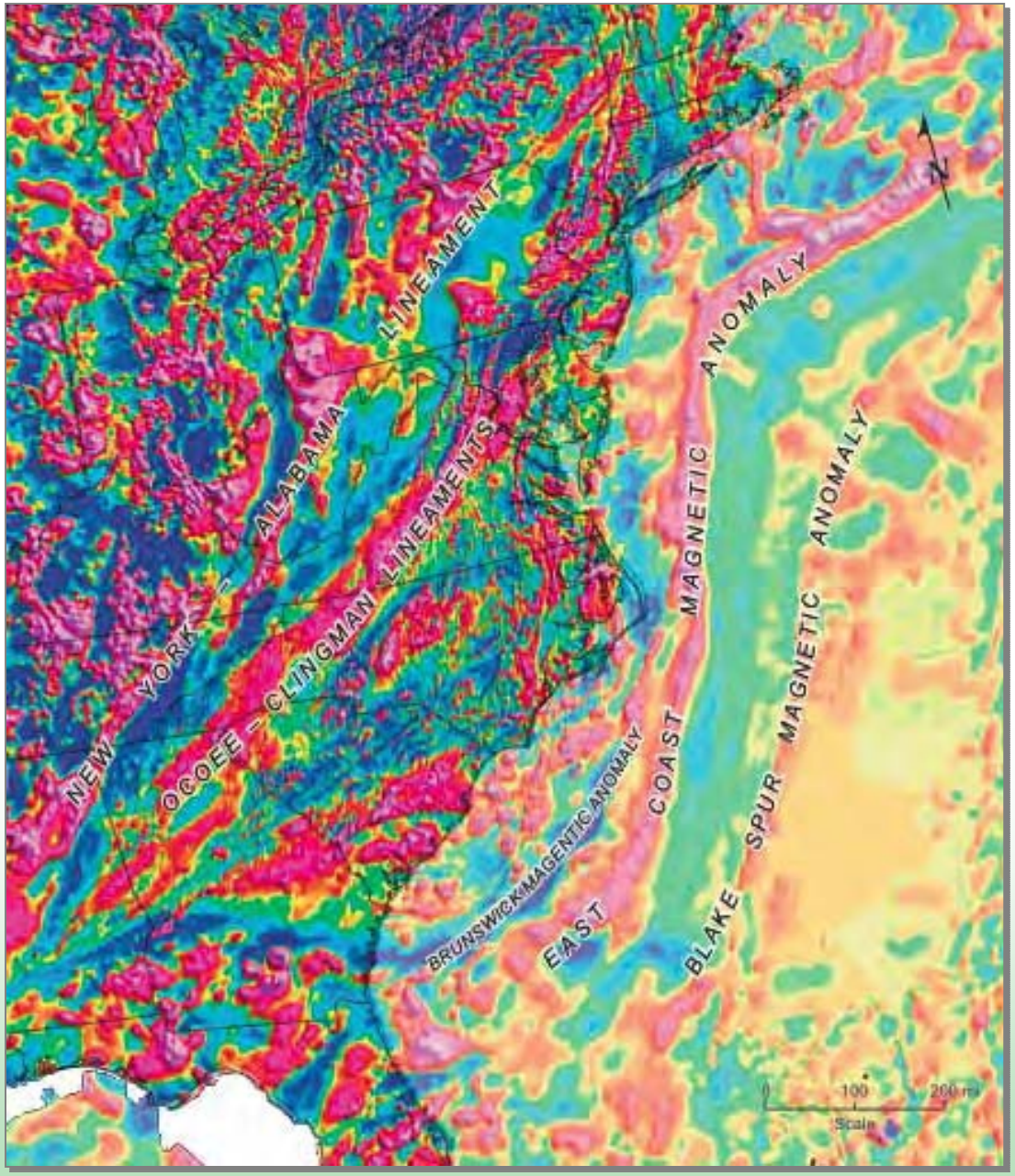


Tectonic Features - 200 mi

Tectonic Features - 50 mi

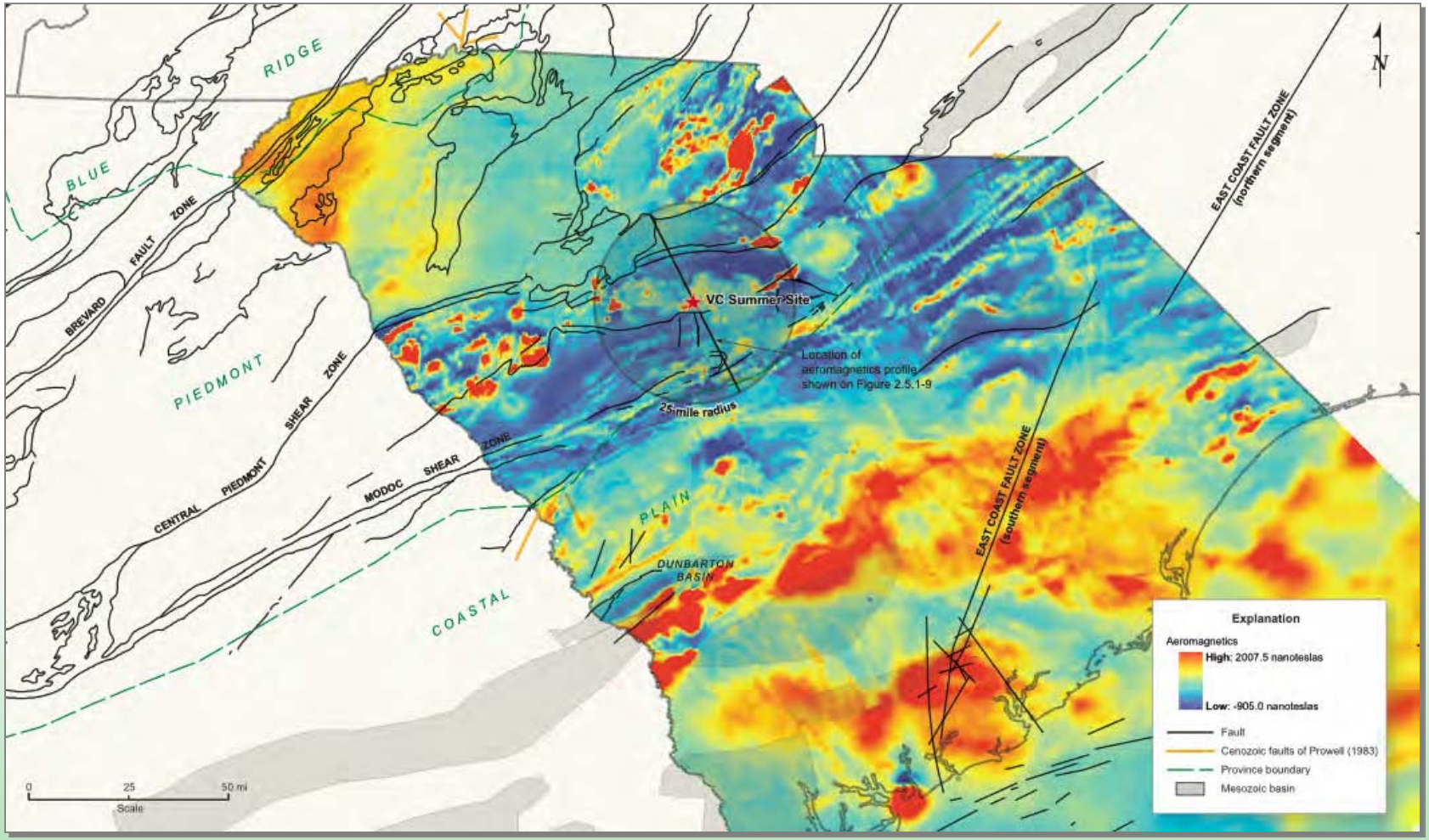




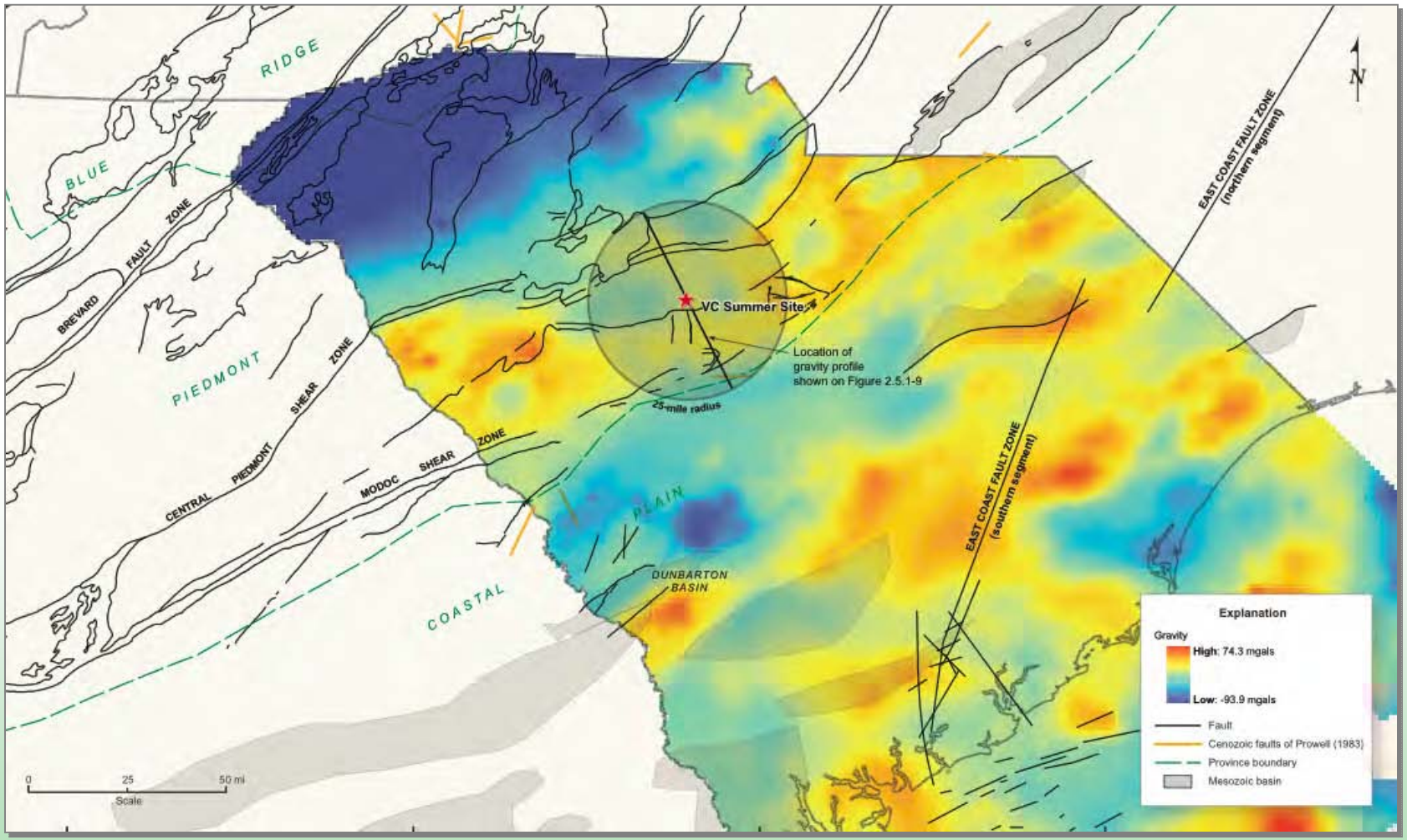


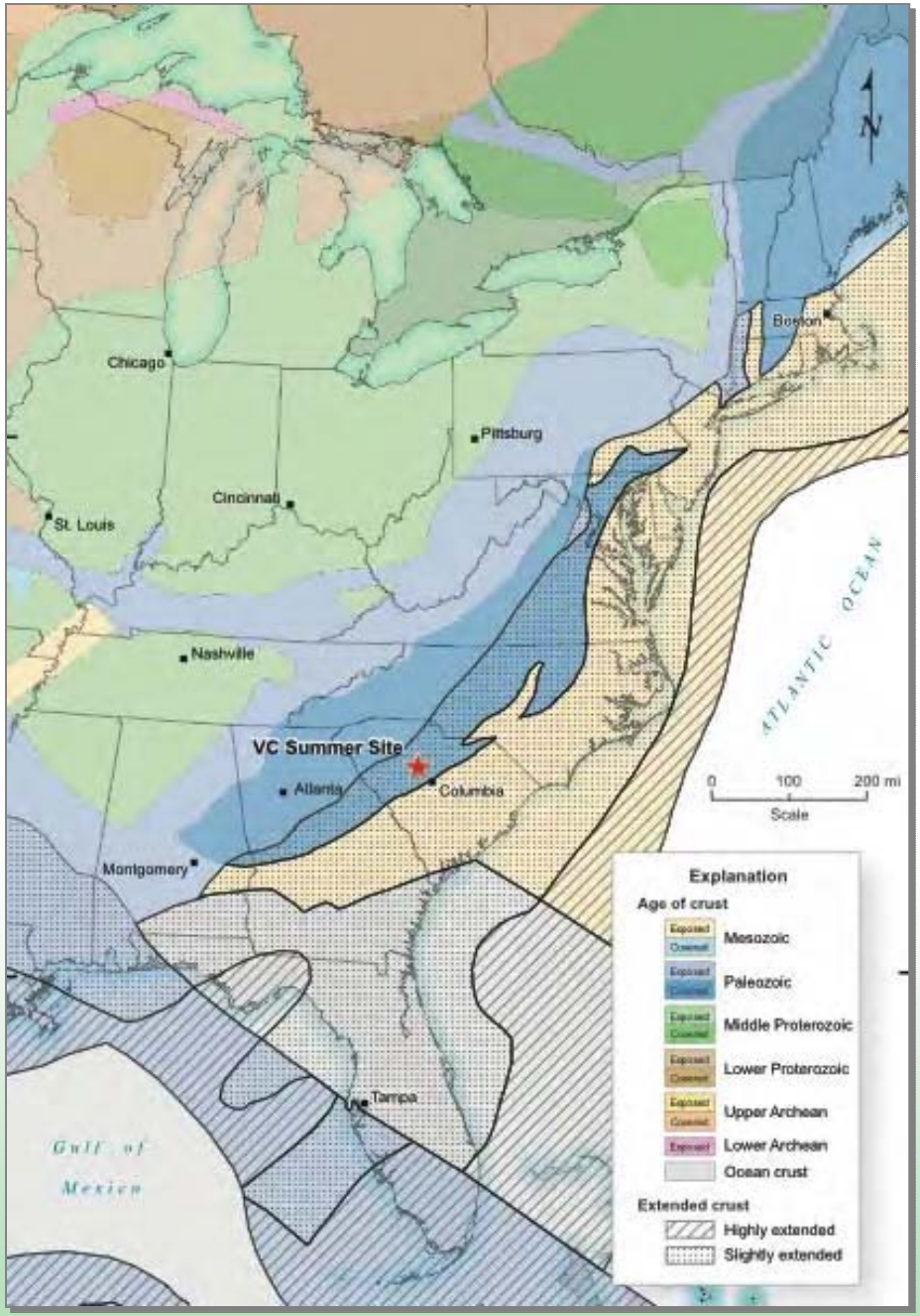
Major Eastern U.S. Aeromagnetic Anomalies

Regional Aeromagnetic Data



Regional Gravity Data





Regional Crustal Ages

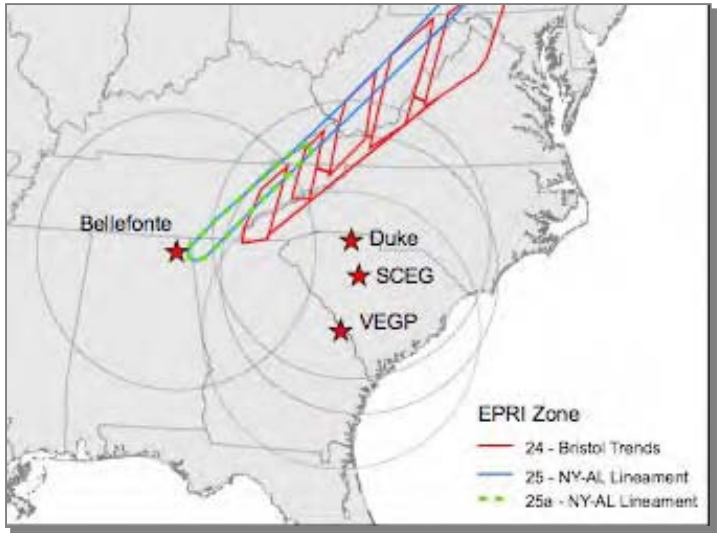
Summary of Seismic Source Models for AP1000 Sites

- **No new Capable Tectonic Sources identified within site region**
- **Use significant EPRI sources (99%)**
- **Consistent use of seismic source models**
  - Updated Charleston Seismic Source (UCSS)
    - Imbedded - Vogtle, Lee and Summer, or layered - BNS and Harris
  - Eastern Tennessee Seismic Source (no modification of EPRI all sites)
  - Updated New Madrid Seismic Source - layered BNS and Lee
- **Updates to 1989 & 2004 EPRI Studies**
    - Acceptability of using a previous NRC-Reviewed revised seismic source zone as a starting point
    - Revised EPRI Sigma

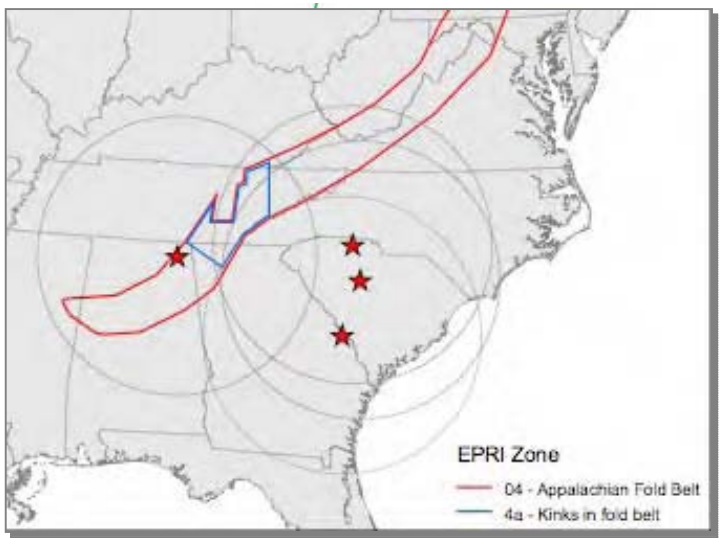
EPRI Eastern Tennessee Seismic Zone (ETSZ) Sources

- All 6 Teams included one or more sources to represent ETSZ
- Mmax range from mb 5.2 to 7.2 (= M 4.8 to 7.5)
- Recent characterizations have placed higher weights on larger magnitudes, but still within EPRI range
- No new evidence to demonstrate occurrence of large historic or prehistoric earthquakes
- Evaluations at Bellefonte, Lee, Summer and Vogtle concluded no need to update ETSZ sources

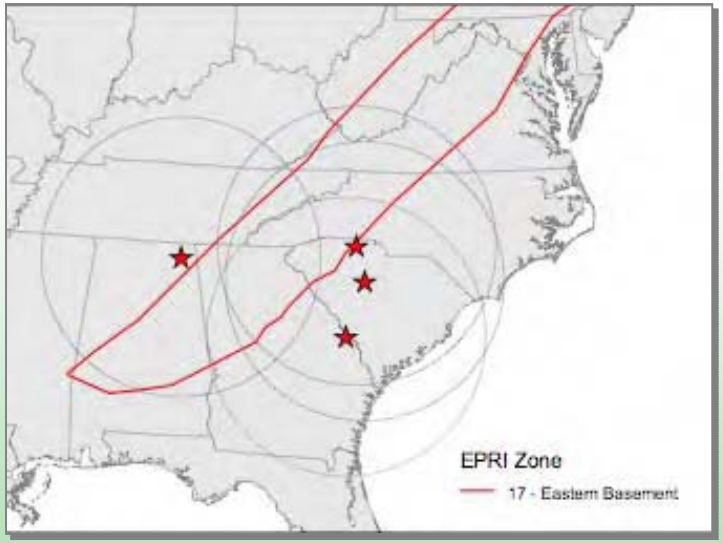
EPRI Eastern Tennessee Seismic Source Representations



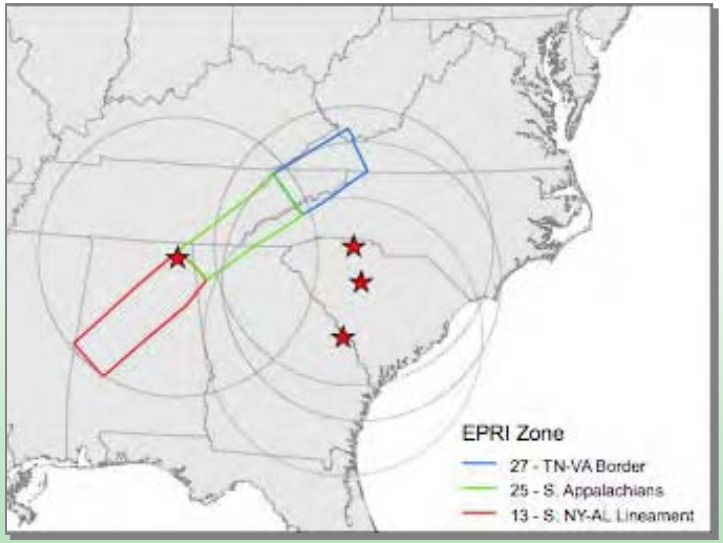
Bechtel



DAM

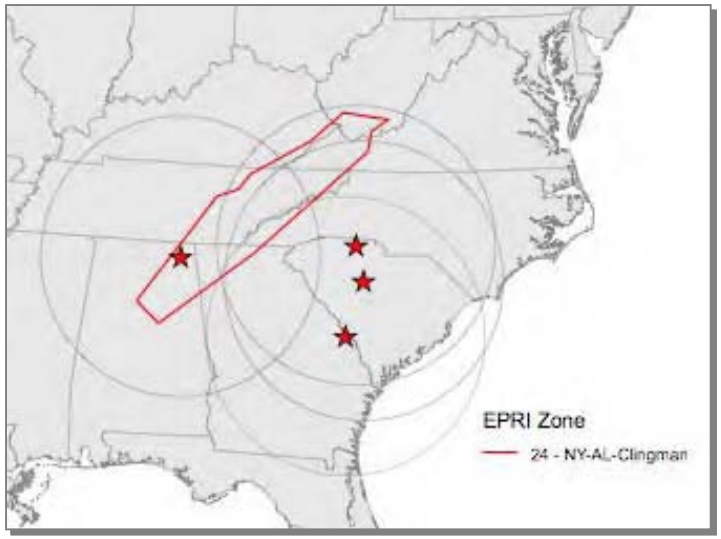


LAW

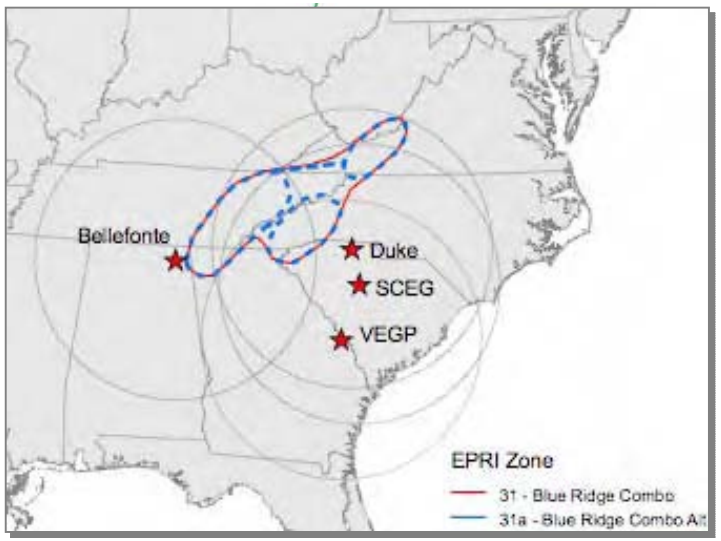


RND

EPRI Eastern Tennessee Seismic Source Representations



Wes



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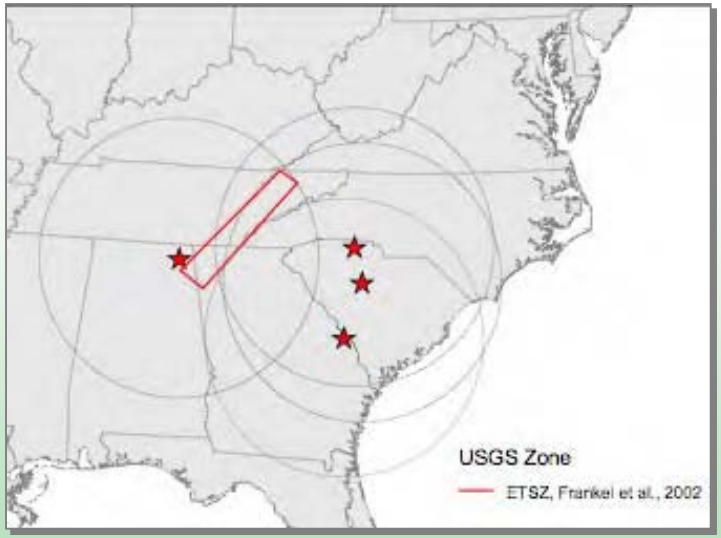
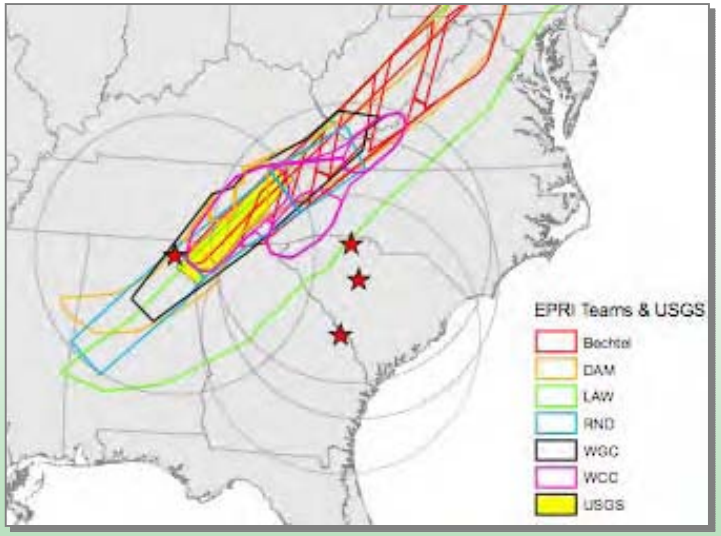
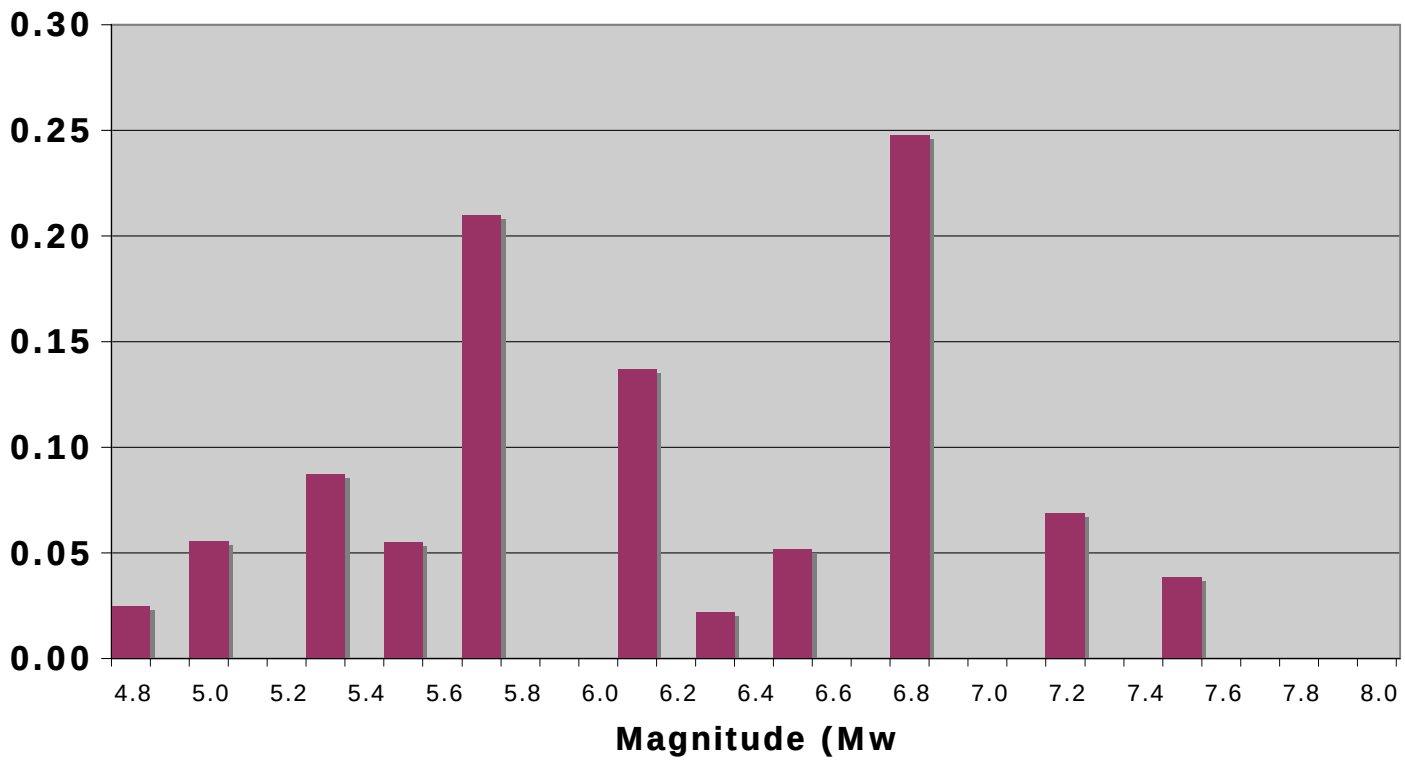


USGS



All Teams

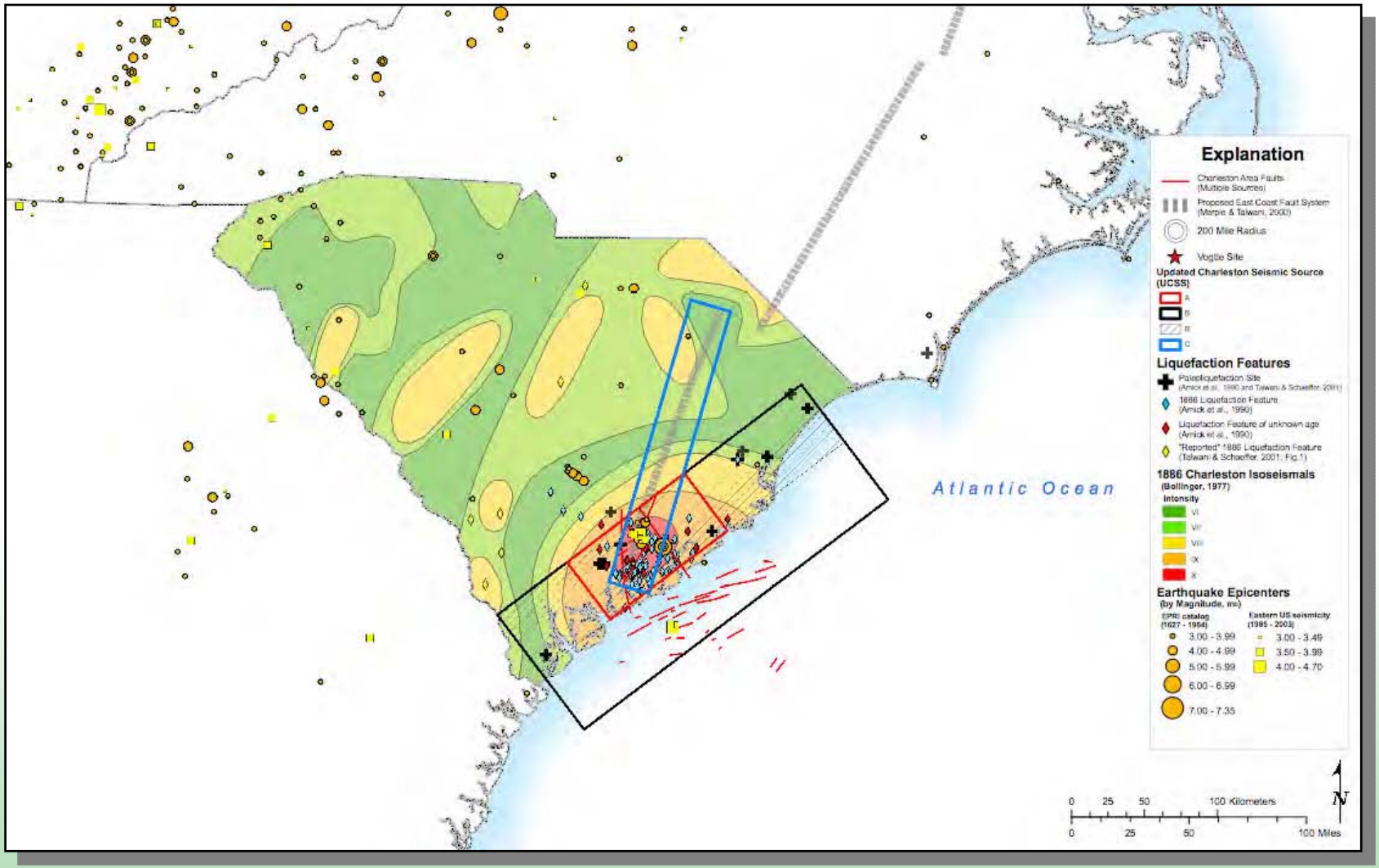
Composite Magnitude Distribution of EPRI Tennessee Zones



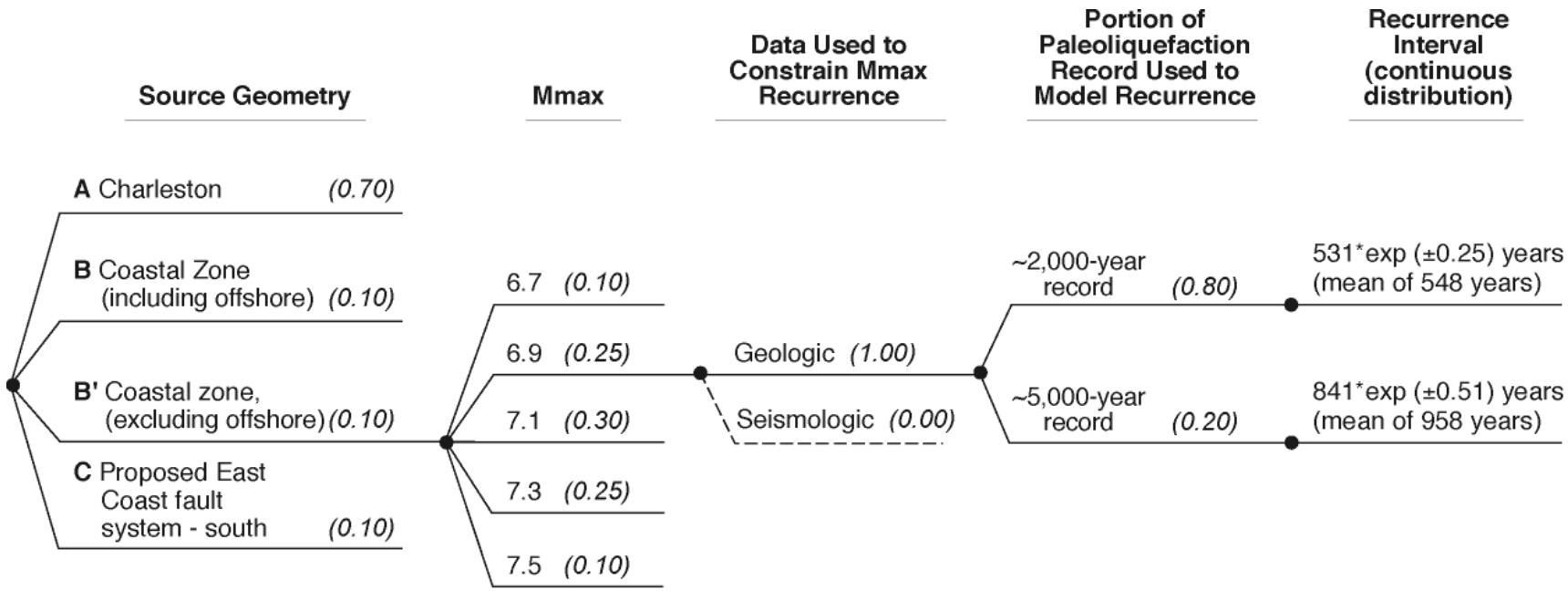
Updated Charleston Seismic Source (UCSS) Model

- Updated for Vogtle ESP to incorporate post-EPRI information
- SSHAC Level 2 process
- Replaces EPRI EST representations of the Charleston source zones in source model
  - Vogtle, Lee, Summer
- Layered UCSS or Simplified
  - Bellefonte, Harris

Updated Charleston Seismic Source (UCSS)



UCSS Logic Tree



AP1000 Site Summary (Nuclear Island)

	Bellefonte	Summer	Lee	Harris	Vogtle
Geologic Setting	**Appalachian Plateau**	**Piedmont**	**Piedmont**	**Piedmont**	**Coastal Plain**
Foundation Location	**Hard Rock (>8000 fps)**	**Hard Rock (>8000 fps)**	**Hard Rock (>8000 fps)**	**Firm Rock (>5000 fps)**	**Deep Soil (>1000 fps)**
Foundation Material Type	**Limestone**	**Granodiorite/ Quartz diorite**	**Metagranite/ metagrano-diorite**	**Triassic Siltstone/ Sandstone**	**Engineered Backfill Over Blue Bluff marl**
Thickness of Backfill	**Concrete**	**Concrete**	**Concrete**	**Concrete**	**46 ft**
Seismic Source Update	**Yes (layered CSS/NMSS)**	**Yes (UCSS)**	**Yes (UCSS,layered NMSS)**	**Yes (layered UCSS)**	**Yes (UCSS)**
Site Response	**Sensitivity**	**Sensitivity**	**Sensitivity**	**Method 2B**	**Method 2A**
CAV / Revised EPRI Sigma	**Yes/Yes**	**Yes/Yes**	**Yes/Yes**	**TBD/Yes**	**No/No**
SSE Control Point	**Foundation base/rock interface**	**Foundation base/rock interface**	**Foundation base/rock interface**	**Foundation base/rock interface**	**Blue Bluff Marl**