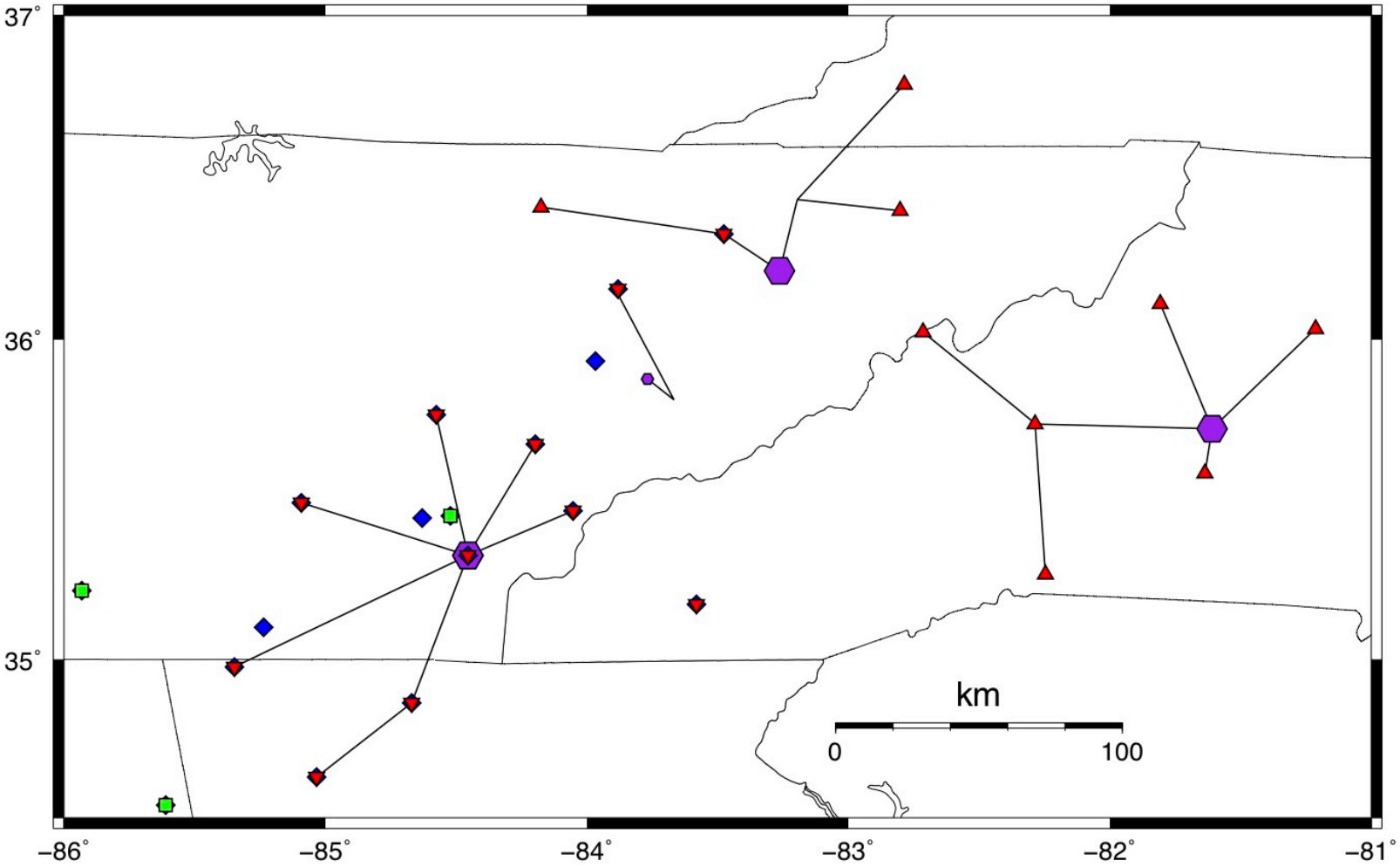
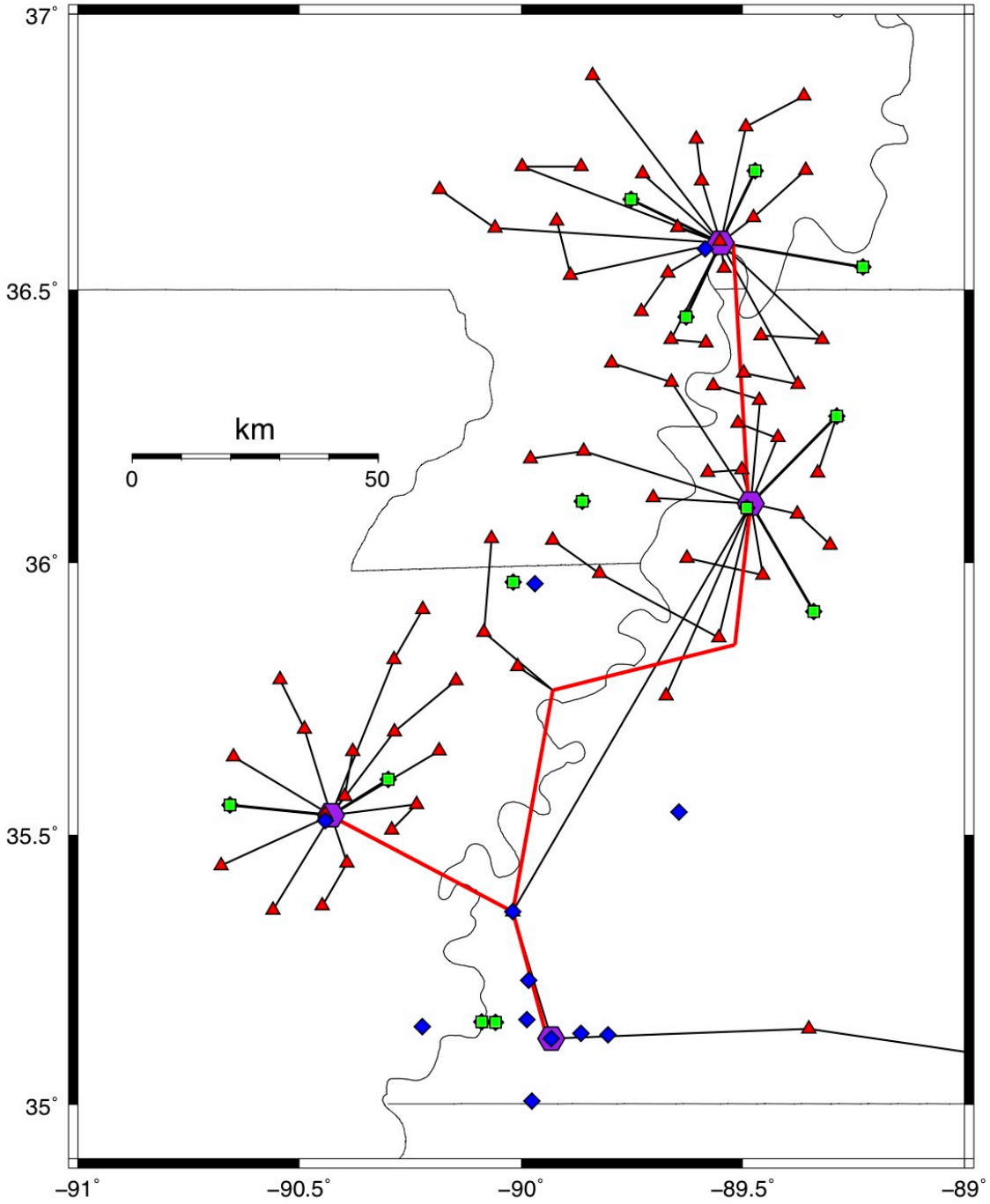


- Nine analog stations remain (red triangles, inverted red triangles are digital).
- 3-c S-13 with ISIS4 electronics in surface vault.
- AMTS digital radios and 3-c Geobit DAS in house ready for install
- Need to conduct Channel 10/13 interference study for AMTS license: about $25k.
- Other sp stations are mostly 3-c S-13 and 3-c strongmotion with 6-c Reftek to be upgraded to centaur using 2018 DM funds.



- 66 analog stations remain (red triangles) + EBZ and SFTN borehole.
- 4.5Hz 3-c Geophones with ISIS3 electronics in 10’ borehole package
- Telemetered to remote node where digitized via NI 12-bit PCI with dual 64 channel mux.
- Adsend isolated on Windows NT and linked to Linux box for external connections and other earthworm.
- Tower separation and antenna polarity are current mechanisms to avoid interference and intermod at node.
- At 90+% of the NMSZ sites, we don’t have the elevation at the station end to get above the trees in the path. We have at least 20 ft at every station but there are generally trees somewhere in the path much taller and can easily get up to 80 or more feet.

Analog to Digital Replacement for UUSS and CERI
September 26-27, 2019
Albuquerque Seismological Laboratory
Albuquerque, NM

Summary∫†The ideas, issues, concerns, and recommendations derived from this meeting are expected to be similar to other ANSS networks. Consequently, the USGS encourages all ANSS networks to prioritize analog stations upgrades by detailing site-specific technical issues (e.g. access, telemetry, required civil works, power) and, most importantly, station merit.

Action Items:

- ASL will send a pair of Etna2 strong-motion systems (configured to 0.25 and 4.0g) to CERI for testing at one of their embayment sites. ASL will use the resulting data for a side-by-side comparison with the short-period sensor. This comparison of noise levels will provide baseline information for further evaluation of SM systems as a replacement for a portion of the analog network.
- ASL will send a Etna2 or Nanometrics Titan strong-motion system to UUSS for testing at one of their sites that has seen urban encroachment and therefore increased background noise. The sensors should be configurable to less than 1g. This will provide baseline information for further evaluation of SM systems as a replacement for selected portions of the analog network-generally sites with higher noise levels.
- Harley Benz will talk to Tom Pratt to see if he knows of any dry, cased boreholes in the Mississippian Embayment that could be used for testing of posthole broadband/strong-motion systems.
- CERI will investigate whether a test posthole system can be installed at Shelby Forest station. If so, ASL will send a Nanometrics Cascadia (BB/SM) system for testing.

Action Items (cont.):

Both CERI and UUSS would like ASL to provide them with a Nanometrics Titan SM/digitizer combination for evaluation and consideration for use in their respective networks.

- UUSS will coordinate with ASL on the construction and installation of their 1st posthole (BB/SM) station in Utah. This station is slated for upgrade using 2019 deferred maintenance equipment and funding. This will provide UUSS with a better understanding of the required civil works and manpower requirements for future upgrades.
- CERI will investigate whether they can posthole a site within the soft sediment portion of the embayment for evaluation of a Nanometrics Cascadia (BB/SM) system.
- Both CERI and UUSS will evaluate their analog network to prioritize what stations might be upgraded in 2020. This is conditional on being able to test some of the SM and BB/SM systems available via the USGS contract. Also, it is important to collect side-by-side data (baseline) for the selected site(s) to model expected performance gains/losses from switching to digital systems.

Action Items (cont.):

- ASL will maintain a dialogue with both UUSS and CERI on the types of instrumentation available and work with their respective counterparts on different aspects of installation, operation, and maintenance of potential systems.
- ASL will work with both groups on modeling exercises that might provide clarity on what configuration of systems under what noise conditions work best for both the USGS, UUSS, and CERI.
- USGS will coordinate with CERI and UUSS via conference call in the January-February timeframe on updates to actions taken under this action plan.